

10-20-2014

# Request for Class 3 Permit Modification to Module IV of Hazardous Waste Permit for Sandia National Laboratories/New Mexico, EPA ID Number NM5890110518

U.S. Department of Energy

Follow this and additional works at: [https://digitalrepository.unm.edu/snl\\_swmu76](https://digitalrepository.unm.edu/snl_swmu76)

---

## Recommended Citation

U.S. Department of Energy. "Request for Class 3 Permit Modification to Module IV of Hazardous Waste Permit for Sandia National Laboratories/New Mexico, EPA ID Number NM5890110518." (2014). [https://digitalrepository.unm.edu/snl\\_swmu76/4](https://digitalrepository.unm.edu/snl_swmu76/4)

This Article is brought to you for free and open access by the Sandia National Labs/NM Technical Reports at UNM Digital Repository. It has been accepted for inclusion in SWMU 76 - Mixed Waste Landfill - Corrective Action by an authorized administrator of UNM Digital Repository. For more information, please contact [disc@unm.edu](mailto:disc@unm.edu).



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



OCT 17 2014

Mr. John E. Kieling  
Chief  
New Mexico Environment Department  
Hazardous Waste Bureau  
2905 Rodeo Park Dr. East, Bldg. 1  
Santa Fe, NM 87505

Subject: Request for Class 3 Modification to Module IV of Hazardous Waste Permit for Sandia National Laboratories/New Mexico, EPA ID NM5890110518

Dear Mr. Kieling:

The Department of Energy (DOE) and Sandia Corporation (Sandia) are requesting a Class 3 modification to Hazardous Waste Permit NM5890110518-1 (Permit) for Sandia National Laboratories/New Mexico (SNL/NM). Following receipt of the certificate of completion for Solid Waste Management Unit (SWMU) 76, Mixed Waste Landfill and, therefore in accordance with the SNL/NM *Compliance Order on Consent (COOC)*, Section III.W.3.b, DOE and Sandia are requesting a Class 3 Permit Modification for Corrective Action Complete from the New Mexico Environment Department (NMED).

This is a Class 3 permit modification in accordance with *Title 20, Chapter 4, Part 1, Subpart IX* of the *New Mexico Administrative Code (20.4.1.900 NMAC)* incorporating *Title 40 of the Code of Federal Regulations Part 270 Section 42(c)*. Approval of this request would result in changes only to Module IV of the Permit. There are no requested changes to Modules I, II, or III of the Permit as a result of this modification, and there are no changes to the information required by 20.4.1.900 NMAC incorporating 40 CFR 270.13 through 270.22, 270.62, 270.63, or 270.66.

DOE and Sandia have implemented corrective measures in accordance with the requirements of Module IV, Section V of the Permit; the April 2004 COOC between NMED, DOE, and Sandia; and, the plans approved by NMED. On January 8, 2014, NMED approved the Long-Term Monitoring and Maintenance Plan (LTMMP) developed by DOE and Sandia. DOE and Sandia implemented the LTMMP upon NMED approval. The controls established through implementation of the corrective measures will be maintained through the LTMMP.

#### Permit Revisions

DOE and Sandia request that NMED make the following revisions to Module IV of the Permit:

- Delete SWMU 76, Mixed Waste Landfill from Table A.1 "List of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) Requiring Corrective Action".

- Add SWMU 76, Mixed Waste Landfill to Table A.2 “List of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) not Currently Requiring Corrective Action.”
- Specify that the controls established in the LTMMMP as approved by NMED be required for SWMU 76, Mixed Waste Landfill.

Upon issuance of the renewal to the *Resource Conservation and Recovery Act (RCRA) Facility Operating Permit* (renewal Permit) currently in process, DOE and Sandia also request a corresponding Class 3 modification. Specifically, DOE and Sandia request that NMED make the following revisions to the renewal Permit:

- Delete SWMU 76, Mixed Waste Landfill from Table K-1 “Solid Waste Management Units and Areas of Concern Requiring Corrective Action under the Consent Order”.
- Add SWMU 76, Mixed Waste Landfill to Table K-3 “Solid Waste Management Units, Areas of Concern, and Hazardous Waste Management Units for which Corrective Action is Complete with Controls.”
- Incorporate the SWMU 76, Mixed Waste Landfill LTMMMP into the upcoming Permit as Permit Attachment N.

The SWMU 76, Mixed Waste Landfill history and corrective measures are summarized in Enclosure 1. The general history and corrective measures are as follows:

- On January 23, 2004, DOE and Sandia requested a Class 3 modification to Module IV for corrective measures (remedy) selection. NMED held a public hearing in December 2004 regarding remedy selection. During the hearing, the entire history and record regarding operations and subsequent corrective measures were considered. The NMED decision is documented in Final Order HWB 04-11(M), dated May 26, 2005. On August 2, 2005, NMED issued a Class 3 modification adding Section V to Module IV of the Permit. Section V specifies that DOE and Sandia will prepare and implement a Corrective Measures Implementation (CMI) Plan, prepare a CMI Report, and prepare a LTMMMP.
- On April 29, 2004, NMED, DOE, and Sandia entered into the COOC, which specifies the corrective action requirements at SNL/NM.
- DOE and Sandia submitted a CMI Plan to NMED on November 3, 2005, and modified it in response to NMED comments; NMED solicited public input and subsequently approved the CMI Plan on December 22, 2008.
- Implementation of corrective measures included preparation of the subgrade and construction of an Evapotranspirative (ET) cover during 2009; DOE and Sandia documented implementation in a CMI report submitted to NMED on January 26, 2010. NMED solicited public input, requested revisions to the report, and subsequently approved the revised CMI report on October 14, 2011.



- At NMED's request, DOE and Sandia withdrew a LTMMP submitted in 2007, and submitted a revised LTMMP on March 23, 2012. NMED solicited public input and subsequently approved the LTMMP on January 8, 2014. DOE and Sandia implemented the LTMMP upon NMED approval.

Enclosure 2 contains a list of supporting documents for this permit modification. These documents have been compiled in the SWMU 76 Justification Binder (eight-volume set) that was delivered to the NMED Hazardous Waste Bureau office in Santa Fe (one hard copy and one electronic copy), the NMED District 1 office in Albuquerque (one electronic copy), and the Government Documents Section at Zimmerman Library on the University of New Mexico (UNM) main campus in Albuquerque (3 hard copies) on October 14, 2014. The notice, permit modification request, and supporting documents are also available online in the SNL/NM documents in the UNM Hosted Collections at <http://repository.unm.edu/handle/1928/10507>.

DOE and Sandia will mail a notice about the permit modification request to all persons on the SNL/NM mailing list maintained by NMED. The notice will also be published in the Albuquerque Journal. The notice will be mailed and published within seven days of the date of this request and will include an announcement of the availability of this request and the supporting documents. The notice will contain all information required by 20.4.1.900 NMAC, incorporating 40 CFR 270.42(c) (2).

As required by 20.4.1.900 NMAC, incorporating 40 CFR 270.42(c)(3)-(5), DOE and Sandia will:

- Make copies of the request and supporting documents available as described above;
- Host a public meeting in Albuquerque within the allotted timeframe; and
- Provide a 60-day comment period for public input.

DOE and Sandia are available to provide additional information as needed. Should you have any questions regarding this submittal, please contact me at (505) 845-6036 or John Weckerle of my staff at (505) 845-6026.

Sincerely,



Geoffrey L. Beausoleil  
Manager

## **2 Enclosures**

1. History of Solid Waste Management Unit 76, Mixed Waste Landfill
2. Document Index: May 2005-October 2014, Justification for Class 3 Permit Modification

cc: See Page 4  
cc w/ enclosures:

William Moats  
Hazardous Waste Bureau  
New Mexico Environment Department  
5500 San Antonio Dr. NE  
Albuquerque, NM 87109

David Cobrain  
Hazardous Waste Bureau  
New Mexico Environment Department  
2905 Rodeo Park Dr. E., Building 1  
Santa Fe, NM 87505

Thomas Skibitski  
Chief, DOE Oversight Bureau  
New Mexico Environment Department  
P.O. Box 5400, MS-1396  
Albuquerque, NM 87185-5400

Laurie King  
U.S. Environmental Protection Agency, Region 6  
Federal Facilities Section (6PD-F)  
1445 Ross Ave, Suite 1200  
Dallas, TX 75202-2733

SNL Customer Funded Records Center, MS-0651  
SFO Legal File  
SFO Waste Management File

cc w/o enclosures:

Amy Blumberg, SNL/NM, MS-0141  
Peter Davies, SNL/NM, MS-0721  
David Miller, SNL/NM, MS-0718  
Pam Puissant, SNL/NM, MS-1103  
John Cochran, SNL/NM, MS-0719  
Anita Reiser, SNL/NM, MS-0729  
Michael Mitchell, SNL/NM, MS-0718  
James Todd, SFO/ENG  
Cynthia Wimberly, SFO/Legal  
John Weckerle, SFO/ENG  
David Rast, SFO/ENG  
15-011-597082

**Request for Class 3 Modification  
Module IV, Permit NM5890110518-1  
Solid Waste Management Unit 76**

**CERTIFICATION STATEMENT**

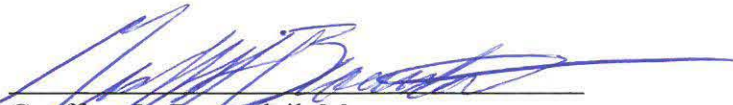
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, 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.



Peter B. Davies, Director  
Nuclear Energy and Fuel Cycle Programs  
Sandia Corporation  
Albuquerque, New Mexico  
Operator

9/25/14

Date signed



Geoffrey L. Beausoleil, Manager  
U.S. Department of Energy  
National Nuclear Security Administration  
Sandia Field Office  
Owner

17 OCT 2014

Date signed

**Enclosure 1**

**History**

**Solid Waste Management Unit 76  
Mixed Waste Landfill**

**Sandia National Laboratories  
NM5890110518**

# **History**

## **Solid Waste Management Unit 76**

### **Mixed Waste Landfill**

#### **Sandia National Laboratories**

## **Contents**

Contents .....	1
Introduction.....	1
Background.....	2
Class 3 Permit Modification for Corrective Measures for the Mixed Waste Landfill.....	3
Corrective Measures Implementation Plan.....	4
Corrective Measures Implementation.....	6
Corrective Measures Implementation Report .....	6
Long-Term Monitoring and Maintenance Plan .....	7
Groundwater Documents .....	8

## **Introduction**

This enclosure presents history of the Mixed Waste Landfill (MWL) in support of the U.S. Department of Energy (DOE) and Sandia Corporation (Sandia) Class 3 Permit Modification Request for Corrective Action Complete with Controls. The primary focus in the historical information is the time period from August 2005 (when the previous Class 3 Permit Modification Request for Corrective Action/Final Remedy Selection was completed and approved by NMED) to the present, October 2014. The organization of this enclosure is consistent with the organization of the corresponding MWL Index provided in Enclosure 2 of this Class 3 Permit Modification Request. The eight-volume MWL Justification Binder containing the corresponding administrative record addressed by this Class 3 Permit Modification Request is similarly organized (Justification Binder No. is provided in the right-hand column of the Enclosure 2 MWL Index).

The MWL is designated as Solid Waste Management Unit (SWMU) 76 and is subject to corrective action under 20.4.1.600 New Mexico Administrative Code (NMAC) incorporating Chapter 40 Code of Federal Regulations (CFR) Part 264.101. The New Mexico Environment Department (NMED) Hazardous Waste Bureau is the lead regulatory agency and oversees corrective action at the MWL under the following:

- Corrective action provisions of the Compliance Order on Consent (COOC) issued in April 2004 pursuant to the New Mexico Hazardous Waste Act,
- Module IV of the SNL/NM Resource Conservation and Recovery Act (RCRA) Permit No. NM5890110518 (the Permit) issued by the U.S. Environmental Protection Agency (EPA) in August 1993, as revised and updated by the NMED on August 2, 2005 for the Class 3 Permit Modification for Corrective Measures for the MWL, and
- NMED Final Order In the Matter of Request for a Class 3 Permit Modification for Corrective Measures for the Mixed Waste Landfill No. HWB 04-11(M) (Final Order) dated May 26, 2005.



## Background

The MWL is 2.6-acre site in the north-central portion of Technical Area III (TA-III) at Sandia National Laboratories, New Mexico (SNL/NM), which is within the boundaries of the federally-owned Kirtland Air Force Base immediately southeast of the City of Albuquerque in Bernalillo County, New Mexico. The MWL is located 4 miles south of SNL/NM central facilities and 5 miles southeast of Albuquerque International Sunport.

The MWL consists of two distinct disposal areas: the classified area (occupying 0.6 acres) and the unclassified area (occupying 2.0 acres). Approximately 100,000 cubic feet of low-level radioactive and mixed waste containing approximately 6,300 curies (at the time of disposal) of radioactivity were disposed of in the MWL from March 1959 through December 1988. Classified wastes were buried in cylindrical pits in the classified area and unclassified wastes were buried in shallow trenches in the unclassified area.

Wastes in the classified area were disposed of in a series of vertical, cylindrical pits. Historical records indicate that early pits were 3 to 5 feet in diameter and 15 feet deep. Later pits were 10 feet in diameter and 25 feet deep. Once pits were filled with waste, they were backfilled with soil and capped with concrete. Wastes in the unclassified area were disposed of in a series of parallel, north-south excavated trenches. Records indicate that trenches were 15 to 25 feet wide, 150 to 180 feet long, and 15 to 20 feet deep. Trenches were reportedly backfilled with soil on a quarterly basis and, once filled with waste, were capped with originally excavated soils which had been stockpiled locally.

Wastes disposed of in classified area pits included depleted, natural, and enriched uranium; thorium; barium; enriched lithium; liquid scintillation vials and beakers; neutron generator tubes and targets; plutonium-contaminated wastes; and plutonium-contaminated weapons test-debris from the Nevada Test Site. The cumulative plutonium mass disposed of in the MWL is very small, estimated to be less than 1 gram. Wastes disposed of in unclassified area trenches included construction and demolition materials, contaminated equipment and soils, lead shielding, wood crates, steel drums, shipping casks, cardboard boxes, and dry solids. Free liquids were not disposed of at the MWL, with one exception (the 1967 disposal of 204,000 gallons of reactor coolant water in the unclassified area, Trench D). Small quantities of liquid waste, typically less than five gallons, were solidified with commercially available materials prior to containerization and disposal at the MWL.

An initial Phase 1 RCRA Facility Investigation (RFI) was conducted in 1989 and 1990 to determine whether a release of RCRA contaminants had occurred at the MWL. The Phase 1 RFI indicated that tritium had been released to the environment. An extensive Phase 2 RFI was conducted from 1992 to 1995 to determine the contaminant source, define the nature and extent of contamination, identify potential contaminant transport pathways, evaluate potential risks, and provide remedial action alternatives for the MWL. The Phase 2 RFI investigation included radiological surveys; air monitoring; soil sampling for background metals and radionuclides; surface geophysical surveys; active and passive soil gas surveys; surface soil sampling for organic compounds, metals, and tritium; borehole sampling for organic compounds, metals, and radionuclides; vadose zone tests; aquifer tests; and risk assessment.

Tritium was confirmed as the primary constituent of concern in soil at the MWL, and the site-specific background level of 0.06 picocuries per gram (pCi/g) was determined. The nature and extent of tritium was defined in surface and near-surface soil across the site. Tritium levels have ranged from 1,100 (pCi/g) in surface soil to 206 pCi/g in subsurface soil. The highest tritium levels have been found within 30 feet below ground surface (bgs) in soil adjacent to and directly below classified area disposal pits. At depths greater than 30 feet bgs, tritium levels decrease rapidly. At approximately 100 feet bgs, the highest tritium

level detected has been 0.074 pCi/g, and at 120 to 140 feet bgs, maximum tritium levels were 0.029 pCi/g (i.e., below background concentration).

During the Phase 2 RFI a detailed inventory investigation was completed that addressed data gaps identified in the Phase 2 RFI Work Plan. Records that were previously reported as lost or destroyed were found in storage and reviewed, and interviews with former and current SNL/NM workers were conducted that helped clarify and document disposal practices. The complete unclassified waste inventory (i.e., no gaps in the waste disposal records) documenting the contents of the MWL by disposal pit and trench is documented in Attachment 2-1 of SNL/NM "Responses to NMED Technical Comments on the Report of the Mixed Waste Landfill Phase 2 RCRA Facility Investigation, Dated September 1996, Volume 1" (two volume set of comment responses including supporting documentation). NMED issued additional technical comments on the Phase 2 RFI Report on October 10, 1998 that were addressed in January 1999. NMED approved the revised Phase 2 RFI Report in 2002, which was published in its final technical format in September 2002. The detailed unclassified waste inventory is provided as Appendix A of this report.

Based upon the Phase 2 RFI risk assessment, the MWL will not significantly affect human health or the environment under an industrial land-use scenario. Tritium activities at the MWL will decrease steadily with time due to its relatively short half-life of 12.3 years. The risk to human health and the environment due to natural radiological sources is much greater than risk posed by the MWL under an industrial land-use scenario.

### **Class 3 Permit Modification for Corrective Measures for the Mixed Waste Landfill**

On October 11, 2001, NMED directed DOE and Sandia to conduct a Corrective Measures Study (CMS) for the MWL. The MWL CMS Report was submitted to NMED on May 21, 2003 and recommended that an alternative vegetative soil cover (i.e., evapotranspirative [ET] cover) coupled with institutional controls (i.e., land-use restrictions, monitoring, inspections, and maintenance/repairs) be selected as the preferred corrective measure for the MWL. After reviewing the December 19, 2003 DOE and Sandia responses to the NOD that was issued on November 5, 2003, NMED deemed the MWL CMS Report complete on January 5, 2005. On January 23, 2004, DOE and Sandia submitted a Class 3 Permit modification petition for the SNL/NM RCRA Permit (the Permit), requesting that NMED select a final remedy for the MWL. As part of this Class 3 modification request, DOE and Sandia conducted a 60-day public comment period from January 30 to March 30, 2004 and held a public meeting on the CMS Report on February 26, 2004. Following completion of the public comment period, NMED issued a public notice and conducted a public comment period on the CMS from August 11 to December 9, 2004. NMED held a public hearing on December 2 to December 3 and December 8 to December 9, 2004. During the hearing, the entire history and record regarding operations, the Phase 1 and 2 RFI results, and 14 years of groundwater monitoring at the MWL was considered.

Based on the administrative record and the Hearing Officer's Report, the NMED Secretary approved a final permit and selected a final remedy for the MWL on May 26, 2005 that was different than the final remedy proposed by DOE and Sandia in the CMS Report. The NMED Secretary selected a vegetative soil cover with bio-intrusion barrier as the final remedy. In addition to selection of the final remedy, the NMED final permit decision required a CMI Plan, including a comprehensive fate and transport model and monitoring triggers for future long-term monitoring; a CMI Report; a Long-Term Monitoring and Maintenance Plan (LTMMP) to specify institutional controls; a report every five years reevaluating the feasibility of excavation and analyzing the effectiveness of the final remedy; and a public participation

process. The NMED final remedy decision is documented in the Final Order No. HWB 04-11(M) signed by the NMED Secretary and dated May 26, 2005.

On August 2, 2005, NMED issued a Class 3 modification adding Section V to Module IV of the Permit. Section V incorporates Final Order requirements into the Permit. These requirements have been completed, and are described in the following sections.

A detailed index of documents beginning with the Final Order is provided as Enclosure 2 of this Class 3 Permit Modification Request. All documents and correspondence referenced below are presented in Enclosure 2 in chronological order, organized by the regulatory subject matter headings. Groundwater documents for this time period are provided after the Corrective Measure Implementation (CMI) Plan, CMI, CMI Report, and LTMMP.

## **Corrective Measures Implementation Plan**

The CMI Plan was submitted to NMED on November 3, 2005; it included a construction plan and cover performance modeling results for the ET cover with a biointrusion barrier, and a fate and transport model with recommended monitoring triggers. NMED conducted a 60-day public comment period on the CMI Plan from December 9, 2005 through February 7, 2006; held a public meeting on May 25, 2006; conducted an additional 14-day public comment period from May 25 to June 8, 2006; and issued responses to CMI Plan public comments on November 21, 2006.

During the MWL CMI Plan public comment period, the NMED received comments expressing concerns that the groundwater samples from the existing MWL monitoring wells had not yielded representative groundwater data due to the effects of residual drilling mud and organic additives (i.e., wells drilled and installed using the mud rotary drilling technique). Commenters asserted that residual organic additives may have removed (adsorbed) contaminants from the groundwater and also reduced the local aquifer permeability in the vicinity of the monitoring wells. Additionally, commenters maintained that residual organic additives may have caused localized reducing conditions around a well bore, affecting the groundwater sample results. They maintained that all of these circumstances exist at the MWL. Given the seriousness of these concerns, the NMED conducted a detailed study that was referenced in the November 21, 2006 public comment responses and was made available on the NMED website at <http://www.nmenv.state.nm.us/HWB/snlperm.html#M>.

The NMED report, "Evaluation of the Representativeness and Reliability of Groundwater Monitoring Well Data, Mixed Waste Landfill," addressed groundwater monitoring results from the groundwater monitoring network that included monitoring wells MWL-BW1, MWL-MW2, and MWL-MW3 (drilled with mud rotary technique); MWL-MW1, MWL-MW5, and MWL-MW6 (drilled with air rotary technique, no drilling mud or organic additives used); and MWL-MW4 (drilled with sonic technique, no drilling mud or organic additives used). The 90-page report evaluated the representativeness and reliability of the MWL groundwater monitoring data based on 16 years of groundwater monitoring results and numerous groundwater studies. The report included the following conclusions from the study:

- The MWL groundwater monitoring well network provides data that are reliable and representative of the hydrochemistry of the aquifer beneath the MWL.

- There are no bentonite drilling mud components that adversely affect sample chemistry in groundwater samples from the mud rotary wells (MWL-BW1, MWL-MW2, and MWL-MW3), and there is no evidence of adsorption of groundwater contaminants or evidence of reducing conditions.
- The totality of evidence indicates that the three monitoring wells that were installed with mud rotary method (MWL-BW1, MWL-MW2, and MWL-MW3), and air rotary well MW5 have yielded reliable and representative hydrochemical data.

NMED issued a Notice of Deficiency (NOD) on the CMI Plan to DOE and Sandia on November 20, 2006 with two sets of comments. Part 1 comments were related the construction plans and cover performance modeling, and Part 2 comments were related to the fate and transport model and monitoring triggers. The NOD also included a requirement for a Soil-Vapor Sampling and Analysis Plan for analysis of samples for volatile organic compounds (VOCs), tritium, and radon at a minimum of three locations (at depths of 10 and 30 feet) within the MWL where previous Phase 2 RFI sampling had detected the highest soil-gas concentrations in the past. DOE and Sandia responded to Part 1 comments and provided a Soil-Vapor Sampling and Analysis Plan on December 21, 2006, and responded to Part 2 comments on January 19, 2007.

As part of the January 19, 2007 NOD Response, DOE and Sandia submitted a revised fate and transport modeling report that had originally been provided as Appendix E in the CMI Plan; revisions were incorporated to address the November 20, 2006 NMED NOD Part 2 comments. This probabilistic performance assessment was required by the Final Order and was conducted to evaluate the fate and transport of radionuclides, heavy metals, and VOCs based on the final disposal inventory and Phase 2 RFI results. Probabilistic analyses were performed to quantify uncertainties for a 1,000-year period, and sensitivity analyses were performed to identify parameters and processes that were most important to the simulated performance goals. Comparisons between simulated results and measured values at the MWL were made to gain confidence in the models and perform calibrations when data were available. In addition, long-term monitoring requirements and triggers were recommended based on the results of the quantified uncertainty and sensitivity analyses. As required by the Final Order, the results of this modeling effort formed the initial basis for proposed monitoring and associated trigger levels that were later finalized in the LTMMP.

Following review of the Part 1 and Part 2 responses, NMED issued a second NOD on the CMI Plan on October 10, 2008 that primarily focused on Part 2 responses and LTMMP monitoring and trigger level issues. DOE and Sandia provided comment responses on November 26, 2008 and NMED conditionally approved the CMI Plan on December 22, 2008. The approval contained 10 conditions, approval to perform supplemental watering as a means to help establish a mature native plant community on the ET cover, and clarification that radon and tritium are to be monitored in the groundwater and at the surface of the MWL in accordance with methods to be documented in the LTMMP. DOE and Sandia provided replacement pages revising the CMI Plan in accordance with the NMED conditions of approval on February 12, 2009.

### ***Corrective Measures Implementation Plan – Soil-Vapor Investigation***

After receiving the Soil-Vapor Sampling and Analysis Plan in December 2006, NMED conducted a 30-day public comment period from February 5, 2007 to March 7, 2007; held a public dialogue (i.e., meeting) on May 1, 2007; and issued a notice of approval with responses to public comments on February 14, 2008. NMED approved the Soil-Vapor Sampling and Analysis Plan with modifications on February 15, 2008. On July 25, 2008, in response to a July 10 request from DOE and Sandia, NMED approved a one month extension for the submittal of the Soil-Vapor Investigation Report. DOE and Sandia

submitted the Soil-Vapor Investigation Report to NMED on August 26, 2008. On September 26, 2008 NMED issued a letter stating the levels and distribution of tritium, radon, and VOC vapors were consistent with earlier data used to develop the conceptual model for the MWL and approved the report.

### ***Corrective Measures Implementation Plan – Subgrade Preparation***

In preparation for ET cover construction, DOE and Sandia conducted excavation and mechanical screening of soil fill material at the SNL/NM TA-III borrow pit from June through July 2006. DOE and Sandia notified NMED on July 12, 2006 that borrow pit activities were underway, requested NMED approval to proceed with security fence removal and subgrade preparation at the MWL, and clarified that ET cover construction would not start until NMED approval of the CMI Plan was received. NMED determined that DOE and Sandia could proceed with fence removal and subgrade preparation activities on September 18, 2006; this work was subsequently completed from October through December 2006. Due to delays in CMI Plan approval, DOE and Sandia requested NMED concurrence on implementing protective measures to prevent erosion damage to the completed subgrade surface on March 13, 2007, and received notice from NMED that concurrence was not required on March 23, 2007. Protective measures were implemented in April 2007. DOE and Sandia also requested a time extension on August 10, 2007 for submittal of the CMI Report, which could not be submitted by the required date of October 29, 2007 because of delays associated with CMI Plan approval. NMED approved the extension on August 23, 2007 and clarified the new submittal date for the CMI Report would be within 180 days of final remedy implementation completion.

## **Corrective Measures Implementation**

After receiving conditional approval of the CMI Plan on December 22, 2008, DOE and Sandia notified NMED on April 10, 2009 that construction of the ET cover would begin in May 2009. ET cover construction was completed from May 20 through September 3, 2009. During the construction, DOE and Sandia submitted quarterly progress reports as required by the Final Order and the Permit. On September 4, 2009 DOE and Sandia documented the supplemental watering approach and schedule discussed with NMED staff on August 13, 2009. NMED approval to perform supplemental watering to facilitate the establishment of native vegetation required for the ET cover was previously granted as part of the December 22, 2008 NMED conditional approval of the CMI Plan. DOE and Sandia requested approval to conduct additional supplemental watering activities and notified NMED of ET cover maintenance activities planned for calendar years (CYs) 2011 through 2013 on March 23, 2011. NMED approved the supplemental watering and ET cover maintenance on April 1, 2011, and the installation of an additional access gate in the perimeter fence at the southern end of the site to facilitate cover maintenance on April 28, 2011. Reclamation work at the MWL borrow pit in TA-III was completed from May to August 2013 and was documented in a submittal to NMED on December 9, 2013. NMED staff inspected the borrow pit on June 4, 2014 and provided DOE and Sandia with a letter stating the work was complete and acceptable on June 26, 2014. With receipt of this letter and completion of activities associated with the revised LTMMP described below, all 10 conditions of CMI Plan approval were met.

## **Corrective Measures Implementation Report**

The CMI Report documenting construction of the ET cover in accordance with the CMI Plan was submitted to NMED on January 26, 2010, within 180 days of ET cover completion. The report included a two-volume Construction Quality Assurance (CQA) Report as Appendix A that was prepared by an independent, third-party contractor and certified by a New Mexico-registered Professional Engineer. The



CQA Report documents all aspects of ET cover deployment and addresses all data and documentation requirements, including extensive field testing of cover materials and CQA Engineer approval of each ET cover layer prior to starting construction of the next layer. All design changes were identified, documented, and approved by the CQA Engineer; these changes resulted in a thicker, more conservative and protective ET cover.

From November 29, 2010 to January 28, 2011 NMED conducted a 60-day public comment period on the CMI Report; held a public meeting on December 14, 2010; and extended the comment period an additional 30 days on January 28, 2011 (through February 28, 2011). NMED issued an NOD on the CMI Report on May 20, 2011; they also issued responses to public comments received on the CMI Report on the same date. DOE and Sandia responded to the eight NOD comments on August 11, 2011 and provided replacement material that revised the CMI Report in accordance with comment responses. Construction details for the additional southern access gate approved by the NMED on April 28, 2011 were provided on the revised as-built drawings included in the August 11, 2011 NOD response. NMED approved the revised CMI Report on October 14, 2011; directed DOE and Sandia to submit a revised LTMMP within 180 days; and clarified that the first five-year period for reevaluating the feasibility of excavation and analyzing the final remedy effectiveness in accordance with the Final Order would begin upon NMED approval of the LTMMP. NMED stated that this clarification on the first five-year reevaluation period was intended to allow for the more extensive monitoring, inspection, and maintenance/repair data collected under the LTMMP to be available for the evaluation.

## **Long-Term Monitoring and Maintenance Plan**

Based on public input during the CMI Plan public comment period, NMED requested submittal of the MWL LTMMP in advance of the schedule required by the Final Order. In response to this request, DOE and Sandia submitted the LTMMP on September 25, 2007. NMED conducted a 60-day public comment period that was extended an additional 30 days, from October 31, 2006 to January 31, 2007. NMED requested DOE and Sandia prepare and submit a revised LTMMP as a result of significant changes since 2007 (e.g., replacement of the compliance groundwater monitoring well network in 2008 and completion of ET cover construction in 2009) in the NMED approval letter for the CMI Report issued on October 14, 2011. DOE and Sandia withdrew the September 2007 LTMMP on December 7, 2011 and, in accordance with the Final Order and the Permit, submitted the revised LTMMP within 180 days of CMI Report approval on March 23, 2012. NMED conducted a 90-day public comment period on the revised LTMMP that was extended an additional 60 days (September 14, 2012 to February 11, 2013, a total of 150 days), and held a public dialogue (i.e., meeting) on October 16, 2012. NMED approved the revised LTMMP on January 8, 2014 and directed DOE and Sandia to implement LTMMP monitoring, maintenance, and reporting requirements; including deployment of all LTMMP monitoring systems. DOE and Sandia implemented the associated monitoring, inspection, maintenance/repair, and reporting requirements as requested and submitted the installation work plan for three multi-port soil-vapor monitoring wells required to complete the LTMMP monitoring systems on January 15, 2014. The installation work plan was approved by NMED on February 14, 2014 and the drilling and installation field work was completed in July 2014. DOE and Sandia submitted the Soil-Vapor Monitoring Well Installation Report on September 10, 2014 and NMED approved the report on September 25, 2014. NMED determined that all LTMMP monitoring systems are deployed for long-term controls and provided a Certificate of Corrective Action Complete with Controls on October 8, 2014.

Other implementation activities included submittal of all reference documents that are cited in the LTMMP, including submittal of reference documents as they are periodically updated. DOE and Sandia submitted all reference documents cited in LTMMP sampling and analysis plans on March 6, 2014, and submitted three updated reference documents on July 9, 2014. The first MWL Annual Long-Term

Monitoring and Maintenance (LTMM) Report for the initial implementation reporting period of January 8 through March 31, 2014 was submitted to NMED on June 18, 2014 and approved by NMED on August 6, 2014. The first semiannual soil-vapor VOC monitoring event was completed in September 2014 and will be documented in the MWL Annual LTMM Report that will be submitted to NMED in June 2015 in accordance with the LTMM reporting requirements (reporting period April 1, 2014 through March 31, 2015). DOE and Sandia continue to perform all required monitoring, inspection, maintenance/repair, and reporting activities in accordance with the LTMM.

## Groundwater Documents

The original groundwater monitoring well network at the MWL (MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3) was installed in 1989. In 1993 MWL-MW4 was completed at an angle of 6 degrees from vertical and was screened at two discrete intervals 20 feet apart to evaluate vertical potentiometric gradients and changes in aquifer parameters with depth. An inflatable packer separates the screened intervals, and pressure is maintained in the packer to prevent combining water from the two screened sections of the aquifer. Because of the angle of the well and the piping and tubing required for the packer, MWL-MW4 is equipped with a dedicated stainless steel sampling pump that is directly attached to, and just above the packer. This configuration allows for groundwater sampling of the MWL-MW4 upper screen interval (i.e., screen interval that is across the top of the regional aquifer). Groundwater elevation measurements are also taken only from the upper screen interval of MWL-MW4. Monitoring wells MWL-MW5 and MWL-MW6 were installed in 2000 at a distance of approximately 200 and 500 feet west of the MWL, respectively, with their screened intervals placed below the top of the regional water table in the coarse-grained Ancestral Rio Grande deposits.

Groundwater at the MWL has been extensively characterized and monitored since 1990 for major ion chemistry, VOCs, semivolatile organic compounds (SVOCs), nitrate, metals, radionuclides, and perchlorate. Data collected over more than twenty years indicate that groundwater has not been contaminated by the MWL. The following information summarizes groundwater documents and associated correspondence from 2005 through October 2014 under the subject headings of annual groundwater monitoring reports, groundwater monitoring well documents, and groundwater studies (toluene investigation and MWL-MW4 metals reporting).

### *Annual Groundwater Monitoring Reports*

DOE and Sandia have been providing MWL groundwater monitoring results in annual groundwater monitoring reports (AGMRs) since the early 1990s. In December 2002 DOE and Sandia published the “MWL Groundwater Report, 1990 through 2001” that provided monitoring results, aquifer testing and characterization, and a detailed conceptual site hydrogeological model based upon 11 years of groundwater monitoring and investigation work. Information gained from the installation and monitoring of wells MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9 that were installed in 2008 (see more information below) was summarized in the “MWL Annual Groundwater Monitoring Report, CY 2009” that was submitted to the NMED on June 7, 2010. Supplemental information was provided in this report that explained the lower groundwater elevations measured in wells MWL-MW7 through MWL-MW9 and augmented the conceptual site hydrogeological model previously presented in the “MWL Groundwater Report, 1990 through 2001” and “MWL Phase 2 RFI Report”. The CY 2009 report was approved by NMED on November 9, 2010. After 2010, MWL annual groundwater monitoring information has been provided exclusively in Chapter 4 of the SNL/NM Annual Groundwater Monitoring Reports that are included as an appendix of the Sandia Annual Site Environmental Reports.

### ***Groundwater Monitoring Well Documents***

The MWL groundwater monitoring network was modified in 2008 after NMED directed DOE and Sandia to replace monitoring well MWL-BW1 (with new well MWL-BW2) on March 23, 2007, and monitoring wells MWL-MW1 and MWL-MW3 (with new wells MWL-MW7 and MWL-MW8) on July 2, 2007. The new wells were required due to declining water levels (i.e., not sufficient water in the wells to obtain representative samples), and were to be installed with polyvinyl chloride (PVC) well screens due to corrosion problems associated with stainless steel screens (i.e., metals detections, including nickel and chromium, in groundwater samples). DOE and Sandia submitted the Decommissioning and Installation (D&I) Plans for the three monitoring wells and the new wells to replace them on April 17 and August 10, 2007, respectively. NMED issued an NOD on the MWL-BW1/MWL-BW2 D&I Plan on June 19, 2007; DOE and Sandia provided comment responses and a revised D&I Plan on August 3, 2007; NMED approved the responses and revised plan on October 10, 2007; and NMED provided a correction to the completion date for field work on October 12, 2007 (field work to be completed by January 31 versus January 1, 2008). NMED approved the MWL-MW1 and MWL-MW3/MWL-MW7 and MWL-MW8 D&I Plan with conditions on October 30, 2007. DOE and Sandia responded with concerns on well placement conditions and provided recommendations for a different approach on December 5, 2007 that included installing a third well (MWL-MW9) to replace well MWL-MW2 (recommended for decommissioning). NMED approved this approach and extended the due dates for well completion and reporting due to the time expended to reach final agreement on February 12, 2008. DOE and Sandia submitted the MWL-MW2/MWL-MW9 D&I Plan on March 6, 2008 and NMED approved the plan on March 21, 2008.

Summary D&I Reports detailing the decommissioning of wells MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3 and the installation of new wells MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9 were submitted to NMED on April 23 and September 23, 2008. NMED issued an NOD on the MWL-BW1/MWL-BW2 D&I Report on August 25, 2008; DOE and Sandia provided comment responses on October 3, 2008; and NMED approved the D&I Report and NOD response on October 31, 2008. NMED approved the MWL-1 through MWL-3/MWL-MW7 through MWL-MW9 D&I Report on January 15, 2009. With this NMED approval, the four wells installed in 2008 (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) became the MWL compliance groundwater monitoring network for the uppermost part of the regional aquifer.

Wells MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9 were considered new wells and, as required by the COOC were sampled a minimum of eight consecutive quarters for a defined suite of parameters in addition to sampling for perchlorate for at least four consecutive quarters. The four consecutive quarters of perchlorate sampling were completed in April 2009 with no detections at or above the screening level of 4 micrograms per liter ( $\mu\text{g/L}$ ). The required eight quarterly sampling events were completed in CY 2010; as of July 2010 ten quarterly sampling events were completed at well MWL-BW2 and nine quarterly events were completed at wells MWL-MW7 through MWL-MW9. Additional quarterly sampling events beyond the required eight events were performed in support of the Toluene Investigation as described below. Groundwater monitoring results for the new wells installed in 2008 are documented in the CY 2008, 2009, and 2010 Annual Groundwater Monitoring Reports. In CYs 2011 through 2013 all MWL groundwater monitoring wells were sampled annually in accordance the requirements of the COOC. With NMED approval of the MWL LTMMMP on January 8, 2014, monitoring of the MWL groundwater compliance network (wells MWL-BW2, MWL-MW7 through MWL-MW9) changed to a semiannual frequency. Semiannual groundwater monitoring under the LTMMMP was conducted in April and October 2014 and will be reported in MWL Annual LTMM Report to be submitted to NMED by June 30, 2015 required by the LTMMMP.

### ***Groundwater Studies - Toluene and MWL-MW4 Metals Investigations***

On April 30, 2010 the DOE and Sandia received a letter from the NMED requesting an investigation into the source of toluene detected at low concentrations (0.37 to 0.97 µg/L) in NMED Oversight Bureau split samples from the new wells installed in 2008 (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9). NMED required DOE and Sandia to conduct a purging/sampling study of the groundwater along with any other studies necessary to determine the source, and provide an investigation report by July 31, 2010. DOE and Sandia had already initiated its own investigation into the toluene detection, and submitted the "MWL Toluene Investigation Report" on August 18, 2010 after requesting a 30-day extension to allow for additional time to receive and validate analytical data associated with the purging/sampling study. This extension was granted by NMED on June 4, 2010. NMED issued an NOD with two comments on September 18, 2010; DOE and Sandia provided comment responses and a revised report on October 14, 2010; and NMED approved the NOD response and revised report on January 13, 2011. The report documented numerous studies, evaluations of drilling and installation materials, a review of MWL site investigation soil-vapor and soil sampling results, groundwater sampling and laboratory procedures, laboratory and field quality control sample results, and an analysis of SNL/NM-wide (i.e., sitewide) groundwater monitoring results for the previous two years. The widespread occurrence of toluene detections in groundwater and quality control samples (field and trip blank samples) from the SNL/NM sitewide monitoring well network, the detection frequency, and the very low concentration range, indicated that the toluene source is not low-level contamination present in the regional aquifer. This was further supported by the April 2010 purging/sampling study performed at the MWL groundwater monitoring wells; results showed only laboratory-related toluene contamination in 5 of the 34 groundwater samples (i.e., no detections of toluene that were not related to confirmed laboratory contamination sources were reported). Evaluation of laboratory quality control data and the data validation process confirmed the presence of toluene sources within the laboratory for some, but not all, cases of low-concentration toluene detections in groundwater samples. The report concluded that toluene groundwater data reflect the ubiquitous nature of toluene and the very low analytical detection limit; the detections do not represent a release to the environment or widespread low-concentration toluene contamination in the regional aquifer.

On May 20, 2014, DOE and Sandia submitted "MWL Groundwater Monitoring Report, Monitoring Well MWL-MW4 Metals Data, CY 2013" that presented filtered and unfiltered metals results for groundwater samples collected in January-February 2013 from monitoring well MWL-MW4. This report was provided in advance of the SNL/NM CY 2013 Annual Groundwater Monitoring Report as requested by NMED, and addressed unfiltered metals results (chromium, cobalt, copper, iron, and nickel) that showed a significant and sudden concentration increase in the 2013 samples. With the exception of nickel, the increases were only in the 2013 unfiltered sample results. All of the 2013 unfiltered results for chromium, cobalt, copper, iron, and nickel were historic maximum concentrations for samples from MWL-MW4, which has been monitored since installation in 1993. All filtered sample results for chromium, cobalt, copper, and iron were within historical ranges and much lower concentrations or non-detections. Nickel groundwater sample concentrations have shown increases during the two previous annual monitoring events conducted in 2011 and 2012.

The sharp increases in unfiltered concentrations of chromium, cobalt, copper, iron, and nickel are indicative of a source within the well and are consistent with unfiltered metals results from previous MWL monitoring wells that had corrosion issues related to stainless steel well screens (i.e., MWL-BW1, MWL-MW1 through MWL-MW3). Two of these four historic wells also showed the same increased concentration trend for filtered nickel concentrations. The source of the elevated metals concentrations in the samples is most likely corrosion by-products from the dedicated stainless steel sampling pump in monitoring well MWL-MW4. The packer and sampling pump/system were removed in May 2009 prior to construction of the MWL ET Cover to allow the inner and outer well casing to be extended to

accommodate the additional height of the ET cover. During that effort oxide staining and corrosion on the stainless steel pump intake guard and screen were visible. The pump was replaced when the packer and pump assembly were reinstalled, and it has not been removed and cleaned/replaced since then. To confirm that the source of elevated metals is directly related to corrosion of the stainless steel sampling pump, DOE and Sandia recommended additional sampling and removal, inspection, cleaning of the packer, and replacement of the sampling pump and all associated tubing in the May 2014 report. On July 24, 2014, NMED provided additional recommendations based upon their review of the "MWL Groundwater Monitoring Report, Monitoring Well MWL-MW4 Metals Data, CY 2013." NMED recommended pumping and sampling of the well prior to equipment removal to remove as much sediment and potential corrosion particles as possible that may have accumulated in the well between annual sampling events.

From September 8 through September 29, 2014, pumping and sampling of MWL-MW4 was conducted to remove sediment and corrosion particles from the well in accordance with the NMED July 24, 2014 recommendations. A total of 233 gallons of groundwater were removed from the upper screen interval of MWL-MW4 and a total of seven samples (not including duplicate samples) were collected throughout the three-week process. Filtered and unfiltered analytical results demonstrate that the pumping was successful at removing sediment and corrosion particles from the well, and in addition this pumping and sampling effectively cleaned the pump intake screen of corrosion. The unfiltered sample results show an overall decreasing trend, with all chromium, copper, cobalt, iron, and nickel results for the final two sampling events within or close to historic concentration ranges. These data demonstrate that the elevated 2013 unfiltered metals results were caused by the corrosion of the stainless steel sampling pump and were not related to contamination in the regional aquifer from the MWL. Additional work is planned for MWL-MW4 that includes removing the packer and pump equipment, video logging the MWL-MW4 well casing and screen intervals, cleaning and servicing of the packer, replacing the tubing for the packer, and reinstalling the packer. The pumping and sampling results, together with the additional work described above, will be documented in a final report submitted to the NMED by May 2015. Sampling of monitoring well MWL-MW4 will not be performed in the future; it will be used to measure and monitor the elevation of the regional aquifer water table in accordance with the LTMMP.

Groundwater monitoring continues under the LTMMP, and results will be included in the MWL Annual LTMM Reports submitted to NMED in June of each CY. Groundwater monitoring results will also be included in the reports reevaluating the feasibility of excavation and analyzing the effectiveness of the final remedy. The first of these reevaluation reports will be submitted five years after NMED approval of the LTMMP (i.e., by January 8, 2019), as stipulated in the NMED-approval letter for the CMI Report dated October 14, 2011.



**Enclosure 2**

**Document Index  
May 2005 – October 2014  
Justification for Class 3 Permit Modification**

**Solid Waste Management Unit 76  
Mixed Waste Landfill**

**Sandia National Laboratories  
NM5890110518**

**Document Index: May 2005 – October 2014**  
**Justification for Class 3 Permit Modification for Corrective Action Complete Status**  
**Solid Waste Management Unit 76, Mixed Waste Landfill**

<b>Date</b>	<b>From</b>	<b>To</b>	<b>Description</b>	<b>Binder No.</b>
<b>Class 3 Permit Modification for Corrective Measures and Final Order</b>				
05/26/2005	State of NM/ Curry	DOE/Sandia	Final Order in the Matter of Request for a Class 3 Permit Modification for Corrective Measures for the Mixed Waste Landfill No. HWB 04-11(M)	I-1
08/02/2005	NMED/Kieling	SNL/Wagner	Remedy Decision and Class 3 Permit Modification Request to Incorporate into RCRA Permit Corrective Measures for Mixed Waste Landfill (SWMU 76)	I-2
<b>Corrective Measures Implementation Plan</b>				
09/07/2005	NMED/Bearzi	SNL/Wagner	Time Extension Request Approval Regarding Mixed Waste Landfill Corrective Measures Implementation Plan and Report, August 4, 2005	I-3
11/03/2005	SNL/Wagner	NMED/Bearzi	Mixed Waste Landfill Corrective Measures Implementation Plan, November 2005	I-4
12/09/2005	NMED/Kieling	Interested Citizen	Notice of Public Comment Period for Mixed Waste Landfill Corrective Measures Implementation Work Plan, November 2005 (Including Fate and Transport Model)	I-5
04/24/2006	SNL/Wagner	NMED/Bearzi	Response to Public Comments Regarding the Mixed Waste Landfill Corrective Measures Implementation Plan, November 2005	I-6
05/04/2006	NMED/Kieling	Interested Citizen	Notice of Public Dialogue on the Corrective Measures Implementation Plan for the Mixed Waste Landfill, November 2005	I-7
05/25/2006	NMED/Kieling	SNL/Wagner	Notice of 14 Day Public Comment Period for the Mixed Waste Landfill Corrective Measures Implementation Work Plan, November 2005	I-8
11/20/2006	NMED/Bearzi	SNL/Wagner	NOD (Part 1 and 2 Comments): Mixed Waste Landfill Corrective Measures Implementation Work Plan, November 2005, and Requirement for Soil-Vapor Sampling and Analysis Plan	I-9
11/21/2006	NMED/Kieling	Interested Citizen	NMED Responses to Public Comments on the Mixed Waste Landfill Corrective Measures Implementation Plan, November 2005	I-10

**Document Index: May 2005 – October 2014**  
**Justification for Class 3 Permit Modification for Corrective Action Complete Status**  
**Solid Waste Management Unit 76, Mixed Waste Landfill**

<b>Date</b>	<b>From</b>	<b>To</b>	<b>Description</b>	<b>Binder No.</b>
11/2006	Moats et. al/ NMED	Interested Citizen	Evaluation of the Representativeness and Reliability of Groundwater Monitoring Well Data, Mixed Waste Landfill (referenced as part of 11/21/2006 NMED Responses to Public Comments on Corrective Measures Implementation Plan)	I-11
12/21/2006	SNL/Wagner	NMED/Bearzi	DOE/Sandia Responses to NOD Part 1 Comments and Submittal of Soil-Vapor Sampling and Analysis Plan: Mixed Waste Landfill Corrective Measures Implementation Plan, November 2005	I-12 & II-1
01/19/2007	SNL/Wagner	NMED/Bearzi	DOE/Sandia Responses to NOD Part 2 Comments: Mixed Waste Landfill Corrective Measures Implementation Plan, November 2005 (Includes submittal of the 2nd Edition of Appendix E, SAND2007-0170)	I-13
10/10/2008	NMED/Bearzi	SNL/Wagner	Second NOD: Mixed Waste Landfill Corrective Measures Implementation Plan, November 2005	I-14
11/26/2008	SNL/Davis	NMED/Bearzi	DOE/Sandia Responses to Second NOD: Mixed Waste Landfill Corrective Measures Implementation Plan, November 2005	I-15
12/22/2008	NMED/Bearzi	SNL/Davis	Conditional Approval: Mixed Waste Landfill Corrective Measures Implementation Plan, November 2005	I-16
02/12/2009	SNL/Davis	NMED/Bearzi	Replacement Pages for the Mixed Waste Landfill Corrective Measures Implementation Plan, November 2005	I-17
<b>Corrective Measures Implementation Plan – Soil-Vapor Investigation*</b>				
<i>*Soil-Vapor Sampling and Analysis Plan was submitted to NMED on December 21, 2006 as Appendix A of the NOD Part 1 Comment Responses – see above</i>				
02/05/2007	NMED/Kieling	Interested Citizen	NMED Notice of Public Comment Period on Mixed Waste Landfill Soil-Vapor Sampling and Analysis Plan	II-2

**Document Index: May 2005 – October 2014**  
**Justification for Class 3 Permit Modification for Corrective Action Complete Status**  
**Solid Waste Management Unit 76, Mixed Waste Landfill**

<b>Date</b>	<b>From</b>	<b>To</b>	<b>Description</b>	<b>Binder No.</b>
04/13/2007	NMED/Kieling	Interested Citizen	Notice of Public Dialogue on the Mixed Waste Landfill Soil-Vapor Sampling and Analysis Plan	II-3
02/14/2008	NMED/Bearzi	SNL/Wagner	Response to Public Comment and Approval with Modifications Soil-Vapor Sampling and Analysis Plan for the Mixed Waste Landfill	II-4
02/15/2008	NMED/Kieling	Interested Citizen	Notice of Approval and Response to Public Comment on Soil-Vapor Sampling and Analysis Plan for Mixed Waste Landfill	II-5
07/10/2008	SNL/Wagner	NMED/Bearzi	Request for Deadline Extension of Investigation Report Soil-Vapor Volatile Organic Compounds, Tritium, and Radon Sampling at the Mixed Waste Landfill	II-6
07/25/2008	NMED/Bearzi	SNL/Wagner	Time Extension Request to Submit Soil-Vapor Investigation Report Mixed Waste Landfill, Letter of July 10, 2008	II-7
08/26/2008	SNL/Wagner	NMED/Bearzi	Investigation Report on the Soil-Vapor Volatile Organic Compounds, Tritium, and Radon Sampling at the Mixed Waste Landfill, August 2008	II-8
09/26/2008	NMED/Bearzi	SNL/Wagner	Notice of Approval: Investigation Report on the Soil-Vapor Volatile Organic Compounds, Tritium, and Radon Sampling at the Mixed Waste Landfill, August 2008	II-9
<b>Corrective Measures Implementation Plan – Subgrade Preparation</b>				
07/12/2006	SNL/Wagner	NMED/Curry	Notification of Current and Planned Field Work at the Mixed Waste Landfill	II-10
09/18/2006	NMED/Bearzi	SNL/Wagner	Fence Removal and Subgrade Preparation, Mixed Waste Landfill	II-11
03/13/2007	SNL/Wagner	NMED/Bearzi	Notification of Precautionary Measures to Prevent Damage to the Mixed Waste Landfill Subgrade Pending Installation of the Cover	II-12
03/23/2007	NMED/Bearzi	SNL/Wagner	Mixed Waste Landfill Corrective Measures Implementation Plan, Letter of March 13, 2007	II-13

**Document Index: May 2005 – October 2014**  
**Justification for Class 3 Permit Modification for Corrective Action Complete Status**  
**Solid Waste Management Unit 76, Mixed Waste Landfill**

<b>Date</b>	<b>From</b>	<b>To</b>	<b>Description</b>	<b>Binder No.</b>
08/10/2007	SNL/Wagner	NMED/Bearzi	Extension Request for Submittal of Burn Site Corrective Measures Evaluation Report and Mixed Waste Landfill Corrective Measures Implementation Report	II-14
08/23/2007	NMED/Bearzi	SNL/Wagner	Extension Request for Submittal of Burn Site Corrective Measures Evaluation Report and Mixed Waste Landfill Corrective Measures Implementation Report	II-15
<b>Corrective Measures Implementation</b>				
04/10/2009	SNL/Davis	NMED/Bearzi	Notification of Execution of the Mixed Waste Landfill Corrective Measures Implementation Plan Beginning on May 14, 2009	III-1
09/04/2009	SNL/Wagner	NMED/Bearzi	Notification Concerning the Schedule and Approach for Supplemental Watering of the Mixed Waste Landfill ET Cover	III-2
09/30/2009	SNL/Wagner	NMED/Bearzi	Mixed Waste Landfill Quarterly Progress Report ET Cover Project May-July 2009	III-3
11/18/2009	NMED/Bearzi	SNL/Davis	NMED Response: Mixed Waste Landfill Quarterly Progress Report ET Cover Construction Project May-July 2009	III-4
12/21/2009	SNL/Wagner	NMED/Bearzi	Mixed Waste Landfill Quarterly Progress Report ET Cover Construction Project August-October 2009	III-5
04/08/2010	NMED/Bearzi	SNL/Wagner	NMED Response: Mixed Waste Landfill Quarterly Progress Report ET Cover Project August-October 2009	III-6
03/23/2011	SNL/Wagner	NMED/Bearzi	Request for Approval to Implement Supplemental Watering Activities for the Mixed Waste Landfill ET Cover	III-7
04/01/2011	NMED/Bearzi	SNL/Wagner	Notice of Approval: Request to Conduct Supplemental Watering and Cover Maintenance Activities Mixed Waste Landfill	III-8
04/28/2011	NMED/Moats	SNL/Cochran	Email from William Moats Dated 4/28/2011 Notice of Approval: Request to Install Access Gate at South End of Mixed Waste Landfill	III-9



**Document Index: May 2005 – October 2014**  
**Justification for Class 3 Permit Modification for Corrective Action Complete Status**  
**Solid Waste Management Unit 76, Mixed Waste Landfill**

<b>Date</b>	<b>From</b>	<b>To</b>	<b>Description</b>	<b>Binder No.</b>
12/09/2013	SNL/Todd	NMED/Cobrain	Environmental Restoration Operations Reclamation of the Mixed Waste Landfill Borrow Pit	III-10
06/26/2014	NMED/Kieling	SNL/Beausoleil	Reclamation of the Mixed Waste Landfill Borrow Pit, Letter of December 9, 2013	III-11
<b>Corrective Measures Implementation Report</b>				
01/26/2010	SNL/Wagner	NMED/Bearzi	Mixed Waste Landfill Corrective Measures Implementation Report, January 2010	III-12 & IV-1
11/29/2010	NMED/Kieling	Interested Citizen	Notice of Public Comment Period for Sandia National Laboratories Mixed Waste Landfill Corrective Measures Implementation Report, January 2010	III-13
01/28/2011	NMED/Kieling	Interested Citizen	Extension of Public Comment Period for Sandia National Laboratories Mixed Waste Landfill Corrective Measures Implementation Report, January 2010	III-14
05/20/2011	NMED/Kieling	SNL/Wagner	NOD: Mixed Waste Landfill Corrective Measures Implementation Report, January 2010	III-15
05/20/2011	NMED/Kieling	SNL/Wagner	NMED Response to Public Comments Regarding the Mixed Waste Landfill Corrective Measures Implementation Report, January 2010	III-16
08/11/2011	SNL/Wagner	NMED/Kieling	Responses to NOD: Mixed Waste Landfill Corrective Measures Implementation Report, January 2010	III-17
10/14/2011	NMED/Kieling	SNL/Wagner	Notice of Approval: Mixed Waste Landfill Corrective Measures Implementation Report, January 2010	III-18
<b>Long-Term Monitoring and Maintenance Plan</b>				
09/25/2007	SNL/Wagner	NMED/Bearzi	Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill, September 2007	V-1

**Document Index: May 2005 – October 2014**  
**Justification for Class 3 Permit Modification for Corrective Action Complete Status**  
**Solid Waste Management Unit 76, Mixed Waste Landfill**

<b>Date</b>	<b>From</b>	<b>To</b>	<b>Description</b>	<b>Binder No.</b>
10/31/2007	NMED/Kieling	SNL/Wagner	Notice of Public Comment Period for Mixed Waste Long-Term Monitoring and Maintenance Plan, September 2007	V-2
12/17/2007	NMED/Kieling	SNL/Wagner	Extension of the Public Comment Period on the Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill, September 2007	V-3
12/07/2011	SNL/Wagner	NMED/Kieling	Withdrawal of the Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan Submitted in September 2007	V-4
12/21/2011	NMED/Kieling	SNL/Wagner	Withdrawal of Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan, September 2007	V-5
03/23/2012	SNL/Sena	NMED/Kieling	Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill, March 2012	V-6
09/14/2012	NMED/Kieling	Interested Citizen	Notice of Public Comment Period and Public Dialogue Meeting for the Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan, March 2012	V-7
11/19/2012	NMED/Kieling	SNL/Beausoleil	Extension of the Public Comment Period on the Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill, March 2012	V-8
12/18/2012	NMED/Kieling	SNL/Beausoleil	Extension of the Public Comment Period on the Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill, March 2012	V-9
01/08/2014	NMED/Blaine	SNL/Beausoleil	Notice of Approval: Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan, March 2012	V-10
01/15/2014	SNL/Beausoleil	NMED/Kieling	Work Plan for the Installation of 3 Soil-Vapor Monitoring Wells at the Mixed Waste Landfill	V-11
02/14/2014	NMED/Blaine	SNL/Beausoleil	Notice of Approval: Work Plan for the Installation of 3 Soil-Vapor Monitoring Wells at the Mixed Waste Landfill	V-12

**Document Index: May 2005 – October 2014**  
**Justification for Class 3 Permit Modification for Corrective Action Complete Status**  
**Solid Waste Management Unit 76, Mixed Waste Landfill**

<b>Date</b>	<b>From</b>	<b>To</b>	<b>Description</b>	<b>Binder No.</b>
03/06/2014	SNL/Todd	NMED/Kieling	Submittal of Reference Documents Cited in the Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan	VI-1
06/18/2014	SNL/Todd	NMED/Cobrain	Mixed Waste Landfill Annual Long-Term Monitoring and Maintenance Report, January-March 2014, June 2014	V-13
07/09/2014	SNL/Todd	NMED/Kieling	Submittal of Updated Reference Documents Cited in the Mixed Waste Landfill Long-Term Monitoring & Maintenance Plan	VI-2
08/04/2014	NMED/Kieling	SNL/Beausoleil	NMED Receipt of Submittal of Updated Reference Documents Cited in the Mixed Waste Landfill Long-Term Monitoring & Maintenance Plan	VI-3
08/06/2014	NMED/Kieling	SNL/Beausoleil	Notice of Approval: Mixed Waste Landfill Annual Long-Term Monitoring & Maintenance Report, January-March 2014, June 2014	V-14
09/10/2014	SNL/Todd	NMED/Kieling	Mixed Waste Landfill FLUTe™ Soil-Vapor Monitoring Well Installation Report, September 2014	V-15
9/25/2014	NMED/Kieling	SNL/Beausoleil	Notice of Approval: Mixed Waste Landfill FLUTe™ Soil-Vapor Monitoring Well Installation Report, September 2014	V-16
<b>Annual Groundwater Monitoring Reports</b>				
01/30/2006	SNL/Wagner	NMED/Bearzi	Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2005	VII-1
12/13/2006	SNL/Wagner	NMED/Bearzi	Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2006 Sampling Event	VII-2
02/21/2008	SNL/Wagner	NMED/Bearzi	Mixed Waste Landfill Annual Groundwater Monitoring Report, Spring 2007 Sampling Event	VII-3
05/27/2009	SNL/Davis	NMED/Bearzi	Mixed Waste Landfill Annual Groundwater Monitoring Report, Calendar Year 2008	VII-4

**Document Index: May 2005 – October 2014**  
**Justification for Class 3 Permit Modification for Corrective Action Complete Status**  
**Solid Waste Management Unit 76, Mixed Waste Landfill**

<b>Date</b>	<b>From</b>	<b>To</b>	<b>Description</b>	<b>Binder No.</b>
10/29/2009	NMED/Bearzi	SNL/Davis	NOD: Mixed Waste Landfill Groundwater Monitoring Report, Calendar Year 2008	VII-5
12/23/2009	SNL/Wagner	NMED/Bearzi	Responses to NOD: Mixed Waste Landfill Groundwater Monitoring Report, Calendar Year 2008	VII-6
06/07/2010	SNL/Wagner	NMED/Bearzi	Mixed Waste Landfill Groundwater Monitoring Report, Calendar Year 2009	VII-7
06/07/2010	NMED/Bearzi	SNL/Wagner	Notice of Approval: Responses to NOD Issued for Mixed Waste Landfill Groundwater Monitoring Report, Calendar Year 2008	VII-8
11/09/2010	NMED/Bearzi	SNL/Wagner	Notice of Approval: Mixed Waste Landfill Groundwater Monitoring Report, Calendar Year 2009	VII-9
09/30/2011	SNL/Wagner	NMED/Kieling	Mixed Waste Landfill Groundwater Monitoring Report, Calendar Year 2010	VII-10
08/16/2012	SNL/ Beausoleil	NMED/Kieling	Mixed Waste Landfill Chapter 4 Excerpted from the Annual Groundwater Report, Calendar Year 2011	VII-11
10/24/2013	SNL/ Beausoleil	NMED/Kieling	Mixed Waste Landfill Chapter 4 Excerpted from the Annual Groundwater Report, Calendar Year 2012	VII-12
9/24/2014	SNL/ Beausoleil	NMED/Kieling	Mixed Waste Landfill Chapter 4 Excerpted from the Annual Groundwater Report, Calendar Year 2013	VII-13
<b>Groundwater Monitoring Well Documents</b>				
03/23/2007	NMED/Bearzi	SNL/Wagner	Replacement of Mixed Waste Landfill Groundwater Monitoring Well MWL-BW1	VIII-1
04/17/2007	SNL/Wagner	NMED/Bearzi	Monitoring Well Plug and Abandonment Plan and Well Construction Plan; Decommissioning of Well MWL-BW1, Installation of Well MWL-BW2	VIII-2
06/19/2007	NMED/Bearzi	SNL/Wagner	NOD: Monitoring Well Plug and Abandonment Plan and Well Construction Plan; Decommissioning of Well MWL-BW1, Installation of Well MWL-BW2	VIII-3

**Document Index: May 2005 – October 2014**  
**Justification for Class 3 Permit Modification for Corrective Action Complete Status**  
**Solid Waste Management Unit 76, Mixed Waste Landfill**

<b>Date</b>	<b>From</b>	<b>To</b>	<b>Description</b>	<b>Binder No.</b>
07/02/2007	NMED/Bearzi	SNL/Wagner	Replacement of Mixed Waste Landfill Groundwater Monitoring Wells MWL-MW1 and MWL-MW3	VIII-4
08/03/2007	SNL/Wagner	NMED/Bearzi	Response to NOD: Monitoring Well Plug and Abandonment Plan and Well Construction Plan; Decommissioning of Well MWL-BW1; Installation of Well MWL-BW2, April 9, 2007; and Submittal of Monitoring Well Plug and Abandonment Plan and Well Construction Plan; Decommissioning of Well MWL-BW1; Installation of Wells MWL-BW2, Revision 1	VIII-5
08/10/2007	SNL/Wagner	NMED/Bearzi	Monitoring Well Plug and Abandonment Plan and Well Construction Plan; Decommissioning of Wells MWL-MW1 and MWL-MW3; Installation of Wells MWL-MW7 and MWL-MW8	VIII-6
10/10/2007	NMED/Bearzi	SNL/Wagner	Notice of Approval: Monitoring Well Plug and Abandonment Plan and Well Construction Plan; Decommissioning of Well MWL-BW1, Installation of Well MWL-BW2, Revision 1	VIII-7
10/12/2007	NMED/Bearzi	SNL/Wagner	Correction for Notice of Approval Dated October 10, 2007 Regarding Monitoring Well Plug and Abandonment Plan and Well Construction Plan; Decommissioning of Well MWL-BW1, Installation of Well MWL-BW2, Revision 1	VIII-8
10/30/2007	NMED/Bearzi	SNL/Wagner	Notice of Approval: Monitoring Well Plug and Abandonment Plan and Well Construction Plan; Decommissioning of Wells MWL-MW1 and MWL-MW3; Installation of Wells MWL-MW7 and MWL-MW8	VIII-9
12/05/2007	SNL/Wagner	NMED/Bearzi	Response to October 30, 2007 Notice of Approval: Monitoring Well Plug and Abandonment Plan and Well Construction Plan; Decommissioning of Wells MWL-MW1 and MWL-MW3; Installation of Wells MWL-MW7 and MWL-MW8	VIII-10
02/12/2008	NMED/Bearzi	SNL/Wagner	Location of Monitoring Wells MWL-MW7 and MWL-MW8	VIII-11



**Document Index: May 2005 – October 2014**  
**Justification for Class 3 Permit Modification for Corrective Action Complete Status**  
**Solid Waste Management Unit 76, Mixed Waste Landfill**

<b>Date</b>	<b>From</b>	<b>To</b>	<b>Description</b>	<b>Binder No.</b>
03/06/2008	SNL/Wagner	NMED/Bearzi	Monitoring Well Plug and Abandonment Plan and Well Construction Plan; Decommissioning of Well MWL-MW2 Installation of Well MWL-MW9	VIII-12
03/21/2008	NMED/Bearzi	SNL/Wagner	Notice of Approval: Monitoring Well Plug and Abandonment Plan and Well Construction Plan; Decommissioning of Well MWL-MW2, Installation of Well MWL-MW9	VIII-13
04/23/2008	SNL/Wagner	NMED/Bearzi	Summary Report for Mixed Waste Landfill Monitoring Well Plug and Abandonment and Installation; Decommissioning of Well MWL-BW1 and Installation of Well MWL-BW2	VIII-14
08/25/2008	NMED/Bearzi	SNL/Wagner	NOD: Summary Report for Mixed Waste Landfill Monitoring Well Plug and Abandonment and Installation; Decommissioning of Well MWL-BW1 and Installation of Well MWL-BW2	VIII-15
09/23/2008	SNL/Davis	NMED/Bearzi	Summary Report for Mixed Waste Landfill Monitoring Well Plug and Abandonment and Installation; Decommissioning of Wells MWL-MW1, MWL-MW2, MWL-MW3, Installation of Wells MWL-MW7, MWL-MW8, MWL-MW9	VIII-16
10/03/2008	SNL/Davis	NMED/Bearzi	Responses to NOD: Summary Report for Mixed Waste Landfill Monitoring Well Plug and Abandonment and Installation; Decommissioning of Well MWL-BW1 and Installation of Well MWL-BW2	VIII-17
10/31/2008	NMED/Bearzi	SNL/Wagner	Notice of Approval: Summary Report for Mixed Waste Landfill Monitoring Well Plug and Abandonment and Installation; Decommissioning of Well MWL-BW1 and Installation of Well MWL-BW2	VIII-18
01/15/2009	NMED/Bearzi	SNL/Davis	Notice of Approval: Summary Report for Mixed Waste Landfill Monitoring Well Plug and Abandonment and Installation; Decommissioning of Wells MWL-MW1, MWL-MW2, MWL-MW3, Installation of Wells MWL-MW7, MWL-MW8, MWL-MW9	VIII-19

**Document Index: May 2005 – October 2014**  
**Justification for Class 3 Permit Modification for Corrective Action Complete Status**  
**Solid Waste Management Unit 76, Mixed Waste Landfill**

<b>Date</b>	<b>From</b>	<b>To</b>	<b>Description</b>	<b>Binder No.</b>
<b>Groundwater Studies - Toluene and Monitoring Well MWL-MW4 Metals Investigations</b>				
04/30/2010	NMED/Bearzi	SNL/Wagner	Toluene Detections in Groundwater Samples from Mixed Waste Landfill	VIII-20
05/21/2010	SNL/Wagner	NMED/Bearzi	Extension Request for the Toluene Investigation Report Required for the Mixed Waste Landfill	VIII-21
06/04/2010	NMED/Bearzi	SNL/Wagner	Approval of Extension Request for Toluene Investigation Report Mixed Waste Landfill, May 21, 2010	VIII-22
08/18/2010	SNL/Wagner	NMED/Bearzi	Mixed Waste Landfill Toluene Investigation Report, August 2010	VIII-23
09/28/2010	NMED/Bearzi	SNL/Wagner	NOD: Mixed Waste Landfill Toluene Investigation Report, August 2010	VIII-24
10/14/2010	SNL/Wagner	NMED/Bearzi	Response to September 28, 2010, NMED comments on the Mixed Waste Landfill Toluene Investigation Report	VIII-25
01/13/2011	NMED/Bearzi	SNL/Wagner	Notice of Approval: Mixed Waste Landfill Toluene Investigation Report, Revised October 2010	VIII-26
05/20/2014	SNL/Todd	NMED/Kieling	Mixed Waste Landfill Groundwater Monitoring Report - Monitoring Well MWL-MW4 Metals Data – Calendar Year 2013	VIII-27
07/24/2014	NMED/Kieling	SNL/ Beausoleil	Mixed Waste Landfill Groundwater Monitoring Report - Monitoring Well MWL-MW4 Metals Data – Calendar Year 2013, May 2014 (NMED Recommendations Letter)	VIII-28