



National Nuclear Security Administration
Sandia Field Office
P. O. Box 5400
Albuquerque, NM 87185
FEB 11 2013



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 Modification to Hazardous Waste Post-Closure Care Permit for the Chemical Waste Landfill at Sandia National Laboratories/New Mexico, Environmental Protection Agency Identification Number NM5890110518

Dear Mr. Kieling:

The Department of Energy (DOE) National Nuclear Security Administration/Sandia Field Office (NNSA/SFO) and Sandia Corporation (Sandia) are submitting a permit modification request for several operational changes at the Chemical Waste Landfill (CWL). Post-closure care activities at the CWL are performed under the Post-Closure Care Permit (Permit) issued by the New Mexico Environment Department (NMED).

The changes are discussed below and are presented in enclosures to this letter, as required by the New Mexico Administrative Code, Title 20, Chapter 4, Part 1, Section 900 (20.4.1.900 NMAC) incorporating Title 40 of the Code of Federal Regulations, Part 270.42(a) and (d) (40 CFR 270.42(a) and (d)). At the CWL, DOE and Sandia are requesting modifications which affect Permit Part 3 and Permit Attachments 1 through 4 as summarized below.

- *Part 3 – Post-Closure Care Requirements for the Chemical Waste Landfill:* clarify inspection documentation requirements consistent with proposed revisions to Permit Attachment 1 and Attachment 4 to allow the use of alternative formats to the forms included in Permit Attachment 4. This change allows ongoing updates to the inspection forms without affecting inspection requirements specified in Permit Attachment 1.
- *Attachment 1 – Post-Closure Care Plan for the CWL:* provide additional detail regarding inspection requirements; and provide additional detail regarding soil-gas passive venting devices.
- *Attachment 2 – Groundwater Sampling and Analysis Plan:* clarify requirements by removing redundant and unnecessary documents from the list of operating procedures.
- *Attachment 3 – Soil-Gas Sampling and Analysis Plan:* clarify requirements by removing redundant and unnecessary documents from the list of operating procedures; and clarify data quality requirements for soil-gas samples.
- *Attachment 4 – Inspection Forms:* clarify that all forms are included for illustrative purposes, as alternative formats may be used to document inspections.

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The requested modifications to the Permit are documented in four enclosures to this letter:

- *Enclosure A*: Summary of changes with proposed permit modification class and rationale for each change.
- *Enclosure B*: Revised pages in redline/strikeout format.
- *Enclosure C*: Revised pages in final format with all changes incorporated. All the revised pages are indicated by a February 2013 date in the header.
- *Enclosure D*: Additional information and discussion of the technical basis for one of the modifications included in the proposal.

One of the requested modifications, revision of the requirements for evaluating the quality of data from duplicate samples, is not explicitly listed in 40 CFR 270.42 Appendix I, *Classification of Permit Modification*. The revision can be equated to a Class 1 modification associated with groundwater monitoring that is explicitly listed in Appendix I. The soil-gas monitoring at the CWL is conducted to monitor the presence of constituents of concern in the vadose zone as part of the groundwater monitoring and protection program during post-closure care.

DOE and Sandia request that NMED make a determination that this is indeed a Class 1 modification. This is a minor change that will keep the permit current with industry practices and recommendations. This change does not substantially alter the permit conditions or reduce the capacity of DOE and Sandia to protect human health or the environment (see 20 NMAC 4.1.900/ 40 CFR 270.42(d)(2)(i)).

The remainder of the proposed modifications are Class 1 modifications that are listed in Appendix I. None of the proposed changes substantially alter the permit conditions or reduce the capacity of DOE and Sandia to protect human health or the environment.

In accordance with 20.4.1.900 NMAC/40 CFR 270.42(a), the changes described in Enclosures A, B, and C will take effect upon NMED approval. DOE and Sandia will mail a notice about the permit modification to all persons on the facility mailing list within 90 days after the changes take effect. DOE and Sandia are available to provide additional information as needed.

If you have questions please contact me at (505) 845-6036 or John Weckerle of my staff at (505) 845-6026.

Sincerely,



Geoffrey L. Beausoleil
Manager

4 Enclosures

cc:

See Page 3

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Mr. John E. Kieling

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cc w/enclosures:

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cc w/o enclosure:

Michael Hazen, SNL/NM, MS-0143
Sidney Gutierrez, SNL/NM, MS-0725
Terry Cooper, SNL/NM, MS-0728
Pamela Puissant, SNL/NM, MS-0729
Michael Mitchell, SNL/NM, MS-0718
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13-186-491597

**Request for Class 1 Permit Modifications
Chemical Waste Landfill Post-Closure Care Permit
Sandia National Laboratories**

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.



Michael W. Hazen, Vice-President
Sandia Corporation
Albuquerque, New Mexico
Operator

22 Jun 2013
Date signed



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

11 FEB 2013
Date signed

Enclosure A

Sandia National Laboratories

**Permit NM5890110518
Chemical Waste Landfill Post-Closure Care**

**Summary of Changes
Permit Part 3
Permit Attachments 1 through 4**

Enclosure A
Summary of Changes for Chemical Waste Landfill Post-Closure Care Permit

Item	Permit Location/ Affected Page(s)	Current Language	Proposed Language	Explanation for Change	Modification Class Rationale
1	Part 3 Section 3.3 Page 25	The Permittees shall inspect the components, structures, and equipment at the CWL in accordance with the Inspection and Maintenance/Repair Schedule described in Section 1.9 of Attachment 1 of this Permit <u>using the Inspection Checklists in Permit Attachment 4</u> , and in accordance with the inspection requirements of 40 C.F.R. § 264.15.	The Permittees shall inspect the components, structures, and equipment at the CWL in accordance with the Inspection and Maintenance/Repair Schedule described in Section 1.9 of Attachment 1 of this Permit <u>and shall record the results of each inspection as described in Section 1.10 of Permit Attachment 1</u> , and in accordance with the inspection requirements of 40 C.F.R. § 264.15.	Clarify that the detailed requirements for recording inspections are included in Section 1.10 of Permit Attachment 1. Please see Item 5 for additional discussion of the inspection forms.	<i>Class 1 modification.</i> Changes in procedures for maintaining the Operating Record 20.4.1.900 NMAC, 40 CFR 270.42 Appendix 1, Modification B.3
2	Attachment 1 Section 1.4.2 Page 33	These devices seal on the top of the well casing to allow soil gas to vent to the atmosphere during periods of low barometric pressure and prevent soil gas from being driven downward during periods of high atmospheric pressure. Figure 11 shows how the BaroBall™ device works.	These devices seal on the top of the well casing to allow soil gas to vent to the atmosphere during periods of low barometric pressure and prevent soil gas from being driven downward during periods of high atmospheric pressure. <u>The BaroBall™ or equivalent passive venting device replaces the cap where it is installed on a well.</u> Figure 11 shows how the BaroBall™ device works.	Provide additional clarification that caps are replaced by BaroBalls™ or other equivalent passive venting devices when and where they are installed on monitoring wells.	<i>Class 1 modification.</i> Informational change 20.4.1.900 NMAC, 40 CFR 270.42 Appendix 1, Modification A.1
3	Attachment 1 Section 1.9.1.1 Page 42	During this monitoring period, the staff biologist shall also be responsible for noting and interpreting signs of animal intrusion. These inspections shall be documented <u>on the Biology Checklist for the CWL Cover inspection form (Attachment 4 of this Permit).</u>	During this monitoring period, the staff biologist shall also be responsible for noting and interpreting signs of animal intrusion. These inspections shall be documented <u>as specified in Section 1.10 of this Permit Attachment.</u>	Clarify that the detailed requirements for recording inspections are included in Section 1.10 of Permit Attachment 1.	<i>Class 1 modification.</i> Changes in procedures for maintaining the Operating Record 20.4.1.900 NMAC, 40 CFR 270.42 Appendix 1, Modification B.3

Enclosure A
Summary of Changes for Chemical Waste Landfill Post-Closure Care Permit

Item	Permit Location/ Affected Page(s)	Current Language	Proposed Language	Explanation for Change	Modification Class Rationale
4	Attachment 1 Section 1.9.1.2 Page 42	Settlement of the cover surface in excess of 6 inches, erosion of the cover soil in excess of 6 inches deep, areas of ponding water on the CWL cover surface in excess of 100 square feet, animal intrusion burrows in excess of 4 inches in diameter, contiguous areas lacking vegetation in excess of 200 square feet, and any other conditions that may impact the cover's integrity shall be noted <u>on the Cover Inspection Checklist (Attachment 4 of this Permit)</u> . Documentation of animal intrusion burrows in excess of 4 inches in diameter and contiguous areas lacking vegetation in excess of 200 square feet may be noted quarterly <u>on the Biology Checklist for the CWL Cover (Attachment 4 of this Permit)</u> instead of the Cover Inspection <u>Checklist</u>	Settlement of the cover surface in excess of 6 inches, erosion of the cover soil in excess of 6 inches deep, areas of ponding water on the CWL cover surface in excess of 100 square feet, animal intrusion burrows in excess of 4 inches in diameter, contiguous areas lacking vegetation in excess of 200 square feet, and any other conditions that may impact the cover's integrity shall be noted <u>as specified in Section 1.10 of this Permit Attachment</u> . Documentation of animal intrusion burrows in excess of 4 inches in diameter and contiguous areas lacking vegetation in excess of 200 square feet may be noted quarterly <u>as part of the vegetation inspection and monitoring</u> instead of the Cover Inspection	Clarify that the detailed requirements for recording inspections are included in Section 1.10 of Permit Attachment 1.	<i>Class 1 modification.</i> Changes in procedures for maintaining the Operating Record 20.4.1.900 NMAC, 40 CFR 270.42 Appendix 1, Modification B.3

Enclosure A
Summary of Changes for Chemical Waste Landfill Post-Closure Care Permit

Item	Permit Location/ Affected Page(s)	Current Language	Proposed Language	Explanation for Change	Modification Class Rationale
5	Attachment 1 Section 1.10 Page 44-45	Inspection results for the CWL monitoring systems shall be recorded on the Post-Closure Inspection Forms (PCIFs) included in Attachment 4 of this Permit. Copies of completed forms shall be provided and summarized in the annual CWL post-closure care report. <u>The completed forms shall document in writing the inspector, a notation of the observations made, and the date and nature of any repairs or other corrective actions taken.</u>	Inspection results for the CWL monitoring systems shall be recorded on the Post-Closure Inspection Forms (PCIFs). <u>PCIFs are included in Attachment 4 of this Permit; however, alternative formats may be used to detail the information. The Permittees shall record the results of each inspection conducted in accordance with Section 1.9 of this Permit Attachment. At a minimum, the Permittees shall produce a record of the date and time of the inspection; the name and signature of the inspector; all required inspection parameters, results, and observations; and the date and nature of any repairs or other remedial actions taken (see 40 CFR § 264.15(d)). The Permittees shall ensure that these records are clearly legible, all handwritten information is in ink, and errors are crossed out with a single line, initialed, and dated by the individual making the correction. The records shall be retained for the period of time specified in Section 1.12 of this Permit Attachment.</u> Copies of completed forms shall be provided and summarized in the annual CWL post-closure care report.	<p>Clarify that alternative formats to the inspection forms in Permit Attachment 4 may be used to detail the inspection requirements of Permit Attachment 1, Sections 1.9 and 1.10.</p> <p>The post-closure inspection forms (PCIFs) included in Permit Attachment 4 are representative of the forms that are completed during the inspections. The actual forms are subject to periodic updates and changes (i.e., improvements) over the term of the Permit.</p> <p>Inspection requirements are specified in Permit Part 2, Section 2.3, and in Permit Attachment 1, in Sections 1.9 and 1.10 and in Table 1-6.</p> <p>Changes to the PCIFs will not affect:</p> <ul style="list-style-type: none"> • The schedule or content of the inspections • Compliance with the Permit • Compliance with the requirements of 40 CFR 264.15(d), which specify the inspection results that must be recorded 	<p><i>Class 1 modification.</i> Changes in procedures for maintaining the Operating Record</p> <p>20.4.1.900 NMAC, 40 CFR 270.42 Appendix 1, Modification B.3</p>

Enclosure A
Summary of Changes for Chemical Waste Landfill Post-Closure Care Permit

Item	Permit Location/ Affected Page(s)	Current Language	Proposed Language	Explanation for Change	Modification Class Rationale		
6	Attachment 2 Section 2.0 Page 66	Other instructions are provided in Sandia National Laboratories/NM (SNL/NM) Field Operating Procedures (FOPs), SNL/NM Administrative Operating Procedures (AOPs), <u>and the SNL/NM Statement of Work (SOW) for Analytical Laboratories</u> ; however, the requirements of this SAP and the CWL Post-Closure Care Permit (Permit) shall take precedence over any FOPs, AOPs, <u>or SOWs</u> .	Other instructions are provided in Sandia National Laboratories/NM (SNL/NM) Field Operating Procedures (FOPs), <u>and</u> SNL/NM Administrative Operating Procedures (AOPs); however, the requirements of this SAP and the CWL Post-Closure Care Permit (Permit) shall take precedence over any FOPs <u>and</u> AOPs.	Permit requirements for sample collection and analysis, and for data evaluation, are fully established in Permit Attachment 2 and the referenced AOPs and FOPs. Compliance with the requirements is documented in the Operating Record. The SOW serves only to communicate requirements applicable to laboratory analyses; the SOW does not provide documentation of compliance with the Permit, nor is it part of the Operating Record. Thus a separate review is not necessary.	<i>Class 1 modification.</i> Informational change 20.4.1.900 NMAC, 40 CFR 270.42 Appendix 1, Modification A.1		
7	Attachment 2 Table 2-1 Page 67	<table border="1" style="width: 100%;"> <tr> <td style="width: 30%;">PLA 05-09</td> <td>Groundwater Health and Safety Plan</td> </tr> </table>	PLA 05-09	Groundwater Health and Safety Plan	none	Safety requirements are established in Section 2.9 of Permit Attachment 2. The Health and Safety Plan (HASP) is included in the Operating Record and is available for review. The provisions of the HASP will not prevent the acquisition of representative and reliable groundwater monitoring results under normal operating condition. Thus listing in Table 2-1 and a separate review are not necessary.	<i>Class 1 modification.</i> Informational change 20.4.1.900 NMAC, 40 CFR 270.42 Appendix 1, Modification A.1
PLA 05-09	Groundwater Health and Safety Plan						

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Summary of Changes for Chemical Waste Landfill Post-Closure Care Permit

Item	Permit Location/ Affected Page(s)	Current Language	Proposed Language	Explanation for Change	Modification Class Rationale				
8	Attachment 2 Table 2-1 Page 67	<table border="1"> <tr> <td>Not Applicable</td> <td>SNL/NM Statement of work for Analytical Laboratories</td> </tr> <tr> <td>Not Applicable</td> <td>Quality Assurance Project Plan for the Sample Management Office</td> </tr> </table>	Not Applicable	SNL/NM Statement of work for Analytical Laboratories	Not Applicable	Quality Assurance Project Plan for the Sample Management Office	none	<p>Permit requirements for analyses and data are fully established in Attachment 2 and compliance with the requirements is documented in the Operating Record. The Quality Assurance Project Plan for the Sample Management Office serves only to communicate requirements applicable to laboratory analyses; it does not provide documentation of compliance with the Permit, nor is it part of the Operating Record. Thus listing in Table 2-1 and a separate review are not necessary.</p> <p>Please see Item 6 for discussion of the SOW.</p>	<p><i>Class 1 modification.</i> Informational change</p> <p>20.4.1.900 NMAC, 40 CFR 270.42 Appendix 1, Modification A.1</p>
Not Applicable	SNL/NM Statement of work for Analytical Laboratories								
Not Applicable	Quality Assurance Project Plan for the Sample Management Office								
9	Attachment 2 Section 2.9 Page 69	All groundwater monitoring personnel shall perform field activities safely in accordance with the SNL/NM Groundwater Health and Safety Plan, <u>PLA 05-09</u> .	All groundwater monitoring personnel shall perform field activities safely in accordance with the SNL/NM Groundwater Health and Safety Plan.	<p>The requirement to perform operations safely is sufficient, and citation of the Groundwater Health and Safety Plan (i.e. the specific PLA number) is not required.</p> <p>Please see Item 7 for additional discussion.</p>	<p><i>Class 1 modification.</i> Informational change</p> <p>20.4.1.900 NMAC, 40 CFR 270.42 Appendix 1, Modification A.1</p>				
10	Attachment 2 Section 2.20.2 Page 74	Recovery values for surrogate compounds that are outside specified control limits require corrective action, <u>which is detailed in the SOW for Analytical Laboratories.</u>	Recovery values for surrogate compounds that are outside specified control limits require corrective action.	<p>The Permit specifies that DOE and Sandia follow procedures in SW-846 <i>Test Methods for Evaluating Solid Waste</i> for quality control and verify compliance through data validation. Additional specifications are not necessary. Please see Item 6 for additional discussion.</p>	<p><i>Class 1 modification.</i> Informational change</p> <p>20.4.1.900 NMAC, 40 CFR 270.42 Appendix 1, Modification A.1</p>				

Enclosure A
Summary of Changes for Chemical Waste Landfill Post-Closure Care Permit

Item	Permit Location/ Affected Page(s)	Current Language	Proposed Language	Explanation for Change	Modification Class Rationale
11	Attachment 3 Section 3.6 Page 84	At least two duplicate samples shall be collected and analyzed during each sampling event. A relative percent difference (RPD) of <u>20%</u> or less for each detected VOC is considered to be acceptable. The Permittees shall immediately repeat the sampling and analysis for any sample results where the <u>above specified quality control targets (%REC and RPD) are not met.</u>	At least two duplicate samples shall be collected and analyzed during each sampling event. A relative percent difference (RPD) of <u>50%</u> or less for each detected VOC is considered to be acceptable. <u>An RPD will only be calculated when results for both the environmental and duplicate samples are greater than or equal to five times the laboratory reporting limit.</u> The Permittees shall immediately repeat the sampling and analysis for any sample results where the %REC is not met.	<p>Permit Attachment 3 includes numerous quality assurance/quality control (QA/QC) requirements, including a data validation process specified in Section 3.7. These are sufficient for establishing the quality of the data, and resampling for soil-gas analytes that exhibit an RPD between 20% and 50% is not necessary and is not consistent with current industry standard practice or with the QA/QC requirements for groundwater samples in Permit Attachment 2.</p> <p>Please see Enclosure D for additional information.</p> <p>Revising this QA/QC requirement does not substantially alter the permit conditions or reduce the capacity of DOE/Sandia to protect human health and the environment during post-closure care of the CWL.</p>	<p><i>Other modification.</i> 20.4.1.900 NMAC, 40 CFR 270.42(d)(1)</p> <p>This modification is not explicitly listed in 40 CFR 270.42 Appendix I. However, it can be equated to Modification C.2 "Changes in ground-water sampling or analysis procedures or monitoring schedule, with prior approval of the Director" which is recognized as a Class 1 modification. The soil-gas monitoring is conducted to monitor the presence of constituents in the soil as part of ground-water protection during post-closure care.</p>
12	Attachment 3 Section 3.6 Page 86	<ul style="list-style-type: none"> Using an off-site contract laboratory that <u>complies with the Facility's Sample Management Office (SMO) analytical laboratory statement of work (SOW) and meeting U.S. Environmental Protection Agency (EPA) standards for quality assurance and quality control (QA/QC);</u> 	<ul style="list-style-type: none"> Using an off-site contract laboratory that meets U.S. Environmental Protection Agency (EPA) standards for quality assurance and quality control (QA/QC); 	Please see Items 6 and 10 for additional discussion.	<p><i>Class 1 modification.</i> Informational change</p> <p>20.4.1.900 NMAC, 40 CFR 270.42 Appendix 1, Modification A.1</p>

Enclosure A
Summary of Changes for Chemical Waste Landfill Post-Closure Care Permit

Item	Permit Location/ Affected Page(s)	Current Language	Proposed Language	Explanation for Change	Modification Class Rationale				
13	Attachment 3 Section 3.9 Page 86	The Facility Operating Procedures for these activities, as well as SMO procedures, <u>guidance</u> , and laboratory procedures that apply to the post-closure care soil-gas monitoring program are listed in Table 3-2 and this Permit.	The Facility Operating Procedures for these activities, as well as SMO procedures and laboratory procedures that apply to the post-closure care soil-gas monitoring program are listed in Table 3-2 and this Permit.	Permit requirements for sample collection and analysis, and for data evaluation, are fully established in Permit Attachment 3 and the referenced AOPs and FOPs. Compliance with the requirements is documented in the Operating Record. SMO guidance serves only to communicate requirements and does not provide documentation of compliance with the Permit, nor is it part of the Operating Record. Please see Item 14 for additional discussion.	<i>Class 1 modification.</i> Informational change 20.4.1.900 NMAC, 40 CFR 270.42 Appendix 1, Modification A.1				
14	Attachment 3 Table 3-2 Page 87	<table border="1" style="width: 100%;"> <tr> <td style="width: 10%; text-align: center;">NA</td> <td>SNL/NM SOW for Analytical Laboratories</td> </tr> <tr> <td style="text-align: center;">NA</td> <td>Quality Assurance Project Plan for the Sample Management Office</td> </tr> </table>	NA	SNL/NM SOW for Analytical Laboratories	NA	Quality Assurance Project Plan for the Sample Management Office	none	Permit requirements for analyses and data are fully established in Attachment 3 and compliance with the requirements is documented in the Operating Record. Thus listing in Table 3-2 and a separate review are not necessary. Please see Items 6 and 8 for additional discussion.	<i>Class 1 modification.</i> Informational change 20.4.1.900 NMAC, 40 CFR 270.42 Appendix 1, Modification A.1
NA	SNL/NM SOW for Analytical Laboratories								
NA	Quality Assurance Project Plan for the Sample Management Office								
15	Attachment 4 Page 98	PERMIT ATTACHMENT 4: INSPECTION FORMS	PERMIT ATTACHMENT 4: INSPECTION FORMS <u>Note: The Inspection Forms are provided in a specific format; however, alternative formats may be used to detail the information.</u>	Clarify that the format of the inspection forms in this Permit Attachment can be changed. Please see Item 5 for additional discussion.	<i>Class 1 modification.</i> Changes in procedures for maintaining the Operating Record 20.4.1.900 NMAC, 40 CFR 270.42 Appendix 1, Modification B.3				

Enclosure B

Sandia National Laboratories

Permit NM5890110518

Chemical Waste Landfill Post-Closure Care

Revised Pages, Redline / Strikeout Format

Permit Part 3

Permit Attachments 1 through 4

3.2.5. Future Land Use Requirements

The Permittees shall not allow any use of the CWL that will disturb the integrity of the final cover or the function of the unit's monitoring systems during the post-closure care period, as required by 40 C.F.R. § 264.117(c).

3.3. INSPECTION

The Permittees shall inspect the components, structures, and equipment at the CWL in accordance with the Inspection and Maintenance/Repair Schedule described in Section 1.9 of Attachment 1 of this Permit and shall record the results of each inspection as described in Section 1.10 of Permit Attachment 1 using the Inspection Checklists in Permit Attachment 4, and in accordance with the inspection requirements of 40 C.F.R. § 264.15.

3.4. GROUNDWATER SAMPLING AND ANALYSIS PLAN

The Permittees shall conduct groundwater sampling and analysis following the procedures and requirements described in Attachments 1 and 2 of this Permit.

3.5. SOIL GAS SAMPLING AND ANALYSIS

The Permittees shall conduct soil-gas sampling and analysis following the procedures and requirements described in Attachments 1 and 3 of this Permit.

3.6. PERSONNEL TRAINING FOR POST-CLOSURE CARE PERIOD

The Permittees shall implement the CWL-specific personnel training program for the post-closure care period specified in Attachment 5 of this Permit, and as required by 40 C.F.R. § 264.16.

3.7. POST-CLOSURE PERMIT MODIFICATIONS

In accordance with 40 C.F.R. § 264.118(d), the Permittees must request a permit modification to authorize a change in this Permit. This request must be in accordance with applicable requirements of 40 C.F.R. Part 270 and 20.4.1.901 NMAC, and must include a copy of the proposed amended portions of this Permit for approval by the Department. The Permittees shall request a permit modification whenever changes in operating plans or facility design affect any part of this Permit, there is a change in the expected year of final closure, or other events occur during the post-closure care period of the CWL that affect this Permit. The Permittees must submit a written request for a permit modification to the Department at least sixty (60) days prior to the proposed change in CWL design or operation, or no later than 60 days after an unexpected event has occurred which has affected the post-closure care requirements contained in this Permit.

3.8. REFERENCES

Dinwiddie, R.S, September 24, 1997. Letter to M.J. Zamorski (U.S. Department of Energy), "Request for Supplemental Information: Background Concentrations Report, SNL/KAFB." New Mexico Environment Department.

Tharp, T.L, February 25, 1999. Memorandum to F.B. Nimick (Sandia National Laboratories/New Mexico), "Tritium Background Data Statistical Analysis for Site-Wide Surface Soils." Sandia National Laboratories/New Mexico.

1.4.2. Soil-Gas Monitoring System

The post-closure care soil-gas monitoring program is designed to ensure the protection of groundwater quality by providing data to be used to analyze whether the VOC soil-gas plume has the potential to contaminate groundwater. The VOC soil-gas monitoring system shall include a network of five former VE/injection wells designed to monitor the vadose zone at various depths beneath the CWL in the area most contaminated by past disposal of organic liquid waste. The monitoring network shall include the following wells that are shown in Figures 6 and 10. Depth-specific sampling ports are shown in Figure 10 and are also indicated as follows for each soil-gas monitoring well:

- D1—Sampling Ports at 100, 160, 240, 350, and 470 feet bgs (5 ports)
- D2—Sampling Ports at 120, 240, 350, 440, and 470 feet bgs (5 ports)
- D3—Sampling Ports at 120, 170, 350, 440, and 480 feet bgs (5 ports)
- UI1—Sampling Ports at 40, 80, and 120 feet bgs (3 ports)
- UI2—Sampling Ports at 36, 76, and 136 feet bgs (3 ports)

Well completion diagrams for all of the soil-gas monitoring wells are provided in Attachment 3 of this Permit. BaroBalls™ or equivalent passive venting equipment may be maintained on all soil-gas and groundwater monitoring wells. The BaroBall™ or equivalent passive venting equipment allows controlled, passive soil-gas venting to the atmosphere and helps prevent the downward migration of VOC soil gas in the well casing. These devices seal on the top of the well casing to allow soil gas to vent to the atmosphere during periods of low barometric pressure and prevent soil gas from being driven downward during periods of high atmospheric pressure. The BaroBall™ or equivalent passive venting device replaces the cap where it is installed on a well. Figure 11 shows how the BaroBall™ device works.

1.5. DESCRIPTION OF STORM-WATER DIVERSION STRUCTURES

The function of the storm-water diversion features associated with the CWL shall be to prevent storm-water run-on and run-off from eroding the cover and to reduce the amount of water that could potentially infiltrate into the cover. Drainage features designed to control surface-water run-on and run-off are shown in Figure 12. A culvert at the southeastern corner of the CWL diverts the existing road ditch drainage from the east (north side of the road) under the asphalt road and to the south. This diversion prevents surface water coming from the east from flowing over the southern footprint of the CWL (Figures 6 and 12). Existing and new road ditches and swales channel surface water along the southern, western, and northern sides of the cover to the north and west, respectively, away from the cover (Figures 6 and 12). The revegetated, gently sloping topography (approximately 3-percent grade from east to west) and slight northeast and southeast inflection to the east of the landfill will prevent significant run-on by directing the upgradient surface water toward the northern and southern boundary swales (Figure 12). Surface water that falls directly on the cover shall be diverted toward the boundary swales that intersect at the northwestern and southwestern corners of the site.

1.9.1. Final Cover System Inspection/Maintenance/Repair

1.9.1.1. *Vegetation Inspection and Monitoring*

Cover vegetation monitoring shall be accomplished in a two-phase approach. The first phase shall concentrate on establishing the vegetation on the cover from seed to a mature plant community. This phase is anticipated to take from three to five years. If the criteria for successful revegetation (per Section 1.9 of this Permit Attachment) are not met within five years of the effective date of this Permit, the Permittees shall submit a plan to the Department for approval that describes the work that will be done to rectify the problem. Normal succession processes should occur and continue once native flora has been established, which is when native perennials comprise 50% of the 20% foliar coverage. During this period, a staff biologist shall inspect and document the inventory of the main flora populating the cover on a quarterly basis, inspect the cover for contiguous areas lacking vegetation in excess of 200 square feet, and recommend soil augmentations, surface scarification, reseeding, or other corrective actions as deemed appropriate to establish a long-term sustainable native plant community. During this monitoring period, the staff biologist shall also be responsible for noting and interpreting signs of animal intrusion. These inspections shall be documented as specified in Section 1.10 of this Permit Attachment~~on the Biology Checklist for the CWL Cover inspection form (Attachment 4 of this Permit)~~. At the end of the fourth quarter of each year, the staff biologist shall compile the results of the quarterly inspections in a summary report that shall be included in the annual CWL post-closure care report submitted to the Department.

Once native flora has been established in a self-sustaining manner on the cover, the second phase of monitoring shall begin. Cover vegetation monitoring by the staff biologist shall transition to an annual frequency to assess the overall health of the cover vegetation. Based upon those observations, the staff biologist shall recommend in writing any soil augmentation, surface scarification, and reseeding as necessary to meet the criteria for successful re-vegetation as defined in Section 1.9 of this Permit Attachment. The Permittees shall implement corrective actions in consideration of the staff biologist's recommendations within 60 days of receipt of the recommendations, except as noted in Section 1.9.1.3 and Table 1-6 of this Permit Attachment. The results of the staff biologist's inspections shall be reported in each of the annual post-closure care reports to be submitted to the Department.

1.9.1.2. *Cover Inspection*

A qualified technician shall perform cover inspections on a quarterly basis. Settlement of the cover surface in excess of 6 inches, erosion of the cover soil in excess of 6 inches deep, areas of ponding water on the CWL cover surface in excess of 100 square feet, animal intrusion burrows in excess of 4 inches in diameter, contiguous areas lacking vegetation in excess of 200 square feet, and any other conditions that may impact the cover's integrity shall be noted as specified in Section 1.10 of this Permit Attachment~~on the Cover Inspection Checklist (Attachment 4 of this Permit)~~. Documentation of animal intrusion burrows in excess of 4 inches in diameter and contiguous areas lacking vegetation in excess of 200 square feet may be noted quarterly as part of the vegetation inspection and monitoring~~on the Biology Checklist for the CWL Cover (Attachment 4 of this Permit)~~ instead of the Cover Inspection Checklist.

wellhead covers/caps/locks, soil-gas sampling ports, well identification markings, and passive venting BaroBalls™ or equivalent. Groundwater pumps and sample tubing shall be inspected during each sampling event (pumps are not dedicated to the wells). Pump replacement and maintenance/repair and tubing replacement shall be performed on an as-needed basis based upon pump and tubing performance, inspections, and review of analytical sampling results.

1.9.3.2. *Maintenance/Repair*

The monitoring well components shall be maintained/repared/replaced as needed within 60 days of discovery of any needed repairs. Maintenance/repair activities shall also include ensuring that all monitoring well components are protected from the weather.

1.9.4. **Security Fence Inspection/Maintenance/Repair**

1.9.4.1. *Inspection*

The fence, gates, locks, and warning signs at the CWL shall be inspected on a quarterly basis. The inspections shall document in writing the condition of the fence, including fence wires, posts, gates, gate locks, and warning signs, and note excessive accumulations of wind-blown plants and debris that would obscure warning signs, block access to the CWL, or interfere with any of the groundwater or soil-gas monitoring network components, or any sampling using said components. Local survey benchmarks and/or monuments shall also be inspected.

1.9.4.2. *Maintenance/Repair*

The fence, gates, locks, warning signs, and survey benchmarks and monuments shall be maintained/repared within 60 days of discovery by routine inspections. Activities may include, but are not limited to, removing excessive accumulations of wind-blown plants and debris, repairing broken wire sections and posts, repairing and oiling gates, cleaning or replacing locks, repairing or replacing warning signs, and removing excess soil and/or vegetation covering survey monuments. Maintenance records shall be maintained with the PCIFs.

1.10. **INSPECTION SCHEDULE, CORRECTIVE ACTIONS, AND RECORDED RESULTS**

A schedule for implementing inspections and prescribed maintenance of the CWL cover, surface-water drainage features, monitoring network, and access controls is provided in Table 1-6. Inspection results for the CWL monitoring systems shall be recorded on the Post-Closure Inspection Forms (PCIFs). PCIFs are included in Attachment 4 of this Permit; however, alternative formats may be used to detail the information. The Permittees shall record the results of each inspection conducted in accordance with Section 1.9 of this Permit Attachment. At a minimum, the Permittees shall produce a record of the date and time of the inspection; the name and signature of the inspector; all required inspection parameters, results, and observations; and the date and nature of any repairs or other remedial actions taken (see 40 CFR § 264.15(d)). The Permittees shall ensure that these records are clearly legible, all handwritten information is in ink, and errors are crossed out with a single line, initialed, and dated by the individual making the correction. The records shall be retained for the period of time specified in Section 1.12 of this Permit Attachment. Copies of completed forms shall be provided and summarized in the annual CWL post-closure care report. The completed forms shall document in writing the inspector, a notation of the observations made, and the date and nature

~~of any repairs or other corrective actions taken.~~ Incomplete inspection forms shall be considered representative of incomplete inspections, and shall constitute a violation of this Permit.

Repairs and maintenance shall be undertaken to ensure protection of human health and the environment and mitigate any potential hazards. If an inspection of the CWL reveals that a non-emergency problem has developed, the needed repairs, maintenance, or replacement shall be initiated within three days, unless circumstances beyond the control of the Permittees cause further delay. The Permittees shall limit any such delays to as short a time period as reasonably possible. Repairs shall not take longer than 60 days to complete. If a hazard appears imminent or a hazardous situation already exists, remedial action shall be initiated immediately. Any action taken pursuant to an inspection shall be noted on the CWL PCIF. If any identified hazard meets the definition of an emergency, as specified in Section 1.14 of this Permit Attachment, the Facility's Contingency Plan for the CWL shall be implemented by the Permittees, and required notification procedures shall be followed. The Permittees shall report to the Department any remedial activities related to an emergency within one (1) business day.

1.11. PERSONNEL TRAINING

The personnel training program for inspection, monitoring, maintenance and repair of the CWL during the compliance monitoring and post-closure care periods is included in this Permit as Attachment 5. All personnel working at the CWL shall be trained, at a minimum, in accordance with the requirements of this Permit.

PERMIT ATTACHMENT 2: GROUNDWATER SAMPLING AND ANALYSIS PLAN

2.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) provides additional requirements that shall be adhered to by the Permittees for the collection and analysis of water samples from groundwater monitoring wells located at the Chemical Waste Landfill (CWL) during the post-closure care and compliance monitoring periods. The post-closure care and compliance groundwater monitoring program is designed to address the requirements of 40 C.F.R. Part 264 Subpart F.

The Permittees must comply with the groundwater protection standard at 40 C.F.R. § 264.92. The hazardous constituents that shall be monitored in accordance with 40 C.F.R. § 264.93 are trichloroethene, chromium, and nickel. Additionally, in accordance with 40 C.F.R. § 264.99(g), the Permittees shall collect and analyze water samples for an enhanced list of constituents (see Section 1.8.1.1 of Permit Attachment 1 for the enhanced list of constituents) at least annually from wells located at the point of compliance and the background well.

The purpose of this SAP is to document procedures for the collection and reporting of consistent, reliable, defensible, and comparable groundwater sampling results. This SAP provides additional instructions for sample collection, data management, and reporting of data that shall be adhered to during the post-closure care and compliance periods. Other instructions are provided in Sandia National Laboratories/NM (SNL/NM) Field Operating Procedures (FOPs), and SNL/NM Administrative Operating Procedures (AOPs), ~~and the SNL/NM Statement of Work (SOW) for Analytical Laboratories~~; however, the requirements of this SAP and the CWL Post-Closure Care Permit (Permit) shall take precedence over any FOPs, and AOPs, ~~or SOWs~~. Table 2-1 summarizes documents that are referenced in this SAP, which can be obtained from the SNL/NM Environmental Safety and Health (ES&H) and Security Records Center. The most current versions of these documents shall be consulted for the purpose of conducting groundwater sampling.

The Permittees shall provide to the New Mexico Environment Department (the Department) within 60 days of the effective date of this Permit in hard copy and electronic format the current versions of the FOPs and AOPs listed above. The Permittees shall provide the Department with any updated versions of the FOPs/AOPs within 30 days of their acceptance by the Permittees. If any requirement or procedure in the FOPs or AOPs is found by the Department to be unacceptable for reasons including, but not limited to, the requirement or procedure will or could prevent the acquisition of representative and reliable groundwater sampling results, the requirement or procedure shall be replaced by the Permittees with a different requirement or procedure that is acceptable to the Department.

2.1. DATA QUALITY OBJECTIVES AND QUALITY CONTROL

The data quality objective (DQO) for groundwater monitoring is to collect accurate and defensible data of high quality to assess the concentrations of hazardous constituents in the groundwater in the uppermost aquifer underlying the CWL such that they can be compared to the concentration limits in Table 1-2 in Permit Attachment 1, as it may be amended. The Permittees shall evaluate accuracy, precision, representativeness, completeness, and comparability of the groundwater data to verify that data are of high quality and ensure that the DQO is met. Quality control (QC) procedures discussed in Section 2.20 of this Permit Attachment shall also be used to determine whether the DQO has been attained. QC samples generated in both the field and the laboratory shall be analyzed and evaluated.

Laboratory measurements shall comply with SNL/NM Sample Management Office (SMO) procedures and protocols listed in Table 2-1, including qualification or validation of laboratory analytical data, and shall also comply with this Permit. This procedure for determining the quality and usability of analytical data acquired during groundwater sampling shall be summarized in data validation reports regarding the overall quality of the data and the resulting data qualifiers. All associated data validation reports shall be submitted to the Department in the post-closure care annual report along with the results for each monitoring event. Data not meeting DQO requirements are subject to corrective action(s) as discussed in SNL/NM SMO procedures and protocol and as discussed in Section 2.22 of this Permit Attachment.

TABLE 2-1
Reference Documentation
CWL Groundwater Monitoring^a

Document Number	Document Title
AOP 00-03	Data Validation Procedure for Chemical and Radiochemical Data
AOP 95-16	Sample Management and Custody
FOP 05-01	Groundwater Monitoring Well Sampling and Field Analytical Measurements
FOP 05-02	Groundwater Monitoring Equipment Field Check For Water Quality Measurements
FOP 05-03	Groundwater Sampling Equipment Decontamination
FOP 05-04	Groundwater Monitoring Waste Management
LOP 94-03	Sample Handling, Packaging, and Shipping
PLA 05-09	Groundwater Health and Safety Plan
SMO 05-03	Procedure for Completing the Contract Verification Review
Not Applicable	SNL/NM Statement of work for Analytical Laboratories
Not Applicable	Quality Assurance Project Plan for the Sample Management Office

^a Sandia National Lab's Documents (procedures/documents will be used as revised and updated).

2.2. ACCURACY

Accuracy is the agreement between a measured value and an accepted reference value. When applied to a set of observed values, accuracy is influenced by a combination of a random component and a systematic bias. Accuracy shall be maintained and evaluated through referenced calibration standards, laboratory control samples (LCS), matrix spike (MS) samples, and surrogate spike samples. The bias component shall be evaluated and expressed as percent recovery (%R), as indicated in the equation below:

$$\%R = \frac{(\text{measure sample concentration})}{\text{true concentration}} \times 100\%$$

The acceptable range for %R shall be 50-130% for volatile organic compounds (VOCs) and 75-125% for metals.

analyzed for trichloroethene (TCE), chromium (Cr), and nickel (Ni). Additionally, in accordance with 40 C.F.R. § 264.99(g), the Permittees shall collect and analyze water samples at least annually from wells located at the point of compliance and analyze them for an enhanced list of constituents (see Section 1.8.1.1 of Permit Attachment 1 for the enhanced list of constituents). The Permittees shall conduct semi-annual (twice each year) groundwater sampling for the entire compliance and post-closure care-periods, with one of these events each year including the enhanced sampling list (see Section 1.8.1.1 of Permit Attachment 1 for the enhanced list of constituents). Aqueous samples shall be reported in units of milligrams per liter (mg/L) or micrograms (µg)/L.

**TABLE 2-2
 CWL Groundwater Monitoring Wells and Sampling Frequency**

Well Number	Installation Year	Semi-Annual Sampling		Comments
		TCE	Cr, Ni	
CWL-BW5	2010	X	X	Upgradient well.
CWL-MW9	2010	X	X	Downgradient well
CWL-MW10	2010	X	X	Downgradient well
CWL-MW11	2010	X	X	Downgradient well

Note: Refer to Table 2-3 for specific information regarding analytical methods and constituents.

2.8. FIELD OPERATIONS

Groundwater sampling shall be conducted in accordance with this SAP and this Permit to ensure accurate, precise, representative, complete, and comparable groundwater sampling results. Other groundwater monitoring activities shall include the measurement of water levels and calculating the direction, flow rate, and gradient of groundwater flow, the decontamination of equipment, inspection of monitoring equipment, monitoring field water quality parameters, collecting and handling samples, and managing waste.

2.9. SAFETY

Field operations shall be conducted in a manner that protects the health and safety of field personnel. Every team member has the authority and responsibility to stop operations if an unsafe condition develops or is observed. All groundwater monitoring personnel shall perform field activities safely in accordance with the SNL/NM Groundwater Health and Safety Plan, PLA-05-09.

2.10. WATER LEVEL MEASUREMENTS

Water level information is used to calculate the volume of water in a well casing and the minimum amount required for purging. It is also used to determine the direction and gradient of groundwater flow, as required by 40 C.F.R. § 264.99(e). Measurements shall be referenced to a surveyed mark of known elevation at the top of each well casing. The static water level shall be measured in each well prior to purging or obtaining a sample, and measurements shall be taken to the nearest 0.01-foot using a water level indicator. Other requirements for water level measurements are provided in SNL/NM FOP 05-01. Water levels in all compliance wells shall be measured during every sampling event.

samples from the sampling system to the sample container. Field blank samples shall be collected and analyzed at a frequency of 10 percent (minimum of one per sampling event).

Trip blanks (TBs) are used to assess the potential for cross-contamination between environmental samples during sample handling and shipping activities. The TBs are to be analyzed for VOCs (including TCE) only. Each batch of groundwater samples to be analyzed for VOCs shall be accompanied by at least one TB during shipping. The Analytical Laboratory shall prepare the TB by filling a VOC-sample vial with deionized water and using the same sample preservation method designated for VOC environmental samples. Each vial shall be sealed with custody tape and dated when it is prepared. The TBs shall accompany the empty sample containers when they are shipped to the field supervisor prior to the start of sample collection. The TBs shall be taken into the field during sample collection and shall be included in the shipment of environmental samples to the laboratory. The TBs must remain sealed during this entire cycle and may be opened only for analysis on return to the analytical laboratory.

2.20.2. Laboratory Quality Control

The analytical laboratory must have established procedures that demonstrate the analytical process is always in control during each sample analysis step. The procedures include Laboratory Control Samples (LCSs), method blank samples, and Matrix Spike (MS) samples.

A LCS consists of a control matrix (e.g., deionized water) spiked with known concentrations of analytes representative of the target analytes. LCSs shall be prepared and analyzed for each analytical procedure performed. LCSs shall be analyzed with each analytical batch containing environmental samples to determine accuracy of the data. The laboratory shall also evaluate the precision of the data by analyzing twice either the environmental samples, LCSs, or MS samples and calculating the RPD between corresponding results.

Method blank samples shall be used to check for contamination in the laboratory during sample preparation and analysis. Method blank samples shall be concurrently prepared and analyzed with each analytical batch. Method blanks shall be reported in the same units as corresponding environmental samples, and the results shall be included with each analytical report.

Surrogate spike analysis shall be performed for all samples analyzed by Gas Chromatography/Mass Spectroscopy. The surrogate compounds added to the sample shall be those specified in the applicable EPA analytical method procedure (EPA November 1986). Recovery values for surrogate compounds that are outside specified control limits require corrective action, which is detailed in the SOW for Analytical Laboratories.

The analytical process shall be systematically evaluated for the effects of indigenous constituents present in the environmental sample matrix. MS/matrix spike duplicate (MSD) analyses shall be performed in accordance with the specified analytical procedures.

2.21. DATA VALIDATION, REVIEW, AND REPORTING

Data validation and review of analytical and field documentation shall be performed. Field and analytical QC data shall be reviewed for conformance to QC acceptance criteria. The entire data package shall be reviewed for completeness, comparability, representativeness, precision, and accuracy to determine whether the DQO has been met. All groundwater monitoring data shall be reported in the CWL post-closure care annual reports for the year for which the data were obtained

3.4. DATA QUALITY OBJECTIVES

Appropriate sampling locations, depths, number of samples collected per event, and sampling frequency are required to ensure that the data are representative of site conditions and meet the objectives of this SAP. The main Data Quality Objective (DQO) is to produce representative, accurate, defensible, and comparable soil-gas analytical results. This SAP is designed to ensure that post-closure care soil-gas monitoring procedures meet the DQO. The DQO shall be accomplished by implementing standard field methods, analytical procedures/methods, and data validation and evaluation protocols consistent with the historic soil-gas monitoring program.

3.5. SAMPLING LOCATIONS AND FREQUENCY

3.5.1. Sample Locations

Soil-gas data shall be collected from within the plume core and at various distances laterally and vertically from the core. Figure 4 shows the configuration of the plume based upon the data set collected in September 2004. The monitoring network shall include five wells equipped with a total of 21 depth-specific sampling ports specifically designed for soil-gas monitoring. Well completion diagrams are presented in Section 3 of this Permit Attachment. The five wells and associated depth-specific sampling ports are listed in Table 3-1 and shown in Figure 10. Well construction diagrams are provided in Appendix 3-1 of Attachment 3. The five soil-gas monitoring wells are spatially located to monitor the area of the vadose zone most affected by past disposal of organic liquid waste. The deepest sampling ports from wells CWL-D1 through D3 (Port 1 in each of these wells) are located in the vadose zone immediately above the capillary fringe zone and water table.

3.5.2. Frequency

Soil-gas sampling shall be conducted annually during the post-closure care period. All sampling locations shown in Table 3-1 and Figure 10 shall be sampled.

3.6. DATA ACCURACY

The Permittees shall follow proper sampling procedures, including purging, preparation of sampling containers, and use of quality assurance/quality control (QA/QC) samples. Accurate estimates of contaminant concentrations shall be obtained through use of qualified laboratories, appropriate analytical methods, and effective QA/QC procedures.

A range in deviation from actual (true) concentration of 50-130% (percent recovered or %REC) for each detected VOC shall be considered acceptable.

At least two duplicate samples shall be collected and analyzed during each sampling event. A relative percent difference (RPD) of ~~20~~50% or less for each detected VOC is considered to be acceptable. An RPD will only be calculated when results for both the environmental and duplicate sample are greater than or equal to five times the laboratory reporting limit. The Permittees shall immediately repeat the sampling and analysis for any sample results where the above-specified quality control targets (~~%REC and RPD~~) are is not met.

3.7. DATA CONSISTENCY AND COMPARABILITY

Future soil-gas monitoring results must be comparable with historic VOC soil-gas data sets. The Permittees shall maintain consistency in methods and procedures by conducting sampling and analysis:

- Using consistent field sample collection and management methods;
- Using an off-site contract laboratory that ~~complies with the Facility's Sample Management Office (SMO) analytical laboratory statement of work (SOW) and meets~~ U.S. Environmental Protection Agency (EPA) standards for quality assurance and quality control (QA/QC);
- Using soil-gas analytical method EPA Compendium Method TO-14 (EPA January 1999) or equivalent; and
- Using the soil-gas analytical data review and validation procedure in Administrative Operating Procedure (AOP) 00-03.

After soil-gas analytical results are received from the laboratory, the Permittees shall review the laboratory report for completeness and conformance to the performance criteria, and arrange for data validation. If problems are noted that require corrective action during these verification and validation reviews, corrective action shall be implemented. The scope of the data verification and validation process shall address field sample management and custody requirements, as well as adherence to QA/QC requirements by the off-site laboratory performing the analyses. These processes are discussed in more detail in Section 3.10 of this Permit Attachment.

3.8. MONITORING ACTIVITIES

This section describes the field and laboratory procedures that shall be followed to produce soil-gas analytical results that meet the requirements of this Permit.

3.9. FIELD SAMPLING

The methods and procedures used to obtain soil-gas samples for laboratory analysis are described below in Sections 3.9.1 through 3.9.3. Additional measurements beyond those described in this SAP may be obtained to support evaluation of the soil-gas plume.

Activities that shall be conducted by the Permittees in preparation for or during soil-gas sampling include:

- Pre-field work planning;
- Vacuum check of SUMMA[®] canisters;
- Visual inspection of all CWL soil-gas wells and sampling ports;
- Purging and field estimation of total VOC concentration;
- Sample acquisition;
- Sample container documentation and packaging; and
- Sample delivery to laboratory within the method holding time.

The Facility Operating Procedures for these activities, as well as SMO procedures ~~guidance~~ and laboratory procedures that apply to the post-closure care soil-gas monitoring program are listed in Table 3-2 and this Permit. All personnel directly involved in field activities related to soil-gas monitoring shall review and abide by these procedures.

The Permittees shall provide to the New Mexico Environment Department (the Department) within sixty (60) days of the effective date of this Permit in hard copy and electronic format the current versions of the FOPs and AOPs listed in Table 3-2. The Permittees shall provide the Department with any updated versions of the FOPs/AOPs within 30 days of their acceptance by the Permittees. If any requirement or procedure in the FOPs or AOPs is found by the Department to be unacceptable for reasons including, but not limited to, the requirement or procedure will or could prevent the acquisition of representative and reliable soil-gas sampling results, the requirement or procedure shall be replaced by the Permittees with a different requirement or procedure that is acceptable to the Department. The requirements of this SAP take precedence over those of any FOP or AOPs listed in Table 3-2.

TABLE 3-2
Reference Documentation
CWL Post-Closure Care Soil-Gas Monitoring^a

FOP or AOP	Title
FOP 08-22	Soil Vapor Sampling
AOP 95-16	Sample Management and Custody
AOP 00-03	Data Validation Procedure for Chemical and Radiochemical Data
LOP 94-03	Sample Handling, Packaging, and Shipping
SMO 05-03	Procedure for Completing the Contract Verification Review
NA	SNL/NM SOW for Analytical Laboratories
NA	Quality Assurance Project Plan for the Sample Management Office

^aSandia National Lab's Documents (procedures/documents will be used as revised and updated):

- FID = Flame Ionization Detector.
- NA = Not applicable.
- PID = Photoionization Detector.

3.9.1. Pre-Field Sampling Preparations

Prior to initiating soil-gas sampling, field personnel shall ensure that all necessary equipment is ready and properly functioning in accordance with applicable FOPs and this Permit and that the necessary arrangements have been made with the SMO and off-site analytical laboratory for sample shipment and analysis. As appropriate, operating procedures shall be reviewed and support personnel notified.

3.9.2. Purging and Field Estimation of Total Concentration of VOCs

At the wellhead, a vacuum pump connected to the sample tubing via a Swagelok[®] or equivalent fitting shall be used to purge stagnant and/or pre-existing soil gas from the monitoring ports and sample tubing. The stream of soil gas extracted from the sampling port shall be screened with a photoionization detector (PID) containing an ultraviolet lamp with an ionization potential of 11.8 electron volts. PID measurements shall be monitored during purging and recorded in the field book

PERMIT ATTACHMENT 4: INSPECTION FORMS

Note: The Inspection Forms are provided in a specific format; however, alternative formats may be used to detail the information

Enclosure C

**Sandia National Laboratories
EPA ID NM5890110518**

**Permit NM5890110518
Chemical Waste Landfill Post-Closure Care**

**Revised Pages, Final
Permit Part 3
Permit Attachments 1 through 4**

3.2.5. Future Land Use Requirements

The Permittees shall not allow any use of the CWL that will disturb the integrity of the final cover or the function of the unit's monitoring systems during the post-closure care period, as required by 40 C.F.R. § 264.117(c).

3.3. INSPECTION

The Permittees shall inspect the components, structures, and equipment at the CWL in accordance with the Inspection and Maintenance/Repair Schedule described in Section 1.9 of Attachment 1 of this Permit and shall record the results of each inspection as described in Section 1.10 of Permit Attachment 1, and in accordance with the inspection requirements of 40 C.F.R. § 264.15.

3.4. GROUNDWATER SAMPLING AND ANALYSIS PLAN

The Permittees shall conduct groundwater sampling and analysis following the procedures and requirements described in Attachments 1 and 2 of this Permit.

3.5. SOIL GAS SAMPLING AND ANALYSIS

The Permittees shall conduct soil-gas sampling and analysis following the procedures and requirements described in Attachments 1 and 3 of this Permit.

3.6. PERSONNEL TRAINING FOR POST-CLOSURE CARE PERIOD

The Permittees shall implement the CWL-specific personnel training program for the post-closure care period specified in Attachment 5 of this Permit, and as required by 40 C.F.R. § 264.16.

3.7. POST-CLOSURE PERMIT MODIFICATIONS

In accordance with 40 C.F.R. § 264.118(d), the Permittees must request a permit modification to authorize a change in this Permit. This request must be in accordance with applicable requirements of 40 C.F.R. Part 270 and 20.4.1.901 NMAC, and must include a copy of the proposed amended portions of this Permit for approval by the Department. The Permittees shall request a permit modification whenever changes in operating plans or facility design affect any part of this Permit, there is a change in the expected year of final closure, or other events occur during the post-closure care period of the CWL that affect this Permit. The Permittees must submit a written request for a permit modification to the Department at least sixty (60) days prior to the proposed change in CWL design or operation, or no later than 60 days after an unexpected event has occurred which has affected the post-closure care requirements contained in this Permit.

3.8. REFERENCES

Dinwiddie, R.S, September 24, 1997. Letter to M.J. Zamorski (U.S. Department of Energy), "Request for Supplemental Information: Background Concentrations Report, SNL/KAFB." New Mexico Environment Department.

Tharp, T.L, February 25, 1999. Memorandum to F.B. Nimick (Sandia National Laboratories/New Mexico), "Tritium Background Data Statistical Analysis for Site-Wide Surface Soils." Sandia National Laboratories/New Mexico.

1.4.2. Soil-Gas Monitoring System

The post-closure care soil-gas monitoring program is designed to ensure the protection of groundwater quality by providing data to be used to analyze whether the VOC soil-gas plume has the potential to contaminate groundwater. The VOC soil-gas monitoring system shall include a network of five former VE/injection wells designed to monitor the vadose zone at various depths beneath the CWL in the area most contaminated by past disposal of organic liquid waste. The monitoring network shall include the following wells that are shown in Figures 6 and 10. Depth-specific sampling ports are shown in Figure 10 and are also indicated as follows for each soil-gas monitoring well:

- D1—Sampling Ports at 100, 160, 240, 350, and 470 feet bgs (5 ports)
- D2—Sampling Ports at 120, 240, 350, 440, and 470 feet bgs (5 ports)
- D3—Sampling Ports at 120, 170, 350, 440, and 480 feet bgs (5 ports)
- UI1—Sampling Ports at 40, 80, and 120 feet bgs (3 ports)
- UI2—Sampling Ports at 36, 76, and 136 feet bgs (3 ports)

Well completion diagrams for all of the soil-gas monitoring wells are provided in Attachment 3 of this Permit. BaroBalls™ or equivalent passive venting equipment may be maintained on all soil-gas and groundwater monitoring wells. The BaroBall™ or equivalent passive venting equipment allows controlled, passive soil-gas venting to the atmosphere and helps prevent the downward migration of VOC soil gas in the well casing. These devices seal on the top of the well casing to allow soil gas to vent to the atmosphere during periods of low barometric pressure and prevent soil gas from being driven downward during periods of high atmospheric pressure. The BaroBall™ or equivalent passive venting device replaces the cap where it is installed on a well. Figure 11 shows how the BaroBall™ device works.

1.5. DESCRIPTION OF STORM-WATER DIVERSION STRUCTURES

The function of the storm-water diversion features associated with the CWL shall be to prevent storm-water run-on and run-off from eroding the cover and to reduce the amount of water that could potentially infiltrate into the cover. Drainage features designed to control surface-water run-on and run-off are shown in Figure 12. A culvert at the southeastern corner of the CWL diverts the existing road ditch drainage from the east (north side of the road) under the asphalt road and to the south. This diversion prevents surface water coming from the east from flowing over the southern footprint of the CWL (Figures 6 and 12). Existing and new road ditches and swales channel surface water along the southern, western, and northern sides of the cover to the north and west, respectively, away from the cover (Figures 6 and 12). The revegetated, gently sloping topography (approximately 3-percent grade from east to west) and slight northeast and southeast inflection to the east of the landfill will prevent significant run-on by directing the upgradient surface water toward the northern and southern boundary swales (Figure 12). Surface water that falls directly on the cover shall be diverted toward the boundary swales that intersect at the northwestern and southwestern corners of the site.

1.9.1. Final Cover System Inspection/Maintenance/Repair

1.9.1.1. *Vegetation Inspection and Monitoring*

Cover vegetation monitoring shall be accomplished in a two-phase approach. The first phase shall concentrate on establishing the vegetation on the cover from seed to a mature plant community. This phase is anticipated to take from three to five years. If the criteria for successful revegetation (per Section 1.9 of this Permit Attachment) are not met within five years of the effective date of this Permit, the Permittees shall submit a plan to the Department for approval that describes the work that will be done to rectify the problem. Normal succession processes should occur and continue once native flora has been established, which is when native perennials comprise 50% of the 20% foliar coverage. During this period, a staff biologist shall inspect and document the inventory of the main flora populating the cover on a quarterly basis, inspect the cover for contiguous areas lacking vegetation in excess of 200 square feet, and recommend soil augmentations, surface scarification, reseeding, or other corrective actions as deemed appropriate to establish a long-term sustainable native plant community. During this monitoring period, the staff biologist shall also be responsible for noting and interpreting signs of animal intrusion. These inspections shall be documented as specified in Section 1.10 of this Permit Attachment. At the end of the fourth quarter of each year, the staff biologist shall compile the results of the quarterly inspections in a summary report that shall be included in the annual CWL post-closure care report submitted to the Department.

Once native flora has been established in a self-sustaining manner on the cover, the second phase of monitoring shall begin. Cover vegetation monitoring by the staff biologist shall transition to an annual frequency to assess the overall health of the cover vegetation. Based upon those observations, the staff biologist shall recommend in writing any soil augmentation, surface scarification, and reseeding as necessary to meet the criteria for successful re-vegetation as defined in Section 1.9 of this Permit Attachment. The Permittees shall implement corrective actions in consideration of the staff biologist's recommendations within 60 days of receipt of the recommendations, except as noted in Section 1.9.1.3 and Table 1-6 of this Permit Attachment. The results of the staff biologist's inspections shall be reported in each of the annual post-closure care reports to be submitted to the Department.

1.9.1.2. *Cover Inspection*

A qualified technician shall perform cover inspections on a quarterly basis. Settlement of the cover surface in excess of 6 inches, erosion of the cover soil in excess of 6 inches deep, areas of ponding water on the CWL cover surface in excess of 100 square feet, animal intrusion burrows in excess of 4 inches in diameter, contiguous areas lacking vegetation in excess of 200 square feet, and any other conditions that may impact the cover's integrity shall be noted as specified in Section 1.10 of this Permit Attachment. Documentation of animal intrusion burrows in excess of 4 inches in diameter and contiguous areas lacking vegetation in excess of 200 square feet may be noted quarterly as part of the vegetation inspection and monitoring instead of the Cover Inspection.

wellhead covers/caps/locks, soil-gas sampling ports, well identification markings, and passive venting BaroBalls™ or equivalent. Groundwater pumps and sample tubing shall be inspected during each sampling event (pumps are not dedicated to the wells). Pump replacement and maintenance/repair and tubing replacement shall be performed on an as-needed basis based upon pump and tubing performance, inspections, and review of analytical sampling results.

1.9.3.2. *Maintenance/Repair*

The monitoring well components shall be maintained/repared/replaced as needed within 60 days of discovery of any needed repairs. Maintenance/repair activities shall also include ensuring that all monitoring well components are protected from the weather.

1.9.4. Security Fence Inspection/Maintenance/Repair

1.9.4.1. *Inspection*

The fence, gates, locks, and warning signs at the CWL shall be inspected on a quarterly basis. The inspections shall document in writing the condition of the fence, including fence wires, posts, gates, gate locks, and warning signs, and note excessive accumulations of wind-blown plants and debris that would obscure warning signs, block access to the CWL, or interfere with any of the groundwater or soil-gas monitoring network components, or any sampling using said components. Local survey benchmarks and/or monuments shall also be inspected.

1.9.4.2. *Maintenance/Repair*

The fence, gates, locks, warning signs, and survey benchmarks and monuments shall be maintained/repared within 60 days of discovery by routine inspections. Activities may include, but are not limited to, removing excessive accumulations of wind-blown plants and debris, repairing broken wire sections and posts, repairing and oiling gates, cleaning or replacing locks, repairing or replacing warning signs, and removing excess soil and/or vegetation covering survey monuments. Maintenance records shall be maintained with the PCIFs.

1.10. INSPECTION SCHEDULE, CORRECTIVE ACTIONS, AND RECORDED RESULTS

A schedule for implementing inspections and prescribed maintenance of the CWL cover, surface-water drainage features, monitoring network, and access controls is provided in Table 1-6. Inspection results for the CWL monitoring systems shall be recorded on the Post-Closure Inspection Forms (PCIFs). PCIFs are included in Attachment 4 of this Permit; however, alternative formats may be used to detail the information. The Permittees shall record the results of each inspection conducted in accordance with Section 1.9 of this Permit Attachment. At a minimum, the Permittees shall produce a record of the date and time of the inspection; the name and signature of the inspector; all required inspection parameters, results, and observations; and the date and nature of any repairs or other remedial actions taken (see 40 CFR § 264.15(d)). The Permittees shall ensure that these records are clearly legible, all handwritten information is in ink, and errors are crossed out with a single line, initialed, and dated by the individual making the correction. The records shall be retained for the period of time specified in Section 1.12 of this Permit Attachment. Copies of completed forms shall be provided and summarized in the annual CWL post-closure care report. Incomplete inspection forms shall be considered representative of incomplete inspections, and shall constitute a violation of

this Permit.

Repairs and maintenance shall be undertaken to ensure protection of human health and the environment and mitigate any potential hazards. If an inspection of the CWL reveals that a non-emergency problem has developed, the needed repairs, maintenance, or replacement shall be initiated within three days, unless circumstances beyond the control of the Permittees cause further delay. The Permittees shall limit any such delays to as short a time period as reasonably possible. Repairs shall not take longer than 60 days to complete. If a hazard appears imminent or a hazardous situation already exists, remedial action shall be initiated immediately. Any action taken pursuant to an inspection shall be noted on the CWL PCIF. If any identified hazard meets the definition of an emergency, as specified in Section 1.14 of this Permit Attachment, the Facility's Contingency Plan for the CWL shall be implemented by the Permittees, and required notification procedures shall be followed. The Permittees shall report to the Department any remedial activities related to an emergency within one (1) business day.

1.11. PERSONNEL TRAINING

The personnel training program for inspection, monitoring, maintenance and repair of the CWL during the compliance monitoring and post-closure care periods is included in this Permit as Attachment 5. All personnel working at the CWL shall be trained, at a minimum, in accordance with the requirements of this Permit.

PERMIT ATTACHMENT 2: GROUNDWATER SAMPLING AND ANALYSIS PLAN

2.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) provides additional requirements that shall be adhered to by the Permittees for the collection and analysis of water samples from groundwater monitoring wells located at the Chemical Waste Landfill (CWL) during the post-closure care and compliance monitoring periods. The post-closure care and compliance groundwater monitoring program is designed to address the requirements of 40 C.F.R. Part 264 Subpart F.

The Permittees must comply with the groundwater protection standard at 40 C.F.R. § 264.92. The hazardous constituents that shall be monitored in accordance with 40 C.F.R. § 264.93 are trichloroethene, chromium, and nickel. Additionally, in accordance with 40 C.F.R. § 264.99(g), the Permittees shall collect and analyze water samples for an enhanced list of constituents (see Section 1.8.1.1 of Permit Attachment 1 for the enhanced list of constituents) at least annually from wells located at the point of compliance and the background well.

The purpose of this SAP is to document procedures for the collection and reporting of consistent, reliable, defensible, and comparable groundwater sampling results. This SAP provides additional instructions for sample collection, data management, and reporting of data that shall be adhered to during the post-closure care and compliance periods. Other instructions are provided in Sandia National Laboratories/NM (SNL/NM) Field Operating Procedures (FOPs), and SNL/NM Administrative Operating Procedures (AOPs); however, the requirements of this SAP and the CWL Post-Closure Care Permit (Permit) shall take precedence over any FOPs and AOPs. Table 2-1 summarizes documents that are referenced in this SAP, which can be obtained from the SNL/NM Environmental Safety and Health (ES&H) and Security Records Center. The most current versions of these documents shall be consulted for the purpose of conducting groundwater sampling.

The Permittees shall provide to the New Mexico Environment Department (the Department) within 60 days of the effective date of this Permit in hard copy and electronic format the current versions of the FOPs and AOPs listed above. The Permittees shall provide the Department with any updated versions of the FOPs/AOPs within 30 days of their acceptance by the Permittees. If any requirement or procedure in the FOPs or AOPs is found by the Department to be unacceptable for reasons including, but not limited to, the requirement or procedure will or could prevent the acquisition of representative and reliable groundwater sampling results, the requirement or procedure shall be replaced by the Permittees with a different requirement or procedure that is acceptable to the Department.

2.1. DATA QUALITY OBJECTIVES AND QUALITY CONTROL

The data quality objective (DQO) for groundwater monitoring is to collect accurate and defensible data of high quality to assess the concentrations of hazardous constituents in the groundwater in the uppermost aquifer underlying the CWL such that they can be compared to the concentration limits in Table 1-2 in Permit Attachment 1, as it may be amended. The Permittees shall evaluate accuracy, precision, representativeness, completeness, and comparability of the groundwater data to verify that data are of high quality and ensure that the DQO is met. Quality control (QC) procedures discussed in Section 2.20 of this Permit Attachment shall also be used to determine whether the DQO has been attained. QC samples generated in both the field and the laboratory shall be analyzed and evaluated.

Laboratory measurements shall comply with SNL/NM Sample Management Office (SMO) procedures and protocols listed in Table 2-1, including qualification or validation of laboratory analytical data, and shall also comply with this Permit. This procedure for determining the quality and usability of analytical data acquired during groundwater sampling shall be summarized in data validation reports regarding the overall quality of the data and the resulting data qualifiers. All associated data validation reports shall be submitted to the Department in the post-closure care annual report along with the results for each monitoring event. Data not meeting DQO requirements are subject to corrective action(s) as discussed in SNL/NM SMO procedures and protocol and as discussed in Section 2.22 of this Permit Attachment.

**TABLE 2-1
Reference Documentation
CWL Groundwater Monitoring^a**

Document Number	Document Title
AOP 00-03	Data Validation Procedure for Chemical and Radiochemical Data
AOP 95-16	Sample Management and Custody
FOP 05-01	Groundwater Monitoring Well Sampling and Field Analytical Measurements
FOP 05-02	Groundwater Monitoring Equipment Field Check For Water Quality Measurements
FOP 05-03	Groundwater Sampling Equipment Decontamination
FOP 05-04	Groundwater Monitoring Waste Management
LOP 94-03	Sample Handling, Packaging, and Shipping
SMO 05-03	Procedure for Completing the Contract Verification Review

^a Sandia National Lab's Documents (procedures/documents will be used as revised and updated).

2.2. ACCURACY

Accuracy is the agreement between a measured value and an accepted reference value. When applied to a set of observed values, accuracy is influenced by a combination of a random component and a systematic bias. Accuracy shall be maintained and evaluated through referenced calibration standards, laboratory control samples (LCS), matrix spike (MS) samples, and surrogate spike samples. The bias component shall be evaluated and expressed as percent recovery (%R), as indicated in the equation below:

$$\%R = \frac{\text{measure sample concentration}}{\text{true concentration}} \times 100\%$$

The acceptable range for %R shall be 50-130% for volatile organic compounds (VOCs) and 75-125% for metals.

analyzed for trichloroethene (TCE), chromium (Cr), and nickel (Ni). Additionally, in accordance with 40 C.F.R. § 264.99(g), the Permittees shall collect and analyze water samples at least annually from wells located at the point of compliance and analyze them for an enhanced list of constituents (see Section 1.8.1.1 of Permit Attachment 1 for the enhanced list of constituents). The Permittees shall conduct semi-annual (twice each year) groundwater sampling for the entire compliance and post-closure care-periods, with one of these events each year including the enhanced sampling list (see Section 1.8.1.1 of Permit Attachment 1 for the enhanced list of constituents). Aqueous samples shall be reported in units of milligrams per liter (mg/L) or micrograms (µg)/L.

**TABLE 2-2
CWL Groundwater Monitoring Wells and Sampling Frequency**

Well Number	Installation Year	Semi-Annual Sampling		Comments
		TCE	Cr, Ni	
CWL-BW5	2010	X	X	Upgradient well.
CWL-MW9	2010	X	X	Downgradient well
CWL-MW10	2010	X	X	Downgradient well
CWL-MW11	2010	X	X	Downgradient well

Note: Refer to Table 2-3 for specific information regarding analytical methods and constituents.

2.8. FIELD OPERATIONS

Groundwater sampling shall be conducted in accordance with this SAP and this Permit to ensure accurate, precise, representative, complete, and comparable groundwater sampling results. Other groundwater monitoring activities shall include the measurement of water levels and calculating the direction, flow rate, and gradient of groundwater flow, the decontamination of equipment, inspection of monitoring equipment, monitoring field water quality parameters, collecting and handling samples, and managing waste.

2.9. SAFETY

Field operations shall be conducted in a manner that protects the health and safety of field personnel. Every team member has the authority and responsibility to stop operations if an unsafe condition develops or is observed. All groundwater monitoring personnel shall perform field activities safely in accordance with the SNL/NM Groundwater Health and Safety Plan.

2.10. WATER LEVEL MEASUREMENTS

Water level information is used to calculate the volume of water in a well casing and the minimum amount required for purging. It is also used to determine the direction and gradient of groundwater flow, as required by 40 C.F.R. § 264.99(e). Measurements shall be referenced to a surveyed mark of known elevation at the top of each well casing. The static water level shall be measured in each well prior to purging or obtaining a sample, and measurements shall be taken to the nearest 0.01-foot using a water level indicator. Other requirements for water level measurements are provided in SNL/NM FOP 05-01. Water levels in all compliance wells shall be measured during every sampling event.

samples from the sampling system to the sample container. Field blank samples shall be collected and analyzed at a frequency of 10 percent (minimum of one per sampling event).

Trip blanks (TBs) are used to assess the potential for cross-contamination between environmental samples during sample handling and shipping activities. The TBs are to be analyzed for VOCs (including TCE) only. Each batch of groundwater samples to be analyzed for VOCs shall be accompanied by at least one TB during shipping. The Analytical Laboratory shall prepare the TB by filling a VOC-sample vial with deionized water and using the same sample preservation method designated for VOC environmental samples. Each vial shall be sealed with custody tape and dated when it is prepared. The TBs shall accompany the empty sample containers when they are shipped to the field supervisor prior to the start of sample collection. The TBs shall be taken into the field during sample collection and shall be included in the shipment of environmental samples to the laboratory. The TBs must remain sealed during this entire cycle and may be opened only for analysis on return to the analytical laboratory.

2.20.2. Laboratory Quality Control

The analytical laboratory must have established procedures that demonstrate the analytical process is always in control during each sample analysis step. The procedures include Laboratory Control Samples (LCSs), method blank samples, and Matrix Spike (MS) samples.

A LCS consists of a control matrix (e.g., deionized water) spiked with known concentrations of analytes representative of the target analytes. LCSs shall be prepared and analyzed for each analytical procedure performed. LCSs shall be analyzed with each analytical batch containing environmental samples to determine accuracy of the data. The laboratory shall also evaluate the precision of the data by analyzing twice either the environmental samples, LCSs, or MS samples and calculating the RPD between corresponding results.

Method blank samples shall be used to check for contamination in the laboratory during sample preparation and analysis. Method blank samples shall be concurrently prepared and analyzed with each analytical batch. Method blanks shall be reported in the same units as corresponding environmental samples, and the results shall be included with each analytical report.

Surrogate spike analysis shall be performed for all samples analyzed by Gas Chromatography/Mass Spectroscopy. The surrogate compounds added to the sample shall be those specified in the applicable EPA analytical method procedure (EPA November 1986). Recovery values for surrogate compounds that are outside specified control limits require corrective action.

The analytical process shall be systematically evaluated for the effects of indigenous constituents present in the environmental sample matrix. MS/matrix spike duplicate (MSD) analyses shall be performed in accordance with the specified analytical procedures.

2.21. DATA VALIDATION, REVIEW, AND REPORTING

Data validation and review of analytical and field documentation shall be performed. Field and analytical QC data shall be reviewed for conformance to QC acceptance criteria. The entire data package shall be reviewed for completeness, comparability, representativeness, precision, and accuracy to determine whether the DQO has been met. All groundwater monitoring data shall be reported in the CWL post-closure care annual reports for the year for which the data were obtained

3.4. DATA QUALITY OBJECTIVES

Appropriate sampling locations, depths, number of samples collected per event, and sampling frequency are required to ensure that the data are representative of site conditions and meet the objectives of this SAP. The main Data Quality Objective (DQO) is to produce representative, accurate, defensible, and comparable soil-gas analytical results. This SAP is designed to ensure that post-closure care soil-gas monitoring procedures meet the DQO. The DQO shall be accomplished by implementing standard field methods, analytical procedures/methods, and data validation and evaluation protocols consistent with the historic soil-gas monitoring program.

3.5. SAMPLING LOCATIONS AND FREQUENCY

3.5.1. Sample Locations

Soil-gas data shall be collected from within the plume core and at various distances laterally and vertically from the core. Figure 4 shows the configuration of the plume based upon the data set collected in September 2004. The monitoring network shall include five wells equipped with a total of 21 depth-specific sampling ports specifically designed for soil-gas monitoring. Well completion diagrams are presented in Section 3 of this Permit Attachment. The five wells and associated depth-specific sampling ports are listed in Table 3-1 and shown in Figure 10. Well construction diagrams are provided in Appendix 3-1 of Attachment 3. The five soil-gas monitoring wells are spatially located to monitor the area of the vadose zone most affected by past disposal of organic liquid waste. The deepest sampling ports from wells CWL-D1 through D3 (Port 1 in each of these wells) are located in the vadose zone immediately above the capillary fringe zone and water table.

3.5.2. Frequency

Soil-gas sampling shall be conducted annually during the post-closure care period. All sampling locations shown in Table 3-1 and Figure 10 shall be sampled.

3.6. DATA ACCURACY

The Permittees shall follow proper sampling procedures, including purging, preparation of sampling containers, and use of quality assurance/quality control (QA/QC) samples. Accurate estimates of contaminant concentrations shall be obtained through use of qualified laboratories, appropriate analytical methods, and effective QA/QC procedures.

A range in deviation from actual (true) concentration of 50-130% (percent recovered or %REC) for each detected VOC shall be considered acceptable.

At least two duplicate samples shall be collected and analyzed during each sampling event. A relative percent difference (RPD) of 50% or less for each detected VOC is considered to be acceptable. An RPD will only be calculated when results for both the environmental and duplicate sample are greater than or equal to five times the laboratory reporting limit. The Permittees shall immediately repeat the sampling and analysis for any sample results where the %REC is not met.

3.7. DATA CONSISTENCY AND COMPARABILITY

Future soil-gas monitoring results must be comparable with historic VOC soil-gas data sets. The Permittees shall maintain consistency in methods and procedures by conducting sampling and analysis:

- Using consistent field sample collection and management methods;
- Using an off-site contract laboratory that meets U.S. Environmental Protection Agency (EPA) standards for quality assurance and quality control (QA/QC);
- Using soil-gas analytical method EPA Compendium Method TO-14 (EPA January 1999) or equivalent; and
- Using the soil-gas analytical data review and validation procedure in Administrative Operating Procedure (AOP) 00-03.

After soil-gas analytical results are received from the laboratory, the Permittees shall review the laboratory report for completeness and conformance to the performance criteria, and arrange for data validation. If problems are noted that require corrective action during these verification and validation reviews, corrective action shall be implemented. The scope of the data verification and validation process shall address field sample management and custody requirements, as well as adherence to QA/QC requirements by the off-site laboratory performing the analyses. These processes are discussed in more detail in Section 3.10 of this Permit Attachment.

3.8. MONITORING ACTIVITIES

This section describes the field and laboratory procedures that shall be followed to produce soil-gas analytical results that meet the requirements of this Permit.

3.9. FIELD SAMPLING

The methods and procedures used to obtain soil-gas samples for laboratory analysis are described below in Sections 3.9.1 through 3.9.3. Additional measurements beyond those described in this SAP may be obtained to support evaluation of the soil-gas plume.

Activities that shall be conducted by the Permittees in preparation for or during soil-gas sampling include:

- Pre-field work planning;
- Vacuum check of SUMMA[®] canisters;
- Visual inspection of all CWL soil-gas wells and sampling ports;
- Purging and field estimation of total VOC concentration;
- Sample acquisition;
- Sample container documentation and packaging; and
- Sample delivery to laboratory within the method holding time.

The Facility Operating Procedures for these activities, as well as SMO procedures and laboratory procedures that apply to the post-closure care soil-gas monitoring program are listed in Table 3-2 and this Permit. All personnel directly involved in field activities related to soil-gas monitoring shall review and abide by these procedures.

The Permittees shall provide to the New Mexico Environment Department (the Department)

within sixty (60) days of the effective date of this Permit in hard copy and electronic format the current versions of the FOPs and AOPs listed in Table 3-2. The Permittees shall provide the Department with any updated versions of the FOPs/AOPs within 30 days of their acceptance by the Permittees. If any requirement or procedure in the FOPs or AOPs is found by the Department to be unacceptable for reasons including, but not limited to, the requirement or procedure will or could prevent the acquisition of representative and reliable soil-gas sampling results, the requirement or procedure shall be replaced by the Permittees with a different requirement or procedure that is acceptable to the Department. The requirements of this SAP take precedence over those of any FOP or AOPs listed in Table 3-2.

TABLE 3-2
Reference Documentation
CWL Post-Closure Care Soil-Gas Monitoring^a

FOP or AOP	Title
FOP 08-22	Soil Vapor Sampling
AOP 95-16	Sample Management and Custody
AOP 00-03	Data Validation Procedure for Chemical and Radiochemical Data
LOP 94-03	Sample Handling, Packaging, and Shipping
SMO 05-03	Procedure for Completing the Contract Verification Review

^aSandia National Lab's Documents (procedures/documents will be used as revised and updated):

FID = Flame Ionization Detector.
NA = Not applicable.
PID = Photoionization Detector.

3.9.1. Pre-Field Sampling Preparations

Prior to initiating soil-gas sampling, field personnel shall ensure that all necessary equipment is ready and properly functioning in accordance with applicable FOPs and this Permit and that the necessary arrangements have been made with the SMO and off-site analytical laboratory for sample shipment and analysis. As appropriate, operating procedures shall be reviewed and support personnel notified.

3.9.2. Purging and Field Estimation of Total Concentration of VOCs

At the wellhead, a vacuum pump connected to the sample tubing via a Swagelok[®] or equivalent fitting shall be used to purge stagnant and/or pre-existing soil gas from the monitoring ports and sample tubing. The stream of soil gas extracted from the sampling port shall be screened with a photoionization detector (PID) containing an ultraviolet lamp with an ionization potential of 11.8 electron volts. PID measurements shall be monitored during purging and recorded in the field book

PERMIT ATTACHMENT 4: INSPECTION FORMS

Note: The Inspection Forms are provided in a specific format; however, alternative formats may be used to detail the information

Enclosure D

**Sandia National Laboratories
EPA ID NM5890110518**

**Permit NM5890110518
Chemical Waste Landfill Post-Closure Care**

**Additional Information for One Permit Modification
Permit Attachment 3**

Enclosure D
**Additional Information for Change to Attachment 3 Soil-Gas Field Duplicate Relative Percent
Difference Criterion for Resampling (Item 11, Enclosure A)**
Chemical Waste Landfill Post-Closure Care Permit

**Permit Modification Item 11 – Soil-Gas Field Duplicate Relative Percent Difference (RPD)
Criterion for Resampling**

The purpose of field duplicate samples (also commonly referred to as replicate samples) is to provide information on the overall reproducibility (i.e., precision) of the field sampling and analytical process. For the CWL, volatile organic compound soil-gas samples are collected from discrete intervals within the vadose zone beneath the CWL using existing soil-gas monitoring wells constructed with stainless steel screen sections. The 2-foot long stainless steel screens connect to the surface with stainless steel tubing that is secured to the outside of the well casing. A sand pack that is sealed above and below by bentonite isolates the well screens at specific depths within the 500-foot thick vadose zone beneath the CWL (construction diagrams provide in Permit Attachment 3). Soil gas is extracted through the screen section using a vacuum pump connected to the tubing at the surface. Due to the variability of VOC soil-gas concentrations within the sediment pore spaces of the vadose zone and the fact that duplicate samples are collected in series, versus in parallel, with the corresponding environmental sample, soil-gas results are expected to have higher variability as opposed to groundwater samples. In addition, two other factors affect the variability of CWL soil-gas results.

- The finer-grained alluvial sediments that are present in the 500-foot thick vadose zone beneath the CWL are very compacted and tight.
- Generally VOC concentrations are very low (e.g., parts per billion volume basis [ppbv])

An RPD of 20% or less is considered acceptable for VOC groundwater and soil-gas duplicate sample results (Permit Attachment 2, Section 2.3 and Attachment 3, Section 3.6 respectively). As part of the analytical procedure for soil-gas samples, a laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) pair is analyzed to demonstrate overall laboratory performance and acceptable method accuracy and precision in a clean matrix (i.e., a laboratory-prepared soil-gas standard). The laboratory specified RPD criterion for the LCS/LCSD pair is 25%, which is greater than the Permit-specified RPD criterion for a field duplicate pair (20%). Based on monitoring at the CWL conducted since the early 1990, field duplicate soil-gas sample RPDs that exceed the RPD criterion are most commonly associated with low concentration results near the RL.

A recent literature review of soil-gas/vapor intrusion investigations and guidance documents (see attached reference list) was conducted to delineate the current industry standard for acceptance criteria of field duplicate/replicate sample precision. The following recommendations are based upon this review, the site-specific factors explained above, and historic soil-gas monitoring results at the CWL.

- A wider allowance should be given for the RPD criterion for field duplicate results (e.g., 50%).
- Because of the greater variability and uncertainty associated with lower concentration results, RPDs should only be calculated when both sample results (environmental and duplicate sample) are greater than or equal to five times (5X) the RL.
- Given the DQOs for CWL soil-gas monitoring (Permit Attachment 3, Section 3.4), resampling should not be required based solely on a field duplicate RPD exceedance.
- Resampling should be required based on the laboratory data review and validation process stipulated in Permit Attachment 3, Section 3.10, which takes into account laboratory control and field duplicate sample results, percent recovery, and many other quality control/quality assurance measures.

Enclosure D
**Additional Information for Change to Attachment 3 Soil-Gas Field Duplicate Relative Percent
Difference Criterion for Resampling (Item 11, Enclosure A)**
Chemical Waste Landfill Post-Closure Care Permit

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Enclosure D
**Additional Information for Change to Attachment 3 Soil-Gas Field Duplicate Relative Percent
Difference Criterion for Resampling (Item 11, Enclosure A)**
Chemical Waste Landfill Post-Closure Care Permit

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Enclosure D
**Additional Information for Change to Attachment 3 Soil-Gas Field Duplicate Relative Percent
Difference Criterion for Resampling (Item 11, Enclosure A)**
Chemical Waste Landfill Post-Closure Care Permit

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