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Date: NOV 22 2013
Reference: EP2013-0230

John Kieling, Bureau Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Subject: Submittal of the Semiannual Progress Report Corrective Measures Evaluation/Corrective Measures Implementation for Consolidated Unit 16-021(c)-99

Dear Mr. Kieling:

Enclosed are two hard copies with electronic files of the Semiannual Progress Report Corrective Measures Evaluation (CME)/Corrective Measures Implementation (CMI) for Consolidated Unit 16-021(c)-99.

As discussed with your staff, this document serves as both the 2012/2013 summary report for the Technical Area 16 permeable reactive barrier and associated CMI projects and the semiannual progress report for the CME for Consolidated Unit 16 021(c)-99. This approach was approved in an email from Mr. Michael Dale to John McCann dated September 7, 2012.

If you have any questions, please contact John McCann at (505) 665-1091 (jmccann@lanl.gov) or Woody Woodworth (lance.woodworth@nnsa.doe.gov).

Sincerely,

Jeff Mousseau, Associate Director
Environmental Programs
Los Alamos National Laboratory

Sincerely,

Peter Maggiore, Assistant Manager
Environmental Projects Office
Los Alamos Field Office



JM/PM/DM/JM:sm

Enclosures: Two hard copies with electronic files – Semiannual Progress Report for Corrective Measures Evaluation/Corrective Measures Implementation for Consolidated Unit 16-021(c)-99 (LA-UR-13-28781)

Cy: (w/enc.)

Woody Woodworth, DOE-NA-00-LA, MS A316
John McCann, EP-CAP, MS M992
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Public Reading Room, MS M992 (hard copy)

Cy: (Letter and CD only)

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Steven Rydeen, San Ildefonso Pueblo
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Jeff Mousseau, ADEP (date-stamped letter emailed)

LA-UR-13-28781
November 2013
EP2013-0230

**Semiannual Progress Report
for Corrective Measures
Evaluation/Corrective Measures
Implementation for Consolidated
Unit 16-021(c)-99**

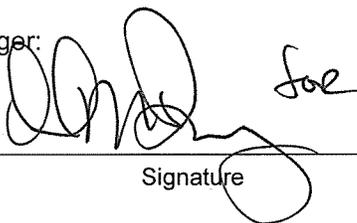
Prepared by the Environmental Programs Directorate

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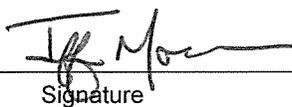
Semiannual Progress Report for Corrective Measures Evaluation/ Corrective Measures Implementation for Consolidated Unit 16-021(c)-99

November 2013

Responsible project manager:

John P. McCann		Project Manager	Environmental Programs	11/20/13
Printed Name	Signature	Title	Organization	Date

Responsible LANS representative:

Jeff Mousseau		Associate Director	Environmental Programs	11/21/13
Printed Name	Signature	Title	Organization	Date

Responsible DOE representative:

Peter Maggiore		Assistant Manager	DOE-NA-00-LA	11-22-2013
Printed Name	Signature	Title	Organization	Date

EXECUTIVE SUMMARY

The subsurface corrective measures evaluation (CME) and surface corrective measures implementation (CMI) for Consolidated Unit 16-021(c)-99 (the 260 Outfall) proceeded at a reduced pace during fiscal year 2013 compared with previous years. The primary reason for the lack of activity is the redirection of funds to continue the focus on accelerating the shipment of aboveground transuranic waste from Los Alamos National Laboratory (LANL or the Laboratory) to the Waste Isolation Pilot Plant. This redirected focus allows the Laboratory to support the environmental priorities established by the New Mexico Environment Department (NMED) and the State of New Mexico.

The most significant work accomplished during this reporting period consisted of the reconfigurations of three wells: CdV-16-4ip, CdV-R-15-3, and CdV-R-37-2.

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1.0 INTRODUCTION

This report serves as both the 2012/2013 summary report for the Technical Area 16 (TA-16) permeable reactive barrier (PRB) and associated corrective measures implementation (CMI) projects and the semiannual progress report for the corrective measures evaluation (CME)/CMI for Consolidated Unit 16-021(c)-99.

The report summarizes activities Los Alamos National Laboratory (LANL or Laboratory) completed from March to September of fiscal year (FY) 2013 on the CME/CMI for Consolidated Unit 16-021(c)-99, the TA-16 260 Outfall. Activities outlined in the 1998 corrective measures study (CMS) plan (LANL 1998, 062413; LANL 1999, 064873), approved by the New Mexico Environment Department (NMED) Hazardous Waste Bureau on September 8, 1999 (NMED 1999, 093666), and other related activities are described herein.

2.0 DESCRIPTION OF ACTIVITIES AND CONTACTS—MARCH 2013 TO SEPTEMBER 2013

A tour of TA-16 for NMED staff was held on April 30, 2013, to review potential well drilling locations. The tour focused on the TA-16 260 Outfall, specifically on intermediate well CdV-9(i) and regional groundwater wells R-58 and R-47 at TA-16.

3.0 SURFACE CMI

3.1 Best Management Practices

Inspection of best management practices (BMPs) associated with Consolidated Unit 16-021(c)-99 is completed under the Individual Storm Water Permit, pursuant to the requirements of National Pollutant Discharge Elimination System (NPDES) Permit No. NM0030759 (hereafter, the Individual Permit), as authorized by the U.S. Environmental Protection Agency (EPA). Current BMPs, called controls in the Individual Permit, include a low-permeability cap consisting of a 20-in.-thick crushed tuff/bentonite cap installed on top of the former settling pond, 6 earthen berms installed to control run-on/runoff, riprap within the former channel to control runoff, and an established vegetative cover to control erosion from the site. Controls are inspected annually and following a significant rain event of 0.25 in. or greater within 30 min, as measured at rain gage (RG) 257, per the Individual Permit. In the period from March 2013 to September 2013, 8 separate significant rain events were recorded at RG 257, resulting in 5 inspections. Per the Individual Permit, if several storms exceeding the intensity threshold occur over a period not to exceed 15 d from the first event, a single inspection is sufficient to achieve compliance (hence the number of events may differ from the number of inspections). Inspection results will be reported in the Storm Water Individual Permit Annual Report, January 1 to December 31, 2013, which will be submitted to the EPA Region 6 Enforcement Division as well as to the NMED Surface Water Quality Bureau, no later than March 1, 2014.

3.2 Hydrogeologic Investigations

Hydrogeologic investigations include periodic water sampling as outlined in the 1998 Resource Conservation and Recovery Act facility investigation (RFI) report (LANL 1998, 059891) as well as continuing investigations delineated in the 1998 CMS plan (LANL 1998, 062413). The ongoing water sampling program, conducted per the Laboratory's Interim Facility-Wide Groundwater Monitoring Plan, includes semiannual sampling at Martin, SWSC, and Burning Ground Springs.

Two full groundwater sampling campaigns were conducted in the Cañon de Valle watershed in March and September 2013, and a single well was sampled in June 2013. From March 13 to March 28, 2013, all wells were sampled, except for FLC-16-25280, which was dry. In June 13, 2013, a single sample was collected at well CdV-16-4ip. From September 3 to September 23, 2013, all wells were sampled, except for CdV-16-61193 and WCO-1r, which were dry. Data from the sampling campaigns will be included in the upcoming periodic monitoring reports.

Floods in July, August, and October of 2012 impacted both canyons, causing localized scouring in parts of the canyons and sediment deposition in downgradient areas. A follow-up study focused on the effects of floods on the geomorphology and sediment chemistry following the 2012 monsoon season. The results are summarized in the "Results of 2012 Sediment Monitoring in the Water Canyon and Cañon de Valle Watershed" (LANL 2013, 241083). The study showed very low concentrations of key chemicals of potential concern, consistent with, or less than, pre-fire concentrations and less than residential and recreational soil screening levels.

The storms on September 12 and 13, 2013, produced a total of 5.39 in. of precipitation at the TA-06 weather station. Precipitation was higher in the headwaters area than on Laboratory property. This flood caused geomorphic changes to Cañon de Valle and Water Canyon that will be assessed in fall 2013 and spring 2014. Damage was reported at three wells: 16-25280, CdV-16-1(i), and MSC-16-06295. This damage is described in the September 2013 Storm and Flood Assessment Report (LANL 2013, 251021).

Sediment sampling of key reaches within Cañon de Valle and Water Canyon are scheduled to be completed during November/December of 2013. Sampling is designed to evaluate the effects of post-Las Conchas fire flooding on the alluvial systems in Cañon de Valle and Water Canyon. The results will be summarized in the reconnaissance survey report to be submitted in April 2014. Previous inspections and sampling have shown the sediment reaches are variably disturbed, with the highest impacts in the more western reaches. In most reaches, sediment packages with the highest contaminant levels were not disturbed by post-fire flooding. This finding will be reevaluated based on the major rain and flood event on September 12 and 13, 2013.

3.3 2013 CMI Activities

The Cañon de Valle pilot PRB remains nonoperational because of post-Las Conchas fire flooding, which destroyed the capture wall for the PRB. Continued risks of flooding preclude reinstalling the PRB at this time. The current location of the PRB is not feasible for barrier reinstallation because the deep scouring of the alluvial sediment in that area.

The carbon-filtration treatment systems at the springs remain in place but are not operational because a permit has not been issued.

The bentonite cap in the former TA-16-260 Outfall pond was inspected following the September 12 to 13, 2013, storm event and was found to be in good condition.

4.0 SUBSURFACE CME

4.1 CME for Deep Groundwater

The most significant work accomplished during this reporting period consisted of the reconfiguration of three wells: CdV-16-4ip, CdV-R-15-3, and CdV-R-37-2.

- **CdV-16-4ip:** The work plan for this well reconfiguration was submitted to NMED on November 15, 2012 (LANL 2012, 232222) and approved by NMED in its approval with modifications letter dated December 21, 2012 (NMED 2012, 521747). The well was reconfigured between June 21 and July 8, 2013, and the Well Reconfiguration of CdV-16-4ip Field Summary Report was submitted to NMED on September 16, 2013 (LANL 2013, 249519).
- **CdV-R-15-3:** The work plan for this well reconfiguration was submitted to NMED on November 27, 2012 (LANL 2012, 232343) and approved by NMED in its approval with modifications letter dated December 21, 2012 (NMED 2012, 521745). The well was reconfigured between July 13 and July 30, 2013, and the Well Reconfiguration of CdV-R-15-3 Field Summary Report was submitted to NMED on September 27, 2013 (LANL 2013, 249519).
- **CdV-R-37-2:** The work plan for this well reconfiguration was submitted to NMED on November 27, 2012 (LANL 2012, 232345) and approved by NMED in its approval with modifications letter dated January 11, 2013 (NMED 2013, 521802). The well was reconfigured between August 9 and August 29, 2013, and the Well Reconfiguration of CdV-R-37-2 Field Summary Report was submitted to NMED on September 27, 2013 (LANL 2013, 250073).

Other work accomplished concerning the CME for deep groundwater from March to September 2013 includes the following:

- **Drilling Work Plan for Well R-63i:** The work plan for R-63i was submitted to NMED on February 14, 2013 (LANL 2013, 235924) and approved by NMED in its approval with modifications letter dated March 8, 2013 (NMED 2013, 522166). This drilling scope was pushed out of FY2013 because of funding constraints.
- **Interim Measures Work Plan for Source Removal Testing at Well CdV-16-4ip:** The Interim Measures Work Plan for Source Removal Testing at Well CdV-16-4ip was submitted to NMED on March 22, 2013 (LANL 2013, 239235) and approved by NMED in its approval with modifications letter dated April 30, 2013 (NMED 2013, 522441). All interim measures source removal work at this well location was pushed out of FY2013 because of funding constraints.
- **Drilling Work Plan for Well CdV-9-1(i):** The work plan for CdV-9-1(i) was submitted to NMED on March 28, 2013 (LANL 2013, 239226) and approved by NMED in its approval with modifications letter dated May 31, 2013 (NMED 2013, 522693). This drilling scope was pushed out of FY2013 because of funding constraints.
- **Drilling Work Plan for Well R-58:** On July 19, 2013, the Laboratory requested an extension request to complete installation of well R-58 (LANL 2013, 245172). NMED approved the request on September 16, 2013 (NMED 2013, 523555). This drilling scope was pushed out of FY2013 because of funding constraints.
- **Drilling Work Plan for Well R-47:** On July 19, 2013, the Laboratory requested an extension request to complete installation of well R-47 (LANL 2013, 245173). NMED approved the request on September 16, 2013 (NMED 2013, 523557). This drilling scope was pushed out of FY2013 because of funding constraints.

- **TA-16 Tracer Test:** On September 4, 2013, the Laboratory submitted a request for extension to submit the Summary Report for Direct Current Resistivity Profiling in Cañon de Valle to January 15, 2014 (LANL 2013, 249321). NMED approved the request on November 1, 2013 (NMED 2013, 523814). All tracer test work at TA-16 was pushed out of FY2013 because of funding constraints.

5.0 PUBLIC AND STAKEHOLDER INVOLVEMENT

No public meetings or meetings with stakeholders were held between March and September of FY2013.

6.0 PROBLEMS ENCOUNTERED/ACTIONS TO RECTIFY PROBLEMS

The hydrologic system in Cañon de Valle was strongly perturbed by the August 2011 flooding because of severe damage to the watershed caused by the Las Conchas wildfire. As a result, baseline contaminant levels within the canyon system need to continue to be reevaluated. Two long-term alluvial wells were destroyed in this flooding, and the PRB capture wall was severely damaged. The TA-16 storm filters in springs have not been turned on because of issues with the National Pollutant Discharge Elimination System permit. Meetings with NMED to address a path forward for the alluvial system will be scheduled.

7.0 KEY PERSONNEL ISSUES

No issues regarding key personnel occurred between March and September of FY2013.

8.0 PROJECTED WORK FOR OCTOBER 2013 TO MARCH 2014

8.1 Surface CMI

8.1.1 BMPs

- Continue to inspect existing BMPs following significant precipitation events

8.1.2 Hydrogeologic Investigations

- Check for the presence and levels of water in the Cañon de Valle alluvial system
- Evaluate geomorphic changes in Cañon de Valle resulting from post–Las Conchas fire storm events in FY2013
- Continue precipitation monitoring

8.1.3 Surface CMI Activities

- Meet with NMED personnel to determine a path forward for the PRB and storm filters
- Monitor the bentonite cap in the TA-16 260 Outfall pond

8.2 Subsurface CME

- Conduct TA-16 tracer test
- Conduct interim measures source removal at CdV-16-4ip
- Install CME intermediate and regional aquifer wells
- Conduct surface geophysics (direct current resistivity) in and around Cañon de Valle

8.3 Public and Stakeholder Involvement

- Continue discussions with NMED personnel regarding the optimal path forward for both surface CMI and groundwater CME

9.0 RECOMMENDATIONS

Key recommendations for the TA-16-260 Outfall subsurface CME and surface CMI for future FYs include the following:

- Activities relevant to the groundwater CME should be given priority in light of recent observations in deep groundwater associated with the TA-16-260 CME. These observations include increasing RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine) concentrations in R-18 and high (>200 µg/L) RDX concentrations in the upper screen of CdV-16-4ip.
- The crucial next steps for the groundwater CME focus on improving the deep groundwater monitoring network; thus, the geophysical survey and the drilling of new wells are key near-term activities.

These drilling activities are important precursors to both the groundwater CME report and any interim actions that may be deemed necessary to minimize high explosives migration into regional groundwater.

- The Laboratory believes decisions to replace the pilot PRB or destroyed alluvial wells should be deferred until 2014, at the earliest. Experience following the Cerro Grande and other fires within the region suggests large floods are likely for up to 3 yr following severe burning in a watershed's headwaters. Nearby alluvial wells with similar concentrations and trends can provide continued alluvial groundwater monitoring for the TA-16 260 monitoring group.
- The use of the storm filters currently located at several TA-16 springs should be reconsidered. This action would be a useful interim measure pending future decisions on the fate of the PRB. These springs currently provide a large fraction of the mass-flux of RDX within the canyon system. In the absence of the PRB, these storm filters may remove a large percentage of the flux of RDX in the alluvial waters within Cañon de Valle.

10.0 REFERENCES

The following list includes all documents cited in this report. Parenthetical information following each reference provides the author(s), publication date, and ER ID. This information is also included in text citations. ER IDs are assigned by the Environmental Programs Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

- LANL (Los Alamos National Laboratory), September 1998. "CMS Plan for Potential Release Site 16-021(c)," Los Alamos National Laboratory document LA-UR-98-3918, Los Alamos, New Mexico. (LANL 1998, 062413)
- LANL (Los Alamos National Laboratory), September 1998. "RFI Report for Potential Release Site 16-021(c)," Los Alamos National Laboratory document LA-UR-98-4101, Los Alamos, New Mexico. (LANL 1998, 059891)
- LANL (Los Alamos National Laboratory), September 1999. "Addendum to CMS Plan for Potential Release Site 16-021(c)," Los Alamos National Laboratory document LA-UR-98-3918, Los Alamos, New Mexico. (LANL 1999, 064873)
- LANL (Los Alamos National Laboratory), November 2012. "Work Plan to Reconfigure Well CdV-16-4ip," Los Alamos National Laboratory document LA-UR-12-26150, Los Alamos, New Mexico. (LANL 2012, 232222)
- LANL (Los Alamos National Laboratory), November 2012. "Work Plan to Reconfigure Well CdV-R-15-3," Los Alamos National Laboratory document LA-UR-12-26362, Los Alamos, New Mexico. (LANL 2012, 232343)
- LANL (Los Alamos National Laboratory), December 2012. "Work Plan to Reconfigure Well CdV-R-37-2," Los Alamos National Laboratory document LA-UR-12-26361, Los Alamos, New Mexico. (LANL 2012, 232345)
- LANL (Los Alamos National Laboratory), February 2013. "Drilling Work Plan for Well R-63i," Los Alamos National Laboratory document LA-UR-13-20150, Los Alamos, New Mexico. (LANL 2013, 235924)
- LANL (Los Alamos National Laboratory), March 2013. "Interim Measures Work Plan for Source Removal Testing at Well CdV-16-4ip," Los Alamos National Laboratory document LA-UR-13-21795, Los Alamos, New Mexico. (LANL 2013, 239235)
- LANL (Los Alamos National Laboratory), April 2013. "Results of 2012 Sediment Monitoring in the Water Canyon and Cañon de Valle Watershed," Los Alamos National Laboratory document LA-UR-13-22536, Los Alamos, New Mexico. (LANL 2013, 241083)
- LANL (Los Alamos National Laboratory), April 2013. "Drilling Work Plan for Well CdV-9-1(i)," Los Alamos National Laboratory document LA-UR-13-20779, Los Alamos, New Mexico. (LANL 2013, 239226)
- LANL (Los Alamos National Laboratory), July 19, 2013. "Request for Extension to Complete Installation of Well R-58," Los Alamos National Laboratory letter (EP2013-0142) to J.E. Keiling (NMED-HWB) from J. Mousseau (LANL) and P. Maggiore (DOE-NA-00-LA), Los Alamos, New Mexico. (LANL 2013, 245172)
- LANL (Los Alamos National Laboratory), July 19, 2013. "Request for Extension to Complete Installation of Well R-47," Los Alamos National Laboratory letter (EP2013-0141) to J.E. Keiling (NMED-HWB) from J. Mousseau (LANL) and P. Maggiore (DOE-NA-00-LA), Los Alamos, New Mexico. (LANL 2013, 245173)

- LANL (Los Alamos National Laboratory), September 2013. "Well Reconfiguration of CdV-16-4ip Field Summary Report," Los Alamos National Laboratory document LA-UR-13-26926, Los Alamos, New Mexico. (LANL 2013, 249519)
- LANL (Los Alamos National Laboratory), September 2013. "Well Reconfiguration of CdV-R-37-2 Field Summary Report," Los Alamos National Laboratory document LA-UR-13-27284, Los Alamos, New Mexico. (LANL 2013, 250073)
- LANL (Los Alamos National Laboratory), September 4, 2013. "Request for Extension to Submit the Summary Report for Direct Current Resistivity Profiling in Cañon de Valle," Los Alamos National Laboratory letter (EP2013-0193) to J.E. Keiling (NMED-HWB) from J. Mousseau (LANL) and P. Maggiore (DOE-NA-00-LA), Los Alamos, New Mexico. (LANL 2013, 249321)
- LANL (Los Alamos National Laboratory), November 2013. "September 2013 Storm and Flood Assessment Report," Los Alamos National Laboratory document LA-UR-13-28173, Los Alamos, New Mexico. (LANL 2013, 251021)
- NMED (New Mexico Environment Department), September 8, 1999. "Approval, 16-021(c) RFI Report and CMS Plan," New Mexico Environment Department letter to T. Taylor (DOE-LAAO) and J. Browne (LANL Director) from J.E. Keiling (NMED-HRMB), Santa Fe, New Mexico. (NMED 1999, 093666)
- NMED (New Mexico Environment Department), December 21, 2012. "Approval with Modifications, Work Plan to Reconfigure Well CdV-16-4ip," New Mexico Environment Department letter to P. Maggiore (DOE-LASO) and J.D. Mousseau (LANL) from J.E. Keiling (NMED-HWB), Santa Fe, New Mexico. (NMED 2012, 521747)
- NMED (New Mexico Environment Department), December 21, 2012. "Approval with Modifications, Work Plan to Reconfigure Well CdV-R-15-3," New Mexico Environment Department letter to P. Maggiore (DOE-LASO) and J.D. Mousseau (LANL) from J.E. Keiling (NMED-HWB), Santa Fe, New Mexico. (NMED 2012, 521745)
- NMED (New Mexico Environment Department), January 11, 2013. "Approval with Modification, Work Plan to Reconfigure Well CdV-R-37-2," New Mexico Environment Department letter to P. Maggiore (DOE-LASO) and J.D. Mousseau (LANL) from J.E. Keiling (NMED-HWB), Santa Fe, New Mexico. (NMED 2013, 521802)
- NMED (New Mexico Environment Department), March 8, 2013. "Approval with Modification, Drilling Work Plan for Well R-63i," New Mexico Environment Department letter to P. Maggiore (DOE-LASO) and J.D. Mousseau (LANL) from J.E. Keiling (NMED-HWB), Santa Fe, New Mexico. (NMED 2013, 522166)
- NMED (New Mexico Environment Department), April 30, 2013. "Approval with Modifications, Interim Measures Work Plan for Source Removal Testing at, Well CdV-16-4ip," New Mexico Environment Department letter to P. Maggiore (DOE-LASO) and J.D. Mousseau (LANL) from J.E. Keiling (NMED-HWB), Santa Fe, New Mexico. (NMED 2013, 522441)
- NMED (New Mexico Environment Department), May 31, 2013. "Approval with Modification, Drilling Work Plan for Well CdV-9-1(i)," New Mexico Environment Department letter to P. Maggiore (DOE-LASO) and J.D. Mousseau (LANL) from J.E. Keiling (NMED-HWB), Santa Fe, New Mexico. (NMED 2013, 522693)

NMED (New Mexico Environment Department), September 16, 2013. "Extension Request to Complete Installation of Well R-58," New Mexico Environment Department letter to P. Maggiore (DOE-LASO) and J.D. Mousseau (LANL) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2013, 523555)

NMED (New Mexico Environment Department), September 16, 2013. "Extension Request to Complete Installation of Well R-47," New Mexico Environment Department letter to P. Maggiore (DOE-LASO) and J.D. Mousseau (LANL) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2013, 523557)

NMED (New Mexico Environment Department), November 1, 2013. "Second Extension Request to Submit the Summary Report for Direct Current Resistivity Profiling in Cañon de Valle," New Mexico Environment Department letter to P. Maggiore (DOE-LASO) and J.D. Mousseau (LANL) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2013, 523814)