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

Prepared by the Environmental Programs Directorate

EP2012-0206

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September 2012

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## 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 2012 compared with previous years, primarily because of the ongoing effects of the 2011 Las Conchas fire. The primary activities relevant for the surface CMI included (1) an evaluation of post-fire flooding effects in Cañon de Valle, which revealed moderate levels of geomorphic damage and minimal impacts to contaminants concentrations in alluvial wells and springs in the canyon; and (2) inspection of a monitoring well and bentonite pond cap downgradient of the 260 Outfall ponds, which indicated the injection grouting and bentonite pond cap in that area were working effectively. For the subsurface CME, the principal relevant activity was an evaluation of the well network for Technical Area 16 (TA-16), which identified data gaps in the groundwater monitoring network for the 260 Outfall CME. This network evaluation recommended the installation of new wells north of Cañon de Valle, installation of a new regional well in the central portion of TA-16, rehabilitation of wells to the east of TA-16, and conversion of the CdV-4ip well to a single-screen well. Each well will require four quarters of sampling. These and other drilling-related activities recommended by the New Mexico Environment Department represent the next phase of the groundwater CME effort.

## CONTENTS

## 1.0 INTRODUCTION

This report serves as both the 2011/2012 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 Los Alamos National Laboratory (LANL) activities completed from March to September of fiscal year (FY) 2012 on the CME/CMI for Consolidated Unit 16-021(c)-99, the TA-16 260 Outfall. Activities outlined in the 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 2012 TO SEPTEMBER 2012

A tour of TA-16 for NMED representatives was held on May 24, 2012. The tour focused on the TA-16 260 Outfall, intermediate and regional groundwater wells at TA-16, and the alluvial systems in Cañon de Valle, Fishladder, and S-Site Canyons. The tour included sites relevant to the "Technical Area 16 Well Network Evaluation and Recommendations" report (LANL 2012, 213573), submitted to NMED on March 30, 2012, and on potential drilling sites.

## 3.0 SURFACE CMI

### 3.1 Best Management Practices

Best management practices (BMPs) are inspected quarterly and following significant precipitation events. Over two dozen precipitation events occurred between April 2012 and September 2012; none exceeded 0.5 in. at the TA-06 weather station, which is the nearest on-site station to TA-16.

### 3.2 Hydrogeologic Investigations

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

Sampling within the Cañon de Valle watershed was completed between July 10 and 25, 2012, except for those alluvial wells destroyed by flooding in August 2011 (wells 16-02657 and 16-02658) and those locations containing no water.

Flow in the TA-16 canyons peaked in July from the monsoonal rains. The largest flow event occurred on July 11, 2012, when a moderate-sized flood impacted Cañon de Valle. Precipitation was higher in the headwaters area than on LANL property. This flood caused geomorphic changes to the canyon but did not damage any of the alluvial wells. During July sampling, Martin Spring was flowing at a rate of ~0.9 gallons per minute (gpm), Burning Ground Spring was flowing at a rate of ~4.5 gpm, and SWSC Spring did not flow over the weir-box exit. Of the remaining alluvial wells, those in Cañon de Valle were mostly wet; a few of the monitoring wells around the PRB were dry. Wells in Fishladder Canyon were dry.

During sampling in July 2012, the 90s Line Pond contained a small amount of water, which was enough to sample. Well CdV-16-26644, located next to the pond, had a water level of 138.64 ft below ground surface. Surface water was present in Cañon de Valle from Burning Ground Spring to beyond the former location of Material Disposal Area P.

Sediment sampling of key reaches within Cañon de Valle and Water Canyon was completed during June/July of 2012. This sampling was designed to evaluate the effects of post–Las Conchas fire flooding on the alluvial systems in Cañon de Valle and Water Canyons. The results are summarized in the "Reconnaissance Survey Report for Post–Las Conchas Fire Flooding in Water Canyon and Cañon de Valle" (LANL 2012, 223032). In summary, 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 the post-fire flooding.

### 3.3 2011/2012 CMI Activities

Evaluations of key contaminant dynamics in Cañon de Valle springs and three alluvial wells associated with the Consolidated Unit 16-021(c)-99 CMI were completed as part of the "Reconnaissance Survey Report for Post–Las Conchas Fire Flooding in Water Canyon and Cañon de Valle" (LANL 2012, 223032), which was submitted to NMED on July 30, 2012. All the springs and most of the alluvial wells did not show obvious changes in contaminant concentrations resulting from post-fire flooding impacts to the alluvial system. The exception was barium in alluvial well CdV-16-02659, which showed a slightly increased concentration in fall 2011, to a value of ~14,000 µg/L, the highest value detected in that well.

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 bentonite cap in the TA-16 260 Outfall pond was inspected and is in good shape. No water was present in moisture monitoring well CdV-16-612309, downgradient of the TA-16 260 Outfall pond, during August 2012, suggesting the surge-bed grouting and bentonite caps in this area are working effectively.

## 4.0 SUBSURFACE CME

### 4.1 CME for Deep Groundwater

On June 20, 2012, NMED provided an approval with modifications of the "Technical Area 16 Well Network Evaluation and Recommendations" report (NMED 2012, 520747). In its approval, NMED requested that LANL submit work plans for (1) converting wells CdV-R-15-3, CdV-16-4ip, and CdV-R-37-2 into single-screen wells; (2) plugging and abandoning well R-25; (3) installing new intermediate-depth wells near R-63 and north of Cañon de Valle; and (4) installing regional groundwater wells near R-18 and in the S-Site Canyon watershed. The due dates for these work plans were extended into FY2013 because of funding constraints.

On April 30, 2012, LANL submitted the "Work Plan for Direct Current Resistivity Profiling in Cañon de Valle" (LANL 2012, 215111). NMED approved this document on May 18, 2012 (NMED 2012, 520404).

Laboratory investigations supporting the TA-16 tracer test were initiated. These consist of batch and column studies to evaluate the optimal tracers to deploy in the upcoming tracer test.

## 5.0 PUBLIC AND STAKEHOLDER INVOLVEMENT

No public meetings or meetings with stakeholders were held between March and September of FY2012.

## 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; 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. A meeting 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 FY2012.

## 8.0 PROJECTED WORK FOR OCTOBER 2012 TO MARCH 2013

### 8.1 Surface CMI

#### 8.1.1 BMPs

- Continue to inspect existing BMPs following significant precipitation events

#### 8.1.2 Hydrogeologic Investigations

- Maintain the TA-16 trailers
- 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-fire storm events in FY2012
- Continue precipitation monitoring

#### 8.1.3 CMI Activities

- Meet with NMED personnel to determine a path forward for the PRB and storm filters

### 8.2 Subsurface CME

- Analyze data from the latest watershed aggregate sampling
- Complete laboratory tests of potential tracers
- Submit a report on laboratory tests of potential tracers
- Prepare drilling work plans for TA-16 260 Outfall CME wells

### 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 over the near-surface CMI 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, geophysical surveys, well rehabilitation, and drilling 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.
- LANL 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)

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LANL (Los Alamos National Laboratory), March 2012. "Technical Area 16 Well Network Evaluation and Recommendations," Los Alamos National Laboratory document LA-UR-12-1082, Los Alamos, New Mexico. (LANL 2012, 213573)

LANL (Los Alamos National Laboratory), April 2012. "Work Plan for Direct Current Resistivity Profiling in Cañon de Valle," Los Alamos National Laboratory document LA-UR-12-20546, Los Alamos, New Mexico. (LANL 2012, 215111)

LANL (Los Alamos National Laboratory), July 2012. "Reconnaissance Survey Report for Post–Las Conchas Fire Flooding in Water Canyon and Cañon de Valle," Los Alamos National Laboratory document LA-UR-12-23405, Los Alamos, New Mexico. (LANL 2012, 223032)

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. Kieling (NMED-HRMB), Santa Fe, New Mexico. (NMED 1999, 093666)

NMED (New Mexico Environment Department), May 18, 2012. "Approval, Work Plan for Direct Current Resistivity Profiling in Cañon de Valle," New Mexico Environment Department letter to P. Maggiore (DOE-LASO) and M.J. Graham (LANL) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2012, 520404)

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