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Periodic Monitoring Report for White Rock Watershed, September 17–September 30, 2007

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Responsible project leader:

Ardyth Simmons	Ardyth Simmons	Program Manager	Environmental Programs-LWSP	2/21/08
Printed Name	Signature	Title	Organization	Date

Responsible LANS representative:

Susan G. Stiger	Susan G. Stiger	Associate Director	Environmental Programs	2/26/08
Printed Name	Signature	Title	Organization	Date

Responsible DOE representative:

David R. Gregory	David R. Gregory	Project Director	DOE-LASO	2-27-08
Printed Name	Signature	Title	Organization	Date

EXECUTIVE SUMMARY

The purpose of this report is to provide the results of the periodic monitoring event (PME) conducted by Los Alamos National Laboratory in the White Rock Watershed. The PME for White Rock Watershed was conducted pursuant to the "Interim Facility-Wide Groundwater Monitoring Plan," prepared under the Compliance Order on Consent.

The PME documented in this report occurred from September 17 to September 30, 2007. Twenty-two springs were sampled as part of this PME. The waters from these springs are representative of the chemistry of the regional aquifer and serve as the groundwater monitoring locations for this watershed. No groundwater monitoring wells are presently installed in the White Rock Watershed. Unreported results from the previous PME are also included. These results were not available for inclusion in the previous PME because of data validation issues and time needed for review by San Ildefonso Pueblo.

Water samples obtained from various locations during this PME were analyzed for target analyte list metals, volatile organic compounds, semivolatile organic compounds, cyanide, pesticides, polychlorinated biphenyls, high explosives, radionuclides, low-level tritium, general inorganic chemicals, perchlorate, stable isotopes, and field parameters (alkalinity, dissolved oxygen, pH, specific conductance, temperature, and turbidity).

No analytes from this PME or the previous PME were detected above screening levels.

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Acronyms and Abbreviations

AK	acceptable knowledge
AOC	area of concern
BCG	Biota Concentration Guide (DOE)
bgs	below ground surface
C	cancer (risk type)
Consent Order	Compliance Order on Consent
DCG	Derived Concentration Guidelines (DOE)
DOE	Department of Energy (U.S.)
EP	Environmental Programs Directorate
EPA	Environmental Protection Agency (U.S.)
F	filtered
HE	high explosives
IDW	investigation-derived waste
IFGMP	Interim Facility-Wide Groundwater Monitoring Plan
LANL	Los Alamos National Laboratory (the Laboratory)
MCL	maximum contaminant level (EPA)
MDL	method detection limit
mrem	millirem
N	noncancer (risk type)
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
PCB	polychlorinated biphenyl
PME	periodic monitoring event
PMR	periodic monitoring report
PPE	personal protective equipment
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RPF	Records Processing Facility
SOP	standard operating procedure

SVOC	semivolatile organic compound
SWMU	solid waste management unit
TA	technical area
UF	unfiltered
VOC	volatile organic compound
WCSF	waste characterization strategy form
WPF	waste profile form

1.0 INTRODUCTION

This report provides documentation of semiannual groundwater monitoring conducted by Los Alamos National Laboratory (LANL or the Laboratory) in the White Rock Watershed pursuant to the "Interim Facility-Wide Groundwater Monitoring Plan" (IFGMP) (LANL 2007, 096665), prepared under the Compliance Order on Consent (the Consent Order). This periodic monitoring event (PME) occurred from September 17 to September 30, 2007, and included sampling at 22 springs.

The Consent Order identifies New Mexico Water Quality Control Commission (NMWQCC) groundwater standards, including alternative abatement standards and U.S. Environmental Protection Agency (EPA) drinking water maximum contaminant levels (MCLs), as cleanup levels for groundwater when corrective action is implemented. NMWQCC groundwater standards, MCLs, and EPA tap water screening levels are used as screening levels for monitoring data and are provided in this report.

This report presents the following information:

- general background information on the watershed
- the watershed conceptual model
- field-measurement monitoring results
- water-quality monitoring results
- results of the screening analysis (comparing the PME results with regulatory standards and results from previous reports)
- summary and interpretation based on the data and the screening analysis

Data not reported in the previous periodic monitoring report (PMR) because of data validation issues and time needed for review by San Ildefonso Pueblo are now included in Appendix D. Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to the New Mexico Environment Department (NMED) in accordance with U.S. Department of Energy (DOE) policy.

1.1 Background

This section describes the physical characteristics of the White Rock Watershed, some of the previous investigatory activities conducted, and the Laboratory activities that may have impacted groundwater.

The Rio Grande flows from northeast to southwest adjacent to the Laboratory and forms a part of the eastern Laboratory boundary. The White Rock Canyon springs are located along the Rio Grande at the eastern border of the Laboratory and on Los Alamos County and San Ildefonso Pueblo land. The springs serve as monitoring points to detect possible discharges of contaminated groundwater from beneath the Laboratory into the Rio Grande. The White Rock springs are one of the most frequently monitored locations in or adjacent to the Laboratory. Most of the major springs have been sampled regularly since the late 1960s, with some sampled since the early 1950s. From 1980 to 2005, over 25 sampling rounds have been conducted in 60% of the springs. An analysis of the data shows that the chemical parameters have been stable in the 25-yr sampling record of White Rock Canyon springs.

Tritium operations took place at Technical Area (TA) 33 in the southern portion of the canyon that borders the Rio Grande. The "RFI Work Plan for Operable Unit 1122" (LANL 1992, 007671) describes environmental concerns at TA-33. To the north of TA-33 lies TA-70, a buffer area where no Laboratory

activities have occurred. Adjoining TA-70 to the north are low- to moderate-density residential areas in White Rock, a mix of private property, and Los Alamos County land. A municipal sanitary treatment plant discharges effluent into Mortandad Canyon just above the river at the northern county boundary. San Ildefonso Pueblo property borders Los Alamos County land on the north; this land is undeveloped. San Ildefonso Pueblo operates numerous water supply wells on both sides of the Rio Grande, and the City of Santa Fe operates the Buckman Well Field on the east side of the Rio Grande across from White Rock.

The springs in White Rock Canyon are largely remote from potential contamination and serve as boundary monitoring points for Laboratory impact. Little chemical variation occurs in the White Rock Canyon springs, which, along with chemical similarities, suggests that much of the groundwater is derived from the regional aquifer. No groundwater monitoring wells are installed in the White Rock Watershed.

1.2 Conceptual Model

The conceptual model for the White Rock Watershed is presented in Appendix A of this document.

2.0 SCOPE OF ACTIVITIES

The PME for the White Rock Watershed was conducted pursuant to the 2007 IFGMP.

Table 2.0-1 provides the location name, easting and northing, hydrogeologic zone, sample collection date, and instantaneous stream-flow values for each spring. These locations are shown spatially in Figure 2.0-1. No surface-water samples were collected for this PME.

3.0 MONITORING RESULTS

3.1 Methods and Procedures

All methods and procedures used to perform the field activities associated with the PME are documented in the 2007 IFGMP.

3.2 Field Parameter Results

Appendix B contains the field parameter results for this PME and the previous three PMEs.

3.3 Water-Level Observations

No information regarding water-level observations is included in this report because no groundwater monitoring wells are present in White Rock Canyon.

3.4 Deviations from Planned Scope

Table 3.4-1 describes the deviations from the planned scope of the PME.

4.0 ANALYTICAL DATA RESULTS

4.1 Methods and Procedures

All methods and procedures used to perform the analytical activities of the PME are documented in the 2007 IFGMP.

4.2 Analytical Data

Appendix D presents the analytical data from this PME and from the last three sampling events immediately before the September 2007 sampling event. The screening levels with which the results are compared are shown in Table 4.2-1. The analytical laboratory reports (including chains of custody, etc.) can be found in Appendix G.

Appendix D contains all data obtained during the PME (that is, all data that have been independently reviewed for conformance with Laboratory requirements), with the following constraints.

- All data
    - ❖ Data that are R qualified (rejected because of noncompliance regarding quality-control [QC] acceptance criteria) during independent validation are considered "not detected" but are still reported. Analytical laboratory QC results, including matrix spike and matrix spike duplicates, are not included in the data set.
- Radionuclides
    - ❖ All low-detection-limit tritium data are reported. Results greater than 3 times the 1 standard deviation total propagated analytical uncertainty (or 3σ) are considered to be detections.
    - ❖ Americium-241 and uranium-235 are reported only by chemical separation alpha spectroscopy. No gamma spectroscopy results are presented for these analytes.
    - ❖ Only cesium-137, cobalt-60, neptunium-237, potassium-40, and sodium-22 are reported (or analyzed) for the gamma spectroscopy suite.
    - ❖ Otherwise, all detections are reported at all locations, that is, results without a laboratory qualifier of U or X (abbreviations indicating the analyte was not detected).
- Nonradionuclides
    - ❖ All results, excluding nondetections, are reported. Field duplicates, reanalyses, field blanks, trip blanks, equipment blanks, and different analytical methods are also reported.

The screening levels applied to all media are listed in Table 4.2-1. Table 4.2-1 indicates the type of screening level and its source.

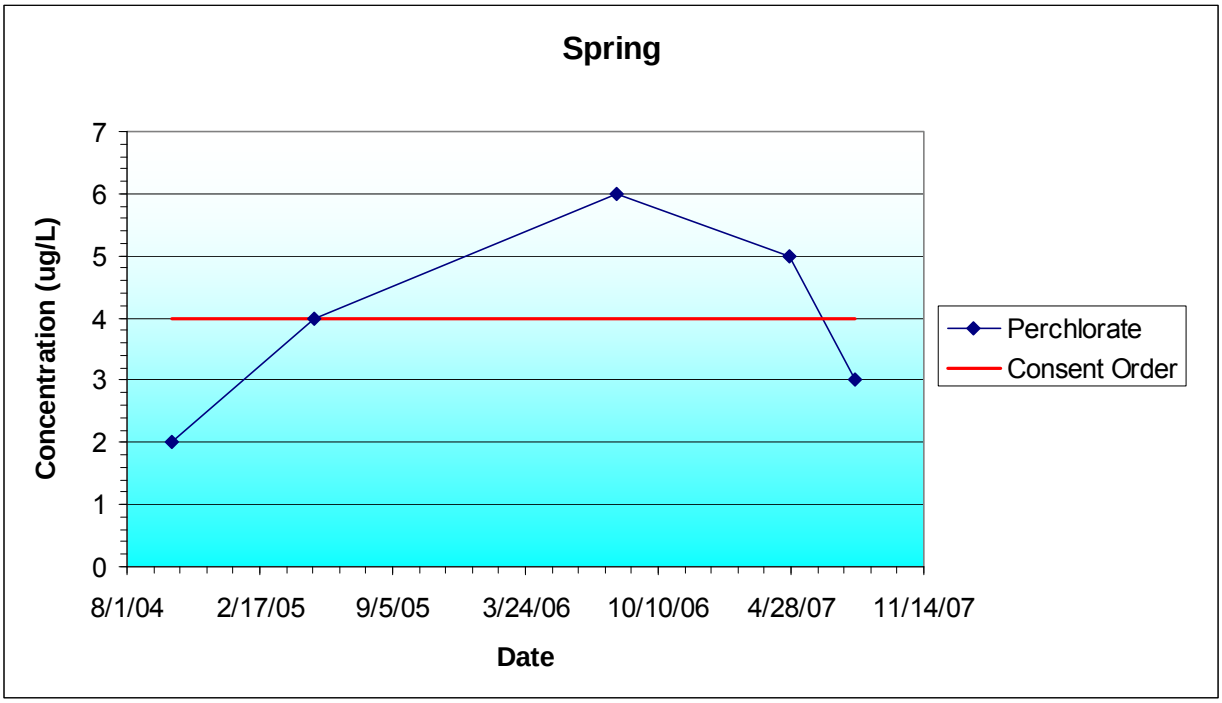
Data for PMRs are evaluated using the following screening process.

- Groundwater perchlorate data were compared with the screening level of 4 µg/L established in Section VIII.A.1.a of the Consent Order. The NMWQCC groundwater standards apply to the dissolved (filtered) portion of specified contaminants; however, the standards for mercury, organic compounds, and nonaqueous phase liquids apply to the total unfiltered concentrations of the contaminants.

- As required by the Consent Order, EPA Region 6 tap water screening levels are used for constituents having no other regulatory standard and for which toxicological information is published. For these screening levels, the tables indicate a risk type of C (excess cancer risk level of 10^{-5}) or N (noncancer). The Consent Order specifies screening for excess cancer risk at a risk level of 10^{-5} (rather than 10^{-6} as given in the Region 6 tables). Therefore, the Region 6 values were multiplied by 10 to obtain the 10^{-5} excess cancer risk level.
- The analytical results for radioactivity are compared with the DOE Derived Concentration Guideline (DCG) for groundwater.

Tables E-1 through E-4 (Appendix E) show all values for perchlorate, radioactivity, and organic compounds, and all values greater than half the lowest applicable screening level for metals and general inorganic compounds.

Analytical results are presented graphically in Figure 4.2-1. Figure 4.2-1 contains diagrams displaying a series of selected analytes. An example of a diagram displaying perchlorate concentration is shown below.



Perchlorate concentration

The analytes shown in Figure 4.2-1 were selected from data obtained during the PME. Diagrams are shown only for groundwater data. The analytes were selected and are shown in Figure 4.2-1 because of their historical presence in groundwater in this watershed.

Analytes not shown on the diagrams were either not detected or were radionuclides. When shown, the solid red lines depict applicable screening levels. Note that some screening levels may exceed the highest concentration displayed and may not appear on the diagram. Screening-level values are presented in Tables E-1 through E-4 in Appendix E.

A summary of the results comparing the groundwater analytical data with screening levels is shown in Tables E-1 through E-4 (Appendix E). Graphical representations of select groundwater analytical results (section 4.2) are shown in Figure 4.2-1.

4.2.1 Surface Water (Base Flow)

No surface-water locations were sampled for this monitoring event.

4.2.2 Groundwater

None of the groundwater sample results measured for this PME were above screening levels.

Arsenic is typically detected in spring samples collected within White Rock Canyon. During this PME, arsenic was detected in Springs 4 and 6AAA at 5.3 µg/L and 5 µg/L, respectively. Both of these values are greater than or equal to one-half the screening level of 10 µg/L\ for unfiltered groundwater samples. Gross alpha was present in La Mesita Spring at 8.23 pCi/L, which is greater than one-half the screening level.

4.3 Sampling Program Modifications

No modifications to the periodic monitoring sampling for the White Rock Watershed are proposed at this time.

5.0 INVESTIGATION-DERIVED WASTE

Appendix F discusses the management of wastes produced during this PME and contains the waste management records for waste streams generated during the sampling events.

6.0 SUMMARY

6.1 Monitoring Results

An evaluation of the field parameter monitoring results presented in Appendix B and subsequent monitoring events will be provided in the annual update to the IFGMP.

6.2 Analytical Results

6.2.1 Surface Water (Base Flow)

No surface-water locations were included in this monitoring event.

6.2.2 Groundwater

The types of contaminants detected and their concentrations are consistent with data reported from previous monitoring events in this watershed.

No groundwater sampling results measured from the previous or current PME were above screening levels.

6.3 Data Gaps

A summary of the field parameter gaps encountered during the PME are presented in Table 3.4-1. The table provides a detailed account of sampling event deviations.

7.0 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 number. This information is also included in text citations. ER ID numbers 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; the U.S. Department of Energy–Los Alamos Site Office; the U.S. Environmental Protection Agency, Region 6; 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), May 1992. "RFI Work Plan for Operable Unit 1122," Los Alamos National Laboratory document LA-UR-92-925, Los Alamos, New Mexico. (LANL 1992, 007671)

LANL (Los Alamos National Laboratory), May 2007. "Interim Facility-Wide Groundwater Monitoring Plan," Los Alamos National Laboratory document LA-UR-07-3271, Los Alamos, New Mexico. (LANL 2007, 096665)

11x17

Figure 2.0-1 Watershed monitoring locations

11x17

Figure 4.2-1 Analytical results

Table 2.0-1
Monitoring Locations and General Information

Location	Sample Collection Date	Instantaneous Stream Flow (ft^3/s)
Base Flow		
Ancho Spring	09/25/07	<1
Doe Spring	09/26/07	<1
La Mesita Spring	09/18/07	0.0027
Sacred Spring	09/19/07	0.00056
Sandia Spring	09/18/07	0.0004
Spring 1	09/24/07	0.00278
Spring 2	09/24/07	0.000341
Spring 2B	09/27/07	Not measured*
Spring 3	09/24/07	0.002
Spring 3A	09/24/07	0.4
Spring 3AA	09/24/07	0.000341
Spring 4	09/24/07	0.004
Spring 4A	09/24/07	6
Spring 4AA	09/24/07	<1
Spring 4B	09/25/07	0.005
Spring 4C	09/25/07	1
Spring 5	09/25/07	Not measured
Spring 5A	09/25/07	Not measured
Spring 5B	09/25/07	0.01
Spring 6	09/25/07	0.002
Spring 6A	09/25/07	0.005
Spring 6AAA	09/25/07	0.007
Spring 7	09/25/07	Not measured
Spring 8	09/25/07	Not measured
Spring 8A	09/25/07	<0.5
Spring 9	09/25/07	<0.002
Spring 9A	09/25/07	0.001
Spring 9B	09/26/07	Not measured
Spring 10	09/26/07	Not measured

* See Table 3.4-1.

Table 3.4-1
Observations and Deviations

Sampling Problems			
Location	Deviation	Cause	Comment
Spring 2B	No data are included in this report for this location.	No sample was collected because the spring was dry.	Spring will be sampled during next PME if possible.
Spring 5, Spring 5A	No data are included in this report for these locations.	No sample was collected because of low flow and possible mixing with river water.	Springs will be sampled during next PME if possible.
Spring 7, Spring 8	No data are included in this report for these locations.	No sample was collected because the springs were under water.	Springs will be sampled during next PME if possible.
Spring 9B	No data are included in this report for this location.	No sample was collected because of poison ivy and low flow.	Spring will be sampled during next PME if possible.
Spring 10	No data are included in this report for this location.	No sample was collected because of low flow.	Spring will be sampled during next PME if possible.

Table 4.2-1
Cleanup Standards, Risk-Based Screening Levels, and Risk-Based Cleanup Levels for Groundwater and Surface Water at Los Alamos National Laboratory

Standard Type	Groundwater	Surface Water
DOE Biota Concentration Guidelines (BCG)	n/a[a]	x[b]
DOE 100 mrem Public Dose DCG	x	n/a
DOE 4 mrem Drinking Water DCG	x	n/a
EPA MCL	x	n/a
EPA Region 6 Tap Water Screening Level	x	n/a
New Mexico Environmental Improvement Board Radiation Protection Standards	x	x
NMWQCC Fisheries Standards Chronic	n/a	x
NMWQCC Fisheries Standards Chronic, Hardness = 100 mg/L	n/a	x
NMWQCC Groundwater Standard	x	n/a
NMWQCC Livestock Watering Standard	n/a	x
NMWQCC Wildlife Habitat Standard	n/a	x
NMWQCC Human Health Standard Ephemeral	n/a	x
NMWQCC Human Health Standard Perennial	n/a	x

[a] n/a = Not applicable.

[b] x = Standard applied to data screen for this report.