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Post-Cerro Grande Fire Environmental Sampling Data: Los Alamos Canyon Surface Water and Spring Samples Collected in June 2000

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Acronyms

EPA	US Environmental Protection Agency
ER	environmental restoration
MCL	maximum contaminant level
NMED	New Mexico Environment Department
TA	technical area
WQCC	Water Quality Control Commission

1.0 INTRODUCTION

The Los Alamos National Laboratory's (the Laboratory's) Environmental Restoration (ER) Project collected surface water and spring water samples at three locations in Los Alamos Canyon on June 22 and June 27, 2000 (after the Cerro Grande fire). This report summarizes the analytical results of these sampling efforts.

Sampling was conducted before the summer monsoon season and before significant postfire flooding occurred in Los Alamos Canyon. This sampling provided baseline data for later comparison with data from samples collected during the monsoon season because the chemistry of the floodwater could affect water quality in the canyon. For more information, see the conceptual model at http://erproject.lanl.gov/Fire/Data/datahome.html#CE_Model. The surface water locations were selected to represent potential spatial variability in water quality in Los Alamos Canyon, and were chosen from locations with persistent surface water.

2.0 SAMPLING AND ANALYSIS

Sampling

Surface water samples were collected at two locations in Los Alamos Canyon: in the vicinity of alluvial well LAO-0.6 between technical area (TA) 41 and TA-2 (Figure 2.0-1), and in the vicinity of alluvial well LLAO-1 (Figure 2.0-2). Alluvial well LAO-0.6 is located on Laboratory land in upper Los Alamos Canyon. Alluvial well LLAO-1 is located in lower Los Alamos Canyon on San Ildefonso land, approximately 0.6 mi southwest of the village of Totavi. Potential sources of this surface water include springs and surface water from the upper portion of the Los Alamos watershed and water from the Los Alamos reservoir as it was drained.

Spring water samples were collected at Basalt Spring, which is located on San Ildelfonso Pueblo land in lower Los Alamos Canyon, upstream of LLAO-1 (Figure 2.0-2).

Both filtered and nonfiltered samples were collected to characterize the difference in results caused by the presence of suspended solids. Filtered samples are used to evaluate the dissolved chemicals in the samples. Nonfiltered samples are used to evaluate chemicals associated with the suspended sediment, in addition to the dissolved chemicals. Filtered samples were prepared in the field by filtration through a 0.45-micron filter. All water samples were analyzed by analytical laboratories that are approved by the ER Project and that are external to the Laboratory.

The surface water samples near LAO-0.6 were collected on June 22, 2000. The surface water samples near LLAO-1 and the spring water samples at Basalt Spring were collected on June 27, 2000. The first major storm event after the Cerro Grande fire occurred on June 2, 2000. That event did not produce a flood in Los Alamos Canyon; some increased surface water flow that contained ash and possibly fire-fighting chemicals was generated as the Los Alamos reservoir (located in the upper portions of the watershed) was drained. Therefore, ash-related chemicals and fire-fighting chemicals may be present in these samples. Because some chemicals or chemical concentrations not related to Laboratory operations have been identified in ash and flood-transported ash (muck), sampling results should be evaluated in that context. Data summaries for baseline ash and muck samples collected by the ER Project in June 2000 are provided at http://erproject.lanl.gov/Fire/Data/ash-muck.html.

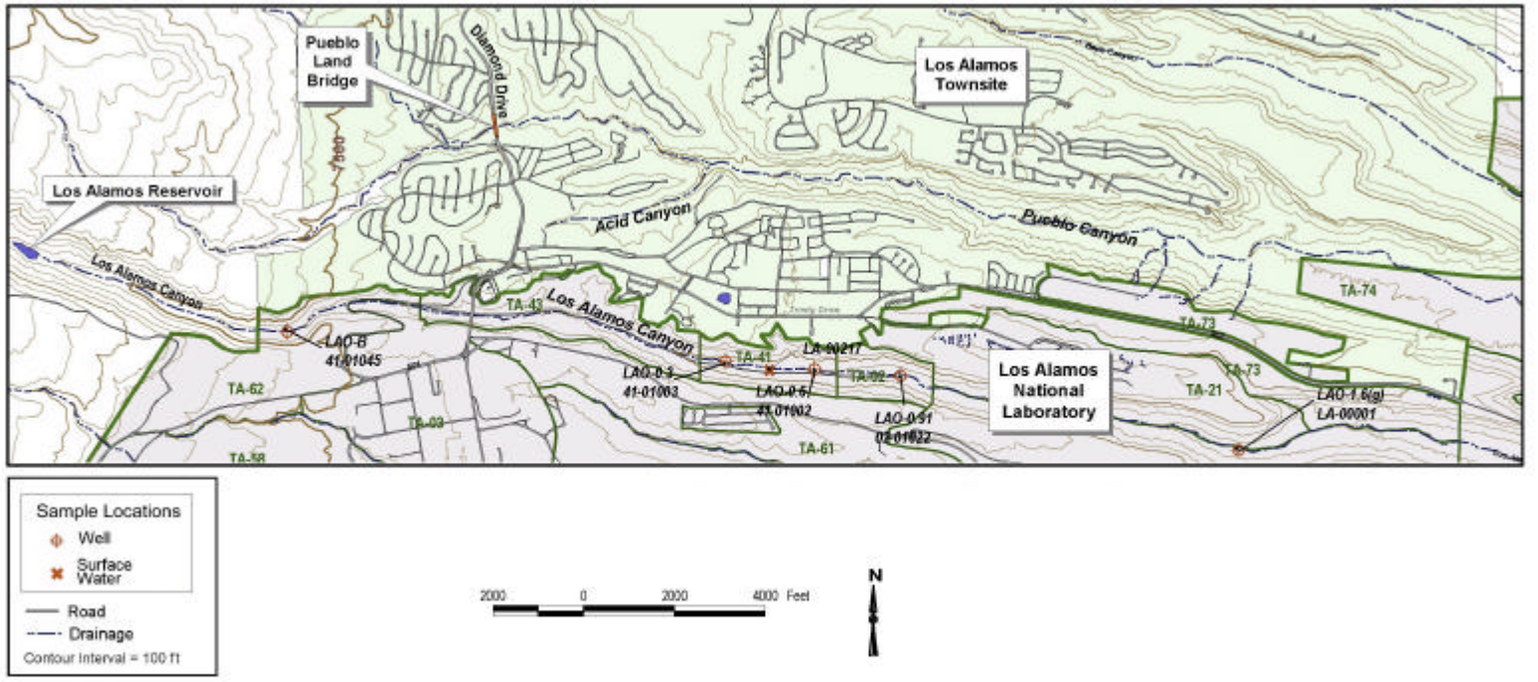

Figure 2.0-1. Post-Cerro Grande fire alluvial groundwater monitoring wells and surface water sampling locations in upper Los Alamos Canyon

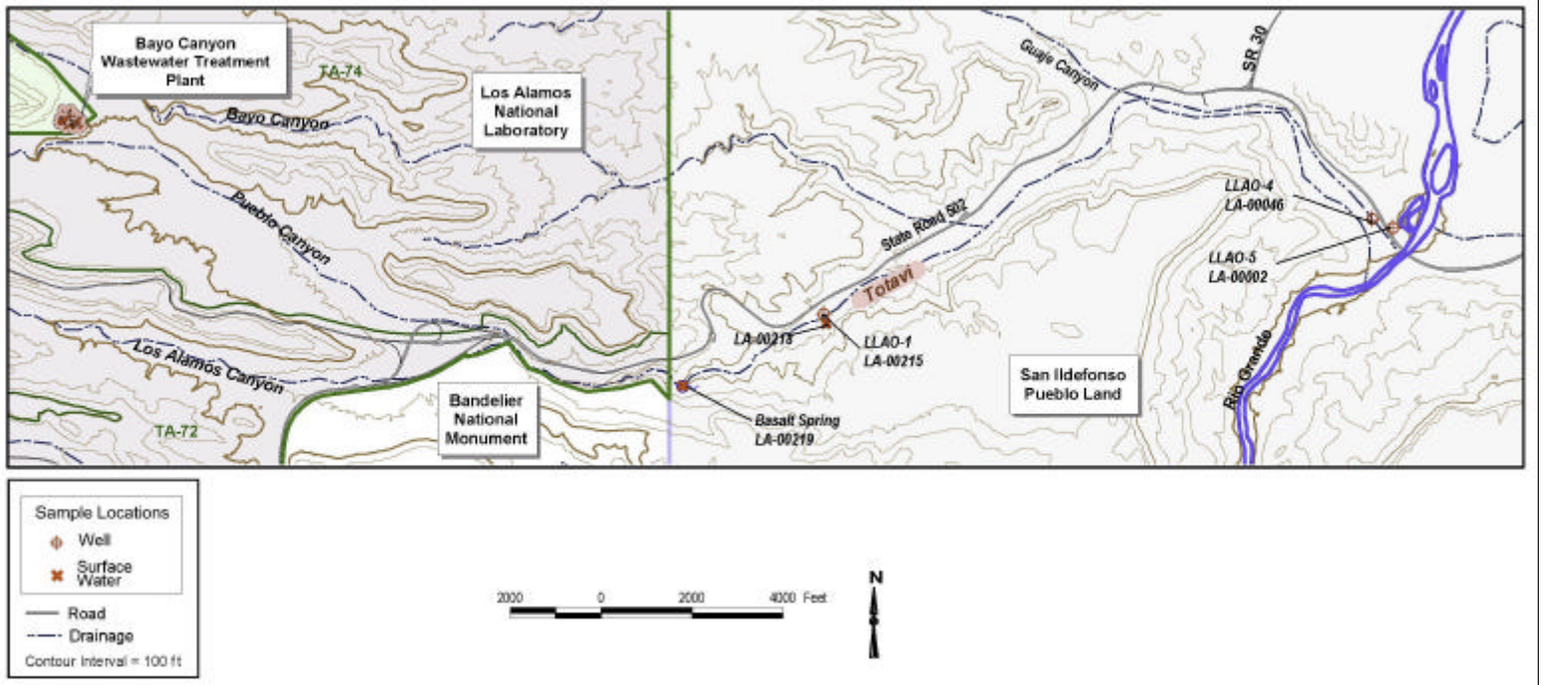

Figure 2.0-2. Post-Cerro Grande fire alluvial groundwater monitoring wells and surface water sampling locations in lower Los Alamos Canyon

Analysis

All filtered and nonfiltered samples were analyzed for the following inorganic chemicals and radionuclides: 23 trace metals, uranium, ammonia, nitrite and nitrate, total phosphorus, americium-241, isotopic plutonium (plutonium-238 and plutonium-239), isotopic uranium (uranium-234, uranium-235, and uranium-238), and strontium-90.

Only filtered samples were analyzed for the following chemicals: bicarbonate, carbonate, chloride, fluoride, and sulfate.

Only nonfiltered samples were analyzed for the following chemicals: total suspended solids, perchlorate, total cyanide, and tritium.

3.0 DATA SUMMARY TABLES

The inorganic and radionuclide chemical data for the water samples are summarized in two separate tables (Tables 3.0-1 and 3.0-2). Each table lists the chemical analyte, the number of samples analyzed, the number of detected results, and the minimum, mean, and maximum values for the detected results.

The surface water results are compared with New Mexico Water Quality Control Commission (WQCC) surface water standards for livestock watering (Section 3100K) and wildlife habitat (Section 3100L). Livestock watering and wildlife habitat are New Mexico Environment Department-designated uses for surface water in Los Alamos Canyon as well as other canyons at the Laboratory. Some standards apply only to filtered samples, and some standards apply only to nonfiltered samples. The New Mexico WQCC standards for interstate and intrastate streams are available under “Environmental Protection Regulations, Regulations by Subject, Standards for Interstate and Intrastate Streams–20NMAC6.1,” at http://www.nmenv.state.nm.us/.

The WQCC standards are used only as screening levels for the purposes of reviewing the surface water sample results. An exceedance of its screening level by a chemical does not necessarily mean that immediate action is necessary; an exceedance means only that further evaluation should be undertaken. That evaluation may include additional sample collection leading to a risk assessment, in order to accurately assess the potential risk from exposure.

4.0 REFERENCES

NMED (New Mexico Environment Department), Environmental Protection Regulations, Regulations by Subject, Standards for Interstate and Intrastate Streams–20NMAC6.1, http://www.nmenv.state.nm.us/.

Environmental Restoration Project, http://erproject.lanl.gov/Fire/Data/ash-muck.html.

Table 3.0-1
Los Alamos Canyon Surface Water and Spring Samples, June 2000: Data Summary for Inorganics

Analyte	Field Preparation	Number of Analyses	Number of Detects	Minimum of Detects (µg/L)	Mean of Detects (µg/L)	Maximum of Detects (µg/L)	NMED[a] Livestock Watering Standard[b] (µg/L)	Frequency of Detects >Livestock Watering Standard	NMED Wildlife Habitat Standard[b] (µg/L)	Frequency of Detects >Wildlife Habitat Standard
Aluminum	F[c]	3	0	—[d]	—	—	5000	—	—	—
Aluminum	NF[e]	3	1	57	57	57	—	—	—	—
Ammonia (expressed as N)	F	3	0	—	—	—	—	—	—	—
Ammonia (expressed as N)	NF	3	0	—	—	—	—	—	—	—
Antimony	F	3	0	—	—	—	—	—	—	—
Antimony	NF	3	0	—	—	—	—	—	—	—
Arsenic	F	3	3	0.42	3.7	6	200	0/3	—	—
Arsenic	NF	3	3	0.54	4.41	8.5	—	—	—	—
Barium	F	3	3	75.3	83.0	88.6	—	—	—	—
Barium	NF	3	3	79.5	83.1	89.6	—	—	—	—
Beryllium	F	3	0	—	—	—	—	—	—	—
Beryllium	NF	3	2	0.029	0.038	0.046	—	—	—	—
Bicarbonate	F	3	3	65000	119000	210000	—	—	—	—
Cadmium	F	3	0	—	—	—	50	—	—	—
Cadmium	NF	3	1	0.152	0.152	0.152	—	—	—	—
Calcium	F	3	3	24100	25367	27100	—	—	—	—
Calcium	NF	3	3	22200	23000	24500	—	—	—	—
Carbonate	F	3	1	24000	24000	24000	—	—	—	—
Chloride	F	3	3	27000	49667	93000	—	—	—	—
Chromium	F	3	1	2.4	2.4	2.4	1000	0/3	—	—
Chromium	NF	3	1	4.7	4.7	4.7	—	—	—	—
Cobalt	F	3	2	3.1	3.15	3.2	1000	0/3	—	—
Cobalt	NF	3	2	2.9	4.5	6.1	—	—	—	—

Table 3.0-1 (continued)

Analyte	Field Preparation	Number of Analyses	Number of Detects	Minimum of Detects (?g/L)	Mean of Detects (?g/L)	Maximum of Detects (?g/L)	NMED Livestock Watering Standard (?g/L)	Frequency of Detects >Livestock Watering Standard	NMED Wildlife Habitat Standard (?g/L)	Frequency of Detects >Wildlife Habitat Standard
Copper	F	3	2	6.9	7.1	7.3	500	0/3	—	—
Copper	NF	3	2	6.7	7.75	8.8	—	—	—	—
Cyanide (total)	NF	3	0	—	—	—	—	—	5.2	0/3
Fluoride	F	3	3	140	353	500	—	—	—	—
Iron	F	3	3	8	75	207	—	—	—	—
Iron	NF	3	3	19.8	53.0	84.8	—	—	—	—
Lead	F	3	2	0.089	0.11	0.131	100	0/3	—	—
Lead	NF	3	3	0.115	0.31	0.496	—	—	—	—
Magnesium	F	3	3	6010	6210	6310	—	—	—	—
Magnesium	NF	3	3	5230	5583	5770	—	—	—	—
Manganese	F	3	2	2.3	38.6	74.9	—	—	—	—
Manganese	NF	3	3	2.5	40	110	—	—	—	—
Mercury	F	3	0	—	—	—	—	—	—	—
Mercury	NF	3	0	—	—	—	10	—	0.77	0/3
Nickel	F	3	2	8	8.4	8.8	—	—	—	—
Nickel	NF	3	2	7.3	9.1	10.8	—	—	—	—
Nitrate + nitrite (expressed as N)	F	3	3	53	3884	7500	—	—	—	—
Nitrate + nitrite (expressed as N)	NF	3	2	4400	5900	7400	—	—	—	—
Perchlorate	NF	3	0	—	—	—	—	—	—	—
Phosphorus (total)	F	3	2	1700	1950	2200	—	—	—	—
Phosphorus (total)	NF	3	2	1700	1950	2200	—	—	—	—

Table 3.0-1 (continued)

Analyte	Field Preparation	Number of Analyses	Number of Detects	Minimum of Detects (?g/L)	Mean of Detects (?g/L)	Maximum of Detects (?g/L)	NMED Livestock Watering Standard (?g/L)	Frequency of Detects >Livestock Watering Standard	NMED Wildlife Habitat Standard (?g/L)	Frequency of Detects >Wildlife Habitat Standard
Potassium	F	3	3	4210	6670	8590	—	—	—	—
Potassium	NF	3	3	3880	6060	7720	—	—	—	—
Selenium	F	3	2	2	2.25	2.5	50	0/3	—	—
Selenium	NF	3	3	1.8	3.5	5.1	—	—	5	1/3
Silver	F	3	2	0.02	0.045	0.07	—	—	—	—
Silver	NF	3	3	0.03	0.99	2.9	—	—	—	—
Sodium	F	3	3	42700	45700	49200	—	—	—	—
Sodium	NF	3	3	38900	41533	43800	—	—	—	—
Sulfate	F	3	3	7600	20533	29000	—	—	—	—
Thallium	F	3	2	0.191	0.5605	0.93	—	—	—	—
Thallium	NF	3	2	0.42	0.5795	0.739	—	—	—	—
Total suspended solids	NF	3	1	7500	7500	7500	—	—	—	—
Uranium	F	3	3	0.039	0.321	0.592	—	—	—	—
Uranium	NF	3	3	0.068	0.355	0.636	—	—	—	—
Vanadium	F	3	3	0.87	6.5	11.2	100	0/3	—	—
Vanadium	NF	3	3	1	7.4	14.2	—	—	—	—
Zinc	F	3	0	—	—	—	25000	—	—	—
Zinc	NF	3	0	—	—	—	—	—	—	—

[a] NMED = New Mexico Environment Department.

[b] State of New Mexico surface water standards are from New Mexico Water Quality Control Commission Regulations, *Standards for Interstate and Intrastate Surface Waters*, 20NMAC6.1.

[c] F = Filtered.

[d] Value is not available or not applicable.

[e] NF = Nonfiltered.

Table 3.0-2
Los Alamos Canyon Surface Water and Spring Samples, June 2000:
Data Summary for Radionuclides

Analyte	Field Preparation	Number of Analyses	Number of Detects	Minimum of Detects (pCi/L)	Mean of Detects (pCi/L)	Maximum of Detects (pCi/L)	NMED[a] Livestock Watering Standard[b] (pCi/L)	Frequency of Detects >NMED Livestock Watering Standard
Americium-241	F[c]	3	0	—[d]	—	—	—	—
Americium-241	NF[e]	3	0	—	—	—	—	—
Plutonium-238	F	3	0	—	—	—	—	—
Plutonium-238	NF	3	0	—	—	—	—	—
Plutonium-239	F	3	0	—	—	—	—	—
Plutonium-239	NF	3	0	—	—	—	—	—
Strontium-90	F	3	0	—	—	—	—	—
Strontium-90	NF	3	0	—	—	—	—	—
Tritium	NF	3	3	55	60	63	20000	0/3
Uranium-234	F	3	2	0.14	0.27	0.4	—	—
Uranium-234	NF	3	3	0.07	0.22	0.36	—	—
Uranium-235	F	3	0	—	—	—	—	—
Uranium-235	NF	3	1	0.037	0.037	0.037	—	—
Uranium-238	F	3	2	0.076	0.161	0.245	—	—
Uranium-238	NF	3	2	0.099	0.129	0.158	—	—

[a] NMED = New Mexico Environment Department.

[b] State of New Mexico surface water standards are from New Mexico Water Quality Control Commission Regulations, *Standards for Interstate and Intrastate Surface Waters*, 20NMAC6.1.

[c] F = Filtered.

[d] Value is not available or not applicable.

[e] NF = Nonfiltered.