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Date: **MAR 01 2011**  
Refer To: EP2011-0091

Mr. Brian Snyder, Water Division Director  
Acting Public Utilities Division Director  
Sangre de Cristo Water Division  
City of Santa Fe  
801 West San Mateo  
P.O. Box 909  
Santa Fe, New Mexico 87504

**Subject: Los Alamos National Laboratory Sitewide Monitoring Program Drinking Water  
Results for the City of Santa Fe Buckman Water Supply Wells**

Dear Mr. Snyder:

This report, prepared by Los Alamos National Laboratory (the Laboratory), provides the analytical results from the November 10, 2010, sampling and analysis of the City of Santa Fe Buckman Water Supply Wells No. 1, 6, and 8. All results were below the U.S. Environmental Protection Agency (EPA) primary and secondary drinking water standards with the exception of the following:

- Arsenic (As) was measured in an unfiltered sample from Buckman Well No. 1 at a concentration of 11.5  $\mu\text{g/L}$ ; the EPA maximum contaminant level (MCL) for arsenic in drinking water is 10  $\mu\text{g/L}$ .

Routine monitoring of select Buckman water supply wells is conducted in accordance with the April 22, 2010, sampling and analysis plan cooperatively developed between the Laboratory and City of Santa Fe staff. Under this plan, Buckman Wells No. 1, 6, and 8 will be sampled quarterly by the Laboratory: twice per year for full-suite analysis (radionuclides [including tritium], general inorganics [including perchlorate], metals [including chromium], and organics) and twice per year for low-level tritium.

The attached CD contains the following items: (1) General Engineering Laboratories, Inc. (GEL), data packages and (2) an Excel file of the analytical results (Tables 1–6) with a glossary of laboratory qualification codes, secondary validation codes, and secondary validation reason codes. The analytical results are as follows.

**Radionuclides:** Analytical results from sampling Buckman Wells No. 1, 6, and 8 for radionuclides are presented in Table 1.

- **Americium-241, Cesium-137, Neptunium-237, Plutonium-238, Plutonium-239/240, and Strontium-90:** All results at all locations were nondetect, as indicated by the analytical laboratory qualifier code "U."
- **Gross Alpha:** The gross-alpha activities at Buckman Wells No. 1, 6, and 8 were 4.70 pCi/L, 8.56 pCi/L, and 8.83 pCi/L, respectively. All results were below the EPA MCL for gross alpha in drinking water of 15 pCi/L.
- **Gross Beta:** Gross-beta activities at Buckman Wells No. 1, 6, and 8 were 4.33 pCi/L, 6.47 pCi/L, and 8.17 pCi/L, respectively. All results were below the EPA screening level for gross beta in drinking water of 50 pCi/L (40 Code of Federal Regulations § 141.26).
- **Combined Radium-226 and Radium-228:** The combined radium-226 and radium-228 activities at Buckman Wells No. 1, 6, and 8 ranged from nondetect (lab qualifier code "U") to a maximum value of 1.4 pCi/L. The results at all locations were below the EPA MCL of 5 pCi/L for combined radium-226 and radium-228 in drinking water.
- **Tritium:** Tritium results were pending at the time this report was prepared.
- **Isotopic Uranium:** Unfiltered samples from Buckman Wells No. 1, 6, and 8 were analyzed for isotopic uranium using alpha spectroscopy (alpha spec), an analytical method that indirectly measures the alpha activity in a sample. Using alpha spectroscopy, GEL analyzed the samples for uranium isotopes, uranium-234, uranium-235/236, and uranium-238. EPA has not established an activity-based MCL for uranium isotopes in drinking water; the current EPA MCL of 30 µg/L is a mass-based standard.

The mass of total uranium in the sample was calculated using the following formula, which incorporates the specific activities for the isotopes:

$$\text{Total uranium } (\mu\text{g/L}) = (^{234}\text{U}/6250) + (^{235/236}\text{U}/2.16) + (^{238}\text{U}/0.336)$$

The calculated concentrations of total uranium are presented in the table below, along with the results obtained from inductively coupled plasma mass spectrometry (ICPMS) analysis (see Table 3). All results were below the EPA MCL of 30 µg/L for uranium in drinking water.

**Total Uranium Concentrations, Buckman Wells No. 1, 6, and 8, November 10, 2010**

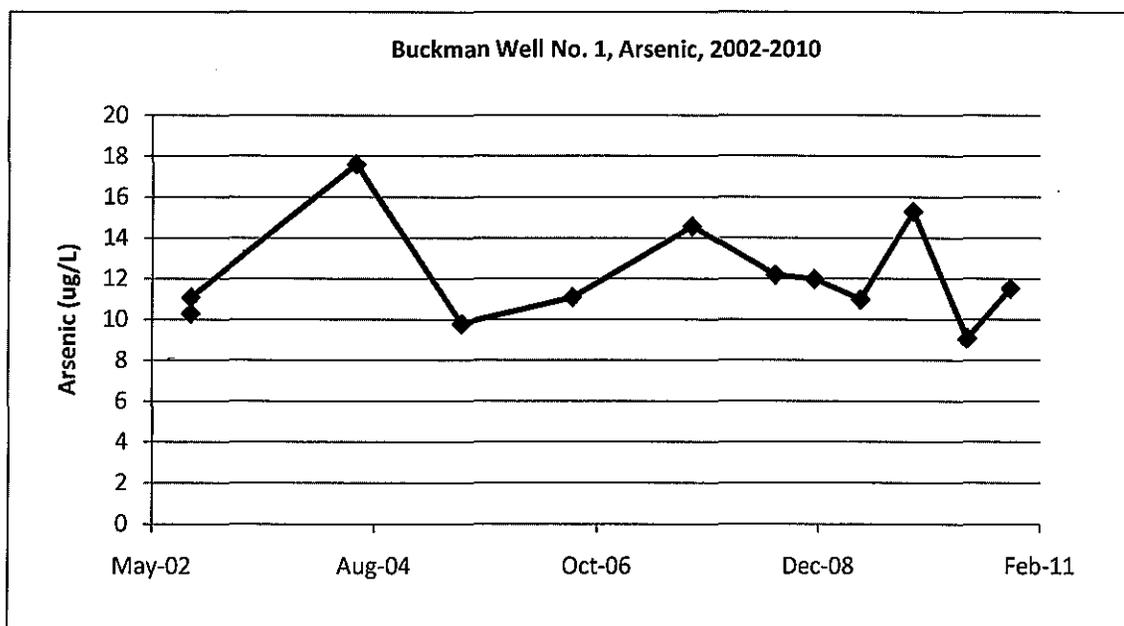
All Units: µg/L	Buckman Well No. 1	Buckman Well No. 6	Buckman Well No. 8
Total U: Calculated	15.9	5.72	19.7
Total U: ICPMS	18.8	5.44	21.2

**General Inorganics:** The analytical results from sampling Buckman Wells No. 1, 6, and 8 for general inorganics are summarized in Table 2.

- **Perchlorate:** The unfiltered perchlorate concentrations at Buckman Wells No. 1, 6, and 8 were 0.34  $\mu\text{g/L}$ , 0.46  $\mu\text{g/L}$ , and 0.32  $\mu\text{g/L}$ , respectively. Currently, neither the federal government nor the State of New Mexico has established a drinking water standard for perchlorate. On January 8, 2009, EPA issued an interim health advisory of 15  $\mu\text{g/L}$  for perchlorate in drinking water, replacing the existing preliminary remediation goal of 24.5  $\mu\text{g/L}$ .
- **Cyanide, Chloride, Fluoride, Nitrate+Nitrite, Sulfate, and Total Dissolved Solids:** Cyanide, chloride, fluoride, nitrate+nitrite (as N), sulfate, and total dissolved solids concentrations at all locations were below the EPA primary and secondary drinking water standards.

**Metals:** The analytical results from sampling Buckman Wells No. 1, 6, and 8 for metals are summarized in Table 3.

- **Arsenic:** The unfiltered arsenic concentrations at Buckman Wells No. 1, 6, and 8 were 11.5  $\mu\text{g/L}$ , 9.3  $\mu\text{g/L}$ , and 6.7  $\mu\text{g/L}$ , respectively. The reported value from Buckman Well No. 1 exceeds the EPA MCL of 10  $\mu\text{g/L}$  for arsenic in drinking water. As shown in the figure below, arsenic concentrations at Buckman Well No. 1 have ranged from approximately 9  $\mu\text{g/L}$  to approximately 18  $\mu\text{g/L}$  between 2002 and 2010.



- **Chromium:** The filtered and unfiltered chromium concentrations at Buckman Wells No. 1, 6, and 8 ranged between 6.3  $\mu\text{g/L}$  and 10.9  $\mu\text{g/L}$ , well below the EPA MCL of 100  $\mu\text{g/L}$  and the New Mexico groundwater standard of 50  $\mu\text{g/L}$ .
- **Strontium (metal):** The unfiltered strontium (metal) concentrations at Buckman Wells No. 1, 6, and 8 were 136  $\mu\text{g/L}$ , 1250  $\mu\text{g/L}$ , and 537  $\mu\text{g/L}$ , respectively. There is no EPA

drinking water standard or New Mexico groundwater standard for strontium (metal). The EPA has established a regional screening level for strontium (metal) in tap water of 22,000 µg/L (noncancer). Since 2008, strontium (metal) concentrations at Buckman Well No. 6 have ranged from 527 µg/L to 1250 µg/L with a mean concentration of 856 µg/L. Mean strontium (metal) concentrations at Buckman Wells No. 1 and 8 were 127 µg/L and 462 µg/L, respectively.

**Organics:** The analytical results from sampling Buckman Wells No. 1, 6, and 8 for organics are summarized in Tables 4, 5, and 6.

- **High Explosives (HE):** No HE compounds were detected at concentrations greater than GEL's method detection limit (MDL).
- **Polychlorinated Biphenyls (PCBs):** No PCBs were detected at concentrations greater than GEL's MDL.
- **Volatile Organic Compounds (VOCs):** No VOCs were detected in samples or in field trip blanks at concentrations greater than GEL's MDL.

In summary, all results presented in this report are below EPA MCLs and New Mexico groundwater standards with the exception of arsenic at Buckman Well No. 1.

If you would like additional information regarding this report, please contact Bob Beers at (505) 667-7969 (bbeers@lanl.gov).

Sincerely,



Michael J. Graham, Associate Director  
Environmental Programs  
Los Alamos National Laboratory

MG/CD/SP/BB:sm

Attachment: CD with the following items:

- (1) GEL data packages
- (2) Excel file of Tables 1–6 and glossary of laboratory qualification codes, secondary validation codes, and secondary validation reason codes (LA-UR-11-0783)

Cy: (w/att.)

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