Offsite

Los Alamos
NATIONAL LABORATORY
EST 1943

Environmental Programs
P.O. Box 1663, MS M991
Los Alamos, New Mexico 87545
(505) 606-2337/FAX (505) 665-1812

ENTERED

National Nuclear Security Administration
Los Alamos Site Office, MS A316
Environmental Restoration Program
Los Alamos, New Mexico 87544
(505) 667-4255/FAX (505) 606-2132

Date: JAN 14 2011
Refer To: EP2011-0029

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 Surface Water Monitoring Results, Rio Grande above the City of Santa Fe's Buckman Direct Diversion

Dear Mr. Snyder:

This report, prepared by Los Alamos National Laboratory (LANL or the Laboratory), provides analytical results from the July 13, 2010, sampling of the Rio Grande above the City of Santa Fe's Buckman Direct Diversion (BDD). All results were below U.S. Environmental Protection Agency (EPA) drinking water standards, with the exception of the following naturally occurring metals.

- Aluminum (Al) was measured in an unfiltered sample at a concentration of 612 µg/L; the EPA national secondary drinking water standard for aluminum is 50 µg/L–200 µg/L. The concentration of aluminum in the filtered sample was <200 µg/L.

- Iron (Fe) was measured in an unfiltered sample at a concentration of 428 µg/L; the EPA national secondary drinking water standard for iron is 300 µg/L. The concentration of iron in the filtered sample was <100 µg/L.

- Manganese (Mn) was measured in an unfiltered sample at a concentration of 60.7 µg/L; the EPA national secondary drinking water standard for manganese is 50 µg/L. The concentration of manganese in the filtered sample was 4.46 µg/L.

In a November 1, 2007, letter the BDD Board requested that LANL and the U.S. Department of Energ (DOE) fund and implement six actions to protect public drinking water supplies (H. Montoya, Chair, BDD Board, to G. Rael, DOE, and S. Stiger, LANL). Pursuant to the letter's action item 2, *Properly monitor the transport of legacy contaminants in both the surface water and groundwater flow systems*, on July 30, 2008, LANL initiated bimonthly sampling of the Rio Grande at Otowi Bridge and at Buckman upstream of the BDD. This report presents the analytical results from the July 13, 2010, 11:30 a.m., sampling event at Buckman. The results from sampling the Rio Grande at Otowi Bridge will be reported separately once the Pueblo of San Ildefonso has had an opportunity to review the data.

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Please be advised that the July 13, 2010, sampling of the Rio Grande at Buckman was the last surface water monitoring event conducted at this location under the above-referenced initiative; future monitoring will be executed pursuant to the May 13, 2010, Memorandum of Understanding Regarding Water Quality Monitoring between the BDD Board and the DOE.

Analytical results from the July 13, 2010, event are summarized in Tables 1.0 to 6.0. The attached CD also contains the following items: (1) Desert Research Institute (DRI) geotechnical reports for particle-size analysis from both the May 10, 2010, and July 13, 2010, sampling events; and (2) an Excel file of Tables 1.0 to 6.0 and a glossary of laboratory qualification codes, secondary validation codes, and secondary validation reason codes. A discussion of the analytical results follows.

Radionuclides: Samples were collected from the Rio Grande at Buckman and submitted to General Engineering Laboratories, Inc. (GEL) and American Radiation Services, Inc. (ARSL) for the analysis of radionuclides. Analytical results are summarized in Table 1.0. The results are discussed below.

- **Americium-241, Cesium-137, Neptunium-237, Plutonium-238, Plutonium-239/240, and Strontium-90**: All filtered and unfiltered results were nondetect, as indicated by the analytical laboratory qualifier code "U."

- **Gross Alpha:** Gross alpha was not detected in the filtered and unfiltered samples, as indicated by the analytical laboratory qualifier code "U."

- **Gross Beta:** Gross beta was not detected in the filtered sample, as indicated by the analytical laboratory qualifier code "U." Gross-beta activity in the unfiltered sample was 3.8 pCi/L, below the EPA screening level of 50 pCi/L for gross beta in drinking water.

- **Radium-226:** Radium-226 was not detected in the filtered and unfiltered samples, as indicated by the analytical laboratory qualifier code "U."

- **Radium-228:** Radium-228 was not detected in the filtered sample, as indicated by the analytical laboratory qualifier code "U." Radium-228 activity in the unfiltered sample was 2.42 pCi/L, below the EPA maximum contaminant level (MCL) of 5 pCi/L for radium-228 in drinking water.

- **Isotopic Thorium**: Filtered and unfiltered samples were submitted to GEL for isotopic thorium analysis. All filtered results were nondetect, as indicated by the analytical laboratory qualifier code "U." Unfiltered thorium activities were less than 0.08 pCi/L. The EPA has not established a drinking water standard for thorium. Thorium, like uranium, occurs naturally in the environment.

- **Tritium:** Tritium activity in the unfiltered sample was 12.5 pCi/L, below the EPA MCL of 20,000 pCi/L for tritium in drinking water and consistent with background atmospheric tritium levels in northern New Mexico of about 30 pCi/L.

- **Isotopic Uranium**: Filtered and unfiltered samples were submitted to GEL for isotopic uranium (U) analysis using alpha spectroscopy. The 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 uranium in each sample was calculated using the following formula, which incorporates the specific activities for the isotopes:

$$\text{Total uranium } (\mu g/L) = ({}^{233/234}U/6250) + ({}^{235/236}U/2.16) + ({}^{238}U/0.336)$$

The calculated concentrations of total uranium are presented below. These values are consistent with the total uranium results obtained from inductively coupled plasma/mass spectrometry (ICPMS) analysis presented in Table 6.0. All results are below the EPA MCL of 30 µg/L for total uranium in drinking water.

Location	Field Prep (F/UF)	Total Uranium –Calculated– (pCi/L)	Total Uranium –ICPMS– (pCi/L)
Buckman Diversion SW	F	1.2	1.4
Buckman Diversion SW	UF	1.3	1.4

Organics: Samples were collected from the Rio Grande at Buckman and submitted to GEL for the analysis of organics. The analytical results are summarized in Tables 2.0, 3.0, and 4.0 and are discussed below.

- **Volatile Organic Compounds (VOCs):** No VOCs were detected in the unfiltered sample or field trip blank at concentrations greater than GEL's method detection limit (MDL).

- **Semivolatile Organic Compounds (SVOCs):** No SVOCs were detected in the unfiltered sample at concentrations greater than GEL's MDL.

- **Pesticides:** No pesticides were detected in the unfiltered sample at concentrations greater than GEL's MDL.

- **Polychlorinated Biphenyls (PCBs):** An unfiltered sample and unfiltered field blank (FB) were submitted to Cape Fear Analytical (CFA) for the analysis of 209 PCB congeners using analytical method EPA:1668A. Congeners are individual PCB compounds. Table 4.0 presents the total detected PCBs—the sum of detected PCB congeners—in each sample. The results are summarized below.

Location	Analyte	Field Prep	Result (µg/L)	Result (pg/L)	Lab Qual Code	Concat Flag Code	Fld QC Type Code
Buckman Diversion SW	Total detected PCBs	UF	<0.0000000	<0.00	U	U	
Buckman Diversion SW	Total detected PCBs	UF	<0.0000000	<0.00	U	U	FB

The sample and FB were reported as nondetect for PCBs by CFA, as indicted by the qualifier code "U." Individual congener results have not been included in this report but are available online at RACER NM (http://www.racernm.com/).

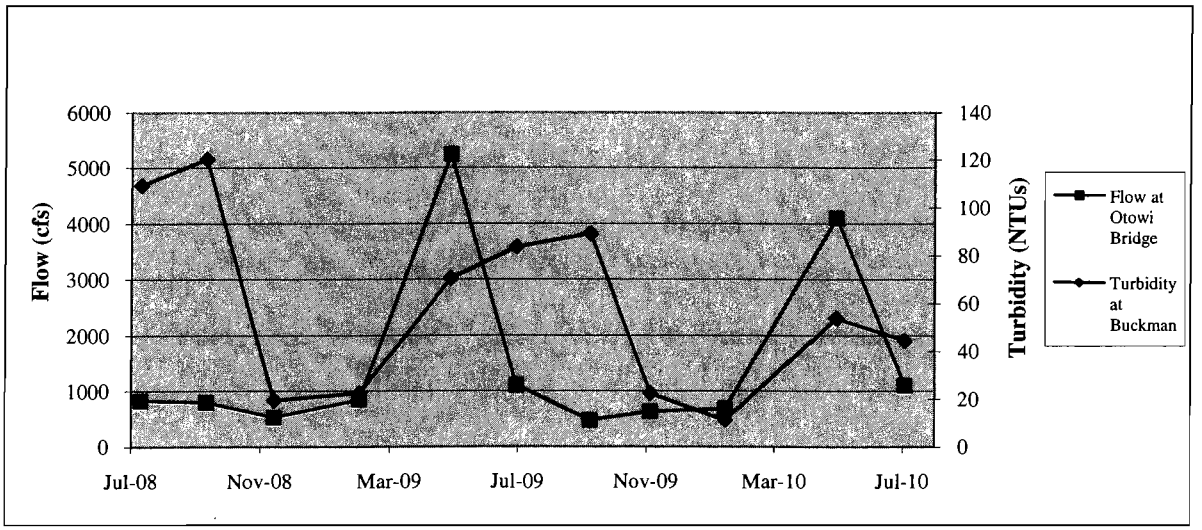
General Inorganics: Samples were submitted to GEL for the analysis of general inorganics. Field measurements were taken for dissolved oxygen, conductivity, temperature, turbidity, and pH. The results are summarized in Table 5.0 and discussed below.

- **Perchlorate**: The unfiltered perchlorate concentration was 0.08 µg/L. Currently, neither the federal government nor the State of New Mexico has established a drinking water standard for perchlorate.

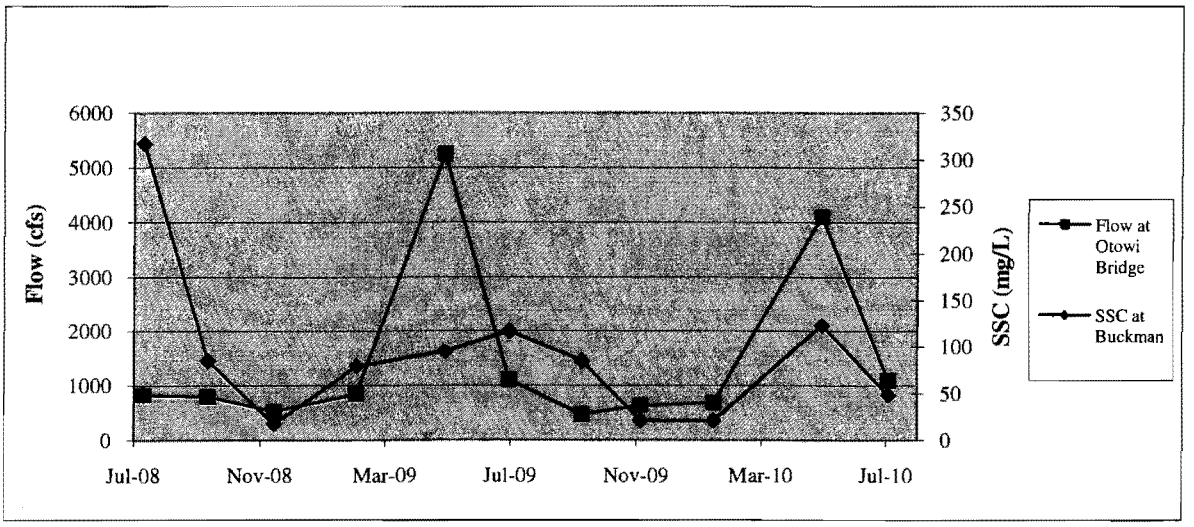
- **Cyanide, Fluoride, and Nitrate+Nitrite (as N):** All results were below EPA MCLs.

- **Chloride, Sulfate, Total Dissolved Solids, and pH:** All results were below EPA secondary drinking water standards.

- **Turbidity, Suspended Solids Concentration (SSC), and Streamflow:** Turbidity was measured at 44.2 nephelometric turbidity units (NTU). As shown in the figure below, turbidity values in the Rio Grande at Buckman have ranged from 11 to 120 NTU since July 2008.



The unfiltered SSC was 47.6 mg/L. As shown in the figure below, SSC values in the Rio Grande at Buckman have ranged from 16 to 316 mg/L since July 2008.



The U.S. Geologic Survey (USGS) collects real-time streamflow data from the Rio Grande and Rio Chama upgradient of the Buckman sampling site. Daily mean discharge data for July 13, 2010, are presented below.

USGS Station Name	Date	Daily Mean Discharge (ft^3/s)
Rio Grande at Otowi Bridge (USGS 08313000)	7/13/10	1080
Rio Grande at Embudo (USGS 08279500)	7/13/10	311
Rio Chama near Chamita (USGS 08290000)	7/13/10	627

Source: http://waterdata.usgs.gov/nm/nwis/current/?type=flow.

Metals: Filtered and unfiltered samples were collected from the Rio Grande at Buckman and submitted to GEL for metals analysis. All results are summarized in Table 6.0. The concentrations of filtered and unfiltered metals were below the EPA national primary and secondary drinking water standards, with the exception of aluminum, iron, and manganese reported on page 1 of this report.

Particle Size: Particle-size results from both the May 10, 2010, and July 13, 2010, sampling events are included in this report.

- May 10, 2010, Sampling Event. An unfiltered sample (CAWR-10-17019) and unfiltered field duplicate (FD) sample (CAWR-10-17022) were submitted to DRI, Reno, NV, for particle-size analysis (see the enclosed CD for a copy of the geotechnical report). The sand, silt, and clay contents of these two samples are presented in the following table.

% Size Fraction	Rio Grande at Buckman CAWR-10-17019	Rio Grande at Buckman-FD CAWR-10-17022
Sand	16.21%	18.64%
Silt	72.25%	70.48%
Clay	11.54%	10.88%

- July 13, 2010, Sampling Event. An unfiltered sample (CAWR-10-24220) was submitted to the DRI for particle-size analysis (see the enclosed CD for a copy of the geotechnical report). The sand, silt, and clay contents of the sample are presented in the following table.

% Size Fraction	Rio Grande at Buckman CAWR-10-24220
Sand	22.77%
Silt	69.84%
Clay	7.39%

In summary, all results presented in this report are below EPA drinking water standards, with the exception of unfiltered aluminum, iron, and manganese.

If you have any questions, please contact Bob Beers at (505) 667-7969 (bbeers@lanl.gov) or Cheryl Rodriguez at (505) 665-5330 (crodriguez2@doeal.gov).

Sincerely,

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

Sincerely,

George J. Rael, Manager
Environmental Projects Office
Los Alamos Site Office

JAN 2011

MG/GR/SP/BB:sm

Attachment: CD with the following items:
(1) Geotechnical reports from the DRI for particle-size analysis
(2) Excel file of Tables 1.0–6.0 and glossary of laboratory qualification codes, secondary validation codes, and secondary validation reason codes (LA-UR-10-7037)

Cy: (w/att.)
Virginia Vigil, BDDB Committee, 102 Grant Avenue, Santa Fe, NM 87501
Rick Carpenter, City of Santa Fe, 801 West San Mateo, Santa Fe, NM 87505
Alex Puglisi, City of Santa Fe, 801 West San Mateo, Santa Fe, NM 87505
Sandy Hurlocker, USDA, P.O. Box 3307, Espanola, NM 87533
James Bearzi, NMED-HWB, 2905 Rodeo Park Drive East, Bldg 1, Santa Fe, NM 87505
Neil Weber, San Ildefonso Pueblo, 02 Tunyo Po, Santa Fe, NM 87506
Steve Yanicak, NMED-DOE-OB, MS M894
Cheryl Rodriguez, DOE-LASO, MS A316
Hai Shen, DOE-LASO, MS A316
Gene Turner, DOE-LASO, MS A316
Bob Beers, ENV-RCRA, MS K490
RPF, MS M707 (with two CDs)

Cy: (Letter and CD and/or DVD only)
Laurie King, EPA Region 6, Dallas, TX
Steve Paris, EP-CAP, MS M992
Suzanne Coyne, IRM-DCS, MS K490
William Alexander, EP-BPS, MS M992

Cy: (w/o att.)
Tom Skibitski, NMED-OB, Santa Fe, NM
Annette Russell, DOE-LASO (date-stamped letter emailed)
James C. Cantwell, ADESHQ, MS K491 (date-stamped letter emailed)
Mike Saladen, ENV-RCRA, MS K490 (date-stamped letter emailed)
Craig Douglass, EP-CAP, MS M992 (date-stamped letter emailed)
Michael J. Graham, ADEP, MS M991 (date-stamped letter emailed)

Table 1.0
Rio Grande at Buckman Diversion
Radionuclides

Location Name	Start Date	Analyte	Anyl Meth Code	Fld Prep Code		Std Result	Units	Std Uncert	Std Mda	Lab Qual Code	Concat Flag Code	Sample Id	Lab Code	Scr Lvl	Scr Lvl Type Code
Buckman Diversion SW	7/13/10	Am-241	HASL-300:AM-241	F	<	0.002	pCi/L	0.003	0.034	U	U	CAWR-10-24221	GELC		
Buckman Diversion SW	7/13/10	Am-241	HASL-300:AM-241	UF	<	0.006	pCi/L	0.004	0.036	U	U	CAWR-10-24220	GELC		
Buckman Diversion SW	7/13/10	Co-60	EPA:901.1	F	<	0.238	pCi/L	1.9	6.2	U	U	CAWR-10-24221	GELC		
Buckman Diversion SW	7/13/10	Co-60	EPA:901.1	UF	<	-0.805	pCi/L	1.6	5.1	U	U	CAWR-10-24220	GELC		
Buckman Diversion SW	7/13/10	Cs-137	EPA:901.1	F	<	-2.89	pCi/L	1.5	4.2	U	U	CAWR-10-24221	GELC		
Buckman Diversion SW	7/13/10	Cs-137	EPA:901.1	UF	<	3.09	pCi/L	1.6	5.9	U	U	CAWR-10-24220	GELC		
Buckman Diversion SW	7/13/10	GROSSA	EPA:900	F	<	1.03	pCi/L	0.77	2.6	U	U	CAWR-10-24221	GELC	15	EPA PRIM DW LVL
Buckman Diversion SW	7/13/10	GROSSA	EPA:900	UF	<	0.657	pCi/L	0.66	2.5	U	U	CAWR-10-24220	GELC	15	EPA PRIM DW LVL
Buckman Diversion SW	7/13/10	GROSSB	EPA:900	F	<	0.742	pCi/L	0.86	3.0	U	U	CAWR-10-24221	GELC	50	EPA SEC DW LVL
Buckman Diversion SW	7/13/10	GROSSB	EPA:900	UF		3.75	pCi/L	1.0	2.9			CAWR-10-24220	GELC	50	EPA SEC DW LVL
Buckman Diversion SW	7/13/10	GROSSG	EPA:901.1	F	<	3.9	pCi/L	1.4	3.4		U	CAWR-10-24221	GELC		
Buckman Diversion SW	7/13/10	GROSSG	EPA:901.1	UF	<	5.3	pCi/L	2.3	12	U	U	CAWR-10-24220	GELC		
Buckman Diversion SW	7/13/10	H-3	Low_Level_Tritium	UF		12.52	pCi/L	2.04	2.14			CAWR-10-24220	ARSL	20,000	EPA PRIM DW LVL
Buckman Diversion SW	7/13/10	K-40	EPA:901.1	F	<	34.3	pCi/L	20	75	U	U	CAWR-10-24221	GELC		
Buckman Diversion SW	7/13/10	K-40	EPA:901.1	UF	<	28.7	pCi/L	25	90	U	U	CAWR-10-24220	GELC		
Buckman Diversion SW	7/13/10	Na-22	EPA:901.1	F	<	-3.2	pCi/L	1.3	2.6	U	U	CAWR-10-24221	GELC		
Buckman Diversion SW	7/13/10	Na-22	EPA:901.1	UF	<	-1.8	pCi/L	1.3	3.6	U	U	CAWR-10-24220	GELC		
Buckman Diversion SW	7/13/10	Np-237	HASL-300:Np-237	F	<	0.011	pCi/L	0.01	0.03	U	U	CAWR-10-24221	GELC		
Buckman Diversion SW	7/13/10	Np-237	EPA:901.1	F	<	2.65	pCi/L	3.1	11	U	U	CAWR-10-24221	GELC		
Buckman Diversion SW	7/13/10	Np-237	HASL-300:Np-237	UF	<	0.003	pCi/L	0.004	0.018	U	U	CAWR-10-24220	GELC		
Buckman Diversion SW	7/13/10	Np-237	EPA:901.1	UF	<	0.198	pCi/L	3.0	9.9	U	U	CAWR-10-24220	GELC		
Buckman Diversion SW	7/13/10	Pu-238	HASL-300:ISOPU	F	<	0.0000	pCi/L	0.006	0.026	U	U	CAWR-10-24221	GELC		
Buckman Diversion SW	7/13/10	Pu-238	HASL-300:ISOPU	UF	<	0.0000	pCi/L	0.004	0.036	U	U	CAWR-10-24220	GELC		
Buckman Diversion SW	7/13/10	Pu-239/240	HASL-300:ISOPU	F	<	-0.002	pCi/L	0.006	0.026	U	U	CAWR-10-24221	GELC		
Buckman Diversion SW	7/13/10	Pu-239/240	HASL-300:ISOPU	UF	<	0.008	pCi/L	0.01	0.04	U	U	CAWR-10-24220	GELC		
Buckman Diversion SW	7/13/10	Ra-226	EPA:903.1	F	<	0.224	pCi/L	0.08	0.16		U	CAWR-10-24221	GELC	5	EPA PRIM DW LVL
Buckman Diversion SW	7/13/10	Ra-226	EPA:903.1	UF	<	-0.042	pCi/L	0.08	0.34	U	U	CAWR-10-24220	GELC	5	EPA PRIM DW LVL
Buckman Diversion SW	7/13/10	Ra-228	EPA:904	F	<	0.473	pCi/L	0.19	0.55	U	U	CAWR-10-24221	GELC	5	EPA PRIM DW LVL
Buckman Diversion SW	7/13/10	Ra-228	EPA:904	UF		2.42	pCi/L	0.50	1.1			CAWR-10-24220	GELC	5	EPA PRIM DW LVL
Buckman Diversion SW	7/13/10	Sr-90	EPA:905.0	F	<	0.304	pCi/L	0.13	0.39	U	U	CAWR-10-24221	GELC	8	EPA PRIM DW LVL
Buckman Diversion SW	7/13/10	Sr-90	EPA:905.0	UF	<	-0.047	pCi/L	0.13	0.50	U	U	CAWR-10-24220	GELC	8	EPA PRIM DW LVL
Buckman Diversion SW	7/13/10	Th-228	HASL-300:ISOTH	F	<	-0.0004	pCi/L	0.006	0.035	U	U	CAWR-10-24221	GELC		
Buckman Diversion SW	7/13/10	Th-228	HASL-300:ISOTH	UF		0.073	pCi/L	0.016	0.035			CAWR-10-24220	GELC		
Buckman Diversion SW	7/13/10	Th-230	HASL-300:ISOTH	F	<	0.035	pCi/L	0.010	0.054	U	U	CAWR-10-24221	GELC		
Buckman Diversion SW	7/13/10	Th-230	HASL-300:ISOTH	UF		0.063	pCi/L	0.013	0.053			CAWR-10-24220	GELC		
Buckman Diversion SW	7/13/10	Th-232	HASL-300:ISOTH	F	<	0.004	pCi/L	0.003	0.025	U	U	CAWR-10-24221	GELC		
Buckman Diversion SW	7/13/10	Th-232	HASL-300:ISOTH	UF		0.049	pCi/L	0.011	0.024			CAWR-10-24220	GELC		
Buckman Diversion SW	7/13/10	U-234	HASL-300:ISOU	F		0.699	pCi/L	0.066	0.067			CAWR-10-24221	GELC		
Buckman Diversion SW	7/13/10	U-234	HASL-300:ISOU	UF		0.745	pCi/L	0.068	0.063			CAWR-10-24220	GELC		
Buckman Diversion SW	7/13/10	U-235/236	HASL-300:ISOU	F	<	0.026	pCi/L	0.009	0.040	U	U	CAWR-10-24221	GELC		
Buckman Diversion SW	7/13/10	U-235/236	HASL-300:ISOU	UF	<	0.021	pCi/L	0.008	0.038	U	U	CAWR-10-24220	GELC		
Buckman Diversion SW	7/13/10	U-238	HASL-300:ISOU	F		0.405	pCi/L	0.043	0.047			CAWR-10-24221	GELC		
Buckman Diversion SW	7/13/10	U-238	HASL-300:ISOU	UF		0.426	pCi/L	0.044	0.044			CAWR-10-24220	GELC		

Table 2.0
Rio Grande at Buckman Diversion
Volatile Organic Compounds (VOCs)

Location Name	Start Date	Analyte	Analyte Desc	Anyl Meth Code	Fld Prep Code		Std Result	Units	Std Mdl	Lab Qual Code	Concat Flag Code	Sample ID	Fld Qc Type Code	Lab Code
Buckman Diversion SW	7/13/10	67-64-1	Acetone	SW-846:8260B	UF	<	10.0	ug/L	3.5	U	UJ	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	75-05-8	Acetonitrile	SW-846:8260B	UF	<	25.0	ug/L	6.3	U	R	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	107-02-8	Acrolein	SW-846:8260B	UF	<	5.0	ug/L	1.3	U	R	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	107-13-1	Acrylonitrile	SW-846:8260B	UF	<	5.0	ug/L	1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	71-43-2	Benzene	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	108-86-1	Bromobenzene	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	74-97-5	Bromochloromethane	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	75-27-4	Bromodichloromethane	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	75-25-2	Bromoform	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	74-83-9	Bromomethane	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	71-36-3	Butanol[1-]	SW-846:8260B	UF	<	50.0	ug/L	15	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	78-93-3	Butanone[2-]	SW-846:8260B	UF	<	5.0	ug/L	1.3	U	UJ	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	104-51-8	Butylbenzene[n-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	135-98-8	Butylbenzene[sec-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	98-06-6	Butylbenzene[tert-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	75-15-0	Carbon Disulfide	SW-846:8260B	UF	<	5.0	ug/L	1.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	56-23-5	Carbon Tetrachloride	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	126-99-8	Chloro-1,3-butadiene[2-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	107-05-1	Chloro-1-propene[3-]	SW-846:8260B	UF	<	5.0	ug/L	1.5	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	108-90-7	Chlorobenzene	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	124-48-1	Chlorodibromomethane	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	75-00-3	Chloroethane	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	67-66-3	Chloroform	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	74-87-3	Chloromethane	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	95-49-8	Chlorotoluene[2-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	106-43-4	Chlorotoluene[4-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	96-12-8	Dibromo-3-Chloropropane[1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	UJ	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	106-93-4	Dibromoethane[1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	74-95-3	Dibromomethane	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	95-50-1	Dichlorobenzene[1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	541-73-1	Dichlorobenzene[1,3-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	106-46-7	Dichlorobenzene[1,4-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	75-71-8	Dichlorodifluoromethane	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	75-34-3	Dichloroethane[1,1-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	107-06-2	Dichloroethane[1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	75-35-4	Dichloroethene[1,1-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	156-59-2	Dichloroethene[cis-1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	156-60-5	Dichloroethene[trans-1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	78-87-5	Dichloropropane[1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	142-28-9	Dichloropropane[1,3-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	594-20-7	Dichloropropane[2,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	563-58-6	Dichloropropene[1,1-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	10061-01-5	Dichloropropene[cis-1,3-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	10061-02-6	Dichloropropene[trans-1,3-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	60-29-7	Diethyl Ether	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	97-63-2	Ethyl Methacrylate	SW-846:8260B	UF	<	5.0	ug/L	1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	100-41-4	Ethylbenzene	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	87-68-3	Hexachlorobutadiene	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	591-78-6	Hexanone[2-]	SW-846:8260B	UF	<	5.0	ug/L	1.3	U	UJ	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	74-88-4	Iodomethane	SW-846:8260B	UF	<	5.0	ug/L	1.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	78-83-1	Isobutyl alcohol	SW-846:8260B	UF	<	50.0	ug/L	13	U	R	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	98-82-8	Isopropylbenzene	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	99-87-6	Isopropyltoluene[4-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC

Table 2.0
Rio Grande at Buckman Diversion
Volatile Organic Compounds (VOCs)

Location Name	Start Date	Analyte	Analyte Desc	Anyl Meth Code	Fld Prep Code		Std Result	Units	Std Mdl	Lab Qual Code	Concat Flag Code	Sample ID	Fld Qc Type Code	Lab Code
Buckman Diversion SW	7/13/10	126-98-7	Methacrylonitrile	SW-846:8260B	UF	<	5.0	ug/L	1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	80-62-6	Methyl Methacrylate	SW-846:8260B	UF	<	5.0	ug/L	1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	1634-04-4	Methyl tert-Butyl Ether	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	108-10-1	Methyl-2-pentanone[4-]	SW-846:8260B	UF	<	5.0	ug/L	1.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	75-09-2	Methylene Chloride	SW-846:8260B	UF	<	10.0	ug/L	3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	91-20-3	Naphthalene	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	107-12-0	Propionitrile	SW-846:8260B	UF	<	5.0	ug/L	1.5	U	R	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	103-65-1	Propylbenzene[1-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	100-42-5	Styrene	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	630-20-6	Tetrachloroethane[1,1,1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	79-34-5	Tetrachloroethane[1,1,2,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	127-18-4	Tetrachloroethene	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	108-88-3	Toluene	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	76-13-1	Trichloro-1,2,2-trifluoroethane[1,1,2-]	SW-846:8260B	UF	<	5.0	ug/L	1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	87-61-6	Trichlorobenzene[1,2,3-]	SW-846:8260B	UF	<	1.0	ug/L	0.33	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	120-82-1	Trichlorobenzene[1,2,4-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	71-55-6	Trichloroethane[1,1,1-]	SW-846:8260B	UF	<	1.0	ug/L	0.33	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	79-00-5	Trichloroethane[1,1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	79-01-6	Trichloroethene	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	75-69-4	Trichlorofluoromethane	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	96-18-4	Trichloropropane[1,2,3-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	95-63-6	Trimethylbenzene[1,2,4-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	108-67-8	Trimethylbenzene[1,3,5-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	75-01-4	Vinyl Chloride	SW-846:8260B	UF	<	1.0	ug/L	0.5	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	108-05-4	Vinyl acetate	SW-846:8260B	UF	<	5.0	ug/L	1.5	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	95-47-6	Xylene[1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	lene[1,3 and	Xylene[1,3-]+Xylene[1,4-]	SW-846:8260B	UF	<	2.0	ug/L	0.5	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	67-64-1	Acetone	SW-846:8260B	UF	<	10.0	ug/L	3.5	U	UJ	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	75-05-8	Acetonitrile	SW-846:8260B	UF	<	25.0	ug/L	6.3	U	R	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	107-02-8	Acrolein	SW-846:8260B	UF	<	5.0	ug/L	1.3	U	R	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	107-13-1	Acrylonitrile	SW-846:8260B	UF	<	5.0	ug/L	1	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	71-43-2	Benzene	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	108-86-1	Bromobenzene	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	74-97-5	Bromochloromethane	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	75-27-4	Bromodichloromethane	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	75-25-2	Bromoform	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	74-83-9	Bromomethane	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	71-36-3	Butanol[1-]	SW-846:8260B	UF	<	50.0	ug/L	15	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	78-93-3	Butanone[2-]	SW-846:8260B	UF	<	5.0	ug/L	1.3	U	UJ	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	104-51-8	Butylbenzene[n-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	135-98-8	Butylbenzene[sec-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	98-06-6	Butylbenzene[tert-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	75-15-0	Carbon Disulfide	SW-846:8260B	UF	<	5.0	ug/L	1.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	56-23-5	Carbon Tetrachloride	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	126-99-8	Chloro-1,3-butadiene[2-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	107-05-1	Chloro-1-propene[3-]	SW-846:8260B	UF	<	5.0	ug/L	1.5	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	108-90-7	Chlorobenzene	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	124-48-1	Chlorodibromomethane	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	75-00-3	Chloroethane	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	67-66-3	Chloroform	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	74-87-3	Chloromethane	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	95-49-8	Chlorotoluene[2-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	106-43-4	Chlorotoluene[4-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC

Table 2.0
Rio Grande at Buckman Diversion
Volatile Organic Compounds (VOCs)

Location Name	Start Date	Analyte	Analyte Desc	Anyl Meth Code	Fld Prep Code		Std Result	Units	Std Mdl	Lab Qual Code	Concat Flag Code	Sample ID	Fld Qc Type Code	Lab Code
Buckman Diversion SW	7/13/10	96-12-8	Dibromo-3-Chloropropane[1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	UJ	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	106-93-4	Dibromoethane[1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	74-95-3	Dibromomethane	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	95-50-1	Dichlorobenzene[1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	541-73-1	Dichlorobenzene[1,3-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	106-46-7	Dichlorobenzene[1,4-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	75-71-8	Dichlorodifluoromethane	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	75-34-3	Dichloroethane[1,1-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	107-06-2	Dichloroethane[1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	75-35-4	Dichloroethene[1,1-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	156-59-2	Dichloroethene[cis-1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	156-60-5	Dichloroethene[trans-1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	78-87-5	Dichloropropane[1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	142-28-9	Dichloropropane[1,3-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	594-20-7	Dichloropropane[2,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	563-58-6	Dichloropropene[1,1-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	10061-01-5	Dichloropropene[cis-1,3-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	10061-02-6	Dichloropropene[trans-1,3-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	60-29-7	Diethyl Ether	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	97-63-2	Ethyl Methacrylate	SW-846:8260B	UF	<	5.0	ug/L	1	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	100-41-4	Ethylbenzene	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	87-68-3	Hexachlorobutadiene	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	591-78-6	Hexanone[2-]	SW-846:8260B	UF	<	5.0	ug/L	1.3	U	UJ	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	74-88-4	Iodomethane	SW-846:8260B	UF	<	5.0	ug/L	1.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	78-83-1	Isobutyl alcohol	SW-846:8260B	UF	<	50.0	ug/L	13	U	R	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	98-82-8	Isopropylbenzene	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	99-87-6	Isopropyltoluene[4-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	126-98-7	Methacrylonitrile	SW-846:8260B	UF	<	5.0	ug/L	1	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	80-62-6	Methyl Methacrylate	SW-846:8260B	UF	<	5.0	ug/L	1	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	1634-04-4	Methyl tert-Butyl Ether	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	108-10-1	Methyl-2-pentanone[4-]	SW-846:8260B	UF	<	5.0	ug/L	1.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	75-09-2	Methylene Chloride	SW-846:8260B	UF	<	10.0	ug/L	3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	91-20-3	Naphthalene	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	107-12-0	Propionitrile	SW-846:8260B	UF	<	5.0	ug/L	1.5	U	R	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	103-65-1	Propylbenzene[1-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	100-42-5	Styrene	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	630-20-6	Tetrachloroethane[1,1,1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	79-34-5	Tetrachloroethane[1,1,2,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	127-18-4	Tetrachloroethene	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	108-88-3	Toluene	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	76-13-1	Trichloro-1,2,2-trifluoroethane[1,1,2-]	SW-846:8260B	UF	<	5.0	ug/L	1	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	87-61-6	Trichlorobenzene[1,2,3-]	SW-846:8260B	UF	<	1.0	ug/L	0.33	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	120-82-1	Trichlorobenzene[1,2,4-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	71-55-6	Trichloroethane[1,1,1-]	SW-846:8260B	UF	<	1.0	ug/L	0.33	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	79-00-5	Trichloroethane[1,1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	79-01-6	Trichloroethene	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	75-69-4	Trichlorofluoromethane	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	96-18-4	Trichloropropane[1,2,3-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	95-63-6	Trimethylbenzene[1,2,4-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	108-67-8	Trimethylbenzene[1,3,5-]	SW-846:8260B	UF	<	1.0	ug/L	0.25	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	75-01-4	Vinyl Chloride	SW-846:8260B	UF	<	1.0	ug/L	0.5	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	108-05-4	Vinyl acetate	SW-846:8260B	UF	<	5.0	ug/L	1.5	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	95-47-6	Xylene[1,2-]	SW-846:8260B	UF	<	1.0	ug/L	0.3	U	U	CAWR-10-24225	FTB	GELC
Buckman Diversion SW	7/13/10	lene[1,3 and	Xylene[1,3-]+Xylene[1,4-]	SW-846:8260B	UF	<	2.0	ug/L	0.5	U	U	CAWR-10-24225	FTB	GELC

Table 3.0
Rio Grande at Buckman Diversion
Semivolatile Organic Compounds (SVOCs)

Location Name	Start Date	Analyte	Analyte Desc	Anyl Meth Code	Fld Prep Code		Std Result	Units	Std Mdl	Lab Qual Code	Concat Flag Code	Sample Id	Fld Qc Type Code	Lab Code
Buckman Diversion SW	7/13/10	83-32-9	Acenaphthene	SW-846:8270C	UF	<	1.04	ug/L	0.32	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	208-96-8	Acenaphthylene	SW-846:8270C	UF	<	1.04	ug/L	0.21	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	62-53-3	Aniline	SW-846:8270C	UF	<	10.4	ug/L	2.6	U	UJ	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	120-12-7	Anthracene	SW-846:8270C	UF	<	1.04	ug/L	0.21	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	1912-24-9	Atrazine	SW-846:8270C	UF	<	10.4	ug/L	3.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	103-33-3	Azobenzene	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	92-87-5	Benzidine	SW-846:8270C	UF	<	10.4	ug/L	3.1	U	UJ	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	56-55-3	Benzo(a)anthracene	SW-846:8270C	UF	<	1.04	ug/L	0.21	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	50-32-8	Benzo(a)pyrene	SW-846:8270C	UF	<	1.04	ug/L	0.21	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	205-99-2	Benzo(b)fluoranthene	SW-846:8270C	UF	<	1.04	ug/L	0.21	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	191-24-2	Benzo(g,h,i)perylene	SW-846:8270C	UF	<	1.04	ug/L	0.21	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	207-08-9	Benzo(k)fluoranthene	SW-846:8270C	UF	<	1.04	ug/L	0.21	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	65-85-0	Benzoic Acid	SW-846:8270C	UF	<	20.8	ug/L	6.3	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	100-51-6	Benzyl Alcohol	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	111-91-1	Bis(2-chloroethoxy)methane	SW-846:8270C	UF	<	10.4	ug/L	3.1	U	UJ	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	111-44-4	Bis(2-chloroethyl)ether	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	UJ	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	117-81-7	Bis(2-ethylhexyl)phthalate	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	101-55-3	Bromophenyl-phenylether[4-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	85-68-7	Butylbenzylphthalate	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	59-50-7	Chloro-3-methylphenol[4-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	106-47-8	Chloroaniline[4-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	91-58-7	Chloronaphthalene[2-]	SW-846:8270C	UF	<	1.04	ug/L	0.31	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	95-57-8	Chlorophenol[2-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	7005-72-3	Chlorophenyl-phenyl[4-] Ether	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	218-01-9	Chrysene	SW-846:8270C	UF	<	1.04	ug/L	0.21	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	84-74-2	Di-n-butylphthalate	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	117-84-0	Di-n-octylphthalate	SW-846:8270C	UF	<	10.4	ug/L	3.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	53-70-3	Dibenz(a,h)anthracene	SW-846:8270C	UF	<	1.0	ug/L	0.21	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	132-64-9	Dibenzofuran	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	95-50-1	Dichlorobenzene[1,2-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	541-73-1	Dichlorobenzene[1,3-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	106-46-7	Dichlorobenzene[1,4-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	91-94-1	Dichlorobenzidine[3,3'-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	120-83-2	Dichlorophenol[2,4-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	84-66-2	Diethylphthalate	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	131-11-3	Dimethyl Phthalate	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	105-67-9	Dimethylphenol[2,4-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	534-52-1	Dinitro-2-methylphenol[4,6-]	SW-846:8270C	UF	<	10.4	ug/L	3.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	51-28-5	Dinitrophenol[2,4-]	SW-846:8270C	UF	<	20.8	ug/L	5.2	U	UJ	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	121-14-2	Dinitrotoluene[2,4-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC

Table 3.0
Rio Grande at Buckman Diversion
Semivolatile Organic Compounds (SVOCs)

Location Name	Start Date	Analyte	Analyte Desc	Anyl Meth Code	Fld Prep Code		Std Result	Units	Std Mdl	Lab Qual Code	Concat Flag Code	Sanple Id	Fld Qc Type Code	Lab Code
Buckman Diversion SW	7/13/10	606-20-2	Dinitrotoluene[2,6-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	88-85-7	Dinoseb	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	123-91-1	Dioxane[1,4-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	122-39-4	Diphenylamine	SW-846:8270C	UF	<	10.4	ug/L	3.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	206-44-0	Fluoranthene	SW-846:8270C	UF	<	1.04	ug/L	0.21	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	86-73-7	Fluorene	SW-846:8270C	UF	<	1.04	ug/L	0.21	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	118-74-1	Hexachlorobenzene	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	UJ	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	87-68-3	Hexachlorobutadiene	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	77-47-4	Hexachlorocyclopentadiene	SW-846:8270C	UF	<	10.4	ug/L	3.1	U	UJ	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	67-72-1	Hexachloroethane	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	193-39-5	Indeno(1,2,3-cd)pyrene	SW-846:8270C	UF	<	1.04	ug/L	0.21	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	78-59-1	Isophorone	SW-846:8270C	UF	<	10.4	ug/L	3.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	90-12-0	Methylnaphthalene[1-]	SW-846:8270C	UF	<	1.04	ug/L	0.31	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	91-57-6	Methylnaphthalene[2-]	SW-846:8270C	UF	<	1.04	ug/L	0.31	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	95-48-7	Methylphenol[2-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	106-44-5	Methylphenol[4-]	SW-846:8270C	UF	<	10.4	ug/L	3.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	91-20-3	Naphthalene	SW-846:8270C	UF	<	1.04	ug/L	0.31	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	88-74-4	Nitroaniline[2-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	UJ	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	99-09-2	Nitroaniline[3-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	100-01-6	Nitroaniline[4-]	SW-846:8270C	UF	<	10.4	ug/L	3.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	98-95-3	Nitrobenzene	SW-846:8270C	UF	<	10.4	ug/L	3.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	88-75-5	Nitrophenol[2-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	100-02-7	Nitrophenol[4-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	UJ	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	924-16-3	Nitroso-di-n-butylamine[N-]	SW-846:8270C	UF	<	10.4	ug/L	3.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	621-64-7	Nitroso-di-n-propylamine[N-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	55-18-5	Nitrosodiethylamine[N-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	62-75-9	Nitrosodimethylamine[N-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	930-55-2	Nitrosopyrrolidine[N-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	108-60-1	Oxybis(1-chloropropane)[2,2'-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	UJ	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	608-93-5	Pentachlorobenzene	SW-846:8270C	UF	<	10.4	ug/L	3.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	87-86-5	Pentachlorophenol	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	85-01-8	Phenanthrene	SW-846:8270C	UF	<	1.04	ug/L	0.21	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	108-95-2	Phenol	SW-846:8270C	UF	<	10.4	ug/L	1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	129-00-0	Pyrene	SW-846:8270C	UF	<	1.04	ug/L	0.31	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	110-86-1	Pyridine	SW-846:8270C	UF	<	10.4	ug/L	3.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	95-94-3	Tetrachlorobenzene[1,2,4,5]	SW-846:8270C	UF	<	10.4	ug/L	3.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	58-90-2	Tetrachlorophenol[2,3,4,6-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	120-82-1	Trichlorobenzene[1,2,4-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	95-95-4	Trichlorophenol[2,4,5-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	88-06-2	Trichlorophenol[2,4,6-]	SW-846:8270C	UF	<	10.4	ug/L	2.1	U	U	CAWR-10-24220		GELC

Table 4.0
Rio Grande at Buckman Diversion
Pesticides/PCBs

Location Name	Start Date	Analyte	Analyte Desc	Anyl Meth Code	Fld Prep Code		Std Result	Units	Std Mdl	Lab Qual Code	Concat Flag Code	Sample Id	Fld Qc Type Code	Lab Code
Buckman Diversion SW	7/13/10	309-00-2	Aldrin	SW-846:8081A	UF	<	0.022	ug/L	0.005	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	319-84-6	BHC[alpha-]	SW-846:8081A	UF	<	0.022	ug/L	0.005	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	319-85-7	BHC[beta-]	SW-846:8081A	UF	<	0.022	ug/L	0.007	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	319-86-8	BHC[delta-]	SW-846:8081A	UF	<	0.022	ug/L	0.005	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	58-89-9	BHC[gamma-]	SW-846:8081A	UF	<	0.022	ug/L	0.005	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	5103-71-9	Chlordane[alpha-]	SW-846:8081A	UF	<	0.022	ug/L	0.005	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	5103-74-2	Chlordane[gamma-]	SW-846:8081A	UF	<	0.022	ug/L	0.005	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	72-54-8	DDD[4,4'-]	SW-846:8081A	UF	<	0.043	ug/L	0.011	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	72-55-9	DDE[4,4'-]	SW-846:8081A	UF	<	0.043	ug/L	0.005	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	50-29-3	DDT[4,4'-]	SW-846:8081A	UF	<	0.043	ug/L	0.011	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	60-57-1	Dieldrin	SW-846:8081A	UF	<	0.043	ug/L	0.011	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	959-98-8	Endosulfan I	SW-846:8081A	UF	<	0.022	ug/L	0.005	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	33213-65-9	Endosulfan II	SW-846:8081A	UF	<	0.043	ug/L	0.011	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	1031-07-8	Endosulfan Sulfate	SW-846:8081A	UF	<	0.043	ug/L	0.011	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	72-20-8	Endrin	SW-846:8081A	UF	<	0.043	ug/L	0.011	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	7421-93-4	Endrin Aldehyde	SW-846:8081A	UF	<	0.043	ug/L	0.005	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	53494-70-5	Endrin Ketone	SW-846:8081A	UF	<	0.043	ug/L	0.011	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	76-44-8	Heptachlor	SW-846:8081A	UF	<	0.022	ug/L	0.005	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	1024-57-3	Heptachlor Epoxide	SW-846:8081A	UF	<	0.022	ug/L	0.005	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	72-43-5	Methoxychlor[4,4'-]	SW-846:8081A	UF	<	0.215	ug/L	0.054	U	U	CAWR-10-24220		GELC
Buckman Diversion SW	7/13/10	8001-35-2	Toxaphene (Technical Grade)	SW-846:8081A	UF	<	0.538	ug/L	0.16	U	U	CAWR-10-24220		GELC
Location Name	**Start Date**	**Analyte**	**Analyte Desc**	**Anyl Meth Code**	**Fld Prep Code**		**Std Result**	**Units**	**Std Mdl**	**Lab Qual Code**	**Concat Flag Code**	**Sample Id**	**Fld Qc Type Code**	**Lab Code**
Buckman Diversion SW	7/13/10	1336-36-3	Total PCB	EPA:1668A	UF	<	0.00000000	ug/L	NA	U	U	CAWR-10-24220		CFA
Buckman Diversion SW	7/13/10	1336-36-3	Total PCB	EPA:1668A	UF	<	0.00000000	ug/L	NA	U	U	CAWR-10-24222	FB	CFA

Notes:
[1]NA means that no MDL is available for Total PCB measurements because the result is a summation of individual congener values.

Table 5.0
Rio Grande at Buckman Diversion
General Inorganics

Location Name	Start Date	Analyte	Anyl Meth Code	Fld Prep Code		Std Result	Units	Std Mdl	Lab Qual Code	Concat Flag Code	Sample Id	Lab Code	Scr Lvl	Scr Lvl Type Code
Buckman Diversion SW	07/13/10	ALK-CO3	EPA:310.1	UF	<	1	mg/L	0.73	U	U	CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	ALK-CO3+HCO3	EPA:310.1	UF		98	mg/L	0.73			CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	Br(-1)	EPA:300.0	UF	<	0.20	mg/L	0.07	U	U	CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	CN(TOTAL)	EPA:335.4	UF	<	0.005	mg/L	0.002	U	U	CAWR-10-24220	GELC	0.2	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Ca	SW-846:6010B	F		36.5	mg/L	0.05			CAWR-10-24221	GELC		
Buckman Diversion SW	07/13/10	Ca	SW-846:6010B	UF		38.5	mg/L	0.05			CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	Cl(-1)	EPA:300.0	UF		3.1	mg/L	0.066			CAWR-10-24220	GELC	250	EPA SEC DW LVL
Buckman Diversion SW	07/13/10	ClO4	SW-846:6850	UF		0.081	ug/L	0.05	J	J	CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	DO	Generic Field Measurement	UF		8.5	mg/L				CAWR-10-24220	FLD		
Buckman Diversion SW	07/13/10	F(-1)	EPA:300.0	UF		0.22	mg/L	0.033		J-	CAWR-10-24220	GELC	4	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	HARDNESS	SM:A2340B	F		117	mg/L	0.35			CAWR-10-24221	GELC		
Buckman Diversion SW	07/13/10	HARDNESS	SM:A2340B	UF		124	mg/L	0.35			CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	K	SW-846:6010B	F		2.1	mg/L	0.05			CAWR-10-24221	GELC		
Buckman Diversion SW	07/13/10	K	SW-846:6010B	UF		2.2	mg/L	0.05			CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	Mg	SW-846:6010B	F		6.3	mg/L	0.09			CAWR-10-24221	GELC		
Buckman Diversion SW	07/13/10	Mg	SW-846:6010B	UF		6.7	mg/L	0.09			CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	NH3-N	EPA:350.1	UF		0.04	mg/L	0.016	J	J-	CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	NO3+NO2-N	EPA:353.2	UF	<	0.09	mg/L	0.05	J	U	CAWR-10-24220	GELC	10	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Na	SW-846:6010B	F		13.8	mg/L	0.10			CAWR-10-24221	GELC		
Buckman Diversion SW	07/13/10	Na	SW-846:6010B	UF		14.1	mg/L	0.10			CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	PO4-P	EPA:365.4	UF		0.13	mg/L	0.02		J	CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	SO4(-2)	EPA:300.0	UF		44.2	mg/L	1.00			CAWR-10-24220	GELC	250	EPA SEC DW LVL
Buckman Diversion SW	07/13/10	SPEC_CONDC	FIELD CONDUCTIVITY	UF		298	uS/cm				CAWR-10-24220	FLD		
Buckman Diversion SW	07/13/10	SPEC_CONDC	EPA:120.1	UF		296	uS/cm	1.0			CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	SSC	EPA:160.2	UF		47.6	mg/L	2.3			CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	TDS	EPA:160.1	UF		212	mg/L	2.4			CAWR-10-24220	GELC	500	EPA SEC DW LVL
Buckman Diversion SW	07/13/10	TEMP	GENERIC FIELD TEMP	UF		20.5	deg C				CAWR-10-24220	FLD		
Buckman Diversion SW	07/13/10	TKN	EPA:351.2	UF	<	0.10	mg/L	0.033	U	U	CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	TOC	SW-846:9060	UF		3.8	mg/L	0.33			CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	TURB	GENERIC FIELD TURB	UF		44.2	NTU				CAWR-10-24220	FLD		
Buckman Diversion SW	07/13/10	pH	EPA:150.1	UF		8.29	SU	0.01	H	J-	CAWR-10-24220	GELC	6.5-8.5	EPA SEC DW LVL
Buckman Diversion SW	07/13/10	pH	GENERIC FIELD PH	UF		7.91	SU				CAWR-10-24220	FLD	6.5-8.5	EPA SEC DW LVL

Table 6.0
Rio Grande at Buckman Diversion
Metals

Location Name	Start Date	Analyte	Anyl Meth Code	Fld Prep Code		Std Result	Units	Std Mdl	Lab Qual Code	Concat Flag Code	Sample Id	Lab Code	Scr Lvl	Scr Lvl Type Code
Buckman Diversion SW	07/13/10	Ag	SW-846:6020	F	<	1	ug/L	0.2	U	U	CAWR-10-24221	GELC	100	EPA SEC DW LVL
Buckman Diversion SW	07/13/10	Ag	SW-846:6020	UF	<	1	ug/L	0.2	U	U	CAWR-10-24220	GELC	100	EPA SEC DW LVL
Buckman Diversion SW	07/13/10	Al	SW-846:6010B	F	<	200	ug/L	68	U	U	CAWR-10-24221	GELC	200	EPA SEC DW LVL
Buckman Diversion SW	07/13/10	Al	SW-846:6010B	UF		612	ug/L	68			CAWR-10-24220	GELC	200	EPA SEC DW LVL
Buckman Diversion SW	07/13/10	As	SW-846:6020	F	<	5	ug/L	1.5	U	U	CAWR-10-24221	GELC	10	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	As	SW-846:6020	UF	<	5	ug/L	1.5	U	U	CAWR-10-24220	GELC	10	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	B	SW-846:6010B	F		26.6	ug/L	15	J	J	CAWR-10-24221	GELC		
Buckman Diversion SW	07/13/10	B	SW-846:6010B	UF		27.4	ug/L	15	J	J	CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	Ba	SW-846:6010B	F		60	ug/L	1			CAWR-10-24221	GELC	2000	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Ba	SW-846:6010B	UF		71	ug/L	1			CAWR-10-24220	GELC	2000	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Be	SW-846:6010B	F	<	5	ug/L	1	U	U	CAWR-10-24221	GELC	4	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Be	SW-846:6010B	UF	<	5	ug/L	1	U	U	CAWR-10-24220	GELC	4	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Cd	SW-846:6020	F	<	1	ug/L	0.11	U	U	CAWR-10-24221	GELC	5	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Cd	SW-846:6020	UF	<	1	ug/L	0.11	U	U	CAWR-10-24220	GELC	5	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Co	SW-846:6010B	F	<	5	ug/L	1	U	U	CAWR-10-24221	GELC		
Buckman Diversion SW	07/13/10	Co	SW-846:6010B	UF	<	5	ug/L	1	U	U	CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	Cr	SW-846:6020	F		5.7	ug/L	2.5	J	J	CAWR-10-24221	GELC	100	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Cr	SW-846:6020	UF		4.9	ug/L	2.5	J	J	CAWR-10-24220	GELC	100	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Cu	SW-846:6010B	F	<	10	ug/L	3	U	U	CAWR-10-24221	GELC	1300	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Cu	SW-846:6010B	UF	<	10	ug/L	3	U	U	CAWR-10-24220	GELC	1300	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Fe	SW-846:6010B	F	<	100	ug/L	30	U	U	CAWR-10-24221	GELC	300	EPA SEC DW LVL
Buckman Diversion SW	07/13/10	Fe	SW-846:6010B	UF		428	ug/L	30			CAWR-10-24220	GELC	300	EPA SEC DW LVL
Buckman Diversion SW	07/13/10	Hg	EPA:245.2	F	<	0.2	ug/L	0.07	U	U	CAWR-10-24221	GELC	2	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Hg	EPA:245.2	UF	<	0.2	ug/L	0.07	U	U	CAWR-10-24220	GELC	2	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Mn	SW-846:6010B	F		4.46	ug/L	2	J	J	CAWR-10-24221	GELC	50	EPA SEC DW LVL
Buckman Diversion SW	07/13/10	Mn	SW-846:6010B	UF		60.7	ug/L	2			CAWR-10-24220	GELC	50	EPA SEC DW LVL
Buckman Diversion SW	07/13/10	Mo	SW-846:6020	F		3.5	ug/L	0.1			CAWR-10-24221	GELC		
Buckman Diversion SW	07/13/10	Mo	SW-846:6020	UF		3.0	ug/L	0.1			CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	Ni	SW-846:6020	F		1.4	ug/L	0.5	J	J	CAWR-10-24221	GELC		
Buckman Diversion SW	07/13/10	Ni	SW-846:6020	UF		1.7	ug/L	0.5	J	J	CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	Pb	SW-846:6020	F	<	2	ug/L	0.5	U	U	CAWR-10-24221	GELC	15	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Pb	SW-846:6020	UF		0.7	ug/L	0.5	J	J	CAWR-10-24220	GELC	15	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Sb	SW-846:6020	F	<	3	ug/L	0.5	U	U	CAWR-10-24221	GELC	6	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Sb	SW-846:6020	UF	<	3	ug/L	0.5	U	U	CAWR-10-24220	GELC	6	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Se	SW-846:6020	F	<	5	ug/L	1	U	U	CAWR-10-24221	GELC	50	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Se	SW-846:6020	UF	<	5	ug/L	1	U	U	CAWR-10-24220	GELC	50	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	SiO2	SW-846:6010B	UF		17.7	mg/L	0.05			CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	Sn	SW-846:6010B	F	<	10	ug/L	2.5	U	U	CAWR-10-24221	GELC		
Buckman Diversion SW	07/13/10	Sn	SW-846:6010B	UF	<	10	ug/L	2.5	U	U	CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	Sr	SW-846:6010B	F		267	ug/L	1			CAWR-10-24221	GELC		
Buckman Diversion SW	07/13/10	Sr	SW-846:6010B	UF		278	ug/L	1			CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	Tl	SW-846:6020	F	<	1	ug/L	0.3	U	U	CAWR-10-24221	GELC	2	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	Tl	SW-846:6020	UF	<	1	ug/L	0.3	U	U	CAWR-10-24220	GELC	2	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	U	SW-846:6020	F		1.4	ug/L	0.05			CAWR-10-24221	GELC	30	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	U	SW-846:6020	UF		1.4	ug/L	0.05			CAWR-10-24220	GELC	30	EPA PRIM DW LVL
Buckman Diversion SW	07/13/10	V	SW-846:6010B	F		2.6	ug/L	1	J	J	CAWR-10-24221	GELC		
Buckman Diversion SW	07/13/10	V	SW-846:6010B	UF		4.1	ug/L	1	J	J	CAWR-10-24220	GELC		
Buckman Diversion SW	07/13/10	Zn	SW-846:6010B	F	<	10	ug/L	3.3	U	U	CAWR-10-24221	GELC	5000	EPA SEC DW LVL
Buckman Diversion SW	07/13/10	Zn	SW-846:6010B	UF	<	10	ug/L	3.3	U	U	CAWR-10-24220	GELC	5000	EPA SEC DW LVL

Desert Research Institute

Analytical Results of Suspended Sediment Concentration and Laser Particle-Size Analysis For water Samples From Los Alamos National Laboratory

Report for Request: **10-3670**
Prepared: **09/23/10**

Prepared for: Keith Greene: LANL-FSF
TA3-Bdg 271, DP: 01U
Los Alamos National Laboratory
Los Alamos, NM 87545

Prepared by: Ms. Sophie Baker
Dr. Eric McDonald
Division of Earth and Ecosystem Sciences
Desert Research Institute
2215 Raggio Parkway
Reno, NV 89512-1095

Contents:

(1) Summary of laboratory procedures used at DRI
(2) Table of SSC and LPSA results for submitted samples
(3) Summary of analytical results
(4) Appendix: Documentation of laboratory procedures
(5) CD with summary file (in MS Excel format) of included data

Laboratory Analytical Results for Request Nos. 10-3670

1.0 SUMMARY OF ANALYTICAL LABORATORY PROCEDURES USED AT DRI

1.1 General Summary: Methods used by the DRI Soil Characterization and Quaternary Pedology Laboratory for Suspended Sediment Concentration (SSC) measurement and Laser Particle Size Analysis (LPSA) follow standard analytical methods commonly employed for the analysis of water and sediment samples. Detailed descriptions of these methods are documented in Appendix A1.

1.2 QA/QC Procedures: Standard QA/QC procedures are followed for SSC and LPSA. Analytical balances are serviced once a year by a manufacturer-approved technician and are checked for calibration weekly by laboratory personnel. All samples are logged into and out of the lab and all laboratory measurements are recorded in ink on laboratory worksheets. All data is entered into a computer database with backups for all data. A laboratory flowchart system with checks-and-balances is incorporated into laboratory procedures to ensure that all samples are correctly analyzed. All analyses are performed by laboratory personnel trained in the methods.

2.0 TABLE OF SSC AND LPSA RESULTS FOR SUBMITTED SAMPLES

Results for all samples are presented in Table 2-1. Suspended sediment concentrations are presented in g/L. The total solids in the samples are also presented (in g) as well as the total volume of water in the samples (in mL). For laser particle size analysis, analysis information provided includes the digital file name(s), % obscuration, and weighted residual (the meaning of these parameters is explained in Appendix A1.2). The results are given in terms of the percentage of particles falling into 35 size bins, each size bin being labeled by the low diameter of it's size range (in μm). As a quality assurance measure, the percentages in all the bins are added up to show that they amount to 100% (+/– 0.1%). The percentages of sand, silt, and clay are determined by adding up the percentages in all the bins that fall into the sand, silt, and clay size ranges as shown in Table 2-2. Although the upper size limit of sand is generally defined as 2000 μm rather than the 1000 μm shown here, particles greater than 1000 μm cannot be measured at DRI using LPSA. Water samples are poured through a sieve with 1000 μm apertures before being transferred to the analyzer, so that particles >1000 μm are excluded from the analysis. In the case of these samples, no sediment was retained on the sieve, so the LPSA results represent the entire sample.

Table 2-2. The size ranges for sand, silt, and clay, as used in LPSA.

Major Class	Minimum Size (μm)
Sand	1000 – 62.5
Silt	15 – 2
Clay	< 2

3.0 SUMMARY OF ANALYTICAL RESULTS

As shown in Table 2.1, the two samples in Request. No. 10-3670 (CAWR-10-24220 and 10-24226) displayed very similar values in SSC, ranging from only 0.26 to 0.25 g/L. The results of LPSA also show very little variation with sand, silt, and clay contents of 22.77%, 69.84%, and 7.39%, respectively, for CAWR-10-24220, and 21.17%, 70.22%, and 8.61%, respectively, for CAWR-10-24226).

APPENDIX A1:

A1.1. Method for Determination of Suspended Sediment Concentration

Suspended-sediment concentration (SSC) is determined using ATSM method D 3977-97, "Standard Test Method for Determining Sediment Concentration in Water Samples" (ASTM, 2000) using test method A -Evaporation. Each sample bottle is weighed and emptied into a weighed 1500 mL beaker, and then the sample bottle is re-weighed to determine initial sample mass. The density of water is assumed to be 0.998 g/mL at STP. If deemed necessary, the bottle is rinsed using DI water and the rinsings are emptied into the beaker. The beaker is then placed in an oven at 105° for 24 hrs or until a constant weight is achieved (usually less than 48 hrs). The beaker is weighed to determine the mass of the solids, and then the solids are resuspended in liquid for transferal to the Laser Particle Size Analyzer. It is assumed in this method that the weight of any dissolved solids in the sample is insignificant compared to that of the suspended sediments, so that the weight of the dried sample is effectively the weight of the suspended sediments.

Equipment:

Balance (Top loader)	1500 mL Beakers
Wire Brush	Repipettor
Convection Oven	Hot plate and water bath
Desiccators	

SSC Procedure:

(1) Weigh 1500 mL beaker to the nearest 0.001 g.
(2) Weigh sample bottle to nearest 0.001 g.
(3) Empty sample contents into beaker, removing as much solid material as possible.
(4) Rinse bottle with 20 mL increments of DI and return rinse to beaker (and note how many 20 mL rinses are used).
(5) Weigh and record mass of empty bottle and filled beaker.
(6) Dry beaker in oven at 105°C for 24 hrs or constant weight.
(7) Cool sample in desiccators, weigh- to nearest 0.001 g

(8) If the sample was too large to fit in the beaker in one go, dry the sample in increments, weighing the filled beaker and the dried beaker each time. Remember to weigh the empty bottle when all the sample has finally been poured into the beaker.

Documentation and Calculations:

(1) Transfer all weights and sample information to appropriate spreadsheet set-up for SSC calculations in laboratory computer.

(2) Ensure all numbers are entered correctly. Back-up all data.

(3) Laboratory data entered into spreadsheet for SSC should include the following:

a) Weight of full sample container - $M_{Bottle+sample}$

b) Empty sample bottle - M_{Bottle}

c) Beaker tare weight - M_{Beaker}

d) Oven dry beaker + sample weight. $M_{Sed+Beaker}$

$$M_{Sediment}(g) = M_{Sed+Beaker} - M_{Beaker}$$

$$Volume(l) = \frac{M_{Bottle+sample} - (M_{Bottle} + M_{Sediment})}{0.998}$$

$$SSC(g/L) = \frac{M_{sediment}}{Volume}$$

A1.2. Method for Laser Particle Size Analysis

Laser particle size analysis (LPSA) procedure is used to determine the percentage of size-class fractions in a soil or sediment sample (Gee and Or, 2002). The procedure is based on ASTM C 1070 – 01 for the determination of PSDA of alumina and quartz powders by laser light scatter (ASTM, 2000). Laser light scattering is based on the Mie theory of light scattering by a spherical particle. In the DRI Quaternary Pedology and Soil Characterization Lab, the instrument used is a Micromeretics Saturn DigiSizer 5200®. The sample is internally dispersed using ultra-sonication in an aqueous medium of 0.005% surfactant (Na metaphosphate) and circulated through the path of the laser light beam. As the particles pass through the laser beam, the light scatters at angles inversely proportional to their size and with intensity directly proportional to their size. A forty-five degree rotational Charged-Coupled Device (CCD) detector collects the scattered light intensity, which is converted to electrical signals and analyzed in a microprocessor. Data reduction consists of a mathematical convolution based on scattering model sets, each calculated from general Mie theory for narrow distributions of isotropic spheres of a specific index of refraction and suspended in liquid of a specific index of refraction. Data reported by the Saturn DigiSizer relates directly to an equivalent Mie sphere. Mie theory consists of a 'real' refractive index (1.550 for soils) and an 'imaginary' refractive index (0.100 for soils) determined by Micromeretics Laboratories. The predictive model error (weighted residual) is proportional to the measure of the calculated Mie theory model to predictions of the observed laser light scattering pattern.

For soils, there are two methods of running samples: 1) a sample may be externally dispersed and sieved to remove the sand fraction, so that only the fine fraction is put into the laser analyzer, or 2) the entire sample may be dispersed within the laser analyzer by ultra-sonication. Method 1 has the advantage of added resolution to the fine end by removing larger particles, thereby reducing multiple light scatter. The pump speed may also be reduced thus decreasing the entrapment of air in the surfactant. Method 2 has the advantage of the entire sample being presented enabling the ability to determine a geometric mean of the entire particle size distribution. In the case of water samples, the entire sample is usually put into the machine (they are sieved to <1000 μm before hand but rarely is any sediment retained on the sieve), but

because they are already in a liquid form, they are introduced into the laser analyzer like the externally dispersed soil samples.

Equipment:

Balance (analytic and top loader)	Funnel
50 ml centrifuge tubes	250 ml beakers
Ependorf repipettor	63 μm (#230) sieve – 3"
Mechanical shaker table	Aluminum boats
Ring stand	Convection oven

Reagents:

Dispersing & Rinse agent: 0.005% Sodium metaphosphate (0.002 g/L)

38 mg sodium metaphosphate $Na_6(PO_3)_6$

Dissolve into RO while filling 5 g carboy

External Dispersion (used for soil samples only):

(1) Transfer LPSA sample split (~1 g clay rich, or ~ 4 g sand rich) into a 50 ml centrifuge tube weighed to the nearest 0.001g.

(2) Add 25 ml dispersant into each tube using repipettor. Place on mechanical shaker table and shake for 12 hours (low setting).

(3) Wet sieve the clay and silt fraction, using DI water, through a 63 μm sieve (#230 mesh) and into a 250 ml beaker. Continue wet sieving until roughly 200 mL is collected in beaker and the water passing through sieve runs clear.

(4) Wash sands back into a weighed tin, place in oven set at 105°C for at least 12 hours. Place in desiccator to cool and weigh to nearest 0.0001g.

Laser Analysis:

(1) Build sample file to run a minimum of 3 replications at 35% laser obscuration using internal auto-dilution. Set pump speed to 11 l/min. Auto-sonicate for 90 seconds followed by 90 seconds of re-circulation. Save sample file and close.

(2) Open the sample file under unit 1 and verify beam obscuration is –0.3< %Obs < 0.3% before adding sample. If not, rinse. Run new background if blank obscuration remains out of tolerance

(3) *METHOD 1- Externally dispersed soils or water samples:* Manually set pump speed to 200 rpm and drain sample reservoir to roughly 200 mL. Pour contents of 250 mL beaker into chamber. Rinse beaker adequately with RO. Do not overfill chamber. Reset pump speed to 1199 rpm and proceed to step 5. In the case of waters samples, pour the water-sediment mixture through a 1000 μm (1 mm) sieve into a beaker to remove any >1000 μm particles before transferring the sample to the DigiSizer liquid sample handling unit. In the case of suspended sediment samples that have been dried, resuspend the sediments in ~200 ml of the surfactant used in the DigisSizer before sieving them and transferring them to the DigiSizer as described above.

(4) *METHOD 2- Entire sample (for dry soil samples)*: Transfer entire LPSA sample split into DigiSizer liquid sample handling unit.

(5) Manually ultra-sonicate sample until a stable obscuration is achieved (usually 30 – 60 seconds). Begin analytic run.

(6) After replicate runs, verify weighted residual is within range (generally < 3%). Residual is highly dependent on beam obscuration. If sample has insufficient volume, residual may be significantly higher.

(7) Auto-rinse unit 2 times with surfactant mixture.

Documentation and Calculations:

(1) Transfer all results and sample information to appropriate spreadsheet set-up for LPSA calculations in Lab computer.. Ensure all numbers are entered correctly. Back-up all data

(2) Complete all log and flow chart sheets for LPSA for each sample run. Any notes regarding unusual properties or potential problems with the samples should be included.

(3) Transfer all lab worksheets to appropriate file cabinet, make sure all worksheets are complete and in order.

Desert Research Institute

Analytical Results of Suspended Sediment Concentration and Laser Particle-Size Analysis For water Samples From Los Alamos National Laboratory

Report for Request: **10-3118**
Prepared: **09/23/10**

Prepared for: Keith Greene: LANL-FSF
TA3-Bdg 271, DP: 01U
Los Alamos National Laboratory
Los Alamos, NM 87545

Prepared by: Ms. Sophie Baker
Dr. Eric McDonald
Division of Earth and Ecosystem Sciences
Desert Research Institute
2215 Raggio Parkway
Reno, NV 89512-1095

Contents:

(1) Summary of laboratory procedures used at DRI
(2) Table of SSC and LPSA results for submitted samples
(3) Summary of analytical results
(4) Appendix: Documentation of laboratory procedures
(5) CD with summary file (in MS Excel format) of included data

Laboratory Analytical Results for Request Nos. 10-3118

1.0 SUMMARY OF ANALYTICAL LABORATORY PROCEDURES USED AT DRI

1.1 General Summary: Methods used by the DRI Soil Characterization and Quaternary Pedology Laboratory for Suspended Sediment Concentration (SSC) measurement and Laser Particle Size Analysis (LPSA) follow standard analytical methods commonly employed for the analysis of water and sediment samples. Detailed descriptions of these methods are documented in Appendix A1.

1.2 QA/QC Procedures: Standard QA/QC procedures are followed for SSC and LPSA. Analytical balances are serviced once a year by a manufacturer-approved technician and are checked for calibration weekly by laboratory personnel. All samples are logged into and out of the lab and all laboratory measurements are recorded in ink on laboratory worksheets. All data is entered into a computer database with backups for all data. A laboratory flowchart system with checks-and-balances is incorporated into laboratory procedures to ensure that all samples are correctly analyzed. All analyses are performed by laboratory personnel trained in the methods.

2.0 TABLE OF SSC AND LPSA RESULTS FOR SUBMITTED SAMPLES

Results for all samples are presented in Table 2-1. Suspended sediment concentrations are presented in g/L. The total solids in the samples are also presented (in g) as well as the total volume of water in the samples (in mL). For laser particle size analysis, analysis information provided includes the digital file name(s), % obscuration, and weighted residual (the meaning of these parameters is explained in Appendix A1.2). The results are given in terms of the percentage of particles falling into 35 size bins, each size bin being labeled by the low diameter of it's size range (in μm). As a quality assurance measure, the percentages in all the bins are added up to show that they amount to 100% (+/– 0.1%). The percentages of sand, silt, and clay are determined by adding up the percentages in all the bins that fall into the sand, silt, and clay size ranges as shown in Table 2-2. Although the upper size limit of sand is generally defined as 2000 μm rather than the 1000 μm shown here, particles greater than 1000 μm cannot be measured at DRI using LPSA. Water samples are poured through a sieve with 1000 μm apertures before being transferred to the analyzer, so that particles >1000 μm are excluded from the analysis. In the case of these samples, no sediment was retained on the sieve, so the LPSA results represent the entire sample.

Table 2-2. The size ranges for sand, silt, and clay, as used in LPSA.

Major Class	Minimum Size (μm)
Sand	1000 – 62.5
Silt	15 – 2
Clay	< 2

3.0 SUMMARY OF ANALYTICAL RESULTS

As shown in Table 2.1, all samples in Request. No. 10-3118 (CAWR-10-17025, 10-17022, and 17019) displayed very similar values in SSC, ranging from 0.30 to 0.33 g/L. The results of LPSA show slight variation with sand ranging from 26.62 to 16.21%, silt ranging from 72.25 to 64.91%, and clay ranging from 11.54 to 8.46%.

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Equipment:

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Desiccators	

SSC Procedure:

(1) Weigh 1500 mL beaker to the nearest 0.001 g.

(2) Weigh sample bottle to nearest 0.001 g.

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(5) Weigh and record mass of empty bottle and filled beaker.

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(1) Transfer all weights and sample information to appropriate spreadsheet set-up for SSC calculations in laboratory computer.

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(3) Laboratory data entered into spreadsheet for SSC should include the following:

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Documentation and Calculations:

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(3) Transfer all lab worksheets to appropriate file cabinet, make sure all worksheets are complete and in order.

Table 2.1: Suspended Sediment Concentration and Laser Particle Size Analysis Results for LANL Request No. 10-3118

LabID	Received	Field ID	SSC (g/L)	Tot. Solids (g)	H2O Bottle (mL)	Laser Particle Size Analysis Run info File_ID	%Obs.	Wgt. Res.	Geometric Mean	St.Dev.
C10-469	5/18/10	CAWR-10-17025	0.33	1.20	3617	LAN-006 & LAN-007	35.13	0.36	22.12	4.33
C10-470	5/18/10	CAWR-10-17022	0.30	1.08	3578	LAN-008 & LAN-009	34.79	0.40	15.57	4.40
C10-471	5/18/10	CAWR-10-17019	0.31	1.06	3442	LAN-010	35.10	0.34	14.55	4.37

LabID	% Particle Size, low diameter (um) 1000	500	250	200	150	125	100	75	62.5	50	40	30	20	19	18	17	16	15	14	13	12	11
C10-469	0.00	0.00	0.48	1.57	4.17	3.57	4.87	6.97	5.00	6.82	7.25	8.63	9.04	0.95	0.99	1.03	1.08	1.15	1.23	1.33	1.44	1.56
C10-470	0.00	0.00	0.17	0.55	2.02	2.27	3.71	5.80	4.11	5.55	6.14	8.14	10.34	1.21	1.26	1.32	1.39	1.46	1.55	1.65	1.76	1.89
C10-471	0.00	0.00	0.17	0.36	1.42	1.72	3.04	5.34	4.17	5.93	6.66	8.70	10.59	1.20	1.25	1.30	1.36	1.44	1.52	1.62	1.74	1.87

LabID	10	9	8	7	6	5	4	3	2	1.5	1	0.5	0.01	ΣSum	% Size Fraction Sand	Silt	Clay	ΣSum
C10-469	1.70	1.85	2.01	2.19	2.39	2.63	2.92	3.19	3.54	2.04	2.22	3.21	0.99	100.00	26.62	64.91	8.46	100.00
C10-470	2.02	2.18	2.36	2.56	2.81	3.13	3.51	3.89	4.35	2.53	2.77	3.89	1.69	100.00	18.64	70.48	10.88	100.00
C10-471	2.01	2.17	2.35	2.56	2.82	3.16	3.57	3.98	4.45	2.60	2.90	4.15	1.90	100.00	16.21	72.25	11.54	100.00

Table 2.1: Suspended Sediment Concentration and Laser Particle Size Analysis Results for LANL Request No. 10-3670

			SSC	Tot. Solids	H2O Bottle	Laser Particle Size Analysis Run info			Geometric		% Particle Size, low diameter (um)																																										% Size Fraction			
LabID	Received	Field ID	(g/L)	(g)	(mL)	File_ID	%Obs.	Wgt. Res.	Mean	St.Dev.	1000	500	250	200	150	125	100	75	62.5	50	40	30	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1.5	1	0.5	0.01	Σ Sum	Sand	Silt	Clay	Σ Sum
C11-001	7/19/10	CAWR-10-24220	0.25	0.99	3925.9	LAN-011	34.90	0.63	20.47	3.81	0.00	0.00	0.00	0.00	0.37	1.57	4.49	9.43	6.89	8.33	7.89	9.41	10.86	1.17	1.20	1.23	1.27	1.32	1.38	1.45	1.52	1.60	1.68	1.77	1.85	1.95	2.10	2.37	2.79	3.21	3.51	2.04	1.93	3.03	0.39	100.00	22.77	69.84	7.39	100.00
C11-002	7/19/10	CAWR-10-24226	0.26	1.00	3871.9	LAN-012	34.80	0.68	17.96	4.02	0.00	0.00	0.00	0.00	0.31	1.35	3.99	8.81	6.72	8.26	7.65	8.44	9.03	0.99	1.03	1.09	1.15	1.23	1.32	1.43	1.55	1.69	1.84	2.00	2.17	2.36	2.59	2.93	3.39	3.86	4.23	2.43	2.26	3.36	0.56	100.00	21.17	70.22	8.61	100.00