308 - - - Q200801230003

Scientific Notebook No. 838: Radionuclide Transport (RT) at Yucca Mountain -- Continuation of Scientific Notebook No. 830 (12/19/2006 through 01/04/2008)

838

~~Dr. Craig Forster~~ BW 12-19-06

~~20.01402.861 and others~~ BW 12-19-06

RT in SZ
20.06002.01.242

CNWRA
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COPY 838
cont from 830

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MP 10/3/02

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3-15-07
Qft copies ~~and~~ BW made on
3-15-07 (see p 32)

Bishop Tuff - Analog to Ptn at Yucca Mtn.

ENTRY FROM "SN 468" - not part of SN 838. Remainder of page not used.
See front cover BW 12-19-06

12-19-06
BW

INVESTIGATOR	SIGNATURE	INITIALS
BRADLEY WERLING	Bradley Werling	BAW
Marla Roberts	Marla Roberts	MR

BW 1-4-08

This notebook contains work for Radionuclide Transport (RT) in both the saturated zone and unsaturated zone. RT is concerned with identification of key geochemical processes that may control radionuclide transport at Yucca Mountain. Radionuclide retardation is dependent on the hydrochemistry and mineralogy along the groundwater flow paths from the proposed repository. Typical activities associated with these investigations would include conducting laboratory batch sorption experiments, collecting field samples, and analyses of field samples.

Current experimental activities are focused on laboratory batch sorption experiments that incorporate materials (groundwater and/or sonic corings) from the Yucca Mountain region and materials (simulated groundwater) based on the chemistry of the Yucca Mountain region materials. The objective for a sorption experiment is to determine the sorption capability (Kd or sorption coefficient) for a particular radionuclide, solid material, and solution typically over a range of pH values. Tasks may include the following:

- Preparation of reference solutions.
- Cation (Div 01), anion (Div 01), inorganic carbon (CNWRA) and pH analyses (CNWRA) of reference and experimental solutions.
- Preparation of experimental solutions
- Liquid Scintillation Analyses (CNWRA) of experimental solutions.

Further details of these tasks are recorded in initial and in-process entries.

This scientific notebook (SN) is a continuation of SN 830. The end of SN 830 contains the Div 01 cation analyses of solutions from sorption experiments 19PB & 22PC phase 2. SN 838 begins with a continuation of these results. This notebook has on the inside cover documentation that it was originally assigned a control number of 468 but that it was never used. Pages 1 and 7 had entries when SN 838 was assigned and initially picked up from QA that are not part of SN 838.

21 DEC 06 CONT BAW

Continuation of sample results: Initial Entry 830/155

DIV01 CATION Results for Select 19PB (w+w/o calcite) and 22PC (w+w/o calcite) Phase 2 (adjusting initial ref soln pH) Experimental Solns

Initial Entry for sorption experiment: 811/77-78

Samples: Total of 14 cation
- 8 select (not all) experimental solutions
  - 2 using 19PB sonic core composite
  - 2 using 19PB sonic core composite w/o calcite
  - 2 using 22PC sonic core composite
  - 2 using 22PC sonic core composite w/o calcite
- 4 UTSA samples
- 2 cation QA samples (dups)

CNWRA Sample Collection: 811/85-6
Sample ID Legend (ALL): 811/87
Note ALL cations and anions (except CNWRA anion samples) were not diluted (811/85-6)
QA sample prep and target concentration: 811/60
Note: QA soln previously analyzed (in duplicate) with phase 1 experiment - see 830/153
~~Delivery~~ BW 12-21-06 BW 12-22-06
QA ID legend 811/~~63~~ 87 and ref: 811/85
Delivery, chain of custody: 811/89-91

Following the raw data is
+ QA data comparing
  - duplicate samples to each other
  - samples to target concentrations
  - reanalyses results (some QA soln previously analyzed with phase 1 experiment

21 DEC 06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: 22WT-9C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 286179

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: 09/14/06

Project No.: 06002.01.242

SRR: 29771

Task Order: 060915-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.500	0.5
Antimony	<0.100	0.1
Arsenic	<0.100	0.1
Barium	0.401	0.05
Beryllium	<0.0500	0.05
Bismuth	<0.150	0.15
Boron	<0.200	0.2
Cadmium	<0.0500	0.05
Calcium	12.9	0.5
Chromium	<0.0500	0.05
Cobalt	<0.0500	0.05
Copper	<0.0500	0.05
Iron	<0.500	0.5
Lanthanum	<0.0500	0.05
Lead	<0.0500	0.05
Lithium	<0.0500	0.05
Magnesium	1.53	0.5
Manganese	<0.0500	0.05
Molybdenum	<0.0500	0.05
Nickel	<0.0500	0.05
Palladium	<0.200	0.2
Phosphorus	<0.200	0.2
Potassium	4.29	0.25
Selenium	<0.100	0.1
Silicon	11.7	0.2
Silver	<0.0500	0.05
Sodium	52.3	2
Strontium	<0.0500	0.05
Sulfur	9.11	0.25
Thallium	<0.100	0.1
Thorium	<0.200	0.2
Tin	<0.0500	0.05
Titanium	<0.0500	0.05
Tungsten	<0.100	0.1
Uranium	<1.00	1
Vanadium	<0.0500	0.05
Yttrium	<0.0500	0.05
Zinc	0.0567	0.05
Zirconium	<0.0500	0.05

21 DEC 06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: 22WT-10C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 286178

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: 09/14/06

Project No.: 06002.01.242

SRR: 29771

Task Order: 060915-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.500	0.5
Antimony	<0.100	0.1
Arsenic	<0.100	0.1
Barium	0.387	0.05
Beryllium	<0.0500	0.05
Bismuth	<0.150	0.15
Boron	<0.200	0.2
Cadmium	<0.0500	0.05
Calcium	12.8	0.5
Chromium	<0.0500	0.05
Cobalt	<0.0500	0.05
Copper	<0.0500	0.05
Iron	<0.500	0.5
Lanthanum	<0.0500	0.05
Lead	<0.0500	0.05
Lithium	<0.0500	0.05
Magnesium	1.56	0.5
Manganese	<0.0500	0.05
Molybdenum	<0.0500	0.05
Nickel	<0.0500	0.05
Palladium	<0.200	0.2
Phosphorus	<0.200	0.2
Potassium	4.25	0.25
Selenium	<0.100	0.1
Silicon	11.6	0.2
Silver	<0.0500	0.05
Sodium	51.2	2
Strontium	<0.0500	0.05
Sulfur	9.01	0.25
Thallium	<0.100	0.1
Thorium	<0.200	0.2
Tin	<0.0500	0.05
Titanium	<0.0500	0.05
Tungsten	<0.100	0.1
Uranium	<1.00	1
Vanadium	<0.0500	0.05
Yttrium	<0.0500	0.05
Zinc	0.0600	0.05
Zirconium	<0.0500	0.05

21DEC06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID
22WOT-9C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 286177

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: 09/14/06

Project No.: 06002.01.242

SRR: 29771

Task Order: 060915-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.500	0.5
Antimony	<0.100	0.1
Arsenic	<0.100	0.1
Barium	0.468	0.05
Beryllium	<0.0500	0.05
Bismuth	<0.150	0.15
Boron	<0.200	0.2
Cadmium	<0.0500	0.05
Calcium	6.74	0.5
Chromium	<0.0500	0.05
Cobalt	<0.0500	0.05
Copper	<0.0500	0.05
Iron	<0.500	0.5
Lanthanum	<0.0500	0.05
Lead	<0.0500	0.05
Lithium	<0.0500	0.05
Magnesium	0.866	0.5
Manganese	<0.0500	0.05
Molybdenum	<0.0500	0.05
Nickel	<0.0500	0.05
Palladium	<0.200	0.2
Phosphorus	<0.200	0.2
Potassium	2.06	0.25
Selenium	<0.100	0.1
Silicon	12.3	0.2
Silver	<0.0500	0.05
Sodium	67.7	2
Strontium	<0.0500	0.05
Sulfur	9.18	0.25
Thallium	<0.100	0.1
Thorium	<0.200	0.2
Tin	<0.0500	0.05
Titanium	<0.0500	0.05
Tungsten	<0.100	0.1
Uranium	<1.00	1
Vanadium	<0.0500	0.05
Yttrium	<0.0500	0.05
Zinc	0.0603	0.05
Zirconium	<0.0500	0.05

July 6/01

TRAVEL - 8:25am fly SLT - Las Vegas
- drive Las Vegas - Boxshop 11:00-5:00
- pickup 3 1ft³ expanding foam kits Smalley & Co.

FIELD SITE - QUARRY
- Dani Or and co. setting up recon. dye infiltration expts in two trenches

ENTRY FROM "SN 468" - not part of SN 838. Remainder of page not used. See front cover. BW 12-19-06

12-21-06 BW

21 DEC 06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID: 22WOT-10C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 286176

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: 09/14/06

Project No.: 06002.01.242

SRR: 29771

Task Order: 060915-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.500	0.5
Antimony	<0.100	0.1
Arsenic	<0.100	0.1
Barium	0.473	0.05
Beryllium	<0.0500	0.05
Bismuth	<0.150	0.15
Boron	<0.200	0.2
Cadmium	<0.0500	0.05
Calcium	6.68	0.5
Chromium	<0.0500	0.05
Cobalt	<0.0500	0.05
Copper	<0.0500	0.05
Iron	<0.500	0.5
Lanthanum	<0.0500	0.05
Lead	<0.0500	0.05
Lithium	<0.0500	0.05
Magnesium	0.828	0.5
Manganese	<0.0500	0.05
Molybdenum	<0.0500	0.05
Nickel	<0.0500	0.05
Palladium	<0.200	0.2
Phosphorus	<0.200	0.2
Potassium	2.30	0.25
Selenium	<0.100	0.1
Silicon	12.2	0.2
Silver	<0.0500	0.05
Sodium	67.7	2
Strontium	<0.0500	0.05
Sulfur	9.13	0.25
Thallium	<0.100	0.1
Thorium	<0.200	0.2
Tin	<0.0500	0.05
Titanium	<0.0500	0.05
Tungsten	<0.100	0.1
Uranium	<1.00	1
Vanadium	<0.0500	0.05
Yttrium	<0.0500	0.05
Zinc	0.0556	0.05
Zirconium	<0.0500	0.05

21 DEC 06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID: AD-C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 286180

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: 09/14/06

Project No.: 06002.01.242

SRR: 29771

Task Order: 060915-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.500	0.5
Antimony	<0.100	0.1
Arsenic	<0.100	0.1
Barium	<0.0500	0.05
Beryllium	<0.0500	0.05
Bismuth	<0.150	0.15
Boron	0.727	0.2
Cadmium	<0.0500	0.05
Calcium	485	0.5
Chromium	<0.0500	0.05
Cobalt	<0.0500	0.05
Copper	<0.0500	0.05
Iron	7.78	0.5
Lanthanum	<0.0500	0.05
Lead	<0.0500	0.05
Lithium	0.0677	0.05
Magnesium	109	0.5
Manganese	0.760	0.05
Molybdenum	<0.0500	0.05
Nickel	<0.0500	0.05
Palladium	<0.200	0.2
Phosphorus	0.253	0.2
Potassium	15.5	1.25
Selenium	<0.100	0.1
Silicon	13.3	0.2
Silver	<0.0500	0.05
Sodium	166	2
Strontium	5.00	0.05
Sulfur	525	0.25
Thallium	<0.100	0.1
Thorium	<0.200	0.2
Tin	<0.0500	0.05
Titanium	<0.0500	0.05
Tungsten	<0.100	0.1
Uranium	<1.00	1
Vanadium	<0.0500	0.05
Yttrium	<0.0500	0.05
Zinc	0.121	0.05
Zirconium	<0.0500	0.05

21 DEC 06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID: LO-C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 286182

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: 09/14/06

Project No.: 06002.01.242

SRR: 29771

Task Order: 060915-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.500	0.5
Antimony	<0.100	0.1
Arsenic	<0.100	0.1
Barium	<0.0500	0.05
Beryllium	<0.0500	0.05
Bismuth	<0.150	0.15
Boron	0.755	0.2
Cadmium	<0.0500	0.05
Calcium	126	0.5
Chromium	<0.0500	0.05
Cobalt	0.0534	0.05
Copper	<0.0500	0.05
Iron	9.48	0.5
Lanthanum	<0.0500	0.05
Lead	<0.0500	0.05
Lithium	0.610	0.05
Magnesium	38.9	0.5
Manganese	0.859	0.05
Molybdenum	<0.0500	0.05
Nickel	<0.0500	0.05
Palladium	<0.200	0.2
Phosphorus	<0.200	0.2
Potassium	13.2	1.25
Selenium	<0.100	0.1
Silicon	13.0	0.2
Silver	<0.0500	0.05
Sodium	58.9	2
Strontium	0.896	0.05
Sulfur	168	0.25
Thallium	<0.100	0.1
Thorium	<0.200	0.2
Tin	<0.0500	0.05
Titanium	<0.0500	0.05
Tungsten	<0.100	0.1
Uranium	<1.00	1
Vanadium	<0.0500	0.05
Yttrium	<0.0500	0.05
Zinc	0.217	0.05
Zirconium	<0.0500	0.05

21 DEC 06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID: TM-C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 286183

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: 09/14/06

Project No.: 06002.01.242

SRR: 29771

Task Order: 060915-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.500	0.5
Antimony	<0.100	0.1
Arsenic	<0.100	0.1
Barium	<0.0500	0.05
Beryllium	<0.0500	0.05
Bismuth	<0.150	0.15
Boron	0.627	0.2
Cadmium	<0.0500	0.05
Calcium	273	0.5
Chromium	<0.0500	0.05
Cobalt	0.0876	0.05
Copper	<0.0500	0.05
Iron	0.711	0.5
Lanthanum	<0.0500	0.05
Lead	<0.0500	0.05
Lithium	0.0998	0.05
Magnesium	59.4	0.5
Manganese	0.425	0.05
Molybdenum	<0.0500	0.05
Nickel	0.0530	0.05
Palladium	<0.200	0.2
Phosphorus	<0.200	0.2
Potassium	16.1	1.25
Selenium	<0.100	0.1
Silicon	15.3	0.2
Silver	<0.0500	0.05
Sodium	204	2
Strontium	2.77	0.05
Sulfur	143	0.25
Thallium	<0.100	0.1
Thorium	<0.200	0.2
Tin	<0.0500	0.05
Titanium	<0.0500	0.05
Tungsten	<0.100	0.1
Uranium	<1.00	1
Vanadium	<0.0500	0.05
Yttrium	<0.0500	0.05
Zinc	0.0790	0.05
Zirconium	<0.0500	0.05

21 DEC 06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID: HT-C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 286181

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: 09/14/06

Project No.: 06002.01.242

SRR: 29771

Task Order: 060915-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.500	0.5
Antimony	<0.100	0.1
Arsenic	<0.100	0.1
Barium	<0.0500	0.05
Beryllium	<0.0500	0.05
Bismuth	<0.150	0.15
Boron	0.722	0.2
Cadmium	<0.0500	0.05
Calcium	89.9	0.5
Chromium	<0.0500	0.05
Cobalt	<0.0500	0.05
Copper	<0.0500	0.05
Iron	0.527	0.5
Lanthanum	<0.0500	0.05
Lead	<0.0500	0.05
Lithium	0.117	0.05
Magnesium	30.6	0.5
Manganese	0.187	0.05
Molybdenum	<0.0500	0.05
Nickel	<0.0500	0.05
Palladium	<0.200	0.2
Phosphorus	<0.200	0.2
Potassium	11.5	1.25
Selenium	<0.100	0.1
Silicon	7.45	0.2
Silver	<0.0500	0.05
Sodium	149	2
Strontium	1.01	0.05
Sulfur	60.4	0.25
Thallium	<0.100	0.1
Thorium	<0.200	0.2
Tin	<0.0500	0.05
Titanium	<0.0500	0.05
Tungsten	<0.100	0.1
Uranium	<1.00	1
Vanadium	<0.0500	0.05
Yttrium	<0.0500	0.05
Zinc	<0.0500	0.05
Zirconium	<0.0500	0.05

21 DEC 06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID: 1922-1C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 286170

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: 09/14/06

Project No.: 06002.01.242

SRR: 29771

Task Order: 060915-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.500	0.5
Antimony	<0.100	0.1
Arsenic	<0.100	0.1
Barium	<0.0500	0.05
Beryllium	<0.0500	0.05
Bismuth	<0.150	0.15
Boron	<0.200	0.2
Cadmium	<0.0500	0.05
Calcium	19.9	0.5
Chromium	<0.0500	0.05
Cobalt	<0.0500	0.05
Copper	<0.0500	0.05
Iron	20.8	0.5
Lanthanum	<0.0500	0.05
Lead	<0.0500	0.05
Lithium	<0.0500	0.05
Magnesium	20.5	0.5
Manganese	<0.0500	0.05
Molybdenum	<0.0500	0.05
Nickel	<0.0500	0.05
Palladium	<0.200	0.2
Phosphorus	<0.200	0.2
Potassium	18.6	1.25
Selenium	<0.100	0.1
Silicon	<0.200	0.2
Silver	<0.0500	0.05
Sodium	19.1	2
Strontium	<0.0500	0.05
Sulfur	<0.250	0.25
Thallium	<0.100	0.1
Thorium	<0.200	0.2
Tin	<0.0500	0.05
Titanium	<0.0500	0.05
Tungsten	<0.100	0.1
Uranium	<1.00	1
Vanadium	<0.0500	0.05
Yttrium	<0.0500	0.05
Zinc	<0.0500	0.05
Zirconium	<0.0500	0.05

21DEC06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: 1922-2C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 286171

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: 09/14/06

Project No.: 06002.01.242

SRR: 29771

Task Order: 060915-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.500	0.5
Antimony	<0.100	0.1
Arsenic	<0.100	0.1
Barium	<0.0500	0.05
Beryllium	<0.0500	0.05
Bismuth	<0.150	0.15
Boron	<0.200	0.2
Cadmium	<0.0500	0.05
Calcium	20.0	0.5
Chromium	<0.0500	0.05
Cobalt	<0.0500	0.05
Copper	<0.0500	0.05
Iron	20.7	0.5
Lanthanum	<0.0500	0.05
Lead	<0.0500	0.05
Lithium	<0.0500	0.05
Magnesium	20.5	0.5
Manganese	<0.0500	0.05
Molybdenum	<0.0500	0.05
Nickel	<0.0500	0.05
Palladium	<0.200	0.2
Phosphorus	<0.200	0.2
Potassium	19.5	1.25
Selenium	<0.100	0.1
Silicon	<0.200	0.2
Silver	<0.0500	0.05
Sodium	20.0	2
Strontium	<0.0500	0.05
Sulfur	<0.250	0.25
Thallium	<0.100	0.1
Thorium	<0.200	0.2
Tin	<0.0500	0.05
Titanium	<0.0500	0.05
Tungsten	<0.100	0.1
Uranium	<1.00	1
Vanadium	<0.0500	0.05
Yttrium	<0.0500	0.05
Zinc	<0.0500	0.05
Zirconium	<0.0500	0.05

21 DEC 06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
DUPLICATE SUMMARY

Sample ID: 1922-1C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 286170D

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: 09/14/06

Project No.: 06002.01.242

SRR: 29771

Task Order: 060915-4

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Aluminum	<0.500	<0.500	0.00%
Antimony	<0.100	<0.100	0.00%
Arsenic	<0.100	<0.100	0.00%
Barium	<0.0500	<0.0500	0.00%
Beryllium	<0.0500	<0.0500	0.00%
Bismuth	<0.150	<0.150	0.00%
Boron	<0.200	<0.200	0.00%
Cadmium	<0.0500	<0.0500	0.00%
Calcium	19.9	19.6	1.52%
Chromium	<0.0500	<0.0500	0.00%
Cobalt	<0.0500	<0.0500	0.00%
Copper	<0.0500	<0.0500	0.00%
Iron	20.8	20.8	0.00%
Lanthanum	<0.0500	<0.0500	0.00%
Lead	<0.0500	<0.0500	0.00%
Lithium	<0.0500	<0.0500	0.00%
Magnesium	20.5	20.4	0.489%
Manganese	<0.0500	<0.0500	0.00%
Molybdenum	<0.0500	<0.0500	0.00%
Nickel	<0.0500	<0.0500	0.00%
Palladium	<0.200	<0.200	0.00%
Phosphorus	<0.200	<0.200	0.00%
Potassium	18.6	19.1	2.65%
Selenium	<0.100	<0.100	0.00%
Silicon	<0.200	<0.200	0.00%
Silver	<0.0500	<0.0500	0.00%
Sodium	19.1	19.2	0.522%
Strontium	<0.0500	<0.0500	0.00%
Sulfur	<0.250	<0.250	0.00%
Thallium	<0.100	<0.100	0.00%
Thorium	<0.200	<0.200	0.00%
Tin	<0.0500	<0.0500	0.00%
Titanium	<0.0500	<0.0500	0.00%
Tungsten	<0.100	<0.100	0.00%
Uranium	<1.00	<1.00	0.00%
Vanadium	<0.0500	<0.0500	0.00%
Yttrium	<0.0500	<0.0500	0.00%
Zinc	<0.0500	<0.0500	0.00%
Zirconium	<0.0500	<0.0500	0.00%

21 DEC 06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE

MATRIX SPIKE SUMMARY

Sample ID: 1922-2C

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 09/14/06

Matrix: Water

Project No.: 06002.01.242

Lab System ID: 286171S

SRR: 29771

Method: 6010B MOD, 6020 MOD

Task Order: 060915-4

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Aluminum	<0.500	19.8	20	99.0%
Antimony	<0.100	5.01	5	100.2%
Arsenic	<0.100	20.5	20	102.5%
Barium	<0.0500	20.3	20	101.5%
Beryllium	<0.0500	0.495	0.5	99.0%
Bismuth	NA	NA	NA	NA
Boron	NA	NA	NA	NA
Cadmium	<0.0500	0.486	0.5	97.2%
Calcium	20.0	223	200	101.5%
Chromium	<0.0500	1.94	2	97.0%
Cobalt	<0.0500	4.97	5	99.4%
Copper	<0.0500	2.48	2.5	99.2%
Iron	20.7	30.0	10	93.0%
Lanthanum	NA	NA	NA	NA
Lead	<0.0500	4.86	5	97.2%
Lithium	<0.0500	39.0	40	97.5%
Magnesium	20.5	228	200	103.8%
Manganese	<0.0500	4.95	5	99.0%
Molybdenum	NA	NA	NA	NA
Nickel	<0.0500	4.94	5	98.8%
Palladium	NA	NA	NA	NA
Phosphorus	NA	NA	NA	NA
Potassium	-----	-----	-----	-----
Selenium	<0.100	20.8	20	104.0%
Silicon	NA	NA	NA	NA
Silver	<0.0500	0.473	0.5	94.6%
Sodium	20.0	224	200	102.0%
Strontium	NA	NA	NA	NA
Sulfur	NA	NA	NA	NA
Thallium	<0.100	20.9	20	104.5%
Thorium	NA	NA	NA	NA
Tin	NA	NA	NA	NA
Titanium	NA	NA	NA	NA
Tungsten	NA	NA	NA	NA
Uranium	NA	NA	NA	NA
Vanadium	<0.0500	4.87	5	97.4%
Yttrium	NA	NA	NA	NA
Zinc	<0.0500	4.89	5	97.8%
Zirconium	NA	NA	NA	NA

21 DEC 06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE

MATRIX SPIKE SUMMARY

Sample ID: 1922-1C

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 09/14/06

Matrix: Water

Project No.: 06002.01.242

Lab System ID: 286170D

SRR: 29771

Method: 6010B MOD, 6020 MOD

Task Order: 060915-4

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Aluminum	-----	-----	-----	-----
Antimony	-----	-----	-----	-----
Arsenic	-----	-----	-----	-----
Barium	-----	-----	-----	-----
Beryllium	-----	-----	-----	-----
Bismuth	-----	-----	-----	-----
Boron	-----	-----	-----	-----
Cadmium	-----	-----	-----	-----
Calcium	-----	-----	-----	-----
Chromium	-----	-----	-----	-----
Cobalt	-----	-----	-----	-----
Copper	-----	-----	-----	-----
Iron	-----	-----	-----	-----
Lanthanum	-----	-----	-----	-----
Lead	-----	-----	-----	-----
Lithium	-----	-----	-----	-----
Magnesium	-----	-----	-----	-----
Manganese	-----	-----	-----	-----
Molybdenum	-----	-----	-----	-----
Nickel	-----	-----	-----	-----
Palladium	-----	-----	-----	-----
Phosphorus	-----	-----	-----	-----
Potassium	18.6	22.5	5.00	78.0%
Selenium	-----	-----	-----	-----
Silicon	-----	-----	-----	-----
Silver	-----	-----	-----	-----
Sodium	-----	-----	-----	-----
Strontium	-----	-----	-----	-----
Sulfur	-----	-----	-----	-----
Thallium	-----	-----	-----	-----
Thorium	-----	-----	-----	-----
Tin	-----	-----	-----	-----
Titanium	-----	-----	-----	-----
Tungsten	-----	-----	-----	-----
Uranium	-----	-----	-----	-----
Vanadium	-----	-----	-----	-----
Yttrium	-----	-----	-----	-----
Zinc	-----	-----	-----	-----
Zirconium	-----	-----	-----	-----

21 DEC 06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
LABORATORY CONTROL SAMPLE

Sample ID: LCS

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: NA

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: NA

Project No.: 06002.01.242

SRR: 29771

Task Order: 060915-4

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Aluminum	19.7	20	98.5%
Antimony	5.03	5	100.6%
Arsenic	20.3	20	101.5%
Barium	20.3	20	101.5%
Beryllium	0.498	0.5	99.6%
Bismuth	NA	NA	NA
Boron	NA	NA	NA
Cadmium	0.492	0.5	98.4%
Calcium	206	200	103.0%
Chromium	1.95	2	97.5%
Cobalt	4.98	5	99.6%
Copper	2.47	2.5	98.8%
Iron	10.2	10	102.0%
Lanthanum	NA	NA	NA
Lead	4.89	5	97.8%
Lithium	40.3	40	100.8%
Magnesium	212	200	106.0%
Manganese	4.97	5	99.4%
Molybdenum	NA	NA	NA
Nickel	4.94	5	98.8%
Palladium	NA	NA	NA
Phosphorus	NA	NA	NA
Potassium	0.0190	0.02	95.0%
Selenium	20.8	20	104.0%
Silicon	NA	NA	NA
Silver	0.486	0.5	97.2%
Sodium	204	200	102.0%
Strontium	NA	NA	NA
Sulfur	NA	NA	NA
Thallium	20.8	20	104.0%
Thorium	NA	NA	NA
Tin	NA	NA	NA
Titanium	NA	NA	NA
Tungsten	NA	NA	NA
Uranium	NA	NA	NA
Vanadium	4.88	5	97.6%
Yttrium	NA	NA	NA
Zinc	4.92	5	98.4%
Zirconium	NA	NA	NA

21 DEC 06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
BLANK SUMMARY

Sample ID: PB

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: NA

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: NA

Project No.: 06002.01.242

SRR: 29771

Task Order: 060915-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.500	0.500
Antimony	<0.100	0.100
Arsenic	<0.100	0.100
Barium	<0.0500	0.0500
Beryllium	<0.0500	0.0500
Bismuth	<0.150	0.150
Boron	<0.200	0.200
Cadmium	<0.0500	0.0500
Calcium	<0.500	0.500
Chromium	<0.0500	0.0500
Cobalt	<0.0500	0.0500
Copper	<0.0500	0.0500
Iron	<0.500	0.500
Lanthanum	<0.0500	0.0500
Lead	<0.0500	0.0500
Lithium	<0.0500	0.0500
Magnesium	<0.500	0.500
Manganese	<0.0500	0.0500
Molybdenum	<0.0500	0.0500
Nickel	<0.0500	0.0500
Palladium	<0.200	0.200
Phosphorus	<0.200	0.200
Potassium	<0.00500	0.005
Selenium	<0.100	0.100
Silicon	<0.200	0.200
Silver	<0.0500	0.0500
Sodium	<2.00	2.00
Strontium	<0.0500	0.0500
Sulfur	<0.250	0.250
Thallium	<0.100	0.100
Thorium	<0.200	0.200
Tin	<0.0500	0.0500
Titanium	<0.0500	0.0500
Tungsten	<0.100	0.100
Uranium	<1.00	1.00
Vanadium	<0.0500	0.0500
Yttrium	<0.0500	0.0500
Zinc	<0.0500	0.0500
Zirconium	<0.0500	0.0500

22 DEC 06 BAW

Table Comparing Cation Target and Div 01 Results
for Blind QA Standard 1922-1C

Species	Target Conc (µg/mL)	Div 01 Conc (mg/L)	Percent Recovery
Potassium	20	18.6	93.0
Calcium	20	19.9	100
Sodium	20	19.1	95.5
Magnesium	20	20.5	103
Iron	20	20.8	104

Source for target conc: 811/60 (see 811/85 for reference)
Iron is sometimes not included in the target values because Fe is not on our typical cation analyses short list
Source for Div 01 results: 838/13

Table Comparing Cation Target and Div 01 Results
for Blind QA Standard 1922-2C

Species	Target Conc (µg/mL)	Div 01 Conc (mg/L)	Percent Recovery
Potassium	20	19.5	97.5
Calcium	20	20.0	100
Sodium	20	20.0	100
Magnesium	20	20.5	103
Iron	20	20.7	104

Source for target conc: 811/60 (see 811/85 for reference)
Iron is sometimes not included in the target values because Fe is not on our typical cation analyses short list
Source for Div 01 results: 838/14

Table Comparing Cation Div 01 Results of Duplicate
Blind Standards 1922-1C and 1922-2C

Species	1922-1C Conc (mg/L)	1922-2C Conc (mg/L)	Percent Difference
Potassium	18.6	19.5	4.84
Calcium	19.9	20.0	0.503
Sodium	19.1	20.0	4.71
Magnesium	20.5	20.5	0.000
Iron	20.8	20.7	-0.481

Source for Div 01 results: 838/13 and 14

12-22-06 BW

22DEC06 CONT BAW

Table Comparing QA Standard Reanalyses (same QA solution previously analyzed with phase 1 experiment)

Species	Phase 1 analyses 1922-2C Conc (mg/L)	Phase 1 analyses 1922-3C Conc (mg/L)	Phase 2 analyses 1922-1C Conc (mg/L)	Phase 2 analyses 1922-2C Conc (mg/L)
Potassium	18.8	19.2	18.6	19.5
Calcium	20.2	20.0	19.9	20.0
Sodium	20.1	21.1	19.1	20.0
Magnesium	20.6	20.5	20.5	20.5
Iron	21.0	20.9	20.8	20.7

Source for phase 1 Div 01 results 830/153
Source for phase 2 Div 01 results 838/20

12-22-06 BAW

22 DEC 06 CONT BAW

Div 01 Cation results from Sept 2006

NC-EWDP Groundwater Sampling Event

Initial Entries for Sept 2006 Sampling Event:
333/76-81 and 811/110-112

Samples: Total of 4 cation
3 groundwater samples from 1 well
- NC-EWDP-13P-0906-FA
- NC-EWDP-13P-0906-FUA
- NC-EWDP-13P-0906-4FUA
1 QA standard.

Field Sample collection: 811/110-112
Div 01 Aliquot prep: 811/98
Sample ID legend: 811/98

QA sample prep and target concentration: 811/99
QA aliquot prep + legend: 811/100

Delivery + Chain of Custody: 811/101 + 103

Following the raw data is QA recovery data

12-22-06 BAW

22 DEC 06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID: 0906C-1

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 287764

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: 10/05/06

Project No.: 06002.01.242

SRR: 29884

Task Order: 061005-14

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.500	0.5
Antimony	<0.100	0.1
Arsenic	<0.100	0.1
Barium	0.393	0.05
Beryllium	<0.0500	0.05
Bismuth	<0.150	0.15
Boron	0.429	0.2
Cadmium	<0.0500	0.05
Calcium	22.3	0.5
Chromium	<0.0500	0.05
Cobalt	<0.0500	0.05
Copper	<0.0500	0.05
Iron	0.932	0.5
Lanthanum	<0.0500	0.05
Lead	<0.0500	0.05
Lithium	<0.150	0.15
Magnesium	17.9	0.5
Manganese	<0.0500	0.05
Molybdenum	<0.0500	0.05
Nickel	<0.0500	0.05
Palladium	<0.200	0.2
Phosphorus	<0.200	0.2
Potassium	11.7	1.25
Selenium	<0.100	0.1
Silicon	34.3	0.2
Silver	<0.0500	0.05
Sodium	85.9	2
Strontium	0.426	0.05
Sulfur	22.8	0.25
Thallium	<0.100	0.1
Thorium	<0.275	0.275
Tin	<0.0500	0.05
Titanium	<0.0500	0.05
Tungsten	<0.100	0.1
Uranium	<1.00	1
Vanadium	<0.0500	0.05
Yttrium	<0.0500	0.05
Zinc	0.257	0.05
Zirconium	<0.0500	0.05

22 DEC 06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID: 0906C-2

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 287765

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: 10/05/06

Project No.: 06002.01.242

SRR: 29884

Task Order: 061005-14

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	0.645	0.5
Antimony	<0.100	0.1
Arsenic	<0.100	0.1
Barium	0.278	0.05
Beryllium	<0.0500	0.05
Bismuth	<0.150	0.15
Boron	0.287	0.2
Cadmium	<0.0500	0.05
Calcium	20.4	0.5
Chromium	<0.0500	0.05
Cobalt	<0.0500	0.05
Copper	<0.0500	0.05
Iron	<0.500	0.5
Lanthanum	<0.0500	0.05
Lead	<0.0500	0.05
Lithium	<0.150	0.15
Magnesium	16.5	0.5
Manganese	<0.0500	0.05
Molybdenum	<0.0500	0.05
Nickel	<0.0500	0.05
Palladium	<0.200	0.2
Phosphorus	<0.200	0.2
Potassium	10.8	1.25
Selenium	<0.100	0.1
Silicon	34.6	0.2
Silver	<0.0500	0.05
Sodium	84.8	2
Strontium	0.388	0.05
Sulfur	22.8	0.25
Thallium	<0.100	0.1
Thorium	<0.275	0.275
Tin	<0.0500	0.05
Titanium	<0.0500	0.05
Tungsten	<0.100	0.1
Uranium	<1.00	1
Vanadium	<0.0500	0.05
Yttrium	<0.0500	0.05
Zinc	0.0660	0.05
Zirconium	<0.0500	0.05

22 DEC 06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

Sample ID: 0906C-3

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 287766

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: 10/05/06

Project No.: 06002.01.242

SRR: 29884

Task Order: 061005-14

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	2.37	0.5
Antimony	<0.100	0.1
Arsenic	<0.100	0.1
Barium	0.310	0.05
Beryllium	<0.0500	0.05
Bismuth	<0.150	0.15
Boron	0.304	0.2
Cadmium	<0.0500	0.05
Calcium	20.3	0.5
Chromium	<0.0500	0.05
Cobalt	<0.0500	0.05
Copper	<0.0500	0.05
Iron	1.06	0.5
Lanthanum	<0.0500	0.05
Lead	<0.0500	0.05
Lithium	<0.150	0.15
Magnesium	16.5	0.5
Manganese	<0.0500	0.05
Molybdenum	<0.0500	0.05
Nickel	<0.0500	0.05
Palladium	<0.200	0.2
Phosphorus	<0.200	0.2
Potassium	11.1	1.25
Selenium	<0.100	0.1
Silicon	39.5	0.2
Silver	<0.0500	0.05
Sodium	85.5	2
Strontium	0.389	0.05
Sulfur	22.9	0.25
Thallium	<0.100	0.1
Thorium	<0.275	0.275
Tin	<0.0500	0.05
Titanium	<0.0500	0.05
Tungsten	<0.100	0.1
Uranium	<1.00	1
Vanadium	<0.0500	0.05
Yttrium	<0.0500	0.05
Zinc	0.0967	0.05
Zirconium	<0.0500	0.05

22 DEC 06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: 0906C-4

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 287767

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: 10/05/06

Project No.: 06002.01.242

SRR: 29884

Task Order: 061005-14

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.500	0.5
Antimony	<0.100	0.1
Arsenic	<0.100	0.1
Barium	<0.0500	0.05
Beryllium	<0.0500	0.05
Bismuth	<0.150	0.15
Boron	<0.200	0.2
Cadmium	<0.0500	0.05
Calcium	9.81	0.5
Chromium	<0.0500	0.05
Cobalt	<0.0500	0.05
Copper	<0.0500	0.05
Iron	9.81	0.5
Lanthanum	<0.0500	0.05
Lead	<0.0500	0.05
Lithium	<0.150	0.15
Magnesium	9.48	0.5
Manganese	<0.0500	0.05
Molybdenum	<0.0500	0.05
Nickel	<0.0500	0.05
Palladium	<0.200	0.2
Phosphorus	<0.200	0.2
Potassium	8.67	1.25
Selenium	<0.100	0.1
Silicon	<0.200	0.2
Silver	<0.0500	0.05
Sodium	10.9	2
Strontium	<0.0500	0.05
Sulfur	<0.250	0.25
Thallium	<0.100	0.1
Thorium	<0.275	0.275
Tin	<0.0500	0.05
Titanium	<0.0500	0.05
Tungsten	<0.100	0.1
Uranium	<1.00	1
Vanadium	<0.0500	0.05
Yttrium	<0.0500	0.05
Zinc	<0.0500	0.05
Zirconium	<0.0500	0.05

22DEC06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
DUPLICATE SUMMARY

Sample ID: 0906C-1

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 287764D

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: 10/05/06

Project No.: 06002.01.242

SRR: 29884

Task Order: 061005-14

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Aluminum	<0.500	<0.500	0.00%
Antimony	<0.100	<0.100	0.00%
Arsenic	<0.100	<0.100	0.00%
Barium	0.393	0.391	0.51%
Beryllium	<0.0500	<0.0500	0.00%
Bismuth	<0.150	<0.150	0.00%
Boron	0.429	0.428	0.23%
Cadmium	<0.0500	<0.0500	0.00%
Calcium	22.3	22.2	0.45%
Chromium	<0.0500	<0.0500	0.00%
Cobalt	<0.0500	<0.0500	0.00%
Copper	<0.0500	<0.0500	0.00%
Iron	0.932	1.15	20.9%
Lanthanum	<0.0500	<0.0500	0.00%
Lead	<0.0500	<0.0500	0.00%
Lithium	<0.150	<0.150	0.00%
Magnesium	17.9	17.9	0.00%
Manganese	<0.0500	<0.0500	0.00%
Molybdenum	<0.0500	<0.0500	0.00%
Nickel	<0.0500	<0.0500	0.00%
Palladium	<0.200	<0.200	0.00%
Phosphorus	<0.200	<0.200	0.00%
Potassium	11.7	11.6	0.90%
Selenium	<0.100	<0.100	0.00%
Silicon	34.3	34.4	0.29%
Silver	<0.0500	<0.0500	0.00%
Sodium	85.9	83.8	2.47%
Strontium	0.426	0.426	0.00%
Sulfur	22.8	22.9	0.44%
Thallium	<0.100	<0.100	0.00%
Thorium	<0.275	<0.275	0.00%
Tin	<0.0500	<0.0500	0.00%
Titanium	<0.0500	<0.0500	0.00%
Tungsten	<0.100	<0.100	0.00%
Uranium	<1.00	<1.00	0.00%
Vanadium	<0.0500	<0.0500	0.00%
Yttrium	<0.0500	<0.0500	0.00%
Zinc	0.257	0.252	1.96%
Zirconium	<0.0500	<0.0500	0.00%

22DEC06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE

MATRIX SPIKE SUMMARY

Sample ID: 0906C-1

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/05/06

Matrix: Water

Project No.: 06002.01.242

Lab System ID: 287764S

SRR: 29884

Method: 6010B MOD, 6020 MOD

Task Order: 061005-14

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Aluminum	-----	-----	-----	-----
Antimony	-----	-----	-----	-----
Arsenic	-----	-----	-----	-----
Barium	-----	-----	-----	-----
Beryllium	-----	-----	-----	-----
Bismuth	-----	-----	-----	-----
Boron	-----	-----	-----	-----
Cadmium	-----	-----	-----	-----
Calcium	-----	-----	-----	-----
Chromium	-----	-----	-----	-----
Cobalt	-----	-----	-----	-----
Copper	-----	-----	-----	-----
Iron	-----	-----	-----	-----
Lanthanum	-----	-----	-----	-----
Lead	-----	-----	-----	-----
Lithium	-----	-----	-----	-----
Magnesium	-----	-----	-----	-----
Manganese	-----	-----	-----	-----
Molybdenum	-----	-----	-----	-----
Nickel	-----	-----	-----	-----
Palladium	-----	-----	-----	-----
Phosphorus	-----	-----	-----	-----
Potassium	11.7	15.5	5.00	76.0%
Selenium	-----	-----	-----	-----
Silicon	-----	-----	-----	-----
Silver	-----	-----	-----	-----
Sodium	-----	-----	-----	-----
Strontium	-----	-----	-----	-----
Sulfur	-----	-----	-----	-----
Thallium	-----	-----	-----	-----
Thorium	-----	-----	-----	-----
Tin	-----	-----	-----	-----
Titanium	-----	-----	-----	-----
Tungsten	-----	-----	-----	-----
Uranium	-----	-----	-----	-----
Vanadium	-----	-----	-----	-----
Yttrium	-----	-----	-----	-----
Zinc	-----	-----	-----	-----
Zirconium	-----	-----	-----	-----

NA-Not Applicable

22DEC06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE

MATRIX SPIKE SUMMARY

Sample ID: 0906C-2

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/05/06

Matrix: Water

Project No.: 06002.01.242

Lab System ID: 287765S

SRR: 29884

Method: 6010B MOD, 6020 MOD

Task Order: 061005-14

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Aluminum	0.645	19.8	20.0	95.8%
Antimony	<0.100	4.97	5.00	99.4%
Arsenic	<0.100	20.0	20.0	100.0%
Barium	0.278	20.0	20.0	98.6%
Beryllium	<0.0500	0.496	0.500	99.2%
Bismuth	NA	NA	NA	NA
Boron	NA	NA	NA	NA
Cadmium	<0.0500	0.487	0.500	97.4%
Calcium	20.4	223	200	101.3%
Chromium	<0.0500	1.92	2.00	96.0%
Cobalt	<0.0500	4.91	5.00	98.2%
Copper	<0.0500	2.40	2.50	96.0%
Iron	<0.500	11.6	10.0	116.0%
Lanthanum	NA	NA	NA	NA
Lead	<0.0500	4.80	5.00	96.0%
Lithium	<0.150	38.7	40	96.8%
Magnesium	16.5	218	200	100.8%
Manganese	<0.0500	4.93	5.00	98.6%
Molybdenum	NA	NA	NA	NA
Nickel	<0.0500	4.79	5.00	95.8%
Palladium	NA	NA	NA	NA
Phosphorus	NA	NA	NA	NA
Potassium	-----	-----	-----	-----
Selenium	<0.100	20.9	20.0	104.5%
Silicon	NA	NA	NA	NA
Silver	<0.0500	0.478	0.500	95.6%
Sodium	84.8	279	200	97.1%
Strontium	NA	NA	NA	NA
Sulfur	NA	NA	NA	NA
Thallium	<0.100	20.4	20.0	102.0%
Thorium	NA	NA	NA	NA
Tin	NA	NA	NA	NA
Titanium	NA	NA	NA	NA
Tungsten	NA	NA	NA	NA
Uranium	NA	NA	NA	NA
Vanadium	<0.0500	4.83	5.00	96.6%
Yttrium	NA	NA	NA	NA
Zinc	0.0660	4.95	5.00	97.7%
Zirconium	NA	NA	NA	NA

NA-Not Applicable

22DEC06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
LABORATORY CONTROL SAMPLE

Sample ID: LCS

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: NA

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: NA

Project No.: 06002.01.242

SRR: 29884

Task Order: 061005-14

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Aluminum	19.1	20.0	95.5%
Antimony	4.96	5.00	99.2%
Arsenic	20.0	20.0	100.0%
Barium	19.7	20.0	98.5%
Beryllium	0.494	0.500	98.8%
Bismuth	NA	NA	NA
Boron	NA	NA	NA
Cadmium	0.489	0.500	97.8%
Calcium	203	200	101.5%
Chromium	1.91	2.00	95.5%
Cobalt	4.94	5.00	98.8%
Copper	2.39	2.50	95.6%
Iron	11.6	10.0	116.0%
Lanthanum	NA	NA	NA
Lead	4.82	5.00	96.4%
Lithium	38.8	40.0	97.0%
Magnesium	202	200	101.0%
Manganese	4.91	5.00	98.2%
Molybdenum	NA	NA	NA
Nickel	4.84	5.00	96.8%
Palladium	NA	NA	NA
Phosphorus	NA	NA	NA
Potassium	0.0203	0.02	101.5%
Selenium	20.6	20.0	103.0%
Silicon	NA	NA	NA
Silver	0.474	0.500	94.8%
Sodium	196	200	98.0%
Strontium	NA	NA	NA
Sulfur	NA	NA	NA
Thallium	20.5	20.0	102.5%
Thorium	NA	NA	NA
Tin	NA	NA	NA
Titanium	NA	NA	NA
Tungsten	NA	NA	NA
Uranium	NA	NA	NA
Vanadium	4.83	5.00	96.6%
Yttrium	NA	NA	NA
Zinc	4.91	5.00	98.2%
Zirconium	NA	NA	NA

NA- Not Applicable.

22 DEC 06 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
BLANK SUMMARY

Sample ID: PB

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: NA

Method: 6010B MOD, 6020 MOD

Client: Division 20

Date Received: NA

Project No.: 06002.01.242

SRR: 29884

Task Order: 061005-14

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.500	0.500
Antimony	<0.100	0.100
Arsenic	<0.100	0.100
Barium	<0.0500	0.0500
Beryllium	<0.0500	0.0500
Bismuth	<0.150	0.150
Boron	<0.200	0.200
Cadmium	<0.0500	0.0500
Calcium	<0.500	0.500
Chromium	<0.0500	0.0500
Cobalt	<0.0500	0.0500
Copper	<0.0500	0.0500
Iron	<0.500	0.500
Lanthanum	<0.0500	0.0500
Lead	<0.0500	0.0500
Lithium	<0.150	0.150
Magnesium	<0.500	0.500
Manganese	<0.0500	0.0500
Molybdenum	<0.0500	0.0500
Nickel	<0.0500	0.0500
Palladium	<0.200	0.200
Phosphorus	<0.200	0.200
Potassium	<0.00500	0.005
Selenium	<0.100	0.100
Silicon	<0.200	0.200
Silver	<0.0500	0.0500
Sodium	<2.00	2.00
Strontium	<0.0500	0.0500
Sulfur	<0.250	0.250
Thallium	<0.100	0.100
Thorium	<0.275	0.275
Tin	<0.0500	0.0500
Titanium	<0.0500	0.0500
Tungsten	<0.100	0.100
Uranium	<1.00	1.00
Vanadium	<0.0500	0.0500
Yttrium	<0.0500	0.0500
Zinc	<0.0500	0.0500
Zirconium	<0.0500	0.0500

NA- Not Applicable.

22 DEC 06 CONT BAW

Table Comparing Cation Target and Div 01 Results
for Blind QA Standard 0906C-4

Species	Target Conc (µg/mL)	Div 01 Conc (mg/L)	Percent Recovery
Potassium	10	8.67	86.7
Calcium	10	9.81	98.1
Sodium	10	10.9	109
Magnesium	10	9.48	94.8
Iron	10	9.81	98.1

Source for target conc: 811/99 (see 811/101 for reference)
Iron was not included in the target values because Fe is not on our typical cation analyses short list
Source for Div 01 results: 838/26

15 March 07 BW

Copy made for QA records

19 July 07 MR

Calibration test of Nanopure Diamond Analytical Ultrapure Water System - L108

Water System: Barnstead Model D11901
Serial # 11900 10979691

Calibration Module: Barnstead Model E89605
Serial # 89602032 1720 with
current certification performed
by SwRI Cal. lab (asset # 009582)

Performed calibration test of sensing
electronics on water system following
instructions listed in the "Nanopure

19 July 2007 MR contd.

Diamond Analytical Ultrapure Water
System Operation Manual Series 1190"
(11/2/00) under the NIST calibration
Module Section (pg. 29)

System responded with LED display
"Passed"

Label placed on unit indicating
date, status, and SN reference.

19 July 2007 MR

27 September 2007 MR

Calibration test of Nanopure Diamond Analytical Ultrapure Water System After Yearly Maintanence-2108

Background: Annual maintenance was performed by Purity Water. As a check/challenge we will use calibration resistor to validate system.

Water System: Barnstead Model D11901
Serial # 11900 10979691

Calibration Module: Barnstead Model E896X5
Serial #: 896020321720 with current certification performed by SwRI calibration lab
Asset # 009582

Performed calibration test of sensing electronics on water system following instructions listed in the "Nanopure Diamond Analytical Ultrapure Water System operation manual series 1190" (11/2/2000) under the NIST Calibration Module Section (pg 29)

System responded with LED display "passed".

label placed on unit ~~indicatio~~ 27 Sept 07 MR indicating date, status and SN reference.

04 JAN 2008 BAW

This scientific notebook (SN 838) includes a CD which is attached to the back inside cover. The "Read Me" file from the CD has been printed out and attached below.

Read Me file for CD in Scientific Notebook 838

This notebook is being closed out because I, Bradley Werling, the person responsibile for this notebook, had a change in job description and associated duties. Previously I worked as a geochemist in the Geochemistry group. Laboratory work was a primary job focus. In December 2007, I was reclassified as an environmental scientist and assigned to the new Environmentmental Science and Environmental Engineering group. Laboratory work was no longer a primary job focus.

This CD contains data and results in electronic form I collected from 2000 to 2007 and stored on my computer workstation. This covers my entire time with the Center for Nuclear Waste Regulatory Analyses (CNWRA) to date. The information from this CD has previoulsy been entered in other CNWRA scientific notebooks in a timely matter as the information was available. The information was also kept in electronic form because it allowed a convenient and efficient way to perform certain tasks with the information such as reorganization or consolidation. Since my job duties change, I did not want to keep this information on my computer workstation. With consent of English Pearcy, the Geochemistry group element manager, a CD with this information is being attached to Scientific Notebook 838 and another duplicate CD is being provided to Paul Bertetti, the Principle Investigtor associated with this work.

The majority of the files are in Excel but the CD also contain files in Adobe Acrobat, Quattro Pro, and Notepad.

The CD contains an electronic copy of this text in the file named "Read me.txt"

END OF SN 838- No Further entries.

At this time, no notebook continuing these entries was generated.

BW 1-4-08

CD from Scientific Notebook 838

BAW data files from 2000-2007

See SN 838/35

ADDITIONAL INFORMATION FOR SCIENTIFIC NOTEBOOK NO. 838

Document Date:	01/04/2008
Availability:	Southwest Research Institute® Center for Nuclear Waste Regulatory Analyses 6220 Culebra Road San Antonio, Texas 78228
Contact:	Southwest Research Institute® Center for Nuclear Waste Regulatory Analyses 6220 Culebra Road San Antonio, TX 78228-5166 Attn.: Director of Administration 210.522.5054
Data Sensitivity:	■"Non-Sensitive" □ Sensitive □"Non-Sensitive - Copyright" □ Sensitive - Copyright
Date Generated:	10/01/2006
Operating System: (including version number)	Windows
Application Used: (including version number)	
Media Type: (CDs, 3 1/2, 5 1/4 disks, etc.)	1 CD
File Types: (.exe, .bat, .zip, etc.)	BAW data files
Remarks: (computer runs, etc.)	Media contains: Read Me file

GEOSCIENCES AND ENGINEERING DIVISION

SCIENTIFIC NOTEBOOK REVIEW CHECKLIST RECORD

Scientific Notebook No. 838 Project Numbers: 20.06002.01.242

Accomplished

- [✓] 1. Initial entries per QAP-001
- [✓] 2. Dating of entries
- [✓] 3. Corrections (crossed out, one line through w/initials/date)
- [✓] 4. No White out used
- [✓] 5. Page number visible on copy or original notebook
- [✓] 6. In process entries per QAP-001
- [✓] 7. Figure information present
- [✓] 8. Text readable
- [N/A] 9. Copyrighted material is identified
- [✓] 10. Permanent ink or type only
- [✓] 11. Signing of entries (not required on each page)
- [✓] 12. Electronic media in the scientific notebook properly labeled
- [✓] 13. NRC Supplementary Scientific Notebook Questions are addressed.
- [✓] 14. The independent, two person verification required by AP-019, Section 5.2.1.2(b) is complete

Any discrepancies must be resolved before notebook closeout.

==========

I have reviewed this scientific notebook and find it in agreement with QAP-001.

E. C. [signature] 1/8/2008

Manager's Signature Date

Attach this completed form to the last page of the notebook.

Form QAP-01 (03/2007)