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Scientific Notebook No. 653: Radionuclide Transport (RT) Key Technical Issues (09/22/2004 through 02/17/2005)

653-RT

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

653-RT

CNWRA
CONTROLLED
COPY 653

RADIONUCLIDE TRANSPORT

Issued to Bradley Werling

210-522-6565

INVESTIGATOR	SIGNATURE	INITIALS
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This notebook is for the Radionuclide Transport (RT) Key Technical Issue. 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.

This scientific notebook (SN) is a continuation of SN 628. Current experimental activities are focused on two topics: the May 2004 Early Warning Drilling Program (EWDP) groundwater sampling event and the initial (series 1) technetium – calcite laboratory batch sorption experiment.

The objectives for the EWPD groundwater sampling event are to collect hydrochemical data from the sampled wells and collect material for possible use in sorption experiments. Tasks include the following:

- Field analyses of groundwater for a limited set of parameters.
- Collection of groundwater for subsequent laboratory analyses including anions and cations (Div 01 and SGS Lakefield), stable isotopes (Coastal Scientific), organic and inorganic carbon (CNWRA), and organic compounds (Div 01).
- Collection of groundwater for possible use in sorption experiments.

The team for the May 2004 sampling event included CNWRA employees Miriam Juckett and Jon Brown and Raba-Kistner employees Brian Styre and Sam Blanco. Further details of these tasks are recorded in initial and in-process entries.

The objective for the technetium – calcite sorption experiment is to determine the sorption capabilities (Kd or sorption coefficient) for this particular radionuclide and mineral pair over a range of pH values. Tasks include the following:

- Preparation of reference calcite solutions.
- Cation (Div 01), inorganic carbon (CNWRA) and pH analyses (CNWRA) of reference solutions.
- Preparation of experimental solutions
- LSA analyses (CNWRA) of experimental solutions

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

BW
9-22-04

9-9-2004
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10 MAY 04 BAW

This notebook was started while scientific notebook 628 was still active. SN 628 was taken to Nevada for May 9-14 EWDP groundwater sampling event. SN 653 is for the radionuclide transport KTI.

Preparation of Organic Carbon Stock Solution Standard (1000 ppm) for TOC Analysis

Target Concentration for stock soln is 1000 ppm organic carbon from potassium hydrogen ~~phtat~~ BW 5-10-04 phthalate (PHP)

FW of PHP = 204.22 $C_8H_5KO_4$

carbon = 12.011 BW 5-10-04

For 1 Liter of 1000 ppm C, use 2.1253 g PHP ~~into~~

Reagents - type 1 water

PHP - Fisher P243-100 lot 033580

Challenge of balance at start (target 20.0000 g) = 20.0003 g

A weighing boat was tared on the Mettler AE 240 balance (SN 101237). The PHP was carefully transfered with a spatula into the weighing boat. The final mass of the PHP was 2.1253

Challenge of balance at end (target 20.0000 g) = 20.0005 g

10 May 04 CONT BAW

The PHP was transfered into a clean 250mL beaker with about 75mL of type I water. The weigh boat was rinsed several times with type I water. The rinsate was also decanted into the beaker. The beaker was placed on a stir plate and a magnetic stir bar was added. The soln was stirred a few minutes. The beaker contents were decanted into a 1000mL volumetric flask. The beaker was rinsed several times with the rinsate transfered into the 1L vol flask. Flask was capped, inverted, and shaken. Soln was transfered into a 1L amber glass bottle. Labeled 1000ppm Organic Carbon. Soln stored in refrigerator in L106

Preparation of Organic Carbon Calibration Stds for TOC Analysis

Target 50 ppm Org Carbon - add 25mL (vol pipet) of 1000ppm Carbon (653/4) into a 500mL vol flask. Filled to mark w/ fresh typel water

Target 25 ppm Org carbon - added 50mL (vol pipet) of 50ppm (653/4) into a 100mL vol flask. Filled to mark w/ fresh typel water

10 May 04 CONT BAW

Target 10ppm Organic Carbon - added 10mL (vol pipet) of 1000ppm (653/4) into a 1000mL vol flask. Filled to mark w/ fresh typel water.

Target 1ppm Organic Carbon - added 50mL (vol pipet) of 10ppm (653/5) into a 500mL vol flask. Filled to mark w/ fresh typel water

Target 0.5ppm Organic Carbon - added 25mL (vol pipet) of 10ppm (653/5) into a 500mL vol flask. Filled to mark w/ fresh typel water

Target 0.1ppm Organic Carbon - added 5mL (vol pipet) of 10ppm (653/5) into 500mL vol flask. Filled to mark w/ fresh typel water

Target 0.05ppm Organic Carbon - added 5mL (vol pipet) of 10ppm (653/5) into 1000mL vol flask. Filled to mark w/ fresh typel water

Preparing Inorganic Carbon Stock Solution Std (200ppm) ~~of~~ BW 5-10-04 for TOC Analysis

Target conc for stock soln is 200ppm inorganic carbon from sodium carbonate (SC).

10 May 04 CONT BAW

FW of SC = 105.99 Na_2CO_3
Carbon = 12.011
For 1 Liter of 200ppm Inorganic Carbon, use 1.7648g of SC

Reagents - type1 water
SC = Fisher S263-500, lot # 006077

Challange balance at start (target = 20.0001g) = 20.0001g
A weighing boat was tared on the Mettler AE240 balance (SN 101237). The SC was carefully transferred with a spatula into the weighing boat. The final mass of the SC was 1.7643g
Challange of balance at end (target 20.0001g) = 20.0001g

The SC was transfered into a clean 250mL beaker with about 75mL of type1 water. The weigh boat was rinsed several times with type1 water. The rinsate was also decanted into the beaker. The beaker was placed on a stir plate and a magnetic stir bar was added. The soln. was stirred a few minutes. The beaker contents were decanted into a 1000mL vol flask. The beaker was rinsed several times with the rinsate transfered into the 1L vol flask.

10 May 04 CONT BAW

Flask was capped, inverted, and shaken. Soln was transfered into a 1L amber glass bottle, labeled ~~500~~ 200 ppm Inorganic Carbon. Soln stored in refrigerator in L106. BW 2-23-05

Preparation of Inorganic ~~Cali~~ Carbon Calibration Stds for TOC Analysis BW 5-10-04

Target 50ppm Inorg. Carbon - added 25mL (vol pipet) of 200ppm (653/7) into 100mL vol flask. Filled to mark w/ type1 water

Target 10ppm Inorg Carbon - added 25mL (vol pipet) of 200ppm (653/7) into 500mL vol flask. Filled to mark w/ type1 water

Target 1ppm Inorganic Carbon - added 50mL of (vol pipet) 10ppm (653-7) into 500mL vol flask. Filled to mark w/ type1 water

Target 0.5ppm Inorg. Carbon - added ~~50~~ 25 mL (vol pipet) of 10ppm (653-7) into a 500mL vol flask. Filled to mark w/ type1 water BW 5-10-04

10 May 04 CONT BAW

Target 0.1 ppm Inorg Carbon - added 5 mL (vol pipet) of 10 ppm (653-7) into 500 mL vol flask. Filled to mark w/ type I water

Target 0.05 ppm Inorg. Carbon - added 1 mL (vol pipet) of 10 ppm (653-7) into 200 mL vol flask. Filled to mark w/ type I water.

11 MAY 04 BAW

Preparation of Sodium Persulfate solution for TOC Analysis

Reagents: type I water
Sodium Persulfate: Acros 20202-5000
lot # B0104212
Phosphoric Acid - ~~trace metal~~ BW 5-11-04
ACS grade, Fisher A242-4, lot # 001815

Target 10% Persulfate + 5% phosphoric
From Phoenix 8000 User Manual
A weighing boat was tared on the Mettler AE240 balance (SN 101237). The sodium persulfate was carefully transfered with a spatula into the weighing boat.

BW 5-11-04
~~to~~ 11 MAY 04 CONT BAW

Challange mass at start (target = 20.0001g) = 20.0001g
Mass of sodium persulfate = 25.0498
Challange mass at end (target = 20.0001g) = 20.0001g

The sodium persulfate was transfered into a 250 mL pc square bottle. 213 mL (grad cylinder) of type I water was added. Some of this water was used to rinse weigh boat with rinsate added to bottle. 9 mL (grad cylinder) of phosphoric acid was added

Preparation of 21% Phosphoric Acid Reagent for TOC Analysis

Reagents: type I water
Phosphoric Acid - Fisher A242-4, lot # 001815

Added 188 mL (250 mL grad cylinder) of type I water to a 500 mL pc square bottle. Added 37 mL (100 mL grad cylinder) of phosphoric acid to the forementioned 500 mL bottle.

24 May 04

Preparation of Sodium Persulfate reagent solution for TOC analysis

Procedures and methods for the creation of Sodium Persulfate reagent solution is documented on 653/8-9.
The Mettler TOLEDO (S/N 1122142730) PR 5002 was used to measure the sodium persulfate.
Inital calibration check, target 400.00g reading 400.00g
Calibration check after measurement target 400.00g, reading 400.00g

Preparation of 21% Acid Reagent for TOC analysis

Procedures and methods used in the creation of 21% acid reagent documented on 653/9.

Preparation of Organic Carbon Stock solution standard (1000 ppm) for TOC Analysis

Procedures and methods used to create Organic carbon stock solution standard is documented on 653/3-4.
Inital challenge of balance (target 20.0001g)

24 May 04 cont.
reading 20.0001g. Challenge of balance end (target 20.0001g) reading 20.0004g.

Preparation of Organic Carbon Calibration Standards For TOC analysis

Target 25 ppm Org carbon - added 25 mL of 1000 ppm OC (653/10-9) into a 1000 mL vol Flask. Filled to mark with Fresh type 1 water

Target 10 ppm OC - added 100 mL of 25 ppm OC (653/11) into a 250 mL vol Flask. Filled to mark with Fresh type 1 water.

Target 1 ppm OC - added 25 mL of 10 ppm OC (653/11) into a 250 mL vol. Flask. Filled to mark w/ Fresh type 1 water.

Target 0.5 ppm OC - added 25 mL of 10 ppm OC (653/11) into a 500 mL vol Flask. Filled to mark w/ fresh type 1 water

Target 0.1 ppm OC - added 25 mL of 1 ppm OC 5-24-04 (653/11) into a 250 mL vol Flask. Filled to mark w/ Fresh type 1 water.

24 May 04 cont. JB

Target 0.04 ppm OC - added 20 mL of 1 ppm OC (653/11) into a 500 mL vol Flask. Filled to the mark w/ Fresh type 1 water.

27 MAY 04 BAW

Ambient CO_2 levels in Lab L106 analysis

Instrument: Gasbound LI-800 (LiCor) serial number AKC-0162

Gases: Zero Air - Praxair batch 530900701

1000ppm CO_2 in Air - SGP CC 55434

Configuration - long optical bench

span at 2000 ppm

Filter - 5 sec

Controls - heater + pressure comp. enabled.

Calibrated at 9:00.

Set software to record CO_2 levels over time. Profile 4000 aquarium pump used to supply ambient air to detector

Software parameters - Y-max = 800

sampling period = 60 sec logging period = 60 sec

logged values = point

file = L106 ambient 27 May 04.txt

Stopped at 16:00 - Challenge w/ 1000ppm = 996.9

27 May 04 JB

Preparation of two TOC Standards

Two new TOC standards were prepared to check the accuracy of standards made on 5-24-04 SN 653/10-12.

A 0.1 ppm OC standard was prepared by taking 50 mL of ~~0.05~~ 0.5 ppm OC standard ~~653/11~~ 5-27-04 JB (653/11) in a volumetric pipet and adding it to a 250 mL vol Flask and filling to the mark

A 0.05 ppm OC standard was prepared by taking 25 mL of 0.5 ppm OC standard (653/11) in a volumetric pipet and adding it to a 250 mL vol Flask and filling to mark.

The two new samples are stored in the refrigerator in Lab 106, Bldg 57.

Organic Carbon Analysis of EWDP groundwater Samples from May 2004 and Sept & Oct 2003 sampling events (Second Run)

This is the second run of these samples with a few new standards, with hopes to get a better calibration curve. The original run is on (628/124-125).

Samples ~~taken~~ 5-27-04 from May 2004 event (628/128-130) were analyzed directly from 40 mL vials used

27 May 04 cont. BAW

for sample collection.
Aliquots were taken from samples collected during the Sept + Oct 2003 event (610/36-41).
40 mL was removed from NC-EWDP-28P and 29P-S-F UA.
Samples analyzed on Phoenix 8000 TOC analyzer (SN 00343010).
Method ID is TOC Range 0.1-20 ppm.

Two sets of standards are used (653/10-12) and (653/13). The first set, created on 5-24-04, 0, 0.04, 0.1, 0.5, 1.10 ppm TOC was used. The second set of standards were also used to compair calibration standards, (653/13) 0.1 and 0.05 ppm TOC. The standards and samples were placed in 40mL amber VOA bottles after a through ~~insert~~ 5-27-04 BAW rinse with type 1 water and 3 x precontamination. All standards and samples are run in triplicate.

The two samples run from May 2004 event are NC-EWDP-19PB-SHAL-0504-IC-FUA-3 and NC-EWDP-19PB-DEEP-0504-IC-FUA-3.
The two samples run from Sept + Oct 2003 sampling event are NC-EWDP-28P-0903-S-FUA and ~~NC-EWDP-19PB-1003~~ 5-27-04 BAW NC-EWDP-29P-1003-S-FUA.

27 MAY 04 CONT BAW

Ambient CO_2 levels in Lab L106

See 653/12 for details - 27 May 04 data
Results on 653/16+17
Summary info below

Average = 376.9

Median = 375.9

Std deviation = 4.8

Max value = 397.7

Min value = 368.8

5-27-04
BAW

27 MAY 04 CONT BAW

CO2 measurement taken every minute from 9:12 to 16:04
Calibrated before starting with air and 1000ppm in air
Challenged at end with 1000 ppm - measured 996.9 ppm
Source 653/12

Time	Point	Time	Point	Time	Point	Time	Point
9:11:22	383.3	10:03:30	381.1	10:55:39	376.3	11:47:47	376.3
9:12:22	384	10:04:30	384.5	10:56:39	376.7	11:48:47	376.5
9:13:23	385.4	10:05:30	385.4	10:57:39	376.6	11:49:47	375.4
9:14:22	384.5	10:06:31	383.2	10:58:40	377.7	11:50:47	375.4
9:15:22	384.5	10:07:31	388.5	10:59:40	377.7	11:51:48	374.4
9:16:21	385.7	10:08:31	383.4	11:00:40	377.2	11:52:48	373
9:17:22	384.4	10:09:31	382.2	11:01:40	377.6	11:53:48	372.6
9:18:22	383.9	10:10:31	382.2	11:02:40	376.8	11:54:48	372.2
9:19:22	385.5	10:11:32	381.6	11:03:40	377.8	11:55:48	372.7
9:20:22	385.6	10:12:32	380.9	11:04:41	378.9	11:56:49	373.2
9:21:22	384.4	10:13:32	379.9	11:05:41	377.4	11:57:49	373.5
9:22:23	384.2	10:14:32	380	11:06:41	378.2	11:58:49	373.9
9:23:23	383.9	10:15:32	378.8	11:07:41	379.2	11:59:49	375
9:24:23	384.2	10:16:32	380.1	11:08:41	379.5	12:00:49	374.3
9:25:23	382	10:17:33	383.5	11:09:42	382.3	12:01:49	374.3
9:26:23	380.2	10:18:33	390.7	11:10:42	381.7	12:02:50	374.5
9:27:23	382	10:19:33	396.7	11:11:42	384.9	12:03:50	374
9:28:24	379.8	10:20:33	397.7	11:12:42	384	12:04:50	374.5
9:29:24	380.2	10:21:33	395.3	11:13:42	382.3	12:05:50	373.9
9:30:24	379.4	10:22:34	396	11:14:42	381.3	12:06:50	373.8
9:31:24	379.6	10:23:34	391.1	11:15:43	382.8	12:07:51	374.1
9:32:24	378.8	10:24:34	386.8	11:16:43	384.3	12:08:51	373.7
9:33:25	379.4	10:25:34	385.4	11:17:43	381.8	12:09:51	373
9:34:25	378.3	10:26:34	384.5	11:18:43	382.6	12:10:51	373.2
9:35:25	379.8	10:27:34	388.2	11:19:43	381.2	12:11:51	372.6
9:36:25	379.3	10:28:35	390.5	11:20:43	379.9	12:12:51	371.7
9:37:25	379.8	10:29:35	391.6	11:21:43	378.9	12:13:52	372.6
9:38:25	379.2	10:30:34	390.5	11:22:43	380	12:14:52	371.7
9:39:26	382	10:31:35	387.2	11:23:44	378.9	12:15:52	371.3
9:40:26	381.6	10:32:35	388.4	11:24:44	379.3	12:16:52	371.1
9:41:26	381.7	10:33:35	385.3	11:25:44	379	12:17:52	371.6
9:42:26	380.9	10:34:35	382.2	11:26:44	378.9	12:18:53	371.6
9:43:26	382	10:35:35	386	11:27:44	379.2	12:19:53	372.4
9:44:27	380.2	10:36:36	385	11:28:44	380.2	12:20:53	371.2
9:45:27	380	10:37:36	385.3	11:29:45	378.2	12:21:53	371.2
9:46:27	381.7	10:38:36	383.9	11:30:45	378.1	12:22:53	370.5
9:47:27	382	10:39:36	384	11:31:45	377.7	12:23:53	370.7
9:48:27	379.3	10:40:36	382.1	11:32:45	378.4	12:24:54	370
9:49:28	380.5	10:41:36	380.5	11:33:45	378.1	12:25:54	371.5
9:50:28	380.5	10:42:37	380.5	11:34:46	378.5	12:26:54	371.3
9:51:28	380.6	10:43:37	378.8	11:35:46	380.2	12:27:54	370.7
9:52:28	379.8	10:44:37	377.9	11:36:46	380.2	12:28:54	370.4
9:53:28	379	10:45:37	378.4	11:37:46	379.4	12:29:55	370.8
9:54:28	379	10:46:37	377.8	11:38:46	378.9	12:30:55	370.1
9:55:29	379.3	10:47:38	377.2	11:39:46	378.2	12:31:55	369.8
9:56:29	379.5	10:48:38	378.2	11:40:46	377	12:32:55	368.9
9:57:29	379.5	10:49:38	377	11:41:46	379.8	12:33:55	370.1
9:58:29	379.8	10:50:38	376.6	11:42:46	376.3	12:34:55	369.9
9:59:29	380	10:51:38	376.8	11:43:46	376.1	12:35:56	370.1
10:00:29	380.7	10:52:38	377.3	11:44:46	377.4	12:36:56	370.2
10:01:30	379.4	10:53:39	375.7	11:45:47	377.2	12:37:56	368.8
10:02:30	378.3	10:54:39	376.2	11:46:47	377.8	12:38:56	369.3

27 MAY 04 CONT BAW

CO2 measurement taken every minute from 9:12 to 16:04
Calibrated before starting with air and 1000ppm in air
Challenged at end with 1000 ppm - measured 996.9 ppm
Source 653/12

Time	Point	Time	Point	Time	Point	Time	Point
12:39:56	368.9	13:32:06	377.1	14:24:15	373.5	15:16:25	376.3
12:40:57	369.8	13:33:06	375.6	14:25:15	376	15:17:25	376.8
12:41:57	369	13:34:06	375.1	14:26:16	379.3	15:18:25	375.7
12:42:57	369.5	13:35:06	374.1	14:27:16	373.9	15:19:25	376.5
12:43:57	370.1	13:36:07	377.1	14:28:16	375.9	15:20:25	377
12:44:57	369.9	13:37:07	375.9	14:29:16	377.3	15:21:26	375.2
12:45:57	369.9	13:38:07	377.6	14:30:16	375.4	15:22:26	375.2
12:46:58	369.4	13:39:07	376.6	14:31:17	375.1	15:23:26	375.6
12:47:58	370.4	13:40:07	376.8	14:32:17	376.1	15:24:26	375.7
12:48:58	371.2	13:41:07	379.2	14:33:17	375	15:25:26	375.1
12:49:58	370.5	13:42:08	377.7	14:34:17	374.8	15:26:27	375.9
12:50:58	371.5	13:43:08	376.5	14:35:17	375.5	15:27:27	376.2
12:51:59	371.1	13:44:08	376.6	14:36:17	375.1	15:28:27	376.3
12:52:59	371.5	13:45:08	375.2	14:37:18	374.5	15:29:27	375
12:53:59	371.5	13:46:08	374.1	14:38:18	374.9	15:30:27	374.9
12:54:59	371.9	13:47:09	373.8	14:39:18	375.4	15:31:27	374.8
12:55:59	371.5	13:48:09	374.3	14:40:18	373.9	15:32:28	373.9
12:56:59	372.6	13:49:09	374.6	14:41:18	373.2	15:33:28	373
12:58:00	372.7	13:50:09	373.9	14:42:19	374.3	15:34:28	376.6
12:59:00	371.7	13:51:09	373.8	14:43:19	374.5	15:35:28	378.8
13:00:00	373.3	13:52:09	373.4	14:44:19	375.7	15:36:28	384.4
13:01:00	372.7	13:53:10	375.6	14:45:19	374.8	15:37:29	382.2
13:02:00	371.9	13:54:10	375.2	14:46:19	375.9	15:38:28	385
13:03:01	373	13:55:10	373.4	14:47:19	375.9	15:39:28	383.9
13:04:01	373.2	13:56:10	373.5	14:48:20	375.2	15:40:29	380.6
13:05:01	372.8	13:57:10	375.7	14:49:20	374.8	15:41:29	380.2
13:06:01	372.4	13:58:11	375.4	14:50:20	374.9	15:42:29	376.8
13:07:01	371.5	13:59:11	378.4	14:51:20	374.5	15:43:29	376.7
13:08:02	371.3	14:00:11	379.5	14:52:20	374.3	15:44:29	375.1
13:09:02	370.5	14:01:11	377.3	14:53:21	375.4	15:45:30	375.4
13:10:02	371.5	14:02:11	376.1	14:54:21	375.4	15:46:30	376.1
13:11:02	370.8	14:03:11	375.9	14:55:21	374.6	15:47:30	375.7
13:12:02	371.5	14:04:12	374.6	14:56:21	375.6	15:48:30	375.5
13:13:02	370.6	14:05:12	375.7	14:57:21	375	15:49:30	375.7
13:14:03	371.6	14:06:12	376.8	14:58:22	373.3	15:50:30	376.3
13:15:03	370.6	14:07:12	376.2	14:59:22	373.4	15:51:31	374
13:16:03	371	14:08:12	374.3	15:00:22	374.5	15:52:31	374.4
13:17:03	371.2	14:09:13	375.2	15:01:22	374.1	15:53:31	374.4
13:18:03	372.3	14:10:13	375.5	15:02:22	375.4	15:54:31	372.8
13:19:03	372.7	14:11:13	374.5	15:03:22	374.6	15:55:31	372.4
13:20:04	372.7	14:12:13	375.2	15:04:23	374.6	15:56:32	373
13:21:04	373.2	14:13:13	376.5	15:05:23	375.1	15:57:32	372.3
13:22:04	371.8	14:14:13	375.5	15:06:23	374.9	15:58:32	374.3
13:23:04	371.2	14:15:14	376.3	15:07:23	376.1	15:59:32	374.1
13:24:04	370.7	14:16:14	374.8	15:08:23	377.8	16:00:32	374.6
13:25:05	371.3	14:17:14	374.1	15:09:23	375.6	16:01:32	374.8
13:26:05	373.9	14:18:14	374.8	15:10:24	375.4	16:02:33	374.3
13:27:05	372.4	14:19:14	373.2	15:11:24	375.9	16:03:33	374
13:28:05	373.4	14:20:15	373.9	15:12:24	374.6	16:04:33	375.5
13:29:05	373	14:21:15	372.8	15:13:24	376.5		
13:30:05	373.5	14:22:15	372.7	15:14:24	376		
13:31:06	374.1	14:23:15	373.3	15:15:25	376.2		

28 MAY 04 BAW

Ambient levels of CO_2 in Lab L106

See 653/12
Calibrated at 9:04
File = L106 ambient 28 May 04.tst
Very humid in the lab - condensation on the windows at 9:04
11:10 - condensation from windows gone, but still overcast + humid outside.
Stopped around 16:30
Challenged with 1000ppm = 1005.9 ppm

01 JUNE 04 BAW

Ambient levels of CO_2 in Lab L106

See 653/12
Calibrated at 0900
File = L106 ambient 01 June 04.tst
Very humid morning - condensation on windows
- Condensation cleared, but still humid
Stopped around 16:15
Challanged with 1000ppm CO_2 = 999.1 ppm

1 JUNE 2004 cont BAW

Results of Reanalysis for Organic Carbon Content of EWDP groundwater samples - May 2004 event and selected Sep/Oct 2003 event

Initial Analyses Results - n 628/161-162
Area counts for the 0.04 and 0.1 ppm calibration standard for initial analyses were not good. Therefore the analyses was redone using newly prepared 0.05 ppm and 0.1 ppm standards (653/13).
The reanalyses was performed 27 May 04 (see 653/13-14).

The following pages include the relevant portion of the raw data file in Excel, the results, and a comparison to the initial analyses. Please refer to the Phoenix manual for the entire legend indicating the meaning of each column. Sample ID is column 8 and Area count is column 30.
Note - fresh (new that day) reservoir water may not have been used for the initial analysis (628/161-162)

1 June 04 cont BHW

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
~~v2.0	1	1	Done	0	5/27/04 14:18	USER1	TOC zero	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	1	3	52704	4	8
~~v2.0	1	1	Done	0	5/27/04 14:24	USER1	TOC zero	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	2	3	52704	4	8
~~v2.0	1	1	Done	0	5/27/04 14:30	USER1	TOC zero	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	3	3	52704	4	8
~~v2.0	1	1	Done	0	5/27/04 14:55	USER1	TOC 0.05 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	1	5	52704	4	8
~~v2.0	1	1	Done	0	5/27/04 15:01	USER1	TOC 0.05 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	2	5	52704	4	8
~~v2.0	1	1	Done	0	5/27/04 15:08	USER1	TOC 0.05 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	3	5	52704	4	8
~~v2.0	1	1	Done	0	5/27/04 15:33	USER1	TOC 0.10 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	1	7	52704	4	8
~~v2.0	1	1	Done	0	5/27/04 15:39	USER1	TOC 0.10 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	2	7	52704	4	8
~~v2.0	1	1	Done	0	5/27/04 15:46	USER1	TOC 0.10 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	3	7	52704	4	8
~~v2.0	1	1	Done	0	5/27/04 15:52	USER1	TOC 0.50 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	1	8	52704	4	8
~~v2.0	1	1	Done	0	5/27/04 15:59	USER1	TOC 0.50 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	2	8	52704	4	8
~~v2.0	1	1	Done	0	5/27/04 16:05	USER1	TOC 0.50 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	3	8	52704	4	8
~~v2.0	1	1	Done	0	5/27/04 16:12	USER1	TOC 1 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	1	9	52704	4	8
~~v2.0	1	1	Done	0	5/27/04 16:18	USER1	TOC 1 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	2	9	52704	4	8
~~v2.0	1	1	Done	0	5/27/04 16:25	USER1	TOC 1 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	3	9	52704	4	8
~~v2.0	1	1	Done	0	5/27/04 16:32	USER1	TOC 10 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	1	10	52704	4	8
~~v2.0	1	1	Done	0	5/27/04 16:40	USER1	TOC 10 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	2	10	52704	4	8
~~v2.0	1	1	Done	0	5/27/04 16:47	USER1	TOC 10 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	3	10	52704	4	8
~~v2.0	10	1	Done	0	5/27/04 16:50	USER1	blank	Blank IC Ranges 3 4 & 5	IC 20ppm up	2	2	6	1	1001	52704	0	0
~~v2.0	10	1	Done	0	5/27/04 16:52	USER1	blank	Blank IC Ranges 3 4 & 5	IC 20ppm up	2	2	6	2	1001	52704	0	0
~~v2.0	10	1	Done	0	5/27/04 16:55	USER1	blank	Blank IC Ranges 3 4 & 5	IC 20ppm up	2	2	6	3	1001	52704	0	0
~~v2.0	10	1	Done	0	5/27/04 16:57	USER1	blank	Blank IC Ranges 3 4 & 5	IC 20ppm up	2	2	6	4	1001	52704	0	0
~~v2.0	10	1	Done	0	5/27/04 16:59	USER1	blank	Blank IC Ranges 3 4 & 5	IC 20ppm up	2	2	6	5	1001	52704	0	0
~~v2.0	10	1	Done	0	5/27/04 17:01	USER1	blank	Blank IC Ranges 3 4 & 5	IC 20ppm up	2	2	6	6	1001	52704	0	0
~~v2.0	0	1	Done	0	5/27/04 17:08	USER1	EWDP-19PB-SHAL-IC-3	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	1	11	52704	4	8
~~v2.0	0	1	Done	0	5/27/04 17:14	USER1	EWDP-19PB-SHAL-IC-3	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	2	11	52704	4	8
~~v2.0	0	1	Done	0	5/27/04 17:20	USER1	EWDP-19PB-SHAL-IC-3	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	3	11	52704	4	8
~~v2.0	0	1	Done	0	5/27/04 17:27	USER1	EWDP-19PB-DEEP-IC-3	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	1	12	52704	4	8
~~v2.0	0	1	Done	0	5/27/04 17:33	USER1	EWDP-19PB-DEEP-IC-3	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	2	12	52704	4	8
~~v2.0	0	1	Done	0	5/27/04 17:39	USER1	EWDP-19PB-DEEP-IC-3	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	3	12	52704	4	8
~~v2.0	0	1	Done	0	5/27/04 17:48	USER1	EWDP-28P-0903-S	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	1	13	52704	4	8
~~v2.0	0	1	Done	0	5/27/04 17:55	USER1	EWDP-28P-0903-S	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	2	13	52704	4	8
~~v2.0	0	1	Done	0	5/27/04 18:03	USER1	EWDP-28P-0903-S	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	3	13	52704	4	8
~~v2.0	0	1	Done	0	5/27/04 18:10	USER1	EWDP-29P-1003-S	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	1	14	52704	4	8
~~v2.0	0	1	Done	0	5/27/04 18:16	USER1	EWDP-29P-1003-S	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	2	14	52704	4	8
~~v2.0	0	1	Done	0	5/27/04 18:22	USER1	EWDP-29P-1003-S	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	3	14	52704	4	8
~~v2.0	0	1	Done	0	5/27/04 18:48	USER1	TOC 0.5 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	1	16	52704	4	8
~~v2.0	0	1	Done	0	5/27/04 18:54	USER1	TOC 0.5 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	2	16	52704	4	8
~~v2.0	0	1	Done	0	5/27/04 19:00	USER1	TOC 0.5 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	3	16	52704	4	8
~~v2.0	0	1	Done	0	5/27/04 19:26	USER1	TOC 0.1 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	1	18	52704	4	8
~~v2.0	0	1	Done	0	5/27/04 19:32	USER1	TOC 0.1 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	2	18	52704	4	8
~~v2.0	0	1	Done	0	5/27/04 19:38	USER1	TOC 0.1 ppm	TOC Range 0.1 - 20 ppm C	TOC initial 0-20 ppm	0	1	3	3	18	52704	4	8

1 June 04 cont BHW

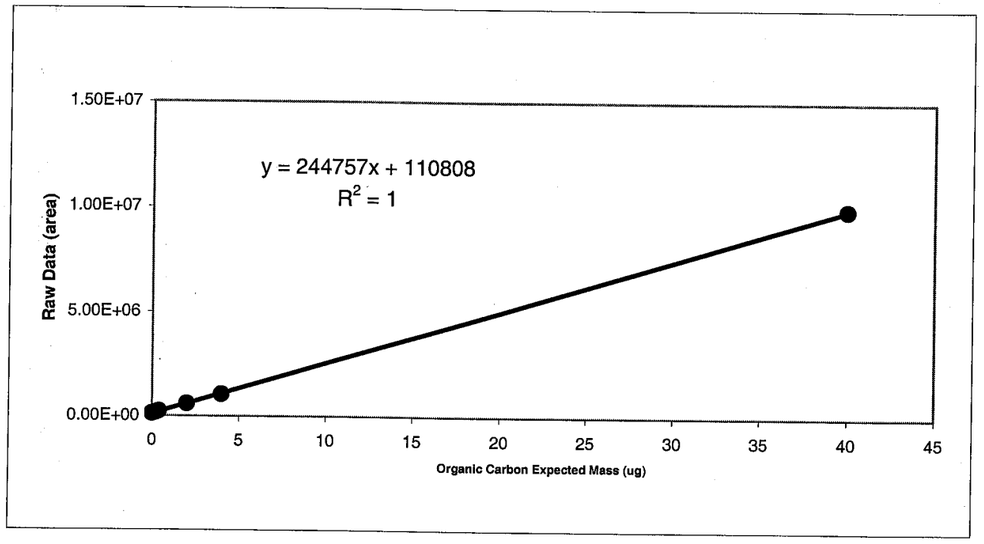
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
0	0	1	0.5	0	0	120	1	5.313	6.305	55	121074	0	0	0	0.00E+00	1/1/70 0:00	0	0	5271337	5271416
0	0	1	0.5	0	0	120	1	5.37	6.365	53	108261	0	0	0	0.00E+00	1/1/70 0:00	0	0	5271337	5271422
0	0	1	0.5	0	0	120	1	5.264	6.264	54	117006	0	0	0	0.00E+00	1/1/70 0:00	0	0	5271337	5271428
0	0	1	0.5	0	0	120	1	5.146	6.14	58	170291	0	0	0	0.00E+00	1/1/70 0:00	0	0	5271337	5271454
0	0	1	0.5	0	0	120	1	5.12	6.117	59	171230	0	0	0	0.00E+00	1/1/70 0:00	0	0	5271337	5271500
0	0	1	0.5	0	0	120	1	5.107	6.106	59	175758	0	0	0	0.00E+00	1/1/70 0:00	0	0	5271337	5271506
0	0	1	0.5	0	0	120	1	5.071	6.071	62	233470	0	0	0	0.00E+00	1/1/70 0:00	0	0	5271337	5271531
0	0	1	0.5	0	0	120	1	5.101	6.098	61	225172	0	0	0	0.00E+00	1/1/70 0:00	0	0	5271337	5271538
0	0	1	0.5	0	0	120	1	5.144	6.142	66	233316	0	0	0	0.00E+00	1/1/70 0:00	0	0	5271337	5271544
0	0	1	0.5	0	0	120	1	5.111	6.105	70	600817	0	0	0	0.00E+00	1/1/70 0:00	0	0	5271337	5271550
0	0	1	0.5	0	0	120	1	5.035	6.031	71	606102	0	0	0	0.00E+00	1/1/70 0:00	0	0	5271337	5271557
0	0	1	0.5	0	0	120	1	5.091	6.086	72	577072	0	0	0	0.00E+00	1/1/70 0:00	0	0	5271337	5271603
0	0	1	0.5	0	0	120	1	5.067	6.06	79	1052869	0	0	0	0.00E+00	1/1/70 0:00	0	0	5271337	5271610
0	0	1	0.5	0	0	120	1	5.105	6.103	79	1057100	0	0	0	0.00E+00	1/1/70 0:00	0	0	5271337	5271616
0	0	1	0.5	0	0	120	1	5.118	6.116	78	1047572	0	0	0	0.00E+00	1/1/70 0:00	0	0	5271337	5271623
0	0	1	0.5	0	0	120	1	5.053	6.052	128	9871613	0	0	0	0.00E+00	1/1/70 0:00	0	0	5271337	5271630
0	0	1	0.5	0	0	120	1	5.171	6.167	151	9898771	0	0	0	0.00E+00	1/1/70 0:00	0	0	5271337	5271637
0	0	1	0.5	0	0	120	1	5.295	6.291	122	9944039	0	0	0	0.00E+00	1/1/70 0:00	0	0	5271337	5271644
0	5	0	0.5	0	10	0	0.5	4.715	5.215	55	75057	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5271337	5271649
0	5	0	0.5	0	10	0	0.5	4.511	5.008	61	53445	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5271337	5271651
0	5	0	0.5	0	10	0	0.5	4.517	5.016	60	46474	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5271337	5271653
0	5	0	0.5	0	10	0	0.5	4.491	4.99	61	45791	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5271337	5271655
0	5	0	0.5	0	10	0	0.5	4.472	4.971	62	47411	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5271337	5271658
0	5	0	0.5	0	10	0	0.5	4.479	4.978	61	45565	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5271337	5271700
0	0	1	0.5	0	0	120	1	5.023	6.014	66	397455	1.2133	0.3033	106266	2.40E+05	2/6/01 11:05	0	0	5271337	5271706
0	0	1	0.5	0	0	120	1	4.947	5.938	68	407335	1.2545	0.3136	106266	2.40E+05	2/6/01 11:05	0	0	5271337	5271712
0	0	1	0.5	0	0	120	1	5.002	6.002	66	410639	1.2682	0.3171	106266	2.40E+05	2/6/01 11:05	0	0	5271337	5271718
0	0	1	0.5	0	0	120	1	5.023	6.02	73	501091	1.6451	0.4113	106266	2.40E+05	2/6/01 11:05	0	0	5271337	5271725
0	0	1	0.5	0	0	120	1	5.027	6.024	71	484462	1.5758	0.394	106266	2.40E+05	2/6/01 11:05	0	0	5271337	5271731
0	0	1	0.5	0	0	120	1	5.024	6.021	72	486435	1.584	0.396	106266	2.40E+05	2/6/01 11:05	0	0	5271337	5271737
0	0	1	0.5	0	0	120	1	4.913	5.912	155	4293662	17.4475	4.3619	106266	2.40E+05	2/6/01 11:05	0	0	5271337	5271744
0	0	1	0.5	0	0	120	1	4.987	5.986	160	4492739	18.277	4.5692	106266	2.40E+05	2/6/01 11:05	0	0	5271337	5271752
0	0	1	0.5	0	0	120	1	4.969	5.968	167	4462521	18.1511	4.5378	106266	2.40E+05	2/6/01 11:05	0	0	5271337	5271800
0	0	1	0.5	0	0	120	1	4.98	5.979	71	433769	1.3646	0.3411	106266	2.40E+05	2/6/01 11:05	0	0	5271337	5271808
0	0	1	0.5	0	0	120	1	4.888	5.887	69	370085	1.0992	0.2748	106266	2.40E+05	2/6/01 11:05	0	0	5271337	5271814
0	0	1	0.5	0	0	120	1	4.832	5.829	68	355883	1.0401	0.26	106266	2.40E+05	2/6/01 11:05	0	0	5271337	5271821
0	0	1	0.5	0	0	120	1	4.902	5.895	72	605856	2.0816	0.5204	106266	2.40E+05	2/6/01 11:05	0	0	5271337	5271846
0	0	1	0.5	0	0	120	1	4.964	5.956	71	602613	2.0681	0.517	106266	2.40E+05	2/6/01 11:05	0	0	5271337	5271852
0	0	1	0.5	0	0	120	1	4.927	5.927	71	608196	2.0914	0.5228	106266	2.40E+05	2/6/01 11:05	0	0	5271337	5271858
0	0	1	0.5	0	0	120	1	4.831	5.825	62	227027	0.5032	0.1258	106266	2.40E+05	2/6/01 11:05	0	0	5271337	5271924
0	0	1	0.5	0	0	120	1	4.765	5.764	62	224976	0.4946	0.1237	106266	2.40E+05	2/6/01 11:05	0	0	5271337	5271930
0	0	1	0.5	0	0	120	1	4.701	5.692	62	230249	0.5166	0.1291	106266	2.40E+05	2/6/01 11:05	0	0	5271337	5271937

1 JUNE 04 CONT BAW

Organic Carbon Analysis
Method TOC 0.1 to 20 ppm (standard 4mL injection volume)
Range 0.04 ppm to 25 ppm TOC (with zero)

Organic Carbon Standard Data

Organic Carbon Std (ppm)	Expected mass (ug)	Raw Data rep 1	Raw Data rep 2	Raw Data rep 3	Raw Data Ave
0	0	121074	108261	117006	115447
0.05	0.2	170291	171230	175758	172426
0.1	0.4	233470	225172	233316	230653
0.5	2	600817	606102	577072	594664
1	4	1052869	1057100	1047572	1052514
10	40	9871613	9898771	9944039	9904808
Blank (last 3)	0	45791	47411	45565	46256



Organic Carbon Sample Data

Sample ID BW 6-3-04	Raw Data rep 1	Raw Data rep 2	Raw Data rep 3	Raw Data Ave	Mass (ug)	Conc# (ppm)
EWDP-19PB-SHAL-IC-~~2~~ 3	397455	407335	410639	405143	1.466	0.37
EWDP-19PB-DEEP-IC-~~2~~ 3	501091	484462	486435	490663	1.816	0.45
EWDP-28P-0903-S BW 6-3-04	4293662	4492739	4462521	4416307	17.855	4.46
EWDP-29P-1003-S	433769	370085	355883	386579	1.390	0.35
OC 0.50 ppm	605856	602613	608196	605555	2.02	0.51
OC 0.10 ppm	227027	224976	230249	227417	0.48	0.12

Calculated by dividing the mass by the volume of sample (4mL)
Samples used blank and calibration challenges used y-intercept for calculation

1 JUNE 04 CONT BAW

Comparison of Organic Carbon Sample Data

Sample ID BW 6-3-04	First Analysis Results (ppm)	Second Analysis Results (ppm)
EWDP-19PB-SHAL-IC-~~2~~ 3	0.38	0.37
EWDP-19PB-DEEP-IC-~~2~~ 3	0.27	0.45
EWDP-27P-0903-S BW	0.54	na
EWDP-28P-0903-S	4.46	4.46
EWDP-29P-1003-S 6-3-04	0.32	0.35
OC 0.50 ppm	na	0.51
OC 0.10 ppm	0.09	0.12
OC 10 ppm	9.92	na

Samples used blank and calibration challenges used y-intercept for calculation
Sources: First analysis 628/162, Second analysis 653/
na = not analyzed

The numbers between the first and second analyses were similar with the ~~exp~~ BW 6-1-04 exception of 19PB deep. The numbers for the second analyses should be used because 1- better area counts for cal curve pts + 2- fresh (new that day) water used in reservoir.

Ambient CO_2 levels in Lab L106

See 653/12 for details
28 May 04 data - 653/18
Result from 28 May 04 on 653/24-25
Summary info ave= 383.8, median= 379.4
std dev= 10.4, max= 418.9, min= 372.4

1 JUNE 04 BAW CONT

Time	Point	Time	Point	Time	Point	Time	Point	Time	Point
		10:09:32	398.6	11:01:42	399.9	11:53:51	381.1	12:45:59	377.1
9:18:25	417.6	10:10:32	398.6	11:02:42	398.2	11:54:51	381.2	12:46:59	376.8
9:19:25	418.3	10:11:33	399.2	11:03:42	396.9	11:55:51	382.6	12:48:00	376.2
9:20:25	417.2	10:12:33	397.1	11:04:42	396.2	11:56:51	381.8	12:49:00	378.1
9:21:25	418.9	10:13:33	396	11:05:43	393.4	11:57:51	381.1	12:50:00	377.8
9:22:25	418.9	10:14:33	395	11:06:43	393.6	11:58:52	380.7	12:51:00	377.1
9:23:25	418.9	10:15:33	393.7	11:07:43	395.3	11:59:52	380.9	12:52:00	378.8
9:24:25	413.7	10:16:34	393.1	11:08:43	395.1	12:00:52	380.7	12:53:00	378.9
9:25:25	413.6	10:17:34	391	11:09:43	395.5	12:01:52	379.9	12:54:01	379.3
9:26:26	413.5	10:18:34	391.6	11:10:43	394.2	12:02:52	382.1	12:55:01	380.7
9:27:26	413.2	10:19:34	392.8	11:11:44	394.2	12:03:53	380.6	12:56:01	380.9
9:28:26	410.9	10:20:34	391.1	11:12:44	392.2	12:04:53	381.2	12:57:01	380.5
9:29:26	412.6	10:21:35	391.1	11:13:44	393.7	12:05:53	381.5	12:58:01	379.8
9:30:26	411.1	10:22:35	390.5	11:14:44	393.1	12:06:53	381.5	12:59:01	379.9
9:31:26	410.9	10:23:35	389.5	11:15:44	397	12:07:53	382.7	13:00:02	379.9
9:32:27	408	10:24:35	389.8	11:16:44	397.1	12:08:53	383.1	13:01:02	380.2
9:33:27	406.6	10:25:35	389.2	11:17:44	396.5	12:09:54	382.8	13:02:02	379.5
9:34:27	407.5	10:26:35	388.4	11:18:44	393.1	12:10:53	382.4	13:03:02	380.2
9:35:27	407	10:27:36	389.3	11:19:45	390.6	12:11:53	384.2	13:04:02	379.5
9:36:27	406.7	10:28:36	389.9	11:20:45	389.6	12:12:53	386.4	13:05:03	379.4
9:37:27	404.8	10:29:36	389.4	11:21:45	388.7	12:13:53	387.1	13:06:03	379.5
9:38:27	408.9	10:30:36	388.8	11:22:45	388.4	12:14:53	385.4	13:07:03	378.1
9:39:27	408.7	10:31:36	389.9	11:23:45	388.2	12:15:54	384.8	13:08:03	378.7
9:40:27	409.7	10:32:36	389.8	11:24:45	387.6	12:16:54	383.3	13:09:03	379
9:41:27	408.1	10:33:37	388.3	11:25:46	386.4	12:17:54	382.9	13:10:03	378.8
9:42:27	409.1	10:34:37	388.9	11:26:46	386.4	12:18:54	382.9	13:11:04	378.4
9:43:28	409.1	10:35:37	388.5	11:27:46	385.5	12:19:54	382.1	13:12:04	379.4
9:44:28	407.2	10:36:37	388.2	11:28:46	385.1	12:20:55	381.2	13:13:04	380
9:45:28	404.8	10:37:37	388.4	11:29:46	385	12:21:55	380.2	13:14:04	379.2
9:46:28	405	10:38:38	388.1	11:30:47	384	12:22:55	380.5	13:15:04	379.2
9:47:28	403.2	10:39:38	388.7	11:31:47	384.3	12:23:55	380.4	13:16:05	377.1
9:48:28	401.7	10:40:38	387.9	11:32:47	384.5	12:24:55	379.2	13:17:05	377.3
9:49:29	404.7	10:41:38	388.4	11:33:47	383.7	12:25:55	380.1	13:18:05	376.3
9:50:29	404.1	10:42:38	389.4	11:34:47	383.1	12:26:56	379	13:19:05	375.9
9:51:29	403	10:43:38	389.6	11:35:47	383.3	12:27:56	379.2	13:20:05	377.3
9:52:29	402	10:44:39	388.8	11:36:48	385.1	12:28:56	379.3	13:21:06	378.3
9:53:29	401.4	10:45:39	389	11:37:48	387.5	12:29:56	378.7	13:22:06	377.4
9:54:30	399.8	10:46:39	388.5	11:38:48	386.1	12:30:56	378.7	13:23:06	378.1
9:55:30	398.2	10:47:39	389.3	11:39:48	385.1	12:31:57	378.1	13:24:06	378.2
9:56:30	397.8	10:48:39	388.5	11:40:48	384.4	12:32:57	378.3	13:25:06	377.7
9:57:30	397.7	10:49:40	389.2	11:41:49	386.2	12:33:57	378.8	13:26:06	377.8
9:58:30	396.6	10:50:40	389.3	11:42:49	383.7	12:34:57	378.1	13:27:07	377.7
9:59:30	397.8	10:51:40	390.5	11:43:49	383.3	12:35:57	378.8	13:28:07	376.8
10:00:31	400	10:52:40	389.4	11:44:49	383.2	12:36:58	378.5	13:29:07	378.7
10:01:31	399.9	10:53:40	390.5	11:45:49	382.8	12:37:58	378.4	13:30:07	377.9
10:02:31	397.7	10:54:41	390.3	11:46:49	382.7	12:38:58	378.1	13:31:07	377.6
10:03:31	396.9	10:55:41	391.7	11:47:50	382	12:39:58	377.3	13:32:08	376.6
10:04:31	396.7	10:56:41	392.5	11:48:50	382.1	12:40:58	377.2	13:33:08	378.1
10:05:32	398.6	10:57:41	393.8	11:49:50	382.2	12:41:58	377.1	13:34:08	378.2
10:06:32	400.4	10:58:41	397.3	11:50:50	382.3	12:42:59	377.1	13:35:08	376.8
10:07:32	397.5	10:59:41	397.2	11:51:50	381.5	12:43:59	377.3	13:36:08	376.8
10:08:32	398.3	11:00:42	400.3	11:52:51	381.8	12:44:59	375.6	13:37:08	377.3

1 JUNE 04 CONT BAW

Time	Point	Time	Point	Time	Point	Time	Point
13:38:09	377.4	14:30:18	376.8	15:22:25	372.8	16:14:35	375.9
13:39:09	377.6	14:31:18	377.1	15:23:26	374.8	16:15:35	376.1
13:40:09	378.9	14:32:18	376.8	15:24:26	372.6	16:16:35	375.9
13:41:09	379.5	14:33:18	376.6	15:25:26	372.4	16:17:35	375.1
13:42:09	380.1	14:34:18	377.3	15:26:26	374.4	16:18:36	375.7
13:43:09	379.4	14:35:18	376	15:27:26	373.8	16:19:36	376.2
13:44:10	378.3	14:36:19	375.1	15:28:27	375.2	16:20:36	375.7
13:45:10	378.8	14:37:19	375.4	15:29:27	373.2	16:21:36	376.6
13:46:10	378.5	14:38:19	375	15:30:27	374	16:22:36	376.2
13:47:10	378.3	14:39:19	374.9	15:31:27	372.6	16:23:37	377.1
13:48:10	378.8	14:40:19	374.6	15:32:27	372.6	16:24:37	376.6
13:49:11	378.1	14:41:20	374.1	15:33:27	373.4	16:25:37	376.2
13:50:11	378.3	14:42:20	375.4	15:34:28	374.3	16:26:37	376.2
13:51:11	379.2	14:43:20	375.7	15:35:28	373.7	16:27:37	374
13:52:11	377.3	14:44:20	376.6	15:36:28	373.8	16:28:37	376
13:53:11	377.3	14:45:20	376.1	15:37:28	374.4	16:29:38	374.9
13:54:12	378.1	14:46:20	376.5	15:38:28	373.9	16:30:38	374.8
13:55:12	378.3	14:47:21	375.6	15:39:29	373.9	16:31:38	374.4
13:56:12	380.1	14:48:21	376.5	15:40:29	373.9	16:32:38	373.8
13:57:12	379.5	14:49:21	374.6	15:41:29	373.7	16:33:38	377.2
13:58:12	378.5	14:50:21	375.7	15:42:29	374.1		
13:59:12	377.1	14:51:21	382.3	15:43:29	374.1		
14:00:13	377.6	14:52:22	378.2	15:44:29	374.5		
14:01:13	377.8	14:53:22	379.2	15:45:30	374.8		
14:02:13	376.6	14:54:22	379.3	15:46:30	373.2		
14:03:13	376.3	14:55:22	378.7	15:47:30	375.2		
14:04:13	377	14:56:22	380.7	15:48:30	376.1		
14:05:14	377	14:57:22	379.2	15:49:30	374.5		
14:06:14	376.5	14:58:23	379.3	15:50:31	374.8		
14:07:14	376.5	14:59:23	380.9	15:51:31	374.9		
14:08:14	379	15:00:23	381	15:52:31	375.7		
14:09:14	378.8	15:01:23	379.2	15:53:31	374.8		
14:10:14	378.8	15:02:23	381.1	15:54:31	376.1		
14:11:15	377.2	15:03:24	379.6	15:55:31	376.1		
14:12:15	377	15:04:23	377.8	15:56:32	375.6		
14:13:15	376.7	15:05:23	376.2	15:57:32	375.7		
14:14:15	377	15:06:23	377.2	15:58:32	374.8		
14:15:15	382.8	15:07:23	377.1	15:59:32	374.8		
14:16:15	382.7	15:08:23	375.1	16:00:32	374.6		
14:17:16	382.9	15:09:23	375.1	16:01:33	376		
14:18:16	382.7	15:10:23	374.4	16:02:33	377		
14:19:16	379.9	15:11:23	374.5	16:03:33	376.1		
14:20:16	377.6	15:12:24	372.8	16:04:33	375.6		
14:21:16	377.6	15:13:24	374.5	16:05:33	374.5		
14:22:16	378.4	15:14:24	375.2	16:06:33	373.9		
14:23:16	377.8	15:15:24	375	16:07:34	374.8		
14:24:16	376.6	15:16:24	375.1	16:08:34	374		
14:25:17	376.3	15:17:25	374.5	16:09:34	373.8		
14:26:17	375.9	15:18:25	374.4	16:10:34	374.8		
14:27:17	375.9	15:19:25	374	16:11:34	374.6		
14:28:17	376.1	15:20:25	373	16:12:35	374.4		
14:29:17	379.8	15:21:25	373.2	16:13:35	375.9		

01 JUNE 04 CONT BAW

Ambient CO_2 levels in L106

See 653/12 for details
01 June 04 data taken 653/18
Results for 01 Jun 04 on 653/27-28
Summary info: (in ppm CO_2)
ave = 379.3
median = 376.7
std dev = 7.8
max = 402.6
min = 368.9

6-1-04 BAW

01 June 04 CONT BAW

Time	Point	Time	Point	Time	Point	Time	Point	Time
		9:59:20	392.2	10:51:25	380.9	11:43:34	379.3	12:35:43
9:08:15	394.4	10:00:20	393.7	10:52:26	381.8	11:44:34	378.4	12:36:43
9:09:16	399.9	10:01:20	393.9	10:53:26	381.7	11:45:34	378.4	12:37:44
9:10:16	397.9	10:02:21	395.8	10:54:26	381.5	11:46:34	379.5	12:38:44
9:11:15	395.4	10:03:21	393.9	10:55:26	382.1	11:47:34	379.2	12:39:44
9:12:16	395.8	10:04:21	395.6	10:56:26	382.2	11:48:35	379.6	12:40:44
9:13:16	395.8	10:05:21	398.3	10:57:26	382.3	11:49:35	379.8	12:41:44
9:14:16	395	10:06:21	397.6	10:58:27	381	11:50:35	378.7	12:42:45
9:15:16	395.9	10:07:21	395.3	10:59:27	381.3	11:51:35	378.3	12:43:45
9:16:15	394.3	10:08:22	397.9	11:00:27	381.3	11:52:35	378.1	12:44:45
9:17:15	394.3	10:09:22	397.3	11:01:27	380.6	11:53:36	377.9	12:45:45
9:18:16	394.4	10:10:22	393.8	11:02:27	381	11:54:36	378.5	12:46:45
9:19:16	395	10:11:22	391.7	11:03:28	380.9	11:55:36	378.9	12:47:45
9:20:16	393.7	10:12:21	391.8	11:04:28	380.5	11:56:36	379	12:48:46
9:21:16	392.7	10:13:21	389.2	11:05:28	380.5	11:57:36	377.8	12:49:46
9:22:16	392	10:14:21	392.3	11:06:28	379.9	11:58:37	377.2	12:50:46
9:23:17	391.4	10:15:21	395.4	11:07:28	380.5	11:59:37	377.9	12:51:46
9:24:17	391.7	10:16:22	394.4	11:08:28	380.1	12:00:37	377.2	12:52:46
9:25:16	391	10:17:21	395.5	11:09:29	380.4	12:01:37	376.2	12:53:46
9:26:16	392.2	10:18:21	392.7	11:10:29	380.1	12:02:37	377.2	12:54:47
9:27:16	390.6	10:19:21	394	11:11:29	380.2	12:03:37	376.8	12:55:47
9:28:16	390.1	10:20:21	391.4	11:12:29	380.1	12:04:38	377.6	12:56:47
9:29:17	390.9	10:21:21	389.2	11:13:29	380.1	12:05:38	378.1	12:57:47
9:30:17	389.6	10:22:21	397.2	11:14:29	380	12:06:38	377.8	12:58:47
9:31:17	390.3	10:23:21	402.6	11:15:30	379.9	12:07:38	378.8	12:59:48
9:32:17	389.9	10:24:20	398.8	11:16:30	380.5	12:08:38	378.3	13:00:48
9:33:18	388.4	10:25:21	393.7	11:17:30	380.6	12:09:38	378.1	13:01:48
9:34:18	387.8	10:26:21	390	11:18:30	379.3	12:10:39	378.4	13:02:48
9:35:18	387.5	10:27:21	388.3	11:19:30	380.2	12:11:39	377.8	13:03:48
9:36:18	387.7	10:28:21	386.8	11:20:31	379	12:12:39	377.3	13:04:48
9:37:18	389	10:29:21	385.5	11:21:31	380.5	12:13:39	377.1	13:05:49
9:38:18	388.5	10:30:21	384.4	11:22:31	386	12:14:39	376.8	13:06:49
9:39:18	387.8	10:31:22	383.9	11:23:31	391.8	12:15:40	376.8	13:07:49
9:40:19	388.1	10:32:22	384.2	11:24:31	391.6	12:16:40	376.3	13:08:49
9:41:19	387.6	10:33:22	383.1	11:25:31	391	12:17:40	376.1	13:09:49
9:42:19	388.5	10:34:22	383.5	11:26:32	395.1	12:18:40	374.9	13:10:50
9:43:19	388.4	10:35:22	382.9	11:27:32	391.2	12:19:40	376	13:11:50
9:44:19	387.3	10:36:23	382.1	11:28:32	389.3	12:20:40	376	13:12:50
9:45:20	388.9	10:37:23	382.7	11:29:31	386.8	12:21:41	376.3	13:13:50
9:46:20	390.9	10:38:23	383.1	11:30:31	384.6	12:22:41	376.1	13:14:50
9:47:20	392.6	10:39:23	382.8	11:31:32	383.9	12:23:41	377.1	13:15:50
9:48:20	392.3	10:40:23	382.6	11:32:32	382.3	12:24:41	375.5	13:16:51
9:49:20	392	10:41:23	382.3	11:33:32	381.5	12:25:41	381.8	13:17:51
9:50:20	390.1	10:42:24	381.7	11:34:32	382.2	12:26:42	377.8	13:18:51
9:51:20	388.9	10:43:24	382.1	11:35:32	381.6	12:27:42	376.7	13:19:51
9:52:20	390.6	10:44:24	381.8	11:36:32	380.6	12:28:42	376.1	13:20:51
9:53:19	398.1	10:45:24	382.8	11:37:33	380.4	12:29:42	376	13:21:52
9:54:19	397	10:46:24	382.4	11:38:33	379.5	12:30:42	375.7	13:22:52
9:55:19	396.5	10:47:25	382.1	11:39:33	379.4	12:31:42	375	13:23:52
9:56:19	399.8	10:48:25	381	11:40:33	380.4	12:32:43	375.5	13:24:52
9:57:20	399.2	10:49:25	381.6	11:41:33	381.5	12:33:43	375.1	13:25:52
9:58:20	397.3	10:50:25	381.2	11:42:34	378.9	12:34:43	375.2	13:26:52

01 JUN 04 CONT BAW

Point	Time	Point	Time	Point	Time	Point	Time	Point
376.5	13:27:53	379.9	14:20:01	373.3	15:12:09	372.1	16:04:18	368.9
375.6	13:28:52	379.2	14:21:01	373.3	15:13:09	371.8	16:05:19	369.9
375.5	13:29:52	378.4	14:22:01	373.9	15:14:09	372.2	16:06:19	370.1
375.2	13:30:52	377.9	14:23:02	373.4	15:15:10	372.7	16:07:19	369.9
375.4	13:31:52	377.6	14:24:02	373	15:16:10	371.6	16:08:19	369.5
375.1	13:32:53	377.4	14:25:02	372.8	15:17:10	371.3	16:09:19	369.6
375.1	13:33:53	376.8	14:26:02	373.3	15:18:10	371.7	16:10:20	369.4
374.5	13:34:53	376.8	14:27:02	373.3	15:19:10	371.3	16:11:20	370.2
375.6	13:35:53	376.2	14:28:03	373.4	15:20:10	371.8	16:12:20	369.8
374.8	13:36:53	375.1	14:29:03	373.2	15:21:11	372.2	16:13:20	371.1
375.5	13:37:53	377.2	14:30:03	371.9	15:22:11	371.5	16:14:20	371.2
376.3	13:38:54	376.6	14:31:03	372.4	15:23:11	371.3	16:15:20	370.2
375.7	13:39:54	376.3	14:32:03	373.4	15:24:11	371.5	16:16:21	370.7
376	13:40:54	375.9	14:33:03	374.3	15:25:11	371.5	16:17:21	371.9
375.6	13:41:54	375.1	14:34:04	373.5	15:26:12	371.6	16:18:21	370.6
376.3	13:42:54	374.8	14:35:04	372.8	15:27:12	372.2	16:19:21	371.2
376.1	13:43:55	375	14:36:04	373.5	15:28:12	372.1	16:20:21	370.7
375	13:44:55	375.1	14:37:04	382.1	15:29:12	371.8		
375.5	13:45:55	374.8	14:38:04	376	15:30:12	371.9		
374.9	13:46:55	375.4	14:39:05	377.9	15:31:12	372.2		
374.6	13:47:55	374.1	14:40:05	380.7	15:32:13	371.9		
378.2	13:48:55	375.4	14:41:05	375.9	15:33:13	371.9		
374.5	13:49:56	374.6	14:42:05	375.5	15:34:13	371.2		
374.6	13:50:56	375	14:43:04	373.8	15:35:13	371.1		
376	13:51:56	374.4	14:44:04	373.4	15:36:13	370.5		
374.6	13:52:56	374.5	14:45:04	373.4	15:37:14	370.7		
374.6	13:53:56	374.3	14:46:04	372.9	15:38:14	370.4		
375.5	13:54:57	375.2	14:47:04	372.2	15:39:14	370.6		
375.4	13:55:57	374.3	14:48:05	372.4	15:40:14	370.7		
375.7	13:56:57	374.6	14:49:05	372.6	15:41:14	370.6		
376.5	13:57:57	374.3	14:50:05	372.7	15:42:14	371.3		
375.7	13:58:57	374.4	14:51:05	372.9	15:43:15	370.8		
375.4	13:59:57	374.9	14:52:05	373.3	15:44:15	371.1		
375.6	14:00:58	374.3	14:53:06	373.9	15:45:15	370.4		
375.4	14:01:58	373.7	14:54:06	374.1	15:46:15	370.4		
375.4	14:02:58	373.9	14:55:06	373.8	15:47:15	370.2		
375.5	14:03:58	373.3	14:56:06	374	15:48:16	370.7		
377.3	14:04:58	374.4	14:57:06	374.1	15:49:16	370		
377.4	14:05:59	374.8	14:58:06	373.4	15:50:16	370.2		
377.1	14:06:59	375.1	14:59:07	372.8	15:51:16	371.3		
377.7	14:07:59	375.2	15:00:07	373	15:52:16	370.2		
376.5	14:08:59	375	15:01:07	371.7	15:53:16	369.8		
376.3	14:09:59	374.4	15:02:07	371.7	15:54:17	370		
375.9	14:10:59	373.8	15:03:07	372.2	15:55:17	369.9		
376.8	14:12:00	374.9	15:04:08	371.9	15:56:17	371.1		
377.2	14:13:00	373.3	15:05:08	372.7	15:57:17	370		
377.6	14:14:00	373.4	15:06:08	372.4	15:58:17	369.9		
386.2	14:15:00	373.7	15:07:08	372.6	15:59:18	369.5		
385.5	14:16:00	373.9	15:08:08	371.9	16:00:18	368.9		
385.6	14:17:01	373.3	15:09:08	372.3	16:01:18	369.6		
383.2	14:18:01	372.9	15:10:09	372.4	16:02:18	369.4		
382.3	14:19:01	374.1	15:11:09	372.4	16:03:18	369.5		

02 JUN 04 BAW

Ambient levels of CO_2 in Lab L106

See 653/12 for set-up
Sampling to be conducted overnight
Calibrated around 16:10
File = L106 ambient 02 June04 overnite.txt

03 JUN 04 BAW

Ambient levels of CO_2 in Lab L106

See 653/12 for set-up
Stopped overnight run at 08:37
Challenged with 1000 ppm = 1007.1
Data taken 653/29
Results found in 653/30-33
Summary info (in ppm CO_2)

ave = 380.5
median = 382.4
std dev = 5.8
max = 390.3
min = 348.0

BW 6-3-04

3 JUNE 04 CONT BW

Time	Point	Time	Point	Time	Point	Time	Point	Time	Point
		17:08:18	371.7	18:00:28	368.2	18:52:37	372.1	19:44:46	377.6
16:17:11	380.1	17:09:18	371.1	18:01:28	368.3	18:53:37	372.6	19:45:47	377.1
16:18:11	379.6	17:10:18	371	18:02:28	368.3	18:54:37	372.1	19:46:47	376.8
16:19:11	378.4	17:11:19	372.1	18:03:28	369	18:55:37	371.6	19:47:47	377.2
16:20:11	379.3	17:12:19	371	18:04:28	370.6	18:56:38	371.9	19:48:47	376.7
16:21:12	377.4	17:13:19	372.2	18:05:28	368.8	18:57:38	372.7	19:49:47	376.6
16:22:12	377.3	17:14:19	372.1	18:06:29	368.7	18:58:38	372.8	19:50:48	377.1
16:23:11	376.6	17:15:19	372.4	18:07:29	368.9	18:59:38	373.4	19:51:48	377
16:24:12	377.4	17:16:19	371.9	18:08:29	368.2	19:00:38	373.2	19:52:48	376.3
16:25:12	377.8	17:17:20	373.9	18:09:29	367.8	19:01:39	373.7	19:53:48	376.5
16:26:12	375.9	17:18:20	374	18:10:29	368.2	19:02:39	373.3	19:54:48	375.9
16:27:12	376.3	17:19:20	372.4	18:11:30	368.8	19:03:39	374.3	19:55:48	379
16:28:12	373.4	17:20:20	376.6	18:12:30	368.2	19:04:39	373.5	19:56:49	378.4
16:29:12	373.3	17:21:20	372.2	18:13:30	367.9	19:05:39	373.8	19:57:49	377.6
16:30:13	373.7	17:22:21	371.9	18:14:30	367.4	19:06:40	373.5	19:58:49	377.3
16:31:13	373.2	17:23:21	370.8	18:15:30	367.8	19:07:40	373.9	19:59:49	375.9
16:32:13	371.9	17:24:21	371.5	18:16:30	367.1	19:08:40	372.9	20:00:49	375.7
16:33:13	372.6	17:25:21	370.8	18:17:31	366.6	19:09:40	373.2	20:01:49	376.2
16:34:13	372.2	17:26:21	370.2	18:18:31	366.6	19:10:40	373.9	20:02:50	377.2
16:35:14	371.9	17:27:22	369.4	18:19:31	366.5	19:11:40	373.7	20:03:50	376.8
16:36:14	371.6	17:28:22	370.2	18:20:31	366.3	19:12:41	373.4	20:04:50	376.6
16:37:14	371.2	17:29:22	370.5	18:21:31	366.6	19:13:41	373.4	20:05:50	376.7
16:38:14	371.7	17:30:22	370.4	18:22:31	367.2	19:14:41	374.3	20:06:50	376.5
16:39:14	371.9	17:31:22	369.6	18:23:32	368.2	19:15:41	374.1	20:07:51	376.1
16:40:14	372.7	17:32:22	369.9	18:24:32	368.8	19:16:41	373.9	20:08:51	375.2
16:41:15	374.1	17:33:23	369.9	18:25:32	368.8	19:17:42	374.3	20:09:51	376.3
16:42:15	374.4	17:34:23	370.1	18:26:32	367.8	19:18:42	373.4	20:10:51	375.6
16:43:15	374.6	17:35:23	373.2	18:27:32	367.8	19:19:42	373.5	20:11:51	375.2
16:44:15	374.4	17:36:23	370.7	18:28:33	367.3	19:20:42	374	20:12:51	375.1
16:45:15	374.4	17:37:23	371.3	18:29:33	367.3	19:21:42	375.1	20:13:52	375
16:46:16	374.4	17:38:24	371.2	18:30:33	367.1	19:22:42	375.1	20:14:52	375.2
16:47:16	373.4	17:39:24	371.3	18:31:33	367.8	19:23:43	375.6	20:15:52	375.4
16:48:16	371.8	17:40:24	371.8	18:32:33	367.4	19:24:43	375.7	20:16:52	374.9
16:49:16	372.2	17:41:24	370.5	18:33:34	366.9	19:25:43	376	20:17:52	376.7
16:50:16	373.5	17:42:24	369.9	18:34:34	366.5	19:26:43	376.2	20:18:53	378.3
16:51:17	372.3	17:43:24	370.2	18:35:34	366.5	19:27:43	375.4	20:19:53	376.6
16:52:17	371.5	17:44:25	369.4	18:36:34	366	19:28:43	376.3	20:20:53	375.9
16:53:16	371.8	17:45:25	368.9	18:37:34	365.5	19:29:44	376.3	20:21:53	376.7
16:54:16	371.2	17:46:25	369.4	18:38:34	365	19:30:44	376.7	20:22:53	375.7
16:55:16	370.4	17:47:25	369.3	18:39:35	365	19:31:44	381	20:23:54	375.9
16:56:16	369.8	17:48:25	369.1	18:40:35	364.6	19:32:44	380.6	20:24:54	376
16:57:17	369.8	17:49:25	369	18:41:35	364.5	19:33:44	380.2	20:25:54	376.7
16:58:16	370	17:50:26	368.9	18:42:35	364.1	19:34:45	379.5	20:26:54	376.7
16:59:16	369.9	17:51:26	368.5	18:43:35	362.1	19:35:45	380.6	20:27:54	377.2
17:00:17	370.6	17:52:26	368.2	18:44:36	356.8	19:36:45	384.4	20:28:54	376.8
17:01:17	369.9	17:53:26	368.8	18:45:36	354.7	19:37:45	379.5	20:29:55	376.6
17:02:17	370.4	17:54:26	368.5	18:46:36	352.4	19:38:45	378.3	20:30:55	377
17:03:17	371.6	17:55:27	368.2	18:47:36	348	19:39:45	377.9	20:31:55	376.7
17:04:17	373.4	17:56:27	368	18:48:36	364.5	19:40:46	377.4	20:32:55	377.1
17:05:17	373.7	17:57:27	368.2	18:49:36	368.7	19:41:46	377	20:33:55	378.7
17:06:18	372.1	17:58:27	368.2	18:50:37	371.6	19:42:46	376.7	20:34:56	380.1
17:07:18	373	17:59:27	368	18:51:37	372.1	19:43:46	377.9	20:35:56	380.5

3 JUNE 04 CONT BW

Time	Point	Time	Point	Time	Point	Time	Point	Time	Point
20:36:56	379.9	21:29:05	379.9	22:21:15	382.9	23:13:24	380.2	0:05:34	382.1
20:37:56	380.1	21:30:06	379.8	22:22:15	381.3	23:14:24	381	0:06:34	382
20:38:56	381.2	21:31:06	379.8	22:23:15	382	23:15:25	380.4	0:07:34	381.8
20:39:56	380.2	21:32:06	379.8	22:24:15	382.9	23:16:25	380.2	0:08:34	381.3
20:40:57	381.5	21:33:06	380	22:25:16	382.3	23:17:25	379.3	0:09:34	381.6
20:41:57	381	21:34:06	380.6	22:26:16	383.4	23:18:25	378.8	0:10:35	380.9
20:42:57	381.1	21:35:06	380.4	22:27:16	382.6	23:19:25	379.9	0:11:35	381.3
20:43:57	380.2	21:36:07	380.4	22:28:16	383.2	23:20:26	379.8	0:12:35	382
20:44:57	380.1	21:37:07	380.5	22:29:16	382.2	23:21:26	379.4	0:13:35	383.1
20:45:57	378.9	21:38:07	379.9	22:30:16	382.7	23:22:26	379.8	0:14:35	382.1
20:46:58	378.1	21:39:07	380.5	22:31:17	382.6	23:23:26	379.6	0:15:36	383.9
20:47:58	377.6	21:40:07	379.6	22:32:17	383.8	23:24:26	379.9	0:16:36	385.3
20:48:58	377.4	21:41:08	381.1	22:33:17	383.8	23:25:26	379.3	0:17:36	385.7
20:49:58	376.7	21:42:08	381.8	22:34:17	383.3	23:26:27	379.8	0:18:36	384.2
20:50:58	376.6	21:43:08	380.6	22:35:17	382.6	23:27:27	382	0:19:36	384.5
20:51:59	377	21:44:08	380.9	22:36:18	382	23:28:27	380.9	0:20:36	383.8
20:52:59	377.4	21:45:08	381.5	22:37:18	382.9	23:29:27	381.2	0:21:37	383.3
20:53:59	376.8	21:46:08	380.4	22:38:18	383.7	23:30:27	381.6	0:22:37	382.7
20:54:59	376.7	21:47:09	380.2	22:39:18	384.6	23:31:28	381.5	0:23:37	382.6
20:55:59	376.7	21:48:09	380.9	22:40:18	384.5	23:32:28	381.3	0:24:37	382.6
20:57:00	377	21:49:09	380.7	22:41:18	383.7	23:33:28	381.2	0:25:37	383.1
20:58:00	377.7	21:50:09	380.7	22:42:19	382.8	23:34:28	381.5	0:26:38	382.4
20:59:00	378.5	21:51:09	381.3	22:43:19	382.7	23:35:28	382.2	0:27:38	382.6
21:00:00	377.9	21:52:10	381.3	22:44:19	382.7	23:36:28	382.7	0:28:38	382.3
21:01:00	377.8	21:53:10	380.9	22:45:19	383.5	23:37:29	383.2	0:29:38	383.2
21:02:00	379	21:54:10	381.7	22:46:19	383.2	23:38:29	383.9	0:30:38	384
21:03:01	380.2	21:55:10	380.6	22:47:20	381.6	23:39:29	382.9	0:31:38	382.9
21:04:01	378.9	21:56:10	379.8	22:48:20	382.2	23:40:29	382.8	0:32:39	382.7
21:05:01	378.5	21:57:10	380.7	22:49:20	382.6	23:41:29	382.2	0:33:39	382.9
21:06:01	379.5	21:58:11	381.1	22:50:20	381.3	23:42:30	383.4	0:34:39	383.2
21:07:01	379.8	21:59:11	381.3	22:51:20	382.2	23:43:30	382.8	0:35:39	383.2
21:08:02	380.5	22:00:11	381.3	22:52:20	383.5	23:44:30	382.6	0:36:39	382.7
21:09:02	381.8	22:01:11	381.6	22:53:21	383.7	23:45:30	383.9	0:37:40	382.7
21:10:02	382.1	22:02:11	380.5	22:54:21	384.6	23:46:30	383.1	0:38:40	382.9
21:11:02	381.6	22:03:11	381.3	22:55:21	384.6	23:47:30	382.9	0:39:40	383.3
21:12:02	380.1	22:04:12	381.3	22:56:21	385.9	23:48:31	383.7	0:40:40	383.5
21:13:02	380.2	22:05:12	380.2	22:57:21	385.4	23:49:31	382.7	0:41:40	386.5
21:14:03	380.4	22:06:12	379.8	22:58:22	384.4	23:50:31	382.3	0:42:40	384.6
21:15:03	381.3	22:07:12	380.5	22:59:22	384.2	23:51:31	381.5	0:43:41	385.1
21:16:03	380.2	22:08:12	381.6	23:00:22	383.5	23:52:31	381.8	0:44:41	384.9
21:17:03	380.6	22:09:13	381.1	23:01:22	383.8	23:53:32	381.7	0:45:41	384.3
21:18:03	379.6	22:10:13	381.1	23:02:22	384.5	23:54:32	382	0:46:41	383.1
21:19:04	379.8	22:11:13	380.6	23:03:22	382.9	23:55:32	382	0:47:41	383.5
21:20:04	378.7	22:12:13	381	23:04:23	382.4	23:56:32	383.8	0:48:42	383.2
21:21:04	379.2	22:13:13	379.9	23:05:23	383.1	23:57:32	384.9	0:49:42	383.7
21:22:04	380.1	22:14:14	380.5	23:06:23	383.1	23:58:32	384.5	0:50:42	383.4
21:23:04	380.7	22:15:14	379.9	23:07:23	382.4	23:59:33	383.8	0:51:42	383.9
21:24:04	379.6	22:16:14	380.4	23:08:23	381	0:00:33	382.9	0:52:42	384.2
21:25:05	380.2	22:17:14	381	23:09:24	380.4	0:01:33	382.8	0:53:42	385
21:26:05	380.4	22:18:14	381.3	23:10:24	380.1	0:02:33	382.1	0:54:43	385
21:27:05	380.6	22:19:14	381.3	23:11:24	380.2	0:03:33	381.8	0:55:43	384.4
21:28:05	381.2	22:20:15	382.3	23:12:24	380.6	0:04:34	382.1	0:56:43	384.4

3 JUNE 04 CONT BAW

Time	Point	Time	Point	Time	Point	Time	Point	Time	Point
0:57:43	384.3	1:49:53	384.9	2:42:02	385	3:34:12	384.6	4:26:21	385.7
0:58:43	384.2	1:50:53	384.9	2:43:02	385.1	3:35:12	384.3	4:27:21	384.8
0:59:44	383.9	1:51:53	385	2:44:02	384.8	3:36:12	382.8	4:28:21	384.6
1:00:44	383.2	1:52:53	384.8	2:45:03	384.8	3:37:12	383.7	4:29:22	384.4
1:01:44	383.5	1:53:53	384.6	2:46:03	384.2	3:38:12	383.9	4:30:22	385
1:02:44	383.9	1:54:54	385.4	2:47:03	384.4	3:39:13	383.8	4:31:22	384.9
1:03:44	383.8	1:55:54	385	2:48:03	385.4	3:40:13	383.8	4:32:22	384
1:04:44	382.9	1:56:54	385.6	2:49:03	385	3:41:13	382.9	4:33:22	383.9
1:05:45	383.1	1:57:54	385.9	2:50:04	384.3	3:42:13	383.4	4:34:23	384
1:06:45	383.9	1:58:54	386.2	2:51:04	384.2	3:43:13	383.3	4:35:23	384.3
1:07:45	383.4	1:59:55	385.9	2:52:04	383.8	3:44:13	383.7	4:36:23	385.5
1:08:45	383.3	2:00:55	385.9	2:53:04	383.8	3:45:14	384.8	4:37:23	386
1:09:45	383.4	2:01:55	386.2	2:54:04	384.4	3:46:14	384.8	4:38:23	385.6
1:10:46	382.6	2:02:55	385.9	2:55:05	384.2	3:47:14	385	4:39:23	385
1:11:46	382.6	2:03:55	386.4	2:56:05	383.7	3:48:14	385.4	4:40:24	385.4
1:12:46	383.2	2:04:55	386.1	2:57:05	383.9	3:49:14	385.3	4:41:24	384.3
1:13:46	383.2	2:05:56	386	2:58:05	384	3:50:15	386.5	4:42:24	384.5
1:14:46	383.3	2:06:56	384.8	2:59:05	384.8	3:51:15	385.6	4:43:24	383.8
1:15:46	383.4	2:07:56	385	3:00:05	384.6	3:52:15	385.4	4:44:24	383.5
1:16:47	383.1	2:08:56	385.3	3:01:06	383.8	3:53:15	385.7	4:45:25	384.3
1:17:47	383.1	2:09:56	385.9	3:02:06	383.9	3:54:15	385.5	4:46:25	384
1:18:47	382.8	2:10:56	385.6	3:03:06	384.9	3:55:15	386.2	4:47:25	383.7
1:19:47	382.7	2:11:57	385.9	3:04:06	384.3	3:56:16	386.6	4:48:25	383.8
1:20:47	383.1	2:12:57	385.6	3:05:06	384.5	3:57:16	386.5	4:49:25	384
1:21:48	383.3	2:13:57	385.6	3:06:07	384.2	3:58:16	386.6	4:50:25	384.2
1:22:48	383.7	2:14:57	385.7	3:07:07	385	3:59:16	386.4	4:51:26	383.1
1:23:48	384	2:15:57	386.5	3:08:07	384.4	4:00:16	386.8	4:52:26	382.7
1:24:48	384.8	2:16:58	387.3	3:09:07	384.4	4:01:17	387	4:53:26	383.3
1:25:48	384.5	2:17:58	386.6	3:10:07	383.4	4:02:17	386.4	4:54:26	383.4
1:26:48	384.8	2:18:58	386.8	3:11:07	383.7	4:03:17	386.1	4:55:26	383.1
1:27:49	387	2:19:58	387.3	3:12:08	383.3	4:04:17	385.9	4:56:27	382.9
1:28:49	386.4	2:20:58	386.7	3:13:08	383.2	4:05:17	386.1	4:57:27	383.1
1:29:49	385.5	2:21:58	387.1	3:14:08	382.8	4:06:17	385.3	4:58:27	382.9
1:30:49	384.5	2:22:59	386.5	3:15:08	383.5	4:07:18	385.3	4:59:27	383.1
1:31:49	384	2:23:59	386.5	3:16:08	383.4	4:08:18	385.5	5:00:27	383.3
1:32:50	384	2:24:59	387	3:17:09	383.1	4:09:18	385.6	5:01:28	384
1:33:50	384	2:25:59	386.2	3:18:09	383.4	4:10:18	385.4	5:02:28	383.3
1:34:50	383.9	2:26:59	386.1	3:19:09	383.5	4:11:18	386	5:03:28	382.7
1:35:50	383.3	2:28:00	385.1	3:20:09	382.8	4:12:19	385.6	5:04:28	382.9
1:36:50	383.8	2:29:00	385.3	3:21:09	383.1	4:13:19	386	5:05:28	382.6
1:37:50	384.2	2:30:00	385	3:22:09	384	4:14:19	385.9	5:06:28	381.3
1:38:51	384.2	2:31:00	385.1	3:23:10	383.4	4:15:19	385.5	5:07:29	380.1
1:39:51	383.5	2:32:00	384.9	3:24:10	383.4	4:16:19	386.2	5:08:29	379.9
1:40:51	383.7	2:33:01	385.3	3:25:10	384	4:17:19	386.5	5:09:29	379.2
1:41:51	384.3	2:34:01	385.4	3:26:10	384	4:18:20	386.7	5:10:29	381.8
1:42:51	384.3	2:35:01	385.5	3:27:10	383.9	4:19:20	386.1	5:11:29	382.3
1:43:52	383.9	2:36:01	385.9	3:28:11	383.2	4:20:20	386.2	5:12:29	381.6
1:44:52	384.5	2:37:01	386.7	3:29:11	384	4:21:20	386.4	5:13:30	381.6
1:45:52	384.4	2:38:01	385.5	3:30:11	383.5	4:22:20	386.5	5:14:30	381.5
1:46:52	384	2:39:02	384.6	3:31:11	384.2	4:23:21	386.6	5:15:30	381.2
1:47:52	384.6	2:40:02	385.6	3:32:11	384.9	4:24:21	386.6	5:16:30	381
1:48:53	384.8	2:41:02	385.1	3:33:11	384.6	4:25:21	386.1	5:17:30	380.1

3 JUNE 04 CONT BAW

Time	Point	Time	Point	Time	Point	Time	Point
5:18:31	380.2	6:10:40	381.6	7:02:50	387.1	7:54:59	386.6
5:19:31	379.6	6:11:40	381.6	7:03:50	386.7	7:55:59	386
5:20:31	379.6	6:12:40	382.2	7:04:50	387.2	7:56:59	386.1
5:21:31	379.5	6:13:41	382.1	7:05:50	387.3	7:58:00	386.2
5:22:31	379.8	6:14:41	382.2	7:06:50	387	7:59:00	386.1
5:23:31	379.2	6:15:41	382.6	7:07:50	387.3	8:00:00	386.6
5:24:32	379.2	6:16:41	382.8	7:08:51	387.2	8:01:00	386.5
5:25:32	379.4	6:17:41	382.3	7:09:51	386.4	8:02:00	386.5
5:26:32	379.4	6:18:41	382.3	7:10:51	387.3	8:03:00	385.7
5:27:32	379.3	6:19:42	383.1	7:11:51	387.3	8:04:01	386.5
5:28:32	378.7	6:20:42	383.1	7:12:51	387.1	8:05:01	385.6
5:29:33	378.9	6:21:42	383.3	7:13:51	387.2	8:06:01	387.1
5:30:33	378.8	6:22:42	382.4	7:14:52	386.8	8:07:01	386.4
5:31:33	379.4	6:23:42	382.9	7:15:52	386.2	8:08:01	386.6
5:32:33	379.3	6:24:43	383.1	7:16:52	386.8	8:09:02	386.5
5:33:33	378.9	6:25:43	383.4	7:17:52	386.6	8:10:02	385.7
5:34:34	378.9	6:26:43	383.3	7:18:52	386.7	8:11:02	386.7
5:35:34	379	6:27:43	383.1	7:19:53	386.8	8:12:02	386.5
5:36:34	379.3	6:28:43	383.3	7:20:53	386.8	8:13:02	385.9
5:37:34	379.3	6:29:43	384	7:21:53	386.4	8:14:02	385.9
5:38:34	379	6:30:44	384.2	7:22:53	386.2	8:15:03	385.6
5:39:34	379.3	6:31:44	384.3	7:23:53	386.6	8:16:03	386
5:40:35	379.5	6:32:44	384.3	7:24:54	386.1	8:17:03	384.8
5:41:35	379.3	6:33:44	384.8	7:25:54	386.1	8:18:03	384.9
5:42:35	379.8	6:34:44	385.1	7:26:54	387	8:19:03	385.4
5:43:35	378.9	6:35:45	384.5	7:27:54	387.6	8:20:04	385
5:44:35	379.9	6:36:45	384.3	7:28:54	386.8	8:21:04	385.4
5:45:36	379.2	6:37:45	384.8	7:29:54	386.6	8:22:04	384.9
5:46:36	379.6	6:38:45	384.9	7:30:55	386.6	8:23:04	384.9
5:47:36	379.8	6:39:45	385.4	7:31:55	385.7	8:24:04	384.9
5:48:36	380.4	6:40:45	385	7:32:55	386.1	8:25:04	385.1
5:49:36	379.5	6:41:46	385.4	7:33:55	386.4	8:26:05	386.1
5:50:36	379.6	6:42:46	385.4	7:34:55	386.4	8:27:05	385.4
5:51:37	380.2	6:43:46	384.5	7:35:56	386.8	8:28:05	385.5
5:52:37	380.1	6:44:46	384.4	7:36:56	386.5	8:29:05	384.9
5:53:37	379.5	6:45:46	385.1	7:37:56	386.5	8:30:05	384.4
5:54:37	379.6	6:46:47	385	7:38:56	386.4	8:31:06	384.8
5:55:37	379.6	6:47:47	385.3	7:39:56	386.1	8:32:06	386.2
5:56:37	379.9	6:48:47	387.8	7:40:56	386.5	8:33:06	385.4
5:57:38	379.2	6:49:47	388.5	7:41:57	387.6	8:34:06	384.6
5:58:38	379.9	6:50:47	388.9	7:42:57	386.8	8:35:06	388.3
5:59:38	379.9	6:51:48	388.8	7:43:57	386.6	8:36:06	389
6:00:38	379.6	6:52:48	388.3	7:44:57	386.7	8:37:07	388.8
6:01:38	379.3	6:53:48	388.2	7:45:57	386.6	8:38:07	389
6:02:39	379	6:54:48	387.6	7:46:57	386.8	8:39:07	389.3
6:03:39	379.2	6:55:48	387.6	7:47:58	385.9		
6:04:39	381.7	6:56:48	387.5	7:48:58	385.4		
6:05:39	381.6	6:57:49	387	7:49:58	385		
6:06:39	382.6	6:58:49	386.6	7:50:58	386.1		
6:07:40	382.7	6:59:49	387.2	7:51:58	386		
6:08:40	382.4	7:00:49	387.3	7:52:59	390.3		
6:09:40	382.2	7:01:49	388.1	7:53:59	386.7		

4 JUNE 04 BAW

Ambient levels of CO_2 in Lab ~~L102~~ L106
BW 6/4/04

See 653/12 for details
Calibrated at 09:03
File > L106ambient04Jun04.txt
Stopped around 16:00
Challange using 1000ppm = 991.2 ppm CO_2

For data collected 4Jun04 (653/34)
Results on 653/35-36
Summary info below: (ppm CO_2)
Ave - 372.6
Median - 372.8
Std deviation - 2.1
Max value - 379.2
Min value - 368.3

6/4/04 BW

4 JUNE 04 CONT BW

Time	Point	Time	Point	Time	Point	Time	Point
		10:11:23	373.3	11:03:32	373.8	11:55:41	371.7
9:20:13	379.2	10:12:23	373.4	11:04:32	373.8	11:56:42	371.8
9:21:13	378.3	10:13:23	373.5	11:05:32	374.5	11:57:42	371.2
9:22:14	376.8	10:14:23	373.9	11:06:33	374.4	11:58:42	372.8
9:23:14	375	10:15:23	374.3	11:07:33	374.9	11:59:42	371.1
9:24:14	376.8	10:16:23	375	11:08:33	374.3	12:00:42	371.5
9:25:14	376.1	10:17:24	375.4	11:09:33	374.3	12:01:43	371.3
9:26:14	377.1	10:18:24	374.8	11:10:33	374.6	12:02:43	370.8
9:27:15	377.2	10:19:24	374.8	11:11:33	374	12:03:43	371
9:28:15	376.1	10:20:24	374.1	11:12:34	373.3	12:04:43	371
9:29:15	377.8	10:21:24	376.3	11:13:34	373.4	12:05:43	370.8
9:30:15	377.2	10:22:25	374.4	11:14:34	373.5	12:06:43	371.1
9:31:15	376.2	10:23:25	373.5	11:15:34	372.9	12:07:44	371.6
9:32:15	376	10:24:25	373.8	11:16:34	375	12:08:44	374.6
9:33:16	376.1	10:25:25	372.9	11:17:35	374.5	12:09:44	374.8
9:34:16	376.2	10:26:25	372.9	11:18:35	374.1	12:10:44	374.4
9:35:16	376.3	10:27:25	372.7	11:19:35	374.4	12:11:44	374.4
9:36:16	376.5	10:28:26	373.3	11:20:35	374.9	12:12:45	373
9:37:16	377.3	10:29:26	373.4	11:21:35	376.1	12:13:45	373
9:38:16	375.2	10:30:26	373.2	11:22:35	374.8	12:14:45	373.8
9:39:17	375.2	10:31:26	374.3	11:23:36	373.8	12:15:45	373.5
9:40:17	374.4	10:32:26	373.8	11:24:36	373.7	12:16:45	373.3
9:41:17	374.3	10:33:27	373.4	11:25:36	374.5	12:17:45	372.6
9:42:17	373.8	10:34:27	373.3	11:26:36	374.3	12:18:46	372.9
9:43:17	374.5	10:35:27	373	11:27:36	373.9	12:19:46	372.4
9:44:18	374.5	10:36:27	372.4	11:28:37	377.7	12:20:46	372.3
9:45:18	375.7	10:37:27	372.7	11:29:37	378.1	12:21:46	372.4
9:46:18	374.6	10:38:27	372.8	11:30:37	376.3	12:22:46	372.1
9:47:18	373.4	10:39:28	373	11:31:37	376.6	12:23:47	372.1
9:48:18	372.7	10:40:28	372.8	11:32:37	377.1	12:24:47	373.2
9:49:19	373.5	10:41:28	372.8	11:33:37	375.4	12:25:47	372.8
9:50:19	375.2	10:42:28	372.9	11:34:38	374.8	12:26:47	372.4
9:51:19	375	10:43:28	373.2	11:35:38	372.8	12:27:47	372.2
9:52:19	375.9	10:44:29	373.3	11:36:38	373.3	12:28:47	372.2
9:53:19	374.8	10:45:29	374.4	11:37:38	372.8	12:29:48	372.4
9:54:19	374	10:46:29	373.8	11:38:38	372.7	12:30:48	373.5
9:55:20	373.5	10:47:29	374.1	11:39:39	373.9	12:31:48	373.3
9:56:20	373	10:48:29	373.8	11:40:39	373.8	12:32:48	373.9
9:57:20	374.1	10:49:29	374.3	11:41:39	372.9	12:33:48	372.8
9:58:20	373.3	10:50:30	374.1	11:42:39	372.6	12:34:49	372.8
9:59:20	373	10:51:30	375.2	11:43:39	372.9	12:35:49	372.8
10:00:21	372.9	10:52:30	375.4	11:44:39	373	12:36:49	373.8
10:01:21	373.2	10:53:30	374.5	11:45:40	372.6	12:37:49	373.4
10:02:21	372.7	10:54:30	374.5	11:46:40	371.5	12:38:49	373
10:03:21	372.8	10:55:31	375	11:47:40	371.6	12:39:49	372.9
10:04:21	372.9	10:56:31	373.9	11:48:40	371.5	12:40:50	372.3
10:05:21	373.8	10:57:31	374	11:49:40	371.7	12:41:50	372.7
10:06:22	373.7	10:58:31	374.8	11:50:41	373.3	12:42:50	372.2
10:07:22	373.4	10:59:31	374.9	11:51:41	371.3	12:43:50	372.1
10:08:22	373.2	11:00:31	375.1	11:52:41	373.2	12:44:50	372.2
10:09:22	373.2	11:01:32	374.5	11:53:41	371.7	12:45:51	372.2
10:10:22	373.2	11:02:32	374.3	11:54:41	372.8	12:46:51	371.7

4 JUNE 04 CONT BAW

Time	Point	Time	Point	Time	Point	Time	Point
12:47:51	371.3	13:40:00	368.9	14:32:10	373.8	15:24:19	370.4
12:48:51	371	13:41:01	369.1	14:33:10	373.7	15:25:19	370.5
12:49:51	371	13:42:01	369	14:34:10	372.7	15:26:20	370.2
12:50:51	371.1	13:43:01	368.4	14:35:10	373.7	15:27:20	372.8
12:51:52	371.2	13:44:01	368.9	14:36:11	375.6	15:28:20	372.6
12:52:52	372.1	13:45:01	368.9	14:37:11	375.6	15:29:20	372.8
12:53:52	372.2	13:46:01	368.5	14:38:11	373.7	15:30:20	373.4
12:54:52	372.6	13:47:02	368.9	14:39:11	373.3	15:31:21	376.2
12:55:52	372.8	13:48:02	369.3	14:40:11	372.8	15:32:21	373.7
12:56:53	371.6	13:49:02	369.4	14:41:11	372.7	15:33:21	373.4
12:57:53	371.8	13:50:02	371.2	14:42:12	372.3	15:34:21	372.4
12:58:53	370.8	13:51:02	369.6	14:43:12	373.9	15:35:21	374.1
12:59:53	370.6	13:52:03	371.7	14:44:12	372.9	15:36:21	374.5
13:00:53	371.2	13:53:03	372.7	14:45:12	372.4	15:37:22	373.3
13:01:53	371.5	13:54:03	371.5	14:46:12	372.8	15:38:22	372.6
13:02:54	371.2	13:55:03	371.2	14:47:13	372.8	15:39:22	372.7
13:03:54	371.2	13:56:03	372.4	14:48:13	371.9	15:40:22	371.6
13:04:54	370.5	13:57:03	372.4	14:49:13	373.2	15:41:22	371.5
13:05:54	370.7	13:58:04	371.6	14:50:13	373.7	15:42:23	371
13:06:54	370.5	13:59:04	371.2	14:51:13	373	15:43:23	371.3
13:07:55	370.6	14:00:04	370.7	14:52:14	374.1	15:44:23	370.5
13:08:55	370.2	14:01:04	370.5	14:53:14	373.4	15:45:23	370.2
13:09:55	370	14:02:04	370	14:54:14	373.9	15:46:23	370.8
13:10:55	370	14:03:05	370.1	14:55:14	374.8	15:47:23	370.4
13:11:55	369.9	14:04:05	369.8	14:56:14	375.5	15:48:24	371
13:12:55	369.5	14:05:05	370	14:57:14	375.2	15:49:24	370.4
13:13:56	369.3	14:06:05	369.9	14:58:15	373.7	15:50:24	371.7
13:14:56	369.1	14:07:05	369.8	14:59:15	372.3	15:51:24	372.4
13:15:56	368.9	14:08:05	369.8	15:00:15	372.2	15:52:24	371.5
13:16:56	369.1	14:09:06	370.5	15:01:15	373.2	15:53:25	371.9
13:17:56	368.5	14:10:06	369.4	15:02:15	373	15:54:25	371
13:18:57	368.5	14:11:06	369.8	15:03:15	375.5	15:55:25	370.4
13:19:57	368.8	14:12:06	369.6	15:04:16	374	15:56:25	370
13:20:57	368.8	14:13:06	369.6	15:05:16	373.9	15:57:25	370.2
13:21:57	369.5	14:14:07	369.1	15:06:16	373	15:58:26	370.6
13:22:57	369	14:15:07	369.3	15:07:16	372.3	15:59:26	371.1
13:23:57	369.3	14:16:07	368.5	15:08:16	372.7	16:00:26	371.6
13:24:58	369.3	14:17:07	369	15:09:17	373	16:01:26	373.3
13:25:58	368.9	14:18:07	369.5	15:10:17	375	16:02:26	372.2
13:26:58	368.9	14:19:08	370.1	15:11:17	374.8	16:03:26	371.5
13:27:58	368.3	14:20:08	371.1	15:12:17	373.4	16:04:27	370.5
13:28:58	369.4	14:21:08	371.3	15:13:17	372.3	16:05:27	370.8
13:29:59	371.3	14:22:08	371.7	15:14:17	372.7	16:06:27	370.4
13:30:59	371.1	14:23:08	372.8	15:15:18	372.2	16:07:27	372.9
13:31:59	369.9	14:24:08	372.7	15:16:18	371.8	16:08:27	372.3
13:32:59	369.1	14:25:09	374.3	15:17:18	372.8		
13:33:59	369.6	14:26:09	371.9	15:18:18	372.2		
13:35:00	369.4	14:27:09	372.2	15:19:18	373.2		
13:36:00	369.8	14:28:09	372.1	15:20:19	372.1		
13:37:00	369.4	14:29:09	371	15:21:19	371.6		
13:38:00	369.5	14:30:09	371.2	15:22:19	370.7		
13:39:00	369.6	14:31:10	371.8	15:23:19	369.9		

17 JUNE 04 BAW

SGS Results for Cation Analyses of May 2004 EWDP Groundwater Samples

Samples from 628/134-135
Four samples and two QAs
Legend 628/135
Analyses also performed by Div 01
Purchase Order 476599P

QA data on next page followed by sample results

Data Accepted 6-17-04 BAW
Per procurement plan from PO 476599P,
Criteria = majority of major analytes within ±20% range from the target concentrations

BAW
6-17-04

17 JUNE 04 CONT BAW

Cation 5B (Cation 1 from 628/132-133)

Cation	Target Conc ppm	Measured Conc (ppm)	Percent Recovery
Ag	-	< 0.0001	-
Al	-	0.006	*
As	-	< 0.005	-
Ba	-	< 0.001	-
Be	-	< 0.005	-
B	-	< 0.01	-
Bi	-	<0.05	-
Ca	10	8.97	-10.3
Cd	-	<0.0001	-
Co	-	<0.0003	-
Cr	-	<0.001	-
Cu	-	<0.0008	-
Fe	10	7.74	-22.6
K	10	9.16	-8.4
Li	-	<0.1	-
Mg	10	9.36	-6.4
Mn	-	<0.002	-
Mo	-	<0.0003	-
Na	10	9.44	-5.6
Ni	-	<0.001	-
Pb	-	<0.0002	-
Sb	-	<0.0004	-
Se	-	<0.005	-
Si	-	<0.05	-
Sn	-	<0.001	-
Sr	-	0.0003	*
Ti	-	<0.003	-
Tl	-	<0.0002	-
U	-	<0.0002	-
V	-	<0.0009	-
W	-	<0.0002	-
Y	-	<0.0001	-
Zn	-	<0.001	-
Zr	-	<0.0004	-

* Detected in sample but not a target cation

Cation 6B (Cation 2 from 628/132-133)

Cation	Target Conc ppm	Measured Conc (ppm)	Percent Recovery
Ag	0.1	0.0947	-5.30
Al	0.1	0.103	3.00
As	0.1	0.114	14.00
Ba	0.1	0.101	1.00
Be	0.1	0.108	8.00
B	-	< 0.01	-
Bi	-	<0.05	-
Ca	10	8.99	-10.10
Cd	0.1	0.101	1.00
Co	0.1	0.1000	0.00
Cr	0.1	0.101	1.00
Cu	0.1	0.101	1.00
Fe	10	8.53	-14.70
K	10	9.11	-8.90
Li	-	<0.1	-
Mg	10	9.37	-6.30
Mn	0.1	0.094	-6.00
Mo	0.1	0.102	2.00
Na	10	9.43	-5.70
Ni	0.1	0.101	1.00
Pb	0.1	0.0989	-1.10
Sb	0.1	0.110	10.00
Se	0.1	0.105	5.00
Si	-	<0.05	-
Sn	-	<0.001	-
Sr	10	9.58	-4.20
Ti	-	<0.003	-
Tl	0.1	0.105	5.00
U	0.1	0.111	11.00
V	0.1	0.101	1.00
W	-	<0.0002	-
Y	-	<0.0001	-
Zn	0.1	0.098	-2.00
Zr	-	<0.0004	-

Detection limits; Al = 0.004
Sr = 0.0002

BW
6-17-04

17 JUNE 04 CONT BAW

Wednesday, June 16, 2004

Date Rec. : 25 May 2004
LR Report: CA10385-MAY04

Copy: #1

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CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Date	2: Analysis Time	3: Cation 1B QA Nuclear	4: Cation 2B QA Nuclear	5: Cation 3B QA Nuclear	6: Cation 4B QA Nuclear	7: Cation 5B QA Nuclear	8: Cation 6B QA Nuclear	9: Env Blank	10: Env Standard
Sample Date & Time			Date:NA	Date:NA	Date:NA	Date:NA	Date:NA	Date:NA		
Temperature [°C]	—	---	19.2	19.2	19.2	19.2	19.2	19.2	—	—
Silver [mg/L]	31-May-04	14:21	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0947	< 0.0001	101%
Aluminum [mg/L]	31-May-04	14:21	0.005	0.083	< 0.004	0.310	0.006	0.103	< 0.004	100%
Arsenic [mg/L]	31-May-04	14:21	0.011	0.022	0.015	0.030	< 0.005	0.114	< 0.005	103%
Barium [mg/L]	31-May-04	14:21	0.010	0.007	0.006	0.004	< 0.001	0.101	< 0.001	100%
Beryllium [mg/L]	31-May-04	14:21	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.108	< 0.005	97%
Boron [mg/L]	01-Jun-04	08:18	0.14	0.17	0.14	0.17	< 0.01	< 0.01	< 0.01	100%
Bismuth [mg/L]	01-Jun-04	08:19	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	100%
Calcium [mg/L]	01-Jun-04	08:19	12.0	5.90	9.39	2.96	8.97	8.99	< 0.05	93%
Cadmium [mg/L]	31-May-04	14:21	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.101	< 0.0001	100%
Cobalt [mg/L]	31-May-04	14:21	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0003	0.1000	< 0.0003	104%
Chromium [mg/L]	31-May-04	14:21	< 0.001	0.002	0.002	0.003	< 0.001	0.101	< 0.001	104%
Copper [mg/L]	31-May-04	14:21	< 0.0008	< 0.0008	< 0.0008	< 0.0008	< 0.0008	0.101	< 0.0008	99%
Iron [mg/L]	01-Jun-04	08:19	< 0.02	0.02	< 0.02	0.10	7.74	8.53	< 0.02	93%
Potassium [mg/L]	01-Jun-04	08:19	3.63	2.84	3.74	2.99	9.16	9.11	< 0.02	94%
Lithium [mg/L]	01-Jun-04	08:19	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	93%
Magnesium [mg/L]	01-Jun-04	08:19	1.23	0.504	1.13	0.328	9.36	9.37	< 0.005	93%
Manganese [mg/L]	01-Jun-04	08:19	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.094	< 0.002	97%

17 JUNE 04 CONT BAW

SGS
SGS Lakefield Research Limited
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - K0L 2H0
Phone: 705-652-2038 FAX: 705-652-6441

LR Report : CA10385-MAY04

Analysis	1: Analysis Date	2: Analysis Time	3: Cation 1B QA Nuclear	4: Cation 2B QA Nuclear	5: Cation 3B QA Nuclear	6: Cation 4B QA Nuclear	7: Cation 5B QA Nuclear	8: Cation 6B QA Nuclear	9: Env Blank	10: Env Standard
Molydenum [mg/L]	31-May-04	14:21	0.0107	0.0093	0.0116	0.0100	< 0.0003	0.102	< 0.0003	103%
Sodium [mg/L]	01-Jun-04	08:19	52.2	78.5	52.5	78.4	9.44	9.43	< 0.05	94%
Nickel [mg/L]	31-May-04	14:21	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.101	< 0.001	99%
Lead [mg/L]	31-May-04	14:21	< 0.0002	0.0002	< 0.0002	< 0.0002	< 0.0002	0.0989	< 0.0002	107%
Antimony [mg/L]	31-May-04	14:21	0.0005	< 0.0004	0.0006	< 0.0004	< 0.0004	0.110	< 0.0004	104%
Selenium [mg/L]	31-May-04	14:21	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.105	< 0.005	94%
Silicon [mg/L]	01-Jun-04	08:19	19.3	25.1	19.4	25.7	< 0.05	< 0.05	< 0.05	97%
Tin [mg/L]	31-May-04	14:21	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	103%
Strontium [mg/L]	31-May-04	14:22	0.0719	0.0320	0.0722	0.0311	0.0003	9.58	< 0.0002	99%
Titanium [mg/L]	31-May-04	14:22	< 0.003	< 0.003	< 0.003	0.003	< 0.003	< 0.003	< 0.003	109%
Thallium [mg/L]	31-May-04	14:22	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.105	< 0.0002	105%
Uranium [mg/L]	31-May-04	14:22	0.0016	0.0022	0.0018	0.0025	< 0.0002	0.111	< 0.0002	109%
Vanadium [mg/L]	31-May-04	14:22	0.0146	0.0065	0.0177	0.0107	< 0.0009	0.101	< 0.0009	103%
Tungsten [mg/L]	31-May-04	14:22	0.0016	0.0019	0.0064	0.0053	< 0.0002	< 0.0002	< 0.0002	107%
Yttrium [mg/L]	31-May-04	14:22	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	101%
Zinc [mg/L]	31-May-04	14:22	0.004	0.001	< 0.001	0.002	< 0.001	0.098	< 0.001	102%
Zirconium [mg/L]	31-May-04	14:22	< 0.0004	< 0.0004	< 0.0004	0.0004	< 0.0004	< 0.0004	< 0.0004	101%

Samples were received filtered with some samples acidified and some not acidified. Analysis performed on as received samples as per client's instructions.

Brian Graham B.Sc.
Project Coordinator
Environmental Services, Analytical

06 JULY 2004 BAW

Anion Results for EWDP May 2004 Groundwater Samples

Chain of Custody - 628/147 and 628/145
Aliquots and Legend 628/134-135
SGS Lakefield Results for same samples
on ~~628/187-194~~ BW 7-6-04 628/197-198
Original Dionex results on 628/187-194 did
not contain phosphate results (~~run~~ BW 7-6-04
analyzed by different method than other analytes)
and had labeling issue (see ~~18~~ BW 7-6-04)
628/187. Problem was at Dionex side. Sequence
file different than physical sampling sequence.

7-6-04 BW

6 JULY 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: Anion 1A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: 245101

Client: Division 20

Date Received: 05/20/04

Project No.: 06002.01.141

SRR: 25943

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	6.74	0.1
Fluoride	1.84	0.1
Nitrate-N	0.922	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	0.0205	0.01
Sulfate	28.8	0.1

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: Anion 2A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: 245102

Client: Division 20

Date Received: 05/20/04

Project No.: 06002.01.141

SRR: 25943

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	5.85	0.1
Fluoride	1.73	0.1
Nitrate-N	0.735	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	0.0679	0.01
Sulfate	22.1	0.1

6 JULY 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: Anion 3A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: 245103

Client: Division 20

Date Received: 05/20/04

Project No.: 06002.01.141

SRR: 25943

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	7.98	0.1
Chloride	3.91	0.1
Fluoride	1.99	0.1
Nitrate-N	1.59	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	4.44	0.01
Sulfate	7.67	0.1

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: Anion 4A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: 245104

Client: Division 20

Date Received: 05/20/04

Project No.: 06002.01.141

SRR: 25943

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	10.2	0.1
Fluoride	<0.1	0.1
Nitrate-N	0.374	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.01	0.01
Sulfate	<0.1	0.1

6 JULY 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
Anion 5A

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 05/20/04

Matrix: Water

Project No.: 06002.01.141

Task Order: 040521-5

SRR: 25943

Lab System ID: 245105

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	<0.1	0.1
Fluoride	<0.1	0.1
Nitrate-N	<0.1	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.01	0.01
Sulfate	<0.1	0.1

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
Anion 6A

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 05/20/04

Matrix: Water

Project No.: 06002.01.141

Task Order: 040521-5

SRR: 25943

Lab System ID: 245106

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	6.70	0.1
Fluoride	1.79	0.1
Nitrate-N	0.902	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	0.027	0.01
Sulfate	28.8	0.1

6 JULY 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
Anion 7A

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 05/20/04

Matrix: Water

Project No.: 06002.01.141

Task Order: 040521-5

SRR: 25943

Lab System ID: 245107

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	5.98	0.1
Fluoride	1.69	0.1
Nitrate-N	0.733	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	0.0673	0.01
Sulfate	22.2	0.1

7-6-04 BW

6 JULY 04 CONT BW

SOUTHWEST RESEARCH INSTITUTE
DUPLICATE SUMMARY

Sample ID: Anion 1A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: 245101

Client: Division 20

Date Received: 05/20/04

Project No.: 06002.01.141

SRR: 25943

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Bromide	<0.1	<0.1	0.00%
Chloride	6.74	6.72	0.30%
Fluoride	1.84	1.83	0.54%
Nitrate-N	0.922	0.916	0.65%
Nitrite-N	<0.1	<0.1	0.00%
Phosphate-P	0.0205	0.0306	39.5%
Sulfate	28.8	28.7	0.35%

SOUTHWEST RESEARCH INSTITUTE
MATRIX SPIKE SUMMARY

Sample ID: Anion 1A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: 245101

Client: Division 20

Date Received: 05/20/04

Project No.: 06002.01.141

SRR: 25943

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Bromide	<0.1	4.11	4.00	103%
Chloride	6.74	8.66	2.00	96.0%
Fluoride	1.84	2.83	1.00	99.0%
Nitrate-N	0.922	1.72	0.904	88.3%
Nitrite-N	<0.1	0.933	1.00	93.3%
Phosphate-P	0.0205	0.273	0.250	101%
Sulfate	28.8	32.4	4.00	90.0%

6 JUL 04 CONT BW

SOUTHWEST RESEARCH INSTITUTE
LABORATORY CONTROL SAMPLE

Sample ID: LCSW

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: NA

Client: Division 20

Date Received: NA

Project No.: 06002.01.141

SRR: 25943

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Bromide	408	400	102%
Chloride	206	200	103%
Fluoride	102	100	102%
Nitrate-N	84.3	90.4	93.3%
Nitrite-N	97.0	100	97.0%
Phosphate-P	2.50	2.31	108%
Sulfate	398	400	99.5%

NA- Not Applicable.

SOUTHWEST RESEARCH INSTITUTE
BLANK SUMMARY

Sample ID: PBW

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: NA

Client: Division 20

Date Received: NA

Project No.: 06002.01.141

SRR: 25943

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	<0.1	0.1
Fluoride	<0.1	0.1
Nitrate-N	<0.1	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.01	0.01
Sulfate	<0.1	0.1

6 Jul 04 cont BAW

The QA accuracy data is below

For Sample Anion 4A (Anion 2 from 628/133)

Analyte	Target Conc (ppm)	Measured Conc (ppm)	Percent Difference
Chloride	10	10.20	2.00
Nitrate - N*	0.452	0.374	-17.26

* 2 ppm NO3 converts to 0.452 ppm NO3 as N

For Sample Anion 3A (Anion 1 from 628/133)

Analyte	Target Conc (ppm)	Measured Conc (ppm)	Percent Difference
Bromide	8	7.98	-0.25
Chloride	4	3.91	-2.25
Fluoride	2	1.99	-0.50
Nitrate-N*	1.81	1.59	-12.01
Phosphate - P #	3.87	4.44	14.73
Sulfate	8	7.67	-4.13

* 8 ppm NO3 converts to 1.81 ppm NO3 as N and 2ppm NO3 converts to 0.452 ppm NO3 as N
N = 14.0067 g/mol
NO3 = 62.0049 g/mol

# 12 ppm HPO4 converts to ppm Phosphate as P
P = 30.97376 g/mol
HPO4 = 95.97926 g/mol

Some variation was observed for the phosphate analyses of NC-EWDP-19PB-Shal-0504-FUA
Div 01 orginal analyses = Anion 1A
Div 01 duplicate = Anion 1A duplicate
Div 20 duplicate = Anion 6A
SGS Lakefield results = below detection limit of 0.03 mg/L (628/198)

7-7-04 BW

7 Jul 2004 BAW

Cation Results from Div 01 for Reanalyses of EWDP Groundwater Samples - Various sampling Events

Testing to determine if time lapse for analyses will result in a change in analyte measured values

Description with Chain of Custody - 628/91-95
Legend 628/91
Anion results for time lapse - 628/168-174

Sample results for reanalyses followed by comparison data for original vs reanalyses.

Data for Div 20 blind standard

	CNWRA 11 ppm	Target Conc ppm	Percent Recovery
Calcium	5.00	5.00	100.0
Sodium	8.86	10.00	88.6

QA sample preparation 628/92

7-7-04 BW

7 JUL 04 CONT BW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
CNWRA 6

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 243229

Client: Division 20

Date Received: 04/14/04

Project No.: 20.06002.01.141

SRR: 25770

TO: 040415-2

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.02	0.02
Arsenic	<0.005	0.005
Barium	0.012	0.005
Beryllium	<0.005	0.005
Bismuth	<0.01	0.01
Boron	0.142	0.05
Cadmium	<0.005	0.005
Calcium	24.7	0.05
Chromium	<0.015	0.015
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.1	0.1
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.035	0.01
Magnesium	3.29	0.05
Manganese	<0.005	0.005
Molybdenum	<0.01	0.01
Nickel	<0.01	0.01
Palladium	<0.005	0.005
Phosphorus	0.025	0.02
Potassium	5.53	0.2
Selenium	<0.015	0.015
Silicon	24.3	0.05
Silver	<0.005	0.005
Sodium	37.3	0.2
Strontium	0.100	0.005
Sulfur	8.52	0.05
Thallium	<0.02	0.02
Thorium	<0.015	0.015
Tin	0.016	0.01
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005

7 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
CNWRA 7

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 243230

Client: Division 20

Date Received: 04/14/04

Project No.: 20.06002.01.141

SRR: 25770

TO: 040415-2

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.02	0.02
Arsenic	<0.005	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.01	0.01
Boron	0.258	0.05
Cadmium	<0.005	0.005
Calcium	2.49	0.05
Chromium	<0.015	0.015
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	0.136	0.1
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.270	0.01
Magnesium	0.112	0.05
Manganese	<0.005	0.005
Molybdenum	0.046	0.01
Nickel	<0.01	0.01
Palladium	<0.005	0.005
Phosphorus	0.057	0.02
Potassium	3.81	0.2
Selenium	<0.05	0.05
Silicon	7.88	0.05
Silver	<0.005	0.005
Sodium	206	0.2
Strontium	0.007	0.005
Sulfur	10.4	0.05
Thallium	<0.075	0.075
Thorium	<0.015	0.015
Tin	0.062	0.01
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005

7 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
CNWRA 8

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 243231

Client: Division 20

Date Received: 04/14/04

Project No.: 20.06002.01.141

SRR: 25770

TO: 040415-2

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.02	0.02
Arsenic	0.010	0.005
Barium	0.008	0.005
Beryllium	<0.005	0.005
Bismuth	<0.01	0.01
Boron	0.136	0.05
Cadmium	<0.005	0.005
Calcium	13.3	0.05
Chromium	<0.015	0.015
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.1	0.1
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.038	0.01
Magnesium	2.05	0.05
Manganese	0.006	0.005
Molybdenum	<0.01	0.01
Nickel	<0.01	0.01
Palladium	<0.005	0.005
Phosphorus	<0.02	0.02
Potassium	5.68	0.2
Selenium	<0.015	0.015
Silicon	25.7	0.05
Silver	<0.005	0.005
Sodium	41.9	0.2
Strontium	0.067	0.005
Sulfur	6.96	0.05
Thallium	<0.02	0.02
Thorium	<0.015	0.015
Tin	0.013	0.01
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.006	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005

7 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
CNWRA 9

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 243232

Client: Division 20

Date Received: 04/14/04

Project No.: 20.06002.01.141

SRR: 25770

TO: 040415-2

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.02	0.02
Arsenic	0.008	0.005
Barium	0.014	0.005
Beryllium	<0.005	0.005
Bismuth	<0.01	0.01
Boron	0.142	0.05
Cadmium	<0.005	0.005
Calcium	12.8	0.05
Chromium	<0.015	0.015
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.1	0.1
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.045	0.01
Magnesium	1.07	0.05
Manganese	<0.005	0.005
Molybdenum	<0.01	0.01
Nickel	<0.01	0.01
Palladium	<0.005	0.005
Phosphorus	<0.02	0.02
Potassium	3.82	0.2
Selenium	<0.015	0.015
Silicon	26.2	0.05
Silver	<0.005	0.005
Sodium	48.6	0.2
Strontium	0.071	0.005
Sulfur	8.09	0.05
Thallium	<0.02	0.02
Thorium	<0.015	0.015
Tin	0.012	0.01
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.007	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005

7 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
CNWRA 10

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 243223

Client: Division 20

Date Received: 04/14/04

Project No.: 20.06002.01.141

SRR: 25770

TO: 040415-2

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.02	0.02
Arsenic	<0.005	0.005
Barium	0.007	0.005
Beryllium	<0.005	0.005
Bismuth	<0.01	0.01
Boron	0.138	0.05
Cadmium	<0.005	0.005
Calcium	17.8	0.05
Chromium	<0.015	0.015
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.1	0.1
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.035	0.01
Magnesium	2.78	0.05
Manganese	0.025	0.005
Molybdenum	<0.01	0.01
Nickel	<0.01	0.01
Palladium	<0.005	0.005
Phosphorus	0.020	0.02
Potassium	5.08	0.2
Selenium	<0.015	0.015
Silicon	19.5	0.05
Silver	<0.005	0.005
Sodium	34.9	0.2
Strontium	0.079	0.005
Sulfur	6.81	0.05
Thallium	<0.02	0.02
Thorium	<0.015	0.015
Tin	0.015	0.01
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005

7 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
CNWRA 11

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 243224

Client: Division 20

Date Received: 04/14/04

Project No.: 20.06002.01.141

SRR: 25770

TO: 040415-2

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.02	0.02
Arsenic	<0.005	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.01	0.01
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	5.00	0.05
Chromium	<0.015	0.015
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.1	0.1
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.01	0.01
Magnesium	<0.05	0.05
Manganese	<0.005	0.005
Molybdenum	<0.01	0.01
Nickel	<0.01	0.01
Palladium	<0.005	0.005
Phosphorus	<0.02	0.02
Potassium	<0.2	0.2
Selenium	<0.015	0.015
Silicon	<0.05	0.05
Silver	<0.005	0.005
Sodium	8.86	0.2
Strontium	<0.005	0.005
Sulfur	<0.05	0.05
Thallium	<0.02	0.02
Thorium	<0.015	0.015
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005

7 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
DUPLICATE SUMMARY

Sample ID: CNWRA 7

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 04/14/04

Matrix: Water

Project No.: 20.06002.01.141

Lab System ID: 243230

SRR: 25770

TO: 040415-2

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Aluminum	NA	NA	NA
Antimony	NA	NA	NA
Arsenic	NA	NA	NA
Barium	NA	NA	NA
Beryllium	NA	NA	NA
Bismuth	NA	NA	NA
Boron	NA	NA	NA
Cadmium	NA	NA	NA
Calcium	NA	NA	NA
Chromium	NA	NA	NA
Cobalt	NA	NA	NA
Copper	NA	NA	NA
Iron	NA	NA	NA
Lanthanum	NA	NA	NA
Lead	NA	NA	NA
Lithium	0.270	0.265	1.57%
Magnesium	NA	NA	NA
Manganese	NA	NA	NA
Molybdenum	NA	NA	NA
Nickel	NA	NA	NA
Palladium	NA	NA	NA
Phosphorus	NA	NA	NA
Potassium	3.81	3.82	0.39%
Selenium	NA	NA	NA
Silicon	NA	NA	NA
Silver	NA	NA	NA
Sodium	206	203	1.51%
Strontium	NA	NA	NA
Sulfur	NA	NA	NA
Thallium	NA	NA	NA
Thorium	NA	NA	NA
Tin	NA	NA	NA
Titanium	NA	NA	NA
Tungsten	NA	NA	NA
Uranium	NA	NA	NA
Vanadium	NA	NA	NA
Yttrium	NA	NA	NA
Zinc	NA	NA	NA
Zirconium	NA	NA	NA

7 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
MATRIX SPIKE SUMMARY

Sample ID: CNWRA 8

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 04/14/04

Matrix: Water

Project No.: 20.06002.01.141

Lab System ID: 243231

SRR: 25770

TO: 040415-2

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Aluminum	<0.05	1.95	2	97.3%
Antimony	<0.02	0.505	0.5	101.1%
Arsenic	0.010	2.04	2	101.7%
Barium	0.008	2.03	2	100.9%
Beryllium	<0.005	0.049	0.05	98.7%
Bismuth	NA	NA	NA	NA
Boron	NA	NA	NA	NA
Cadmium	<0.005	0.050	0.05	99.5%
Calcium	13.3	33.7	20	102.0%
Chromium	<0.015	0.197	0.2	98.5%
Cobalt	<0.005	0.501	0.5	100.2%
Copper	<0.005	0.252	0.25	100.8%
Iron	<0.1	1.08	1	108.4%
Lanthanum	NA	NA	NA	NA
Lead	<0.005	0.497	0.5	99.3%
Lithium	NA	NA	NA	NA
Magnesium	2.05	22.4	20	101.5%
Manganese	0.006	0.509	0.5	100.7%
Molybdenum	NA	NA	NA	NA
Nickel	<0.01	0.490	0.5	98.0%
Palladium	NA	NA	NA	NA
Phosphorus	NA	NA	NA	NA
Potassium	NA	NA	NA	NA
Selenium	<0.015	2.23	2	111.6%
Silicon	NA	NA	NA	NA
Silver	<0.005	0.051	0.05	102.5%
Sodium	NA	NA	NA	NA
Strontium	NA	NA	NA	NA
Sulfur	NA	NA	NA	NA
Thallium	<0.02	2.08	2	103.8%
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	0.006	0.505	0.5	99.9%
Yttrium	NA	NA	NA	NA
Zinc	<0.005	0.509	0.5	101.8%
Zirconium	NA	NA	NA	NA

NA- Not Applicable.

7 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
MATRIX SPIKE SUMMARY

Sample ID: CNWRA 9

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 243232

Client: Division 20

Date Received: 04/14/04

Project No.: 20.06002.01.141

SRR: 25770

TO: 040415-2

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Aluminum	NA	NA	NA	NA
Antimony	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA
Barium	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA
Bismuth	NA	NA	NA	NA
Boron	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA
Calcium	NA	NA	NA	NA
Chromium	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA
Copper	NA	NA	NA	NA
Iron	NA	NA	NA	NA
Lanthanum	NA	NA	NA	NA
Lead	NA	NA	NA	NA
Lithium	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA
Manganese	NA	NA	NA	NA
Molybdenum	NA	NA	NA	NA
Nickel	NA	NA	NA	NA
Palladium	NA	NA	NA	NA
Phosphorus	NA	NA	NA	NA
Potassium	3.82	24.1	20	101.3%
Selenium	NA	NA	NA	NA
Silicon	NA	NA	NA	NA
Silver	NA	NA	NA	NA
Sodium	48.6	68.6	20	100.1%
Strontium	NA	NA	NA	NA
Sulfur	NA	NA	NA	NA
Thallium	NA	NA	NA	NA
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	NA	NA	NA	NA
Yttrium	NA	NA	NA	NA
Zinc	NA	NA	NA	NA
Zirconium	NA	NA	NA	NA

NA- Not Applicable.

7 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
LABORATORY CONTROL SAMPLE

Sample ID: LCSW - F15W1 / F15E2

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: NA

Client: Division 20

Date Received: NA

Project No.: 20.06002.01.141

SRR: 25770

TO: 040415-2

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Aluminum	1.91	2	95.4%
Antimony	0.490	0.5	97.9%
Arsenic	1.99	2	99.7%
Barium	2.01	2	100.6%
Beryllium	0.049	0.05	98.8%
Bismuth	NA	NA	NA
Boron	NA	NA	NA
Cadmium	0.050	0.05	99.3%
Calcium	21.0	20	104.8%
Chromium	0.208	0.2	104.2%
Cobalt	0.499	0.5	99.8%
Copper	0.252	0.25	100.8%
Iron	1.14	1	114.1%
Lanthanum	NA	NA	NA
Lead	0.497	0.5	99.4%
Lithium	NA	NA	NA
Magnesium	20.7	20	103.4%
Manganese	0.504	0.5	100.7%
Molybdenum	NA	NA	NA
Nickel	0.498	0.5	99.6%
Palladium	NA	NA	NA
Phosphorus	NA	NA	NA
Potassium	19.2	20	95.8%
Selenium	2.04	2	101.8%
Silicon	NA	NA	NA
Silver	0.050	0.05	101.0%
Sodium	19.1	20	95.3%
Strontium	NA	NA	NA
Sulfur	NA	NA	NA
Thallium	2.06	2	102.9%
Thorium	NA	NA	NA
Tin	NA	NA	NA
Titanium	NA	NA	NA
Tungsten	NA	NA	NA
Uranium	NA	NA	NA
Vanadium	0.498	0.5	99.6%
Yttrium	NA	NA	NA
Zinc	0.497	0.5	99.4%
Zirconium	NA	NA	NA

NA- Not Applicable.

7 JUL 04 CONT BW

SOUTHWEST RESEARCH INSTITUTE
BLANK SUMMARY

Sample ID
PBW - F15E1 / F15E2

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: NA

Client: Division 20

Date Received: NA

Project No.: 20.06002.01.141

SRR: 25770

TO: 040415-2

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.02	0.02
Arsenic	<0.005	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.01	0.01
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	<0.05	0.05
Chromium	<0.015	0.015
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.1	0.1
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.01	0.01
Magnesium	<0.05	0.05
Manganese	<0.005	0.005
Molybdenum	<0.01	0.01
Nickel	<0.01	0.01
Palladium	<0.005	0.005
Phosphorus	<0.02	0.02
Potassium	<0.2	0.2
Selenium	<0.015	0.015
Silicon	<0.05	0.05
Silver	<0.005	0.005
Sodium	<0.2	0.2
Strontium	<0.005	0.005
Sulfur	<0.05	0.05
Thallium	<0.02	0.02
Thorium	<0.015	0.015
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005

NA- Not Applicable.

7 JUL 04 CONT BAW

The table below indicated the well and the SN reference for the analyses

Well	Sample collection date	Initial analysis documented	Source	Second analysis documented	Source
NC-EWDP-22PB Zone 1	29-Aug-02	8-Nov-02	523/141	7-Jul-04	653/50
NC-EWDP-10P Zone 1	27-Aug-02	8-Nov-02	523/113	7-Jul-04	653/52
NC-EWDP-22S Zone 2	10-Sep-02	8-Nov-02	523/147	7-Jul-04	653/54
NC-EWDP-29P	1-Oct-03	1-Dec-03	610/135	7-Jul-04	653/53
NC-EWDP-19D	29-Oct-03	18-Dec-03	628/14	7-Jul-04	653/51

The following pages provide the comparison between the original and second analysis.

Overall the numbers were good.
Predominant cations - Ca, Mg, Na, K, Fe, S, + Si
Recoveries good for predominant cations except Fe for 19D at 67%. However, all samples were not preserved (no acid added).
~~For predomin~~ BW 7-7-04
Wells with systematically low recoveries were 22PB zone1, 10P zone1, + 22S zone 2
Wells with systematically high recoveries - 19D
Well 29P did not vary systematically.
For trace metals
- some detected on one analyses and not the other
- some larger percent differences from smaller values (approaching detection limit)

7 JULY 04 CONT BAW

NC-EWDP-29P

	Original results 29P-1003-FUA-5 ppm	Reanalysis CNWRA 9 ppm	Percent Recovery
Aluminum	<0.05	<0.05	na
Antimony	<0.01	<0.02	na
Arsenic	0.007	0.008	109.6
Barium	0.015	0.014	94.9
Beryllium	<0.005	<0.005	na
Bismuth	<0.01	<0.01	na
Boron	0.145	0.142	98.0
Cadmium	<0.005	<0.005	na
Calcium	12.5	12.8	102.2
Chromium	<0.005	<0.015	na
Cobalt	<0.005	<0.005	na
Copper	<0.005	<0.005	na
Iron	<0.05	<0.1	na
Lanthanum	<0.005	<0.005	na
Lead	<0.005	<0.005	na
Lithium	0.043	0.045	103.4
Magnesium	1.05	1.07	101.4
Manganese	0.009	<0.005	na
Molybdenum	<0.005	<0.01	na
Nickel	<0.005	<0.01	na
Palladium	<0.005	<0.005	na
Phosphorus	<0.025	<0.02	na
Potassium	4.01	3.82	95.4
Selenium	<0.01	<0.015	na
Silicon	26.2	26.2	100.2
Silver	<0.005	<0.005	na
Sodium	53.3	48.6	91.0
Strontium	0.076	0.071	93.3
Sulfur	7.85	8.09	103.2
Thallium	<0.02	<0.02	na
Thorium	<0.01	<0.015	na
Tin	<0.02	0.012	na
Titanium	<0.005	<0.005	na
Tungsten	<0.02	<0.01	na
Uranium	<0.1	<0.1	na
Vanadium	0.006	0.007	102.9
Yttrium	<0.005	<0.005	na
Zinc	<0.005	<0.005	na
Zirconium	<0.005	<0.005	na

7-7-04 BW

7 JUL 04 CONT BAW

NC-EWDP-22PB Zone 1

	Original results 22PB-1-FUA-3 ppm	Reanalysis CNWRA 6 ppm	Percent Recovery
Aluminum	<0.05	<0.05	na
Antimony	<0.02	<0.02	na
Arsenic	<0.01	<0.005	na
Barium	0.012	0.012	98.1
Beryllium	<0.005	<0.005	na
Bismuth	<0.015	<0.01	na
Boron	0.153	0.142	92.9
Cadmium	<0.005	<0.005	na
Calcium	26.9	24.7	91.8
Chromium	<0.005	<0.015	na
Cobalt	<0.005	<0.005	na
Copper	<0.005	<0.005	na
Iron	<0.05	<0.1	na
Lanthanum	<0.005	<0.005	na
Lead	<0.005	<0.005	na
Lithium	0.040	0.035	88.8
Magnesium	3.68	3.29	89.3
Manganese	<0.005	<0.005	na
Molybdenum	0.006	<0.01	na
Nickel	<0.005	<0.01	na
Palladium	<0.02	<0.005	na
Phosphorus	0.040	0.025	61.4
Potassium	6.24	5.53	88.7
Selenium	<0.01	<0.015	na
Silicon	25.2	24.3	96.4
Silver	<0.005	<0.005	na
Sodium	39.2	37.3	95.2
Strontium	0.104	0.100	96.4
Sulfur	9.31	8.52	91.5
Thallium	<0.01	<0.02	na
Thorium	<0.015	<0.015	na
Tin	<0.005	0.016	na
Titanium	<0.005	<0.005	na
Tungsten	<0.01	<0.01	na
Uranium	<0.1	<0.1	na
Vanadium	<0.005	<0.005	na
Yttrium	<0.005	<0.005	na
Zinc	<0.015	<0.005	na
Zirconium	<0.005	<0.005	na

7-7-04 BW

7 JUL 04 CONT BAW

NC-EWDP-10P Zone 1

	Original results 10P-1-FUA-3 ppm	Reanalysis CNWRA 8 ppm	Percent Recovery
Aluminum	<0.05	<0.05	na
Antimony	<0.02	<0.02	na
Arsenic	0.014	0.010	68.9
Barium	0.009	0.008	92.8
Beryllium	<0.005	<0.005	na
Bismuth	<0.015	<0.01	na
Boron	0.153	0.136	89.1
Cadmium	<0.005	<0.005	na
Calcium	14.4	13.3	92.6
Chromium	<0.005	<0.015	na
Cobalt	<0.005	<0.005	na
Copper	<0.005	<0.005	na
Iron	<0.05	<0.1	na
Lanthanum	<0.005	<0.005	na
Lead	<0.005	<0.005	na
Lithium	0.041	0.038	91.8
Magnesium	2.29	2.05	89.6
Manganese	0.006	0.006	95.1
Molybdenum	0.013	<0.01	*note
Nickel	<0.005	<0.01	na
Palladium	<0.02	<0.005	na
Phosphorus	0.027	<0.02	*note
Potassium	6.50	5.68	87.3
Selenium	<0.01	<0.015	na
Silicon	27.7	25.7	92.8
Silver	<0.005	<0.005	na
Sodium	45.2	41.9	92.7
Strontium	0.072	0.067	92.6
Sulfur	7.82	6.96	88.9
Thallium	<0.01	<0.02	na
Thorium	<0.015	<0.015	na
Tin	<0.005	0.013	na
Titanium	<0.005	<0.005	na
Tungsten	<0.01	<0.01	na
Uranium	<0.1	<0.1	na
Vanadium	0.006	0.006	97.9
Yttrium	<0.005	<0.005	na
Zinc	<0.015	<0.005	na
Zirconium	<0.005	<0.005	na

*note = detected in one sample but not the other

7-7-04 BAW

7 JUL 04 CONT BAW

NC-EWDP-19D

	Original results 19D-1003-FUA-5 ppm	Reanalysis CNWRA 7 ppm	Percent Recovery
Aluminum	<0.05	<0.05	na
Antimony	<0.01	<0.02	na
Arsenic	0.008	<0.005	*note
Barium	<0.005	<0.005	na
Beryllium	<0.005	<0.005	na
Bismuth	<0.015	<0.01	na
Boron	0.233	0.258	110.8
Cadmium	<0.005	<0.005	na
Calcium	2.24	2.49	111.1
Chromium	<0.005	<0.015	na
Cobalt	<0.005	<0.005	na
Copper	<0.005	<0.005	na
Iron	0.202	0.136	67.0
Lanthanum	<0.005	<0.005	na
Lead	<0.005	<0.005	na
Lithium	0.247	0.270	109.3
Magnesium	0.106	0.112	105.7
Manganese	0.039	<0.005	*note
Molybdenum	0.038	0.046	119.6
Nickel	<0.005	<0.01	na
Palladium	<0.01	<0.005	na
Phosphorus	<0.04	0.057	na
Potassium	3.08	3.81	123.7
Selenium	<0.015	<0.05	na
Silicon	7.13	7.88	110.5
Silver	<0.005	<0.005	na
Sodium	173	206	119.1
Strontium	0.006	0.007	108.6
Sulfur	9.89	10.4	105.2
Thallium	<0.025	<0.075	na
Thorium	<0.01	<0.015	na
Tin	0.025	0.062	245.1
Titanium	<0.005	<0.005	na
Tungsten	<0.015	<0.01	na
Uranium	<0.1	<0.1	na
Vanadium	<0.005	<0.005	na
Yttrium	<0.005	<0.005	na
Zinc	<0.005	<0.005	na
Zirconium	<0.005	<0.005	na

*note = detected in one sample but not the other

7-7-04 BAW

7 JUL 04 CONT BAW

NC-EWDP-22S Zone 2

	Original results 22S-2-FUA-3 ppm	Reanalysis CNWRA 10 ppm	Percent Recovery
Aluminum	<0.05	<0.05	na
Antimony	<0.02	<0.02	na
Arsenic	<0.01	<0.005	na
Barium	0.007	0.007	97.8
Beryllium	<0.005	<0.005	na
Bismuth	<0.015	<0.01	na
Boron	0.150	0.138	92.4
Cadmium	<0.005	<0.005	na
Calcium	19.4	17.8	91.4
Chromium	<0.005	<0.015	na
Cobalt	<0.005	<0.005	na
Copper	<0.005	<0.005	na
Iron	0.113	<0.1	*note
Lanthanum	<0.005	<0.005	na
Lead	<0.005	<0.005	na
Lithium	0.038	0.035	92.7
Magnesium	3.15	2.78	88.2
Manganese	0.027	0.025	94.4
Molybdenum	0.006	<0.01	*note
Nickel	<0.005	<0.01	na
Palladium	<0.02	<0.005	na
Phosphorus	<0.025	0.020	*note
Potassium	5.61	5.08	90.6
Selenium	<0.01	<0.015	na
Silicon	20.3	19.5	96.2
Silver	<0.005	<0.005	na
Sodium	36.6	34.9	95.3
Strontium	0.081	0.079	97.1
Sulfur	7.34	6.81	92.7
Thallium	<0.01	<0.02	na
Thorium	<0.015	<0.015	na
Tin	<0.005	0.015	na
Titanium	<0.005	<0.005	na
Tungsten	<0.01	<0.01	na
Uranium	<0.1	<0.1	na
Vanadium	<0.005	<0.005	na
Yttrium	<0.005	<0.005	na
Zinc	<0.015	<0.005	na
Zirconium	<0.005	<0.005	na

*note = detected in one sample but not the other - However, observe dection limits

7-7-04 BW

8 JUL 04 BAW

Div 01 Cation Results for May 2004 EWDP groundwater samples

Chain of Custody - 628/145-146
Legend for IDs - 628/135
QA sample preparation 628/132-133
Aliquots also analyzed by SGS Lakefield (see 653/37-40)

The percent recoveries for the two QA samples good. See 653/81 for details. Aluminum recovery on Cation 6A was low. Cation 6A contained most analytes predominately at the concentrations near the detection limit. Uranium was not detected. It was spiked at the dection limit of 0.1 mg/L.

The ~~Ft~~ BW 7-8-04 Field Blank (Cation 7A) was blank.

7-8-04 BW

8 JUL 08 CONT. BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
Cation 1A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245108

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.02	0.02
Arsenic	0.006	0.005
Barium	0.011	0.005
Beryllium	<0.005	0.005
Bismuth	<0.01	0.01
Boron	0.145	0.05
Cadmium	<0.005	0.005
Calcium	13.6	0.05
Chromium	<0.015	0.015
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.1	0.1
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.042	0.01
Magnesium	1.34	0.05
Manganese	<0.005	0.005
Molybdenum	<0.01	0.01
Nickel	<0.01	0.01
Palladium	<0.005	0.005
Phosphorus	<0.02	0.02
Potassium	3.59	0.2
Selenium	<0.015	0.015
Silicon	19.7	0.05
Silver	<0.005	0.005
Sodium	51.7	0.2
Strontium	0.075	0.005
Sulfur	9.43	0.05
Thallium	<0.02	0.02
Thorium	<0.015	0.015
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.013	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005

8 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
Cation 2A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245109

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	0.084	0.05
Antimony	<0.02	0.02
Arsenic	0.017	0.005
Barium	0.007	0.005
Beryllium	<0.005	0.005
Bismuth	<0.01	0.01
Boron	0.167	0.05
Cadmium	<0.005	0.005
Calcium	6.69	0.05
Chromium	<0.015	0.015
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.1	0.1
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.089	0.01
Magnesium	0.550	0.05
Manganese	<0.005	0.005
Molybdenum	<0.01	0.01
Nickel	<0.01	0.01
Palladium	<0.005	0.005
Phosphorus	0.033	0.02
Potassium	2.76	0.2
Selenium	<0.015	0.015
Silicon	25.6	0.05
Silver	<0.005	0.005
Sodium	77.2	0.2
Strontium	0.031	0.005
Sulfur	7.36	0.05
Thallium	<0.02	0.02
Thorium	<0.015	0.015
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005

8 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
Cation 3A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245110

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.02	0.02
Arsenic	0.007	0.005
Barium	0.011	0.005
Beryllium	<0.005	0.005
Bismuth	<0.01	0.01
Boron	0.141	0.05
Cadmium	<0.005	0.005
Calcium	13.6	0.05
Chromium	<0.015	0.015
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.1	0.1
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.044	0.01
Magnesium	1.34	0.05
Manganese	<0.005	0.005
Molybdenum	<0.01	0.01
Nickel	<0.01	0.01
Palladium	<0.005	0.005
Phosphorus	0.027	0.02
Potassium	3.71	0.2
Selenium	<0.015	0.015
Silicon	19.6	0.05
Silver	<0.005	0.005
Sodium	52.8	0.2
Strontium	0.075	0.005
Sulfur	9.46	0.05
Thallium	<0.02	0.02
Thorium	<0.015	0.015
Tin	0.017	0.01
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.013	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005

8 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
Cation 4A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245111

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	0.396	0.05
Antimony	<0.02	0.02
Arsenic	0.010	0.005
Barium	0.008	0.005
Beryllium	<0.005	0.005
Bismuth	<0.01	0.01
Boron	0.171	0.05
Cadmium	<0.005	0.005
Calcium	6.97	0.05
Chromium	<0.015	0.015
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	0.138	0.1
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.093	0.01
Magnesium	0.604	0.05
Manganese	<0.005	0.005
Molybdenum	<0.01	0.01
Nickel	<0.01	0.01
Palladium	<0.005	0.005
Phosphorus	0.039	0.02
Potassium	2.89	0.2
Selenium	<0.015	0.015
Silicon	27.0	0.05
Silver	<0.005	0.005
Sodium	80.3	0.2
Strontium	0.033	0.005
Sulfur	7.42	0.05
Thallium	<0.02	0.02
Thorium	<0.015	0.015
Tin	0.023	0.01
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005

8 JULY 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
Cation 5A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245112

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.02	0.02
Arsenic	<0.005	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.01	0.01
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	10.0	0.05
Chromium	<0.015	0.015
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	10.1	0.1
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.01	0.01
Magnesium	9.84	0.05
Manganese	<0.005	0.005
Molybdenum	<0.01	0.01
Nickel	<0.01	0.01
Palladium	<0.005	0.005
Phosphorus	<0.02	0.02
Potassium	9.08	0.2
Selenium	<0.015	0.015
Silicon	<0.05	0.05
Silver	<0.005	0.005
Sodium	8.94	0.2
Strontium	<0.005	0.005
Sulfur	<0.05	0.05
Thallium	<0.02	0.02
Thorium	<0.015	0.015
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005

8 JULY 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
Cation 6A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245113

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	0.075	0.05
Antimony	0.096	0.02
Arsenic	0.092	0.005
Barium	0.101	0.005
Beryllium	0.097	0.005
Bismuth	<0.01	0.01
Boron	<0.05	0.05
Cadmium	0.100	0.005
Calcium	9.96	0.05
Chromium	0.097	0.015
Cobalt	0.099	0.005
Copper	0.096	0.005
Iron	10.1	0.1
Lanthanum	<0.005	0.005
Lead	0.099	0.005
Lithium	<0.01	0.01
Magnesium	9.77	0.05
Manganese	0.101	0.005
Molybdenum	0.092	0.01
Nickel	0.098	0.01
Palladium	<0.005	0.005
Phosphorus	<0.02	0.02
Potassium	8.99	0.2
Selenium	0.094	0.015
Silicon	<0.05	0.05
Silver	0.100	0.005
Sodium	8.91	0.2
Strontium	9.91	0.005
Sulfur	<0.05	0.05
Thallium	0.103	0.02
Thorium	0.091	0.015
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.098	0.005
Yttrium	<0.005	0.005
Zinc	0.099	0.005
Zirconium	<0.005	0.005

8 JULY 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
Cation 7A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245114

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.02	0.02
Arsenic	<0.005	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.01	0.01
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	<0.05	0.05
Chromium	<0.015	0.015
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.1	0.1
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.01	0.01
Magnesium	<0.05	0.05
Manganese	<0.005	0.005
Molybdenum	<0.01	0.01
Nickel	<0.01	0.01
Palladium	<0.005	0.005
Phosphorus	<0.02	0.02
Potassium	<0.2	0.2
Selenium	<0.015	0.015
Silicon	<0.05	0.05
Silver	<0.005	0.005
Sodium	<0.2	0.2
Strontium	<0.005	0.005
Sulfur	<0.05	0.05
Thallium	<0.02	0.02
Thorium	<0.015	0.015
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005

8 JULY 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
Cation 8A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245115

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	0.336	0.05
Antimony	<0.02	0.02
Arsenic	0.005	0.005
Barium	0.012	0.005
Beryllium	<0.005	0.005
Bismuth	<0.01	0.01
Boron	0.142	0.05
Cadmium	<0.005	0.005
Calcium	14.0	0.05
Chromium	<0.015	0.015
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	0.182	0.1
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.043	0.01
Magnesium	1.42	0.05
Manganese	<0.005	0.005
Molybdenum	<0.01	0.01
Nickel	<0.01	0.01
Palladium	<0.005	0.005
Phosphorus	0.037	0.02
Potassium	3.69	0.2
Selenium	<0.015	0.015
Silicon	20.7	0.05
Silver	<0.005	0.005
Sodium	52.3	0.2
Strontium	0.077	0.005
Sulfur	9.50	0.05
Thallium	<0.02	0.02
Thorium	<0.015	0.015
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.014	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005

8 JULY 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: Cation 9A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245116

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	0.498	0.05
Antimony	<0.02	0.02
Arsenic	<0.005	0.005
Barium	0.008	0.005
Beryllium	<0.005	0.005
Bismuth	<0.01	0.01
Boron	0.172	0.05
Cadmium	<0.005	0.005
Calcium	7.31	0.05
Chromium	<0.015	0.015
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	0.167	0.1
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.100	0.01
Magnesium	0.640	0.05
Manganese	<0.005	0.005
Molybdenum	<0.01	0.01
Nickel	<0.01	0.01
Palladium	<0.005	0.005
Phosphorus	0.039	0.02
Potassium	2.96	0.2
Selenium	<0.015	0.015
Silicon	27.8	0.05
Silver	<0.005	0.005
Sodium	85.3	0.2
Strontium	0.036	0.005
Sulfur	7.57	0.05
Thallium	<0.02	0.02
Thorium	<0.015	0.015
Tin	0.027	0.01
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005

8 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
DUPLICATE SUMMARY

Sample ID: Cation 1A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245108

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Aluminum	<0.05	<0.05	0.00%
Antimony	<0.02	<0.02	0.00%
Arsenic	0.006	0.009	32.9%
Barium	0.011	0.010	2.39%
Beryllium	<0.005	<0.005	0.00%
Bismuth	<0.01	<0.01	0.00%
Boron	0.145	0.140	3.57%
Cadmium	<0.005	<0.005	0.00%
Calcium	13.6	13.2	2.87%
Chromium	<0.015	<0.015	0.00%
Cobalt	<0.005	<0.005	0.00%
Copper	<0.005	<0.005	0.00%
Iron	<0.1	<0.1	0.00%
Lanthanum	<0.005	<0.005	0.00%
Lead	<0.005	<0.005	0.00%
Lithium	0.042	0.043	1.90%
Magnesium	1.34	1.31	2.74%
Manganese	<0.005	<0.005	0.00%
Molybdenum	<0.01	<0.01	0.00%
Nickel	<0.01	<0.01	0.00%
Palladium	<0.005	<0.005	0.00%
Phosphorus	<0.02	<0.02	0.00%
Potassium	3.59	3.58	0.31%
Selenium	<0.015	<0.015	0.00%
Silicon	19.7	19.1	2.96%
Silver	<0.005	<0.005	0.00%
Sodium	51.7	51.8	0.15%
Strontium	0.075	0.073	2.71%
Sulfur	9.43	9.20	2.41%
Thallium	<0.02	<0.02	0.00%
Thorium	<0.015	<0.015	0.00%
Tin	<0.01	<0.01	0.00%
Titanium	<0.005	<0.005	0.00%
Tungsten	<0.01	<0.01	0.00%
Uranium	<0.1	<0.1	0.00%
Vanadium	0.013	0.013	1.51%
Yttrium	<0.005	<0.005	0.00%
Zinc	<0.005	<0.005	0.00%
Zirconium	<0.005	<0.005	0.00%

08 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
MATRIX SPIKE SUMMARY

Sample ID: Cation 1A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245108

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Aluminum	<0.05	1.94	2	97.0%
Antimony	<0.02	0.501	0.5	100.3%
Arsenic	0.006	2.03	2	101.1%
Barium	0.011	2.01	2	99.9%
Beryllium	<0.005	0.049	0.05	97.8%
Bismuth	NA	NA	NA	NA
Boron	NA	NA	NA	NA
Cadmium	<0.005	0.049	0.05	98.4%
Calcium	13.6	33.8	20	100.9%
Chromium	<0.015	0.195	0.2	97.6%
Cobalt	<0.005	0.498	0.5	99.6%
Copper	<0.005	0.251	0.25	100.5%
Iron	<0.1	1.06	1	106.0%
Lanthanum	NA	NA	NA	NA
Lead	<0.005	0.494	0.5	98.8%
Lithium	NA	NA	NA	NA
Magnesium	1.34	21.8	20	102.1%
Manganese	<0.005	0.501	0.5	100.1%
Molybdenum	NA	NA	NA	NA
Nickel	<0.01	0.482	0.5	96.5%
Palladium	NA	NA	NA	NA
Phosphorus	NA	NA	NA	NA
Potassium	3.59	24.1	20	102.8%
Selenium	<0.015	2.17	2	108.6%
Silicon	NA	NA	NA	NA
Silver	<0.005	0.050	0.05	100.9%
Sodium	51.7	72.1	20	102.0%
Strontium	NA	NA	NA	NA
Sulfur	NA	NA	NA	NA
Thallium	<0.02	2.08	2	104.0%
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	0.013	0.507	0.5	98.8%
Yttrium	NA	NA	NA	NA
Zinc	<0.005	0.508	0.5	101.7%
Zirconium	NA	NA	NA	NA

NA- Not Applicable.

08 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
LABORATORY CONTROL SAMPLE

Sample ID: LCSW - F15W1 / F15E2

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: NA

Client: Division 20

Date Received: NA

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Aluminum	1.91	2	95.4%
Antimony	0.490	0.5	97.9%
Arsenic	1.99	2	99.7%
Barium	2.01	2	100.6%
Beryllium	0.049	0.05	98.8%
Bismuth	NA	NA	NA
Boron	NA	NA	NA
Cadmium	0.050	0.05	99.3%
Calcium	21.0	20	104.8%
Chromium	0.208	0.2	104.2%
Cobalt	0.499	0.5	99.8%
Copper	0.252	0.25	100.8%
Iron	1.14	1	114.1%
Lanthanum	NA	NA	NA
Lead	0.497	0.5	99.4%
Lithium	NA	NA	NA
Magnesium	20.7	20	103.4%
Manganese	0.504	0.5	100.7%
Molybdenum	NA	NA	NA
Nickel	0.498	0.5	99.6%
Palladium	NA	NA	NA
Phosphorus	NA	NA	NA
Potassium	19.2	20	95.8%
Selenium	2.04	2	101.8%
Silicon	NA	NA	NA
Silver	0.050	0.05	101.0%
Sodium	19.1	20	95.3%
Strontium	NA	NA	NA
Sulfur	NA	NA	NA
Thallium	2.06	2	102.9%
Thorium	NA	NA	NA
Tin	NA	NA	NA
Titanium	NA	NA	NA
Tungsten	NA	NA	NA
Uranium	NA	NA	NA
Vanadium	0.498	0.5	99.6%
Yttrium	NA	NA	NA
Zinc	0.497	0.5	99.4%
Zirconium	NA	NA	NA

NA- Not Applicable.

08 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
BLANK SUMMARY

Sample ID
PBW - F15E1 / F15E2

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: NA

Client: Division 20

Date Received: NA

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.02	0.02
Arsenic	<0.005	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.01	0.01
Boron	<0.05	0.05
Cadmium	<0.005	0.005
Calcium	<0.05	0.05
Chromium	<0.015	0.015
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.1	0.1
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.01	0.01
Magnesium	<0.05	0.05
Manganese	<0.005	0.005
Molybdenum	<0.01	0.01
Nickel	<0.01	0.01
Palladium	<0.005	0.005
Phosphorus	<0.02	0.02
Potassium	<0.2	0.2
Selenium	<0.015	0.015
Silicon	<0.05	0.05
Silver	<0.005	0.005
Sodium	<0.2	0.2
Strontium	<0.005	0.005
Sulfur	<0.05	0.05
Thallium	<0.02	0.02
Thorium	<0.015	0.015
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005

NA- Not Applicable.

08 JUL 04 CONT BAW

QA accuracy data from two blind standards

Element	Cation 5A (Div 01 label ID) CL-CAL-3 (Div 20 internal ID) from 628/132-133			Cation 6A (Div 01 label ID) CL-ICV-1 (Div 20 internal ID) from 628/132-133		
	Sample Result (mg/L)	Target Conc mg/L	Percent Recovery	Sample Result (mg/L)	Target Conc mg/L	Percent Recovery
Aluminum	<0.05	-	-	0.075	0.1	75.2
Antimony	<0.02	-	-	0.096	0.1	95.7
Arsenic	<0.005	-	-	0.092	0.1	92.1
Barium	<0.005	-	-	0.101	0.1	100.5
Beryllium	<0.005	-	-	0.097	0.1	96.6
Bismuth	<0.01	-	-	<0.01	-	-
Boron	<0.05	-	-	<0.05	-	-
Cadmium	<0.005	-	-	0.100	0.1	99.6
Calcium	10.0	10.0	100.1	9.96	10	99.6
Chromium	<0.015	-	-	0.097	0.1	96.8
Cobalt	<0.005	-	-	0.099	0.1	98.8
Copper	<0.005	-	-	0.096	0.1	95.9
Iron	10.1	10.0	101.4	10.1	10	101.2
Lanthanum	<0.005	-	-	<0.005	-	-
Lead	<0.005	-	-	0.099	0.1	98.7
Lithium	<0.01	-	-	<0.01	-	-
Magnesium	9.84	10.00	98.4	9.77	10	97.7
Manganese	<0.005	-	-	0.101	0.1	100.7
Molybdenum	<0.01	-	-	0.092	0.1	92.4
Nickel	<0.01	-	-	0.098	0.1	98.2
Palladium	<0.005	-	-	<0.005	-	-
Phosphorus	<0.02	-	-	<0.02	-	-
Potassium	9.08	10.00	90.8	8.99	10	89.9
Selenium	<0.015	-	-	0.094	0.1	93.9
Silicon	<0.05	-	-	<0.05	-	-
Silver	<0.005	-	-	0.100	0.1	100.1
Sodium	8.94	10.00	89.4	8.91	10	89.1
Strontium	<0.005	-	-	9.91	10	99.1
Sulfur	<0.05	-	-	<0.05	-	-
Thallium	<0.02	-	-	0.103	0.1	103.1
Thorium	<0.015	-	-	0.091	-	-
Tin	<0.01	-	-	<0.01	-	-
Titanium	<0.005	-	-	<0.005	-	-
Tungsten	<0.01	-	-	<0.01	-	-
Uranium	<0.1	-	-	<0.1	0.1	note*
Vanadium	<0.005	-	-	0.098	0.1	98.0
Yttrium	<0.005	-	-	<0.005	-	-
Zinc	<0.005	-	-	0.099	0.1	98.6
Zirconium	<0.005	-	-	<0.005	-	-

note* - not dectect in sample. Target value was at the detection limit

7-8-04 BAW

08 JULY 04 CONT BAW

Anion Results for Reanalyses of EWDP May 2004 Groundwater Samples

The first data (628/187-194) did not contain the phosphate data and had issues with labels (see 628/187).

The next set of data from the aliquots did contain the phosphate data and had the label issue corrected. See 653/41-48.

This set reported here was from new aliquots from the original samples.
Sample preparation and legend 628/194
Chain of Custody 628/196
QA standard preparation 628/186

7-9-04 BW

08JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
Anion 1C

Lab Name: Southwest Research Institute
Lab Code: SwRI
Matrix: Water
Task Order: 040615-8
Lab System ID: 246040

Client: Division 20
Date Received: 06/15/04
Project No.: 06002.01.141
SRR: 26045

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	6.78	0.1
Fluoride	1.84	0.1
Nitrate-N	0.900	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	0.0225	0.01
Sulfate	29.0	0.1

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
Anion 2C

Lab Name: Southwest Research Institute
Lab Code: SwRI
Matrix: Water
Task Order: 040615-8
Lab System ID: 246041

Client: Division 20
Date Received: 06/15/04
Project No.: 06002.01.141
SRR: 26045

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	6.74	0.1
Fluoride	1.89	0.1
Nitrate-N	0.894	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	0.0512	0.01
Sulfate	29.0	0.1

08 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
Anion 3C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040615-8

Lab System ID: 246042

Client: Division 20

Date Received: 06/15/04

Project No.: 06002.01.141

SRR: 26045

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	5.92	0.1
Fluoride	1.72	0.1
Nitrate-N	0.739	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	0.104	0.01
Sulfate	22.4	0.1

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
Anion 4C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040615-8

Lab System ID: 246043

Client: Division 20

Date Received: 06/15/04

Project No.: 06002.01.141

SRR: 26045

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	5.94	0.1
Fluoride	1.69	0.1
Nitrate-N	0.740	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	0.0840	0.01
Sulfate	22.2	0.1

08 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
Anion 5C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040615-8

Lab System ID: 246044

Client: Division 20

Date Received: 06/15/04

Project No.: 06002.01.141

SRR: 26045

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	<0.1	0.1
Fluoride	<0.1	0.1
Nitrate-N	<0.1	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.01	0.01
Sulfate	<0.1	0.1

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
Anion 6C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040615-8

Lab System ID: 246045

Client: Division 20

Date Received: 06/15/04

Project No.: 06002.01.141

SRR: 26045

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	5.98	0.1
Chloride	2.93	0.1
Fluoride	1.48	0.1
Nitrate-N	1.17	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	3.31	0.01
Sulfate	5.69	0.1

08 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
DUPLICATE SUMMARY

Sample ID: Anion 1C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040615-8

Lab System ID: 246040

Client: Division 20

Date Received: 06/15/04

Project No.: 06002.01.141

SRR: 26045

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Bromide	<0.1	<0.1	0.00%
Chloride	6.78	6.73	0.74%
Fluoride	1.84	1.81	1.64%
Nitrate-N	0.900	0.918	1.98%
Nitrite-N	<0.1	<0.1	0.00%
Phosphate-P	0.0225	0.0271	18.5%
Sulfate	29.0	28.7	1.04%

SOUTHWEST RESEARCH INSTITUTE
MATRIX SPIKE SUMMARY

Sample ID: Anion 1C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040615-8

Lab System ID: 246040

Client: Division 20

Date Received: 06/15/04

Project No.: 06002.01.141

SRR: 26045

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Bromide	<0.1	4.12	4.00	103%
Chloride	6.78	8.69	2.00	95.5%
Fluoride	1.84	2.82	1.00	98.0%
Nitrate-N	0.900	1.71	0.904	89.6%
Nitrite-N	<0.1	0.926	1.00	92.6%
Phosphate-P	0.0225	0.268	0.250	98.2%
Sulfate	29.0	32.5	4.00	87.5%

08 JUL 04 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
LABORATORY CONTROL SAMPLE

Sample ID: LCSW

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040615-8

Lab System ID: NA

Client: Division 20

Date Received: NA

Project No.: 06002.01.141

SRR: 26045

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Bromide	409	400	102%
Chloride	206	200	103%
Fluoride	101	100	101%
Nitrate-N	84.6	90.4	93.6%
Nitrite-N	97.7	100	97.7%
Phosphate-P	2.46	2.31	106%
Sulfate	400	400	100%

NA- Not Applicable.

SOUTHWEST RESEARCH INSTITUTE
BLANK SUMMARY

Sample ID: PBW

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040615-8

Lab System ID: NA

Client: Division 20

Date Received: NA

Project No.: 06002.01.141

SRR: 26045

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	<0.1	0.1
Fluoride	<0.1	0.1
Nitrate-N	<0.1	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.01	0.01
Sulfate	<0.1	0.1

NA- Not Applicable.

12 July 04 JB

Various calcite solutions in equilibrium with atmospheric PCO_2.

Calculated additions of calcium perchlorate, sodium perchlorate, and sodium hydroxide will be used to bring the solution chemistry close to equilibrium conditions. Solid calcite (30 g) will be added to each solution (final volume at two liters) and air will be bubbled to ensure equilibrium with atmosphere. Table 1 contains target reagent amounts for the various solutions.

Table 1. Target (calculated) amounts of reagents for calcite solutions.

Soln ID	Target pH Of solution	Mass of Calcite (g)	Mass of NaClO4 (g)	Mass of 0.1 NaOH (g)	Amount of $Ca(ClO_4)_2\ 4H_2O$
Soln A	7.25	30	2.3949	4.40	408.51 g
Soln B	7.50	30	2.3827	5.40	86.70 g
Soln C	7.75	30	24.3656	10.00	27.50 g
Soln D	8.00	30	24.2921	16.00	8.18 g
Soln E	8.25	30	24.1697	26.00	2.545 g
Soln F	8.50	30	24.3656	42.00	0.815 mL
Soln G	8.75	30	24.3656	96.00	0.270 mL
Soln H	9.00	30	24.3656	184.00	0.096 mL

Reagents: Sodium perchlorate (anhydrous): Sigma Aldrich catalog # 410241, batch # 08305DC dried at 46°C for over 3 hours
1.0 M Ca from Calcium perchlorate solution (653/90-91)
0.1 M Sodium hydroxide solution labeled Soln Base (653/89)
Calcite (Fisher Scientific cat # C64-500, lot# 986396
Nanopure water

7-26-04 JB
101237
7-14-04 JB
101237

7-14-04 JB
AE 240

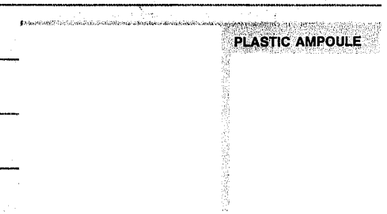
The appropriate amount of sodium perchlorate was weighed (Mettler Toledo ~~PR5002~~, SN ~~1122142733~~) weighing boat and transferred to a 500mL beaker. The weighting boat was rinsed with nanopure water several times to ensure complete transfer of the sodium perchlorate into the beaker. The beaker with sodium perchlorate was placed on the Mettler Toledo PR5002 balance (SN 1122142733) and tared to zero. Next, the appropriate amount of sodium hydroxide was added by weight. Then the appropriate amount of calcium perchlorate was added. For solutions Soln A-E, the solution was tared to zero and the calcium perchlorate was added by weight. For solutions Soln F-H, the calcium perchlorate was added by volume (micropipette). Table 2 contains actual reagent amounts for the various solutions. The solution in the 500mL beaker was transferred to a 2L volumetric flask and diluted to mark with nanopure water. This 2L solution was transferred to a 2L polycarbonate container that contained 30g of calcite (see tables fro ID of calcite containers). Gas bubblers were inserted into each container to ensure equilibrium with atmosphere.

12 July 04 cont. JB

Preparation of 0.1 N NaOH

reagents - nanopure water
- Dilut-it 4687-01 (JT Baker lot # 33121)

Followed instructions on box (see below) using a 1000 mL vol Flask.



Information potentially subject to copyright protection was redacted from this location. The redacted material was a schematic of the plastic ampoule.

Labled Flask - Soln Base

Table 2. Actual amounts of reagents used for calcite solutions

Information potentially subject to copyright protection was redacted from this location. The redacted material was a table from the Phoenix 8000 User Manual p. 6-58.

7-13-04 13 July 04 JB

Preparation of Calcium perchlorate ($Ca(ClO_4)_2 \cdot 4H_2O$) solution at 1.0 M

$$\frac{62.21g\ Ca(ClO_4)_2 \cdot 4H_2O \left(\frac{1\ mol\ Ca}{311.04g\ (Ca(ClO_4)_2 \cdot 4H_2O)}\right)}{0.2\ L} = 1.000M\ Ca$$

reagents $Ca(ClO_4)_2 \cdot 4H_2O$ Aldrich cat # 401420-500G, Batch # 13623LB, open 7/13/04
Nanopure water

Approximately 100 ml of nanopure water was added to a 250 ml beaker (pp) & tared. Added 62.23g of $Ca(ClO_4)_2 \cdot 4H_2O$. Transfered solution to a 200 ml vol flask and diluted to mark with nanopure water. ~~Solutions B-H~~ 7/13/04 JB ~~were~~ Solutions B - H were made with this solution, while solution A was made with the below.

Preparation of Calcium perchlorate $Ca(ClO_4)_2 \cdot 4H_2O$ solution for "solution A"

To make 1 Liter of 1.0M Ca from $Ca(ClO_4)_2 \cdot 4H_2O$

$$\frac{311.04g\ Ca(ClO_4)_2 \cdot 4H_2O \left(\frac{1\ mol\ Ca}{311.04g\ Ca(ClO_4)_2 \cdot 4H_2O}\right)}{1\ Liter} = 1.0M\ Ca$$

13 July 04 cont. JB

reagents = calcium perchlorate tetrahydrate
Aldrich cat # 401420-500G, Batch # 13623LB
nanopure water

Approximately 400 ml of nanopure water was added to a 1000 polypropylene container. This was weighed and tared with the PR5002 Mettler Toledo (SN 1122142733) scale. About 311.04 g of $Ca(ClO_4)_2 \cdot 4H_2O$ was added and reweighed. This was transfered to a 1000 ml vol. flask and diluted to mark with nanopure water. Solution labeled: Calcium Persulfate 1.0M "Soln A".

03 AUG 04 BAW

Addition of water to Calcite Equilibrium Solutions

Small amount of type1 water was added to the reference solutions (653/88) to replace what has evaporated. Type 1 water was placed in a 100 pp beaker. The water was transfered into the reference ~~soln~~ BW 8-3-04 solution with a disposable tranfer pipet (Fisher 13-711-5A) The average amount of addition was about nine pipets

12 Aug 04 [illegible]

Calibration of pH meter

meter: Orion model 920A S/N 039518
probe: Thermo Orion 8103BN

Two buffer calibration points used, pH Buffers points 7.03 and 10.07 used. Temperature was 18.7°C. The slope of the calibration was 100.1. Fisher Buffer soln 7.00 (Lot 033168-24 cat SB108-500) and 10.00 (lot 033031-24 cat SB116-500).

pH of reference Solutions for Technetium + Calcite sorption experiment

8 reference solutions from 653/89

Target pH	Actual pH	Soln ID
7.25	6.78	Soln A
7.50	7.39	Soln B
7.75	7.53	Soln C
8.00	7.82	Soln D
8.25	8.15	Soln E
8.50	8.23	Soln F
8.75	8.67	Soln G
9.00	8.77	Soln H

12 Aug 04 cont. [illegible]

About 16 mL of reference solution was withdrawn with micro-pipet and placed into 15 mL plastic beakers. The pH was taken while the sample is on a stir plate with a stir bar.

Calibration check of pH meter (Orion model 920A S/N 039518) and probe Thermo Orion 8103BN with pH 7.03 as the target. Actual pH was 7.02.

16 AUG 04 BAW

Ref Solns for Technetium - Calcite Sorption Experiments

09:30 - The pH 8.50 reference soln 653/89 was not bubbling. Pump was working and all connections were tight. Assumed frit on tube in solution was clogged. Replaced fritted tube and things were fine.

8-16-04

16 Aug. 04 BAW

Stirring of Soln For Technetium Sorption Experiment

On Aug. 12, 2004, a long metal stirring spatula was used to stir the reference solutions. The calcite was agitated as well. The spatula was rinsed and dried between stirring the solutions to prevent cross contamination.
This stirring was done in response to the low pH readings with hopes of increasing the pH by agitating the calcite (b/c some of the chemicals may be out of circulation when trapped at the bottom with the calcite).

8-17-04 BAW

17 AUG 04 BAW

Results for stable isotope analyses of groundwater samples from May 2004 EWDP sampling event

Samples sent to Coastal Scientific Labs
PO# 476598P - no acceptance criteria in ~~proce~~ 8-17-04 BW procurement plan. Use of standard-accepted method sufficient. Therefore Data Accepted. 8-17-04 Bradley Walling
All samples in duplicate
3 sample sources 19PB shallow, 19PB deep, + QA tap water blank. 628/136

The legend for the samples is below

Source: Scientific Notebook 628/136

Coastal Sample ID	CNWRA Sample ID
Stable 1A	NC-EWDP-19PB-Shal-0504-S-FUA
Stable 2A	NC-EWDP-19PB-Shal-0504-S-FUA Duplicate
Stable 3A	QA (tap water blank)
Stable 4A	QA Duplicate (tap water blank)
Stable 5A	NC-EWDP-19PB-Deep-0504-S-FUA
Stable 6A	NC-EWDP-19PB-Deep-0504-S-FUA Duplicate

The results are on the following page

17 AUG 04 BW

17 AUG 04 CONT BAW

COASTAL SCIENCE LABORATORIES, INC.
6000 Mountain Shadows Drive • Austin, Texas 78735 • (512) 288-5533

August 10, 2004

Dr. Bradley Werling
Southwest Research Institute
Center for Nuclear Waste Regulatory Analyses
6220 Culebra Road
San Antonio, TX 78238-5166

Dear Dr. Werling:

We have completed stable isotope analysis of your samples received recently. The hydrogen data are reported relative to the SMOW reference material and are believed accurate to ±5 per mil. The oxygen data are also reported relative to SMOW and are believed accurate to ±0.3 per mil.

PO#476598P

SAMPLE	δD_{SMOW}	$\delta^{18}O_{SMOW}$
STABLE 1A	-105, -108	-13.4, -13.6
STABLE 2A	-104	-13.5
STABLE 3A	-34	-4.4
STABLE 4A	-33, -32	-4.3
STABLE 5A	-106	-13.7
STABLE 6A	-105, -109	-13.8

Yours truly,

Kenneth Winters
Laboratory Manager

CSL Ref.#ES36

17 AUG 04 CONT BAW

Following tables contain the precision results for the CNWRA duplicates and the Coastal Science Lab (CSL) dups. CSL normally runs "random" duplicates on 15-20% of samples.

CNWRA Blind Suplicates

Well	Hydrogen Sample	Hydrogen Duplicate	Hydrogen % Recovery	Oxygen Sample	Oxygen Duplicate	Oxygen % Recovery
19PB Shallow	-105	-104	99	-13.4	-13.5	101
19PB Deep	-106	-105	99	-13.7	-13.8	101
Tap Water	-34	-33	97	-4.4	-4.3	98

Coastal Science Laboratory Duplicates

Sample ID	Hydrogen	Hydrogen duplicate	Percent Recovery	Oxygen	Oxygen duplicate	Percent Recovery
Stable 1A	-105	-108	103	-13.4	-13.6	101
Stable 2A	-104	na	na	-13.5	na	na
Stable 3A	-34	na	na	-4.4	na	na
Stable 4A	-33	-32	97	-4.3	na	na
Stable 5A	-106	na	na	-13.7	na	na
Stable 6A	-105	-109	104	-13.8	na	na

Percent recoveries look good.

8-27-04 BW

Aug. 24, 2004 JB

Calibration of pH meter

meter: Orion model 920A S/N 039518
probe: Thermo Orion 8103BN

Two buffer calibration points used, Fisher Buffer solution pH 7.02 (lot 033162-24, cat SB108-500) and 10.06 (cat SB116-500, Lot 033031-24) used in calibration. The buffer solutions used were transfered to 60 mL LDPE containers on 8-2-04 for use in calibration. Temperature was 19.9°C. Calibration slope was 100.1% (Target for exceptable slope is 92-102%).

pH of reference solutions

Soln ID	Target pH	Actual pH
Soln A	7.25	6.93
Soln B	7.50	7.38
Soln C	7.75	7.57
Soln D	8.00	7.86
Soln E	8.25	8.20
Soln F	8.50	8.26
Soln G	8.75	8.71
Soln H	9.00	8.97

Solutions from 653/89

24 Aug. 2004 cont JB

About 16 mL ~~Hasp~~ 8-24-04 of reference solution was withdrawn with an Oxford macro pipet (adjustabl 5-10 mL) and placed into a 15 mL plastic container with a stirbar. The pH measurement was taken while on a stir plate.

Calibration check of pH meter (Orion model 920A S/N 039518) and probe Thermo Orion 8103BN with pH 7.02 as target. Actual pH 7.05 at 20.1°C.

25 Aug 04 JB

Calibration of pH meter

Same meter, probe, and method used as on 653/98. Temp 20.3°C. Slope was 99.9

pH of reference solutions

Same methods and solutions used as described on 653/99 and 98. A table of the soln ID, expected pH and actual pH on next page. Measurements done to check the reliability of pH probe.

25 Aug 04 cont [illegible]

pH of reference solutions from 653/89

Soln ID	Target pH	Actual pH
Soln A	7.25	6.80
Soln B	7.50	7.43
Soln C	7.75	7.56
Soln D	8.00	7.83
Soln E	8.25	8.08
Soln F	8.50	8.30
Soln G	8.75	8.60
Soln H	9.00	8.82

Calibration verification with Fisher Buffer solution (pH 7.02 target range) Lot 033162-24 Cat SB108-500. Reading was 7.03.

26 Aug. 04 [illegible]

Samples of reagent solutions for chemistry and IC analysis

Samples taken from reagent solutions for the Tc sorption experiment (653/89). Two samples were taken from each of the eight reference solutions, 1, 30mL sample, for chemical analysis and 1, 40mL sample, for Inorganic Carbon analysis (IC).

~~25~~ 26 Aug. 04 cont [illegible]
8-26-04 [illegible]

Samples extracted 10 mL at a time with an Oxford macro pipette and transferred into a LUER-LOK 30 mL latex free syringe (order # 309650) with a Whatman 0.45 μm filter (cat # 6874-2504, Lot # 11026) attached. The sample is forced through the filter directly into a 30 mL pp bottle for chemical analysis by Div. 1 (specifically Ca, Mg, Na, K, Sr). The bottles are capped and parafilmed. The same syringe and filter are used in creating an IC sample ~~for each solution~~ 8-26-04 [illegible], but a different syringe and filter is used for each different solution, meaning 8 different sets of syringes and filters. About 40 mL of sample is filtered directly into a 40mL amber glass vial for IC analysis.
Samples are labled with their ID, given in 653/89.

A QA standard is prepared by taking 10mL of SPEX Centiprep, Instrument Calibration Standard 3 (Lot # 26-63AS, Cat # CL CAL-3) with a volumetric pipette and placing it into a 100 mL volumetric flask and filling to the line with type one water. This QA standard was labled Sol I. Thirty mL of QA standard was poured into a 30 mL pp bottle and ~~set~~ 8-26-04 [illegible] sent out for analysis with other samples.

27 Aug 04 [illegible]

Delivery of Cation Samples (Tc sorption experiment 653/100-101) to Div. 1 For analysis

Samples sent to Div. 01 From Tc sorption experiment (653/100-101)
8 samples + 1 QA
Chain of custody on next page

8-27-04 [illegible]

27 Aug 04 cont. [illegible]

SAMPLE LIST/CHAIN OF CUSTODY
Southwest Research Institute
Chemistry and Chemical Engineering Division
6220 Culebra Road
San Antonio, Texas 78238-5166

Requested Turnaround:
☐ 2 Weeks
☐ 3 Weeks
☒ Other: 4 weeks

Client Purchase Order/Other ID

SwRI Contact: Mike Dammann

Shipper Name/Address: Bradley Werlins
CNWRA - Div. 20
Bldg. 57

Client

Site/Zone ID

Analyses Requested

REMARKS
Preservation
a = HCl to pH <2
b = HNO_3 to pH <2
c = H_2SO_4 to pH <2
d = NaOH to pH >12
e = Cool (4°C±2°C)
f = Other (specify) none

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Co, Mg, Ni, Cs, Sr by ICP	REMARKS
Soln A	8/26/04		W		1	X	INTACT
Soln B						X	Nuclear Safety
Soln C						X	Limited use
Soln D						X	up to date QA
Soln E						X	records
Soln F						X	
Soln G						X	PDC - Brad Werlins
Soln H						X	X 6565
Soln I						X	Fax 5784
							(202.002.01.141)

Matrix Types:
A – Air
B – Biota
D - Dust
E – Emission/Stack
L - Liquid
P – Product
Sd - Solid
S – Soil
SED – Sediment
T - Tissue
W - Water
WP - Wipe

Sample Types:
D - Duplicate
ER – Equipment Rinsate
ES – Environmental Sample
FB – Field Blank
FD – Field Duplicate
MS – Matrix Spike
MSD – Matrix Spike Dup
TB – Trip Blank

Temp: 22.0°C
Therm #: 027
Comments: 653/100-101

	Date	Time
Relinquished by (Print/Signature): Jon Brown	8/27/04	
Received by (Print/Signature): [illegible]	8/27/04	
Relinquished by (Print/Signature):		
Received by (Print/Signature):		
Relinquished by (Print/Signature):		

SwRI Project: [illegible]
Received by SwRI Lab: (Signature) [illegible]
Date 08/27/04 Time 10:00 am
Samples Disposed: Date Time
Samples Disposed by:

Page 1 of 1

Div 01 COC Form 01-01-001, Rev 8/02

30 AUG 04 BAW

- Ref Solns for technetium/calcite sorption experiments

Soln C (pH 7.75 target) was not ~~at~~ BW 8-30-04 aerating. Replaced fritted tube + bubbling started again.

31 Aug 04 JB

Preparation of Inorganic Carbon Stock Solution standard For TC Analysis of Tc experiment samples

Target concentration for stock solution is 1000 mg/L Carbon from Sodium Carbonate (SC)
(Lot # 006077, S263-500)
SC Formula Na_2CO_3

For 1 liter soln 1000 ppm C has 1000 mg C

$$X_g SC \left(\frac{1 \text{ mol SC}}{105.99 \text{ SC}}\right)\left(\frac{1 \text{ mol C}}{1 \text{ mol SC}}\right)\left(\frac{12.011 \text{ g C}}{1 \text{ mol C}}\right)\left(\frac{1 \times 10^3 \text{ mg}}{\text{g}}\right) = 1000 \text{ mg C}$$

X = 8.824 g of SC in 1 L For 1000 ppm C mixed with type 1 water

Challenge of balance at start
(target 20.0001 g) = 20.0001 g
8-31-04 JB

31 Aug. 04 cont. JB

A weigh boat was tared on the Metler AE 240 electronic balance (SN 101237). The SC was carefully transfered with a spatula into the weighing boat. The final mass of the SC was 8.8243 g.

Challenge of balance at end
(target 20.0001 g) = 20.0001 g

The SC was transfered into a clean 200 mL beaker with about 100 mL of type 1 water. The weighing boat was rinsed several times with type 1 water. The ~~rinsate~~ 8-31-04 JB rinsate was also decanted into the beaker. The beaker was placed on a stir plate and a magnet stir bar was added. The soln was stirred for a few minutes. The beakers contents were decanted into a 1000 mL volumetric flask. The beaker was rinsed several times with type 1 water and transfered into the 1 L vol flask. Flask was inverted and shaken. Solution transfered into a 1 L amber glass bottle. Labled 1000 ppm Inorganic Carbon From Sodium Carbonate. Stored in refrigerator in L 106, Bldg 57.

8-31-04 JB

31 Aug 04 cont. ß

Preparation of IC calibration Standards

Target 200 ppm IC - Added 100 mL of 1000ppm IC (vol pipet) (653/105) into a 500 mL vol Flask Filled to the mark with type 1 water.

Target 100 ppm IC - Added 50 mL (vol. pipet) of 200 ppm IC (653/106) into a 100 mL vol. Flask filled to the mark with type 1 water.

Target 50 ppm IC - Added 25 mL (vol. pipet) of 200 ppm IC (653/106) into a 100 mL vol. Flask and filled to the mark with type 1 water.

Target 10 ppm IC - Added 25 mL (vol. pipet) of 200 ppm IC (653/106) into a 500 mL vol. Flask and filled to the mark w/ type 1 water.

Target 1 ppm IC - Added 50 mL (vol. pipet) of 10 ppm IC (653/106) into a 500 mL vol. Flask and filled to mark with type 1 water.

Preparation of Sodium Persulfate soln for TOC Analysis

Procedures and methods for creation of Sodium Persulfate reagent solution documented on 653/8-9.

31 Aug 04 cont. ß

The Mettler Toledo (SN 1122142730) PR 5002 was used to measure the Sodium Persulfate.
Inital calibration check, target 400.00 g, reading 400.00 g
Calibration check after measurement, target 400.00 g reading 400.00 g.
Mass of Sodium Persulfate = 25.00 g

Preparation of 21% Acid Reagent for TOC Analysis

Procedures, methods, and chemicals used in creation of 21% acid reagent documented on 653/9.

Inorganic Carbon (IC) analysis of TC reagent solutions

The Tekmar Dohrman Phoenix 8000 (S/N 00343010) was used to do an IC analysis on 8 reagent solutions for the Technetium-Calcite sorption experiment (653/89). Samples were taken on ~~Aug 4, 2004~~ 9-3-04 ß (653/100-101). Aug 26, 2004.
The method used in the IC analysis was IC Range 20-200 ppm. The expected detection range is between 1 and 200 ppm IC. Calibration points include 0 ppm, 1 ppm, 10 ppm, 50 ppm, 100 ppm and 200 ppm IC. The standards and samples were each run for 3 reps, while the blanks and

31 Aug 04 cont. JB

cleaning procedures were run for 6 reps. After the calibration and samples were run a 0, 50, and 100 ppm IC samples 8-31-04 JB ~~last~~ were run to check calibration status

1 Sept. 04 JB

IC analysis of Tc + calcium sorption experiment samples

Inorganic Carbon analysis of Tc + calcium sorption experiment solutions did not run to completion on 31 Aug 04. Analysis stoped after sampling Soln D.

Completion of IC analysis of Tc + calcium sorption experiment samples Soln E - H

The same methods and calibration curve standards used as on 653/106-107. Sample ID Soln E - H were 9-1-04 JB ~~ce~~ analized and a 0, 10, + 200 ppm QA standards used at the end of the run to check accuracy.

1 Sept. 04 JB

1 Sept. 04 cont. JB

Preparation of Technetium/Calcite sorption experiment test tubes

Calcite: (309/146 SI) prepared for last series of sorption experiments: stored in dessicator: dried in oven at 50°C before usage, 1 hr.
Solns A to H (653/89)
Electronic Balance: Mettler AE240 (S/N 101237)

32 polycarbonate 9-1-04 JB ~~test tubes~~ test tubes with caps were appropriately labeled (see following table). The TcCAI label prefix used on all test tubes represent Technetium/calcite. In this experiment one calcite mass was used (0.1 g). Eight different pH solns were used, Soln A-H, pH readings on 653/100. Each test was prepared in quadruplicate as represented by the Sufix 1, 2, 3 or 4.
A 30 mL glass beaker (spout directed to the right) was used to stabilized the test tubes on the balance. The test tuber were tilted to the right. Calcite was added (0.10 g) to a tared weighing dish with a spatula. The weigh dish was "coated" with calcite before this was done. 0.10 g aliquats were transfered from the weighing dish to the appropriate test tube. Before calcite added the test tube was weighed with the cap on. Once calcite is added to test tube it is placed in the tared 30 mL glass beaker on the

1 Sept. 04 cont. BS

Scale. The mass of the test tube + calcite is recorded on table that follows. During the handling of samples gloves are worn to prevent oil transfer to test tubes, which could change weight calculations.

Date Measured →	9-1-04 Mass (g) of test tube	9-1-04 Mass (g) of test tube + calcite	9-7-04 Mass (g) of test tube + calcite + solution
Test Tube ID			
TcCA1A1	22.0250	22.1345	53.9266
TcCA1A2	22.1897	22.2934	54.0456
TcCA1A3	21.9249	22.0305	53.7917
TcCA1A4	22.1957	22.2963	54.0088
TcCA1B1	22.4389	22.5391	53.4750
TcCA1B2	21.9752	22.0757	53.0331
TcCA1B3	22.1614	22.2607	53.2175
TcCA1B4	~~22.0458~~ 22.0461 9-1-04 BS	22.1455	53.1342
TcCA1C1	21.9639	22.0631	53.1843
TcCA1C2	21.9911	22.0913	53.2529
TcCA1C3	22.4996	22.6010	53.7354
TcCA1C4	21.9975	22.0993	53.2172
TcCA1D1	22.0973	22.1962	53.1740
TcCA1D2	22.0207	22.1234	52.8639
TcCA1D3	22.0716	22.1718	53.2004
TcCA1D4	21.9936	22.0957	53.1728
TcCA1E1	22.0511	22.1505	53.1500
TcCA1E2	21.9904	22.0918	53.1141
TcCA1E3	22.0097	22.1108	53.0960
TcCA1E4	21.9741	22.0746	53.1718
TcCA1F1	21.9802	22.0800	53.0644
TcCA1F2	22.0829	22.1837	53.1968
TcCA1F3	22.4506	22.5480	53.4785
TcCA1F4	21.9743	22.0733	53.1464
TcCA1G1	21.9972	22.0968	52.0611
TcCA1G2	22.1708	22.2730	53.2563
TcCA1G3	22.0522	22.1530	52.1302
TcCA1G4	22.4304	22.5309	53.4658
TcCA1H1	22.0432	22.1450	53.1837
TcCA1H2	22.0459	22.1460	52.8969
TcCA1H3	21.9325	22.0360	53.0096
TcCA1H4	22.0245	22.1287	53.1409

3 SEPT 04 BAW

~~Techet~~ BW 9-3-04 Technetium-calcite reference solutions

Checked solns in morning upon arrival to work. Soln F (pH 8.5 target) was not bubbling. Rubber band on moisture aspiration apparatus was broken and seal was lost. Resealed with new rubberband + worked fine.

Results of Inorganic Carbon (IC) Analyses of ~~Techet~~ BW 9-3-04 Technetium-Calcite Reference Solns

Analyses ~~docum~~ BW 9-3-04 documented on 653/~~106-107~~ BW 9-3-04 107-108. The sampling was performed overnight. In the next morning, it was discovered that the analyses stopped after the final rep of Ref soln D. We never identified why the sequence stopped at that point. A curve with freshly prepared solutions and the remaining samples and quality control samples was analyzed that day. The two ~~analyz~~ BW 9-3-04 analyses will be documented separately and then the complete results will be displayed collectively.

3 Sep 2004 CONT BWS

Analyses from raw data is stored in PRN files. PRN files contain 39 columns of information. The legend below identifies the contents of each column.

Information potentially subject to copyright protection was redacted from this location. The redacted material was a table from the Phoenix 8000 User Manual p. 6-58.

3 Sep 2004 CONT BW

PRN file 08311438 for ref solns A to D

1	2	3	4	5	6	7	8	9
~~v2.0	3	1	Done	0	8/31/04 14:41	USER1	0 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 14:44	USER1	0 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 14:47	USER1	0 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 14:51	USER1	0 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 14:53	USER1	0 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 14:56	USER1	0 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 15:00	USER1	1 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 15:03	USER1	1 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 15:06	USER1	1 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 15:10	USER1	10 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 15:13	USER1	10 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 15:17	USER1	10 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 15:21	USER1	50 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 15:25	USER1	50 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 15:29	USER1	50 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 15:33	USER1	100 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 15:37	USER1	100 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 15:41	USER1	100 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 15:46	USER1	200 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 15:51	USER1	200 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	8/31/04 15:55	USER1	200 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	10	1	Done	0	8/31/04 15:58	USER1	Blank	Blank IC Ranges 3 4 & 5
~~v2.0	10	1	Done	0	8/31/04 16:00	USER1	Blank	Blank IC Ranges 3 4 & 5
~~v2.0	10	1	Done	0	8/31/04 16:02	USER1	Blank	Blank IC Ranges 3 4 & 5
~~v2.0	10	1	Done	0	8/31/04 16:05	USER1	Blank	Blank IC Ranges 3 4 & 5
~~v2.0	10	1	Done	0	8/31/04 16:07	USER1	Blank	Blank IC Ranges 3 4 & 5
~~v2.0	10	1	Done	0	8/31/04 16:09	USER1	Blank	Blank IC Ranges 3 4 & 5
~~v2.0	0	1	Done	0	8/31/04 16:13	USER1	Soln A	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	8/31/04 16:16	USER1	Soln A	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	8/31/04 16:19	USER1	Soln A	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	8/31/04 16:23	USER1	Soln B	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	8/31/04 16:26	USER1	Soln B	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	8/31/04 16:29	USER1	Soln B	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	8/31/04 16:33	USER1	Soln C	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	8/31/04 16:36	USER1	Soln C	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	8/31/04 16:40	USER1	Soln C	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	8/31/04 16:44	USER1	Soln D	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	8/31/04 16:47	USER1	Soln D	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	8/31/04 16:51	USER1	Soln D	IC Range 20 - 200 ppm C

9-3-04 BW

3 Sept 04 CONT BAW

10	11	12	13	14	15	16	17	18	19	20
IC 20ppm up	2	2	3	1	1	83104	0.5	0	0	5
IC 20ppm up	2	2	3	2	1	83104	0.5	0	0	5
IC 20ppm up	2	2	3	3	1	83104	0.5	0	0	5
IC 20ppm up	2	2	3	1	2	83104	0.5	0	0	5
IC 20ppm up	2	2	3	2	2	83104	0.5	0	0	5
IC 20ppm up	2	2	3	3	2	83104	0.5	0	0	5
IC 20ppm up	2	2	3	1	3	83104	0.5	0	0	5
IC 20ppm up	2	2	3	2	3	83104	0.5	0	0	5
IC 20ppm up	2	2	3	3	3	83104	0.5	0	0	5
IC 20ppm up	2	2	3	1	4	83104	0.5	0	0	5
IC 20ppm up	2	2	3	2	4	83104	0.5	0	0	5
IC 20ppm up	2	2	3	3	4	83104	0.5	0	0	5
IC 20ppm up	2	2	3	1	5	83104	0.5	0	0	5
IC 20ppm up	2	2	3	2	5	83104	0.5	0	0	5
IC 20ppm up	2	2	3	3	5	83104	0.5	0	0	5
IC 20ppm up	2	2	3	1	6	83104	0.5	0	0	5
IC 20ppm up	2	2	3	2	6	83104	0.5	0	0	5
IC 20ppm up	2	2	3	3	6	83104	0.5	0	0	5
IC 20ppm up	2	2	3	1	7	83104	0.5	0	0	5
IC 20ppm up	2	2	3	2	7	83104	0.5	0	0	5
IC 20ppm up	2	2	3	3	7	83104	0.5	0	0	5
IC 20ppm up	2	2	6	1	1001	83104	0	0	0	5
IC 20ppm up	2	2	6	2	1001	83104	0	0	0	5
IC 20ppm up	2	2	6	3	1001	83104	0	0	0	5
IC 20ppm up	2	2	6	4	1001	83104	0	0	0	5
IC 20ppm up	2	2	6	5	1001	83104	0	0	0	5
IC 20ppm up	2	2	6	6	1001	83104	0	0	0	5
IC 20ppm up	2	2	3	1	8	83104	0.5	0	0	5
IC 20ppm up	2	2	3	2	8	83104	0.5	0	0	5
IC 20ppm up	2	2	3	3	8	83104	0.5	0	0	5
IC 20ppm up	2	2	3	1	9	83104	0.5	0	0	5
IC 20ppm up	2	2	3	2	9	83104	0.5	0	0	5
IC 20ppm up	2	2	3	3	9	83104	0.5	0	0	5
IC 20ppm up	2	2	3	1	10	83104	0.5	0	0	5
IC 20ppm up	2	2	3	2	10	83104	0.5	0	0	5
IC 20ppm up	2	2	3	3	10	83104	0.5	0	0	5
IC 20ppm up	2	2	3	1	11	83104	0.5	0	0	5
IC 20ppm up	2	2	3	2	11	83104	0.5	0	0	5
IC 20ppm up	2	2	3	3	11	83104	0.5	0	0	5

9-3-04 BW

3 Sept 04 CONT BAW

21	22	23	24	25	26	27	28	29	30	31
0	0.5	0	10	0	1	6.929	7.925	62	97299	0
0	0.5	0	10	0	1	6.844	7.841	63	100312	0
0	0.5	0	10	0	1	6.822	7.816	64	103869	0
0	0.5	0	10	0	1	6.749	7.742	64	103609	0
0	0.5	0	10	0	1	6.738	7.732	63	102354	0
0	0.5	0	10	0	1	6.729	7.723	63	99541	0
0	0.5	0	10	0	1	6.617	7.608	73	237111	0
0	0.5	0	10	0	1	6.649	7.641	72	230157	0
0	0.5	0	10	0	1	6.567	7.563	72	235523	0
0	0.5	0	10	0	1	6.519	7.512	93	1373150	0
0	0.5	0	10	0	1	6.524	7.523	94	1379651	0
0	0.5	0	10	0	1	6.47	7.467	93	1367098	0
0	0.5	0	10	0	1	6.365	7.364	118	6510359	0
0	0.5	0	10	0	1	6.502	7.499	115	6638296	0
0	0.5	0	10	0	1	6.485	7.483	116	6679342	0
0	0.5	0	10	0	1	6.402	7.402	129	12628788	0
0	0.5	0	10	0	1	6.537	7.532	127	12783782	0
0	0.5	0	10	0	1	6.538	7.537	126	12782907	0
0	0.5	0	10	0	1	6.405	7.404	157	28052547	0
0	0.5	0	10	0	1	6.621	7.62	147	28476037	0
0	0.5	0	10	0	1	6.645	7.641	148	28380487	0
0	0.5	0	10	0	0.5	6.5	6.997	63	153664	0
0	0.5	0	10	0	0.5	6.185	6.681	66	95268	0
0	0.5	0	10	0	0.5	6.116	6.612	66	84142	0
0	0.5	0	10	0	0.5	6.052	6.551	67	83282	0
0	0.5	0	10	0	0.5	6.056	6.553	66	78748	0
0	0.5	0	10	0	0.5	6.001	6.497	67	79850	0
0	0.5	0	10	0	1	5.957	6.954	79	433254	1.3112
0	0.5	0	10	0	1	5.972	6.969	78	420327	1.2631
0	0.5	0	10	0	1	5.929	6.927	78	421683	1.2682
0	0.5	0	10	0	1	5.83	6.824	83	537430	1.6985
0	0.5	0	10	0	1	5.849	6.844	82	521978	1.6411
0	0.5	0	10	0	1	5.821	6.82	83	520336	1.635
0	0.5	0	10	0	1	5.776	6.774	88	837678	2.815
0	0.5	0	10	0	1	5.745	6.74	88	823333	2.7616
0	0.5	0	10	0	1	5.776	6.769	87	824080	2.7644
0	0.5	0	10	0	1	5.713	6.706	95	1376830	4.8197
0	0.5	0	10	0	1	5.742	6.737	93	1349099	4.7166
0	0.5	0	10	0	1	5.754	6.752	93	1347778	4.7117

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3 Sep 04 CONT BW

32	33	34	35	36	37	38	39
0	216905	2.40E+05	2/16/97 12:24	0.99993	129934	8311438	8311439
0	216905	2.40E+05	2/16/97 12:24	0.99993	129934	8311438	8311442
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311445
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311449
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311452
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311455
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311458
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311501
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311504
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311508
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311511
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311515
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311518
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311522
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311526
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311530
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311534
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311538
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311543
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311547
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311552
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311557
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311559
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311601
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311603
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311606
0	0	0.00E+00	1/1/70 0:00	0.99993	129934	8311438	8311608
2.6224	80627	2.69E+05	6/24/03 14:48	0.99993	129934	8311438	8311611
2.5262	80627	2.69E+05	6/24/03 14:48	0.99993	129934	8311438	8311614
2.5363	80627	2.69E+05	6/24/03 14:48	0.99993	129934	8311438	8311617
3.3971	80627	2.69E+05	6/24/03 14:48	0.99993	129934	8311438	8311621
3.2822	80627	2.69E+05	6/24/03 14:48	0.99993	129934	8311438	8311624
3.27	80627	2.69E+05	6/24/03 14:48	0.99993	129934	8311438	8311627
5.6299	80627	2.69E+05	6/24/03 14:48	0.99993	129934	8311438	8311631
5.5233	80627	2.69E+05	6/24/03 14:48	0.99993	129934	8311438	8311634
5.5288	80627	2.69E+05	6/24/03 14:48	0.99993	129934	8311438	8311638
9.6394	80627	2.69E+05	6/24/03 14:48	0.99993	129934	8311438	8311641
9.4332	80627	2.69E+05	6/24/03 14:48	0.99993	129934	8311438	8311645
9.4234	80627	2.69E+05	6/24/03 14:48	0.99993	129934	8311438	8311648

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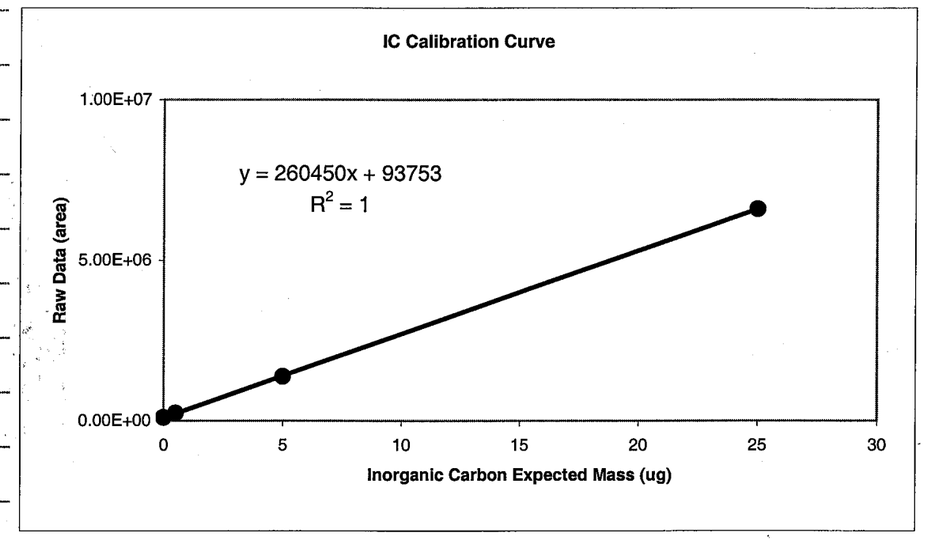
Inorganic Carbon (IC) Analysis for TcCa ref solns A to D
Method IC 20-200 ppm (standard method)
Range 1.0 ppm to 200 ppm IC

IC Standard Data

IC Std (ppm)	IC expected mass (ug)	Raw Data rep 1	Raw Data rep 2	Raw Data rep 3	Raw Data Ave
0	0	103609	102354	99541	101835
1	0.5	237111	230157	235523	234264
10	5	1373150	1379651	1367098	1373300
50	25	6510359	6638296	6679342	6609332
100*	50	12628788	12783782	12782907	12731826
200*	100	28052547	28476037	28380487	28303024
Blank (last 3)	0	83282	78748	79850	80627

*not used - only needed to go as high as the 50 ppm std to encompass sample area counts



IC Sample Data

Sample ID	Raw Data rep 1	Raw Data rep 2	Raw Data rep 3	Raw Data Ave	Mass (ug)	Conc # (ppm)
Soln A	433254	420327	421683	425088	1.323	2.645
Soln B	537430	521978	520336	526581	1.712	3.424
Soln C	837678	823333	824080	828364	2.871	5.742
Soln D	1376830	1349099	1347778	1357902	4.904	9.808

Samples used blank for calculation - not y-intercept
Calculated by dividing the mass by the volume of sample (0.5mL)
Instrument stopped analyses after final rep of soln D for unknown reason.
The remaining solutions and quality control samples were not run.
On the next day, the instrument was recalibrated and the remaining solns were analyzed.

3 Sep 04 CONT BAW

PRN file 09011005 for ref solns E to H

1	2	3	4	5	6	7	8	9
~~v2.0	3	1	Done	0	9/1/04 10:08	USER1	0 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 10:11	USER1	0 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 10:14	USER1	0 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 10:18	USER1	0 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 10:21	USER1	0 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 10:24	USER1	0 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 10:28	USER1	1 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 10:31	USER1	1 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 10:34	USER1	1 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 10:38	USER1	10 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 10:41	USER1	10 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 10:45	USER1	10 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 10:49	USER1	50 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 10:53	USER1	50 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 10:57	USER1	50 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 11:02	USER1	100 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 11:06	USER1	100 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 11:10	USER1	100 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 11:15	USER1	200 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 11:20	USER1	200 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	3	1	Done	0	9/1/04 11:24	USER1	200 ppm IC	IC Range 20 - 200 ppm C
~~v2.0	10	1	Done	0	9/1/04 11:27	USER1	Blank	Blank IC Ranges 3 4 & 5
~~v2.0	10	1	Done	0	9/1/04 11:30	USER1	Blank	Blank IC Ranges 3 4 & 5
~~v2.0	10	1	Done	0	9/1/04 11:32	USER1	Blank	Blank IC Ranges 3 4 & 5
~~v2.0	10	1	Done	0	9/1/04 11:35	USER1	Blank	Blank IC Ranges 3 4 & 5
~~v2.0	10	1	Done	0	9/1/04 11:37	USER1	Blank	Blank IC Ranges 3 4 & 5
~~v2.0	10	1	Done	0	9/1/04 11:40	USER1	Blank	Blank IC Ranges 3 4 & 5
~~v2.0	0	1	Done	0	9/1/04 11:44	USER1	Soln E	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 11:47	USER1	Soln E	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 11:51	USER1	Soln E	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 11:55	USER1	Soln F	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 11:59	USER1	Soln F	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 12:03	USER1	Soln F	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 12:07	USER1	Soln G	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 12:11	USER1	Soln G	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 12:15	USER1	Soln G	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 12:20	USER1	Soln H	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 12:24	USER1	Soln H	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 12:28	USER1	Soln H	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 12:32	USER1	IC 0 ppm	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 12:35	USER1	IC 0 ppm	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 12:38	USER1	IC 0 ppm	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 12:42	USER1	IC 10 ppm	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 12:46	USER1	IC 10 ppm	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 12:49	USER1	IC 10 ppm	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 12:54	USER1	IC 200 ppm	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 12:59	USER1	IC 200 ppm	IC Range 20 - 200 ppm C
~~v2.0	0	1	Done	0	9/1/04 13:03	USER1	IC 200 ppm	IC Range 20 - 200 ppm C

3 Sep 04 CONT BAW

10	11	12	13	14	15	16	17	18	19	20	21	22
IC 20ppm up	2	2	3	1	1	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	2	1	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	3	1	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	1	2	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	2	2	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	3	2	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	1	3	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	2	3	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	3	3	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	1	4	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	2	4	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	3	4	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	1	5	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	2	5	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	3	5	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	1	6	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	2	6	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	3	6	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	1	7	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	2	7	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	3	7	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	6	1	1001	90104	0	0	0	5	0	0.5
IC 20ppm up	2	2	6	2	1001	90104	0	0	0	5	0	0.5
IC 20ppm up	2	2	6	3	1001	90104	0	0	0	5	0	0.5
IC 20ppm up	2	2	6	4	1001	90104	0	0	0	5	0	0.5
IC 20ppm up	2	2	6	5	1001	90104	0	0	0	5	0	0.5
IC 20ppm up	2	2	6	6	1001	90104	0	0	0	5	0	0.5
IC 20ppm up	2	2	3	1	8	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	2	8	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	3	8	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	1	9	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	2	9	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	3	9	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	1	10	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	2	10	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	3	10	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	1	11	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	2	11	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	3	11	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	1	12	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	2	12	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	3	12	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	1	13	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	2	13	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	3	13	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	1	14	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	2	14	90104	0.5	0	0	5	0	0.5
IC 20ppm up	2	2	3	3	14	90104	0.5	0	0	5	0	0.5

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23	24	25	26	27	28	29	30	31	32
0	10	0	1	4.095	5.087	71	156019	0	0
0	10	0	1	4.096	5.093	72	157577	0	0
0	10	0	1	4.15	5.15	71	153280	0	0
0	10	0	1	4.122	5.118	72	157680	0	0
0	10	0	1	4.118	5.11	72	157030	0	0
0	10	0	1	4.133	5.125	73	164265	0	0
0	10	0	1	4.142	5.14	81	305448	0	0
0	10	0	1	4.2	5.195	81	305231	0	0
0	10	0	1	4.205	5.204	80	303253	0	0
0	10	0	1	4.151	5.146	101	1503119	0	0
0	10	0	1	4.202	5.194	99	1495026	0	0
0	10	0	1	4.23	5.228	100	1493282	0	0
0	10	0	1	4.236	5.232	125	7103805	0	0
0	10	0	1	4.358	5.356	122	7163899	0	0
0	10	0	1	4.301	5.297	124	7181723	0	0
0	10	0	1	4.278	5.277	138	13504042	0	0
0	10	0	1	4.441	5.438	135	13539957	0	0
0	10	0	1	4.429	5.429	135	13700995	0	0
0	10	0	1	4.399	5.398	168	30263330	0	0
0	10	0	1	4.627	5.626	159	30608045	0	0
0	10	0	1	4.796	5.795	154	30305671	0	0
0	10	0	0.5	4.702	5.199	75	242422	0	0
0	10	0	0.5	4.413	4.909	78	186214	0	0
0	10	0	0.5	4.386	4.882	78	174401	0	0
0	10	0	0.5	4.349	4.848	79	171038	0	0
0	10	0	0.5	4.345	4.842	78	166616	0	0
0	10	0	0.5	4.299	4.799	77	167311	0	0
0	10	0	1	4.23	5.224	108	2485319	8.6154	17.2307
0	10	0	1	4.343	5.335	108	2436082	8.4323	16.8646
0	10	0	1	4.344	5.341	107	2467478	8.549	17.0981
0	10	0	1	4.341	5.337	115	3820280	13.5792	27.1584
0	10	0	1	4.367	5.363	113	3713734	13.183	26.366
0	10	0	1	4.444	5.438	112	3766995	13.3811	26.7621
0	10	0	1	4.334	5.33	125	7638848	27.7779	55.5558
0	10	0	1	4.421	5.419	124	7644454	27.7987	55.5975
0	10	0	1	4.492	5.485	125	7624603	27.7249	55.4499
0	10	0	1	4.422	5.419	140	14655607	53.8685	107.7371
0	10	0	1	4.511	5.509	138	14614849	53.717	107.434
0	10	0	1	4.604	5.6	136	14671393	53.9272	107.8545
0	10	0	1	4.528	5.522	73	247087	0.2929	0.5858
0	10	0	1	4.31	5.306	75	199139	0.1146	0.2292
0	10	0	1	4.265	5.261	75	194263	0.0965	0.1929
0	10	0	1	4.268	5.267	102	1533696	5.0769	10.1538
0	10	0	1	4.329	5.325	101	1507370	4.979	9.958
0	10	0	1	4.296	5.294	101	1530643	5.0656	10.1311
0	10	0	1	4.288	5.286	175	30575356	113.0635	226.1269
0	10	0	1	4.624	5.622	161	30379373	112.3347	224.6695
0	10	0	1	4.783	5.78	157	30479584	112.7074	225.4147

3 Sep 04 CONT BAW

33	34	35	36	37	38	39
216905	2.40E+05	2/16/97 12:24	0.99993	129934	9011005	9011006
216905	2.40E+05	2/16/97 12:24	0.99993	129934	9011005	9011009
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011012
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011016
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011019
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011022
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011025
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011029
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011032
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011036
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011039
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011043
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011047
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011051
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011055
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011059
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011103
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011107
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011112
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011117
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011121
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011126
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011128
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011131
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011133
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011136
0	0.00E+00	1/1/70 0:00	0.99993	129934	9011005	9011138
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011141
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011145
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011149
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011153
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011157
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011200
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011205
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011208
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011212
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011217
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011221
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011225
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011230
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011233
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011236
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011240
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011243
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011247
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011251
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011256
168322	2.69E+05	6/24/03 14:48	0.99993	129934	9011005	9011300

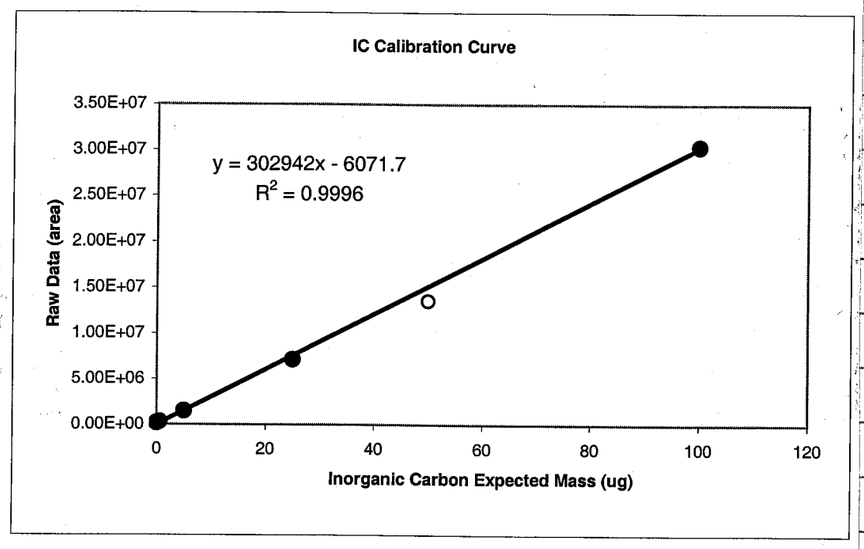
3 Sept 04 CONT BAW

Inorganic Carbon (IC) Analysis for TcCa ref solns E to H
Method IC 20-200 ppm (standard method)
Range 1.0 ppm to 200 ppm IC

IC Standard Data

IC Std (ppm)	IC expected mass (ug)	Raw Data rep 1	Raw Data rep 2	Raw Data rep 3	Raw Data Ave
0	0	157680	157030	164265	159658
1	0.5	305448	305231	303253	304644
10	5	1503119	1495026	1493282	1497142
50	25	7103805	7163899	7181723	7149809
100*	50	13504042	13539957	13700995	13581665
200	100	30263330	30608045	30305671	30392349
Blank (last 3)	0	171038	166616	167311	168322

* not used (unfilled circle on graph) - seemed low relative to other cal pts



IC Sample Data

Sample ID	Raw Data rep 1	Raw Data rep 2	Raw Data rep 3	Raw Data Ave	mass (ug)	conc # (ppm)
Soln E	2485319	2436082	2467478	2462960	7.575	15.1
Soln F	3820280	3713734	3766995	3767003	11.879	23.8
Soln G	7638848	7644454	7624603	7635968	24.650	49.3
Soln H	14655607	14614849	14671393	14647283	47.794	95.6
IC std 10 ppm	1533696	1507370	1530643	1523903	5.050	10.1
IC std 200 ppm	30575356	30379373	30479584	30478104	100.627	201

Samples used blank for calculation while calibration challenges used y-intercept
Calculated by dividing the mass by the volume of sample (0.5mL)

3 Sep 04 CONT BAW

Sample ID	Conc (ppm)
Soln A	2.65
Soln B	3.42
Soln C	5.74
Soln D	9.81
Soln E	15.1
Soln F	23.8
Soln G	49.3
Soln H	95.6
IC std 10 ppm	10.1
IC std 200 ppm	201

Above table is ~~for~~ 9-3-04 BW summary of Technetium-calcite reference solutions IC results. Solns A to D were analyzed on 8-31-04 without quality assurance samples at the end. Solns E to H were analyzed on 9-1-2004 with quality assurance samples at the end. The calibration curves were analyzed each day. The were prepared fresh each day from the same stock solution.

9-2-04

7 Sept. 04 [illegible]

Continuation of preparation of test tube solutions (653/109) for calcite + Tc experiment

120 mL of each reference solution (A-H) was removed from the 2 L containers (653/89). A Cole-Parmer MasterFlex E/S Portable sampler pump (Model # 07571-00, S/N 601003175) was used to draw the sample. The sample was pumped through MasterFlex 06429-24 (Lot # 156699) tubing with a Filter on the end. Solutions A-E were Filtered with AquaPrep 600 Capsules 0.45 µm (Lot # 70270) ~~Filters. Solutions F-H were Filtered with~~ (product # 12176) PALL Gelman Laboratory Filters. Solutions F-H were Filtered with PALL Gelman Laboratory High Capacity In-Line Groundwater Sample Filter 0.45 µm (Lot # 58120, product # 12178). Different Filters were used due to the limited amount of Filters on-hand. The pumped and Filtered water is put into a 250 mL glass beaker. ~~The Filtered water is then~~ poured into the test tubes ~~(~30 mL each)~~. A new tube, Filter, and beaker is used for each reference solution to prevent cross contamination. The Filtered water is then transferred into the test tubes (~30 mL each) ~~by~~ with an Oxford Maxo pipet.

9-7-04 [illegible]

7 Sept. 04 cont. [illegible]

Weighing of Test tube + Calcite + solution for Tc + Calcium sorption experiment

A 30 mL glass beaker (spout directed to right) was used to stabilize the test tubes on the balance. The Mettler AE 240 scale (S/N 101232) was used to determine the weight of the test tubes + calcite + solution. The balance was tared with the beaker on it then the test tubes were placed in and the measurement was taken.

Inital calibration check (Target ~~4~~ 20.0001g) 9-7-04 [illegible]
reading 20.0000 g

Final calibration (Target 20.0001 g)
reading 20.0001 g.

Results recorded on table on page 653/110.

Vortexing test tubes in Tc + calcite sorption experiment

The Vortex Genie 2 Model G-560 (S/N 2-187895) was used to mix the soln and calcite in the test tubes. The test tubes were placed on it one at a time and vortexed for ~1 min at level six. Test tubes stored with their caps unscrewed on a ~~gyrator in Flats~~ gyrotory shaker in lab 108. 9-7-04 [illegible]

9 Sept. 04 [illegible]

Weighing of Test tubes before Technetium spike

Same scale and procedures used as on 653/109-110, to weigh(g) the testtubes for the Tc + calcite sorption experiment. (653/89)

Initial challenge of balance at start
(Target 20.0001 g)
reading 20.0001

Final challenge of balance at end
(Target 20.0001 g)
reading 20.0001

The measurements are in the table that follows.

9-9-04 [illegible]

9 Sept. cont. [illegible]

Date Measured →	9-9-04 Mass (g) before Technetium spike	9-9-04 Mass (g) after Technetium spike
Test Tube ID		
TcCA1A1	53.8883	54.1319
TcCA1A2	54.0113	54.2562
TcCA1A3	53.7651	54.0562
TcCA1A4	53.9839	54.2285
TcCA1B1	53.4398	53.6842
TcCA1B2	52.9888	53.2339
TcCA1B3	53.1394	53.3848
TcCA1B4	53.1109	53.3558
TcCA1C1	53.1491	53.3941
TcCA1C2	53.1756	53.4208
TcCA1C3	53.6554	53.9001
TcCA1C4	53.1360	53.3816
TcCA1D1	53.1382	53.3830
TcCA1D2	52.7861	53.0315
TcCA1D3	53.1193	53.3644
TcCA1D4	53.1414	53.3862
TcCA1E1	53.0728	53.3184
TcCA1E2	53.0342	53.2802
TcCA1E3	53.0469	53.2920
TcCA1E4	53.0871	53.3329
TcCA1F1	53.0327	53.2782
TcCA1F2	53.1522	53.3985
TcCA1F3	53.3966	53.6423
TcCA1F4	53.1191	53.3643
TcCA1G1	53.0241	53.2698
TcCA1G2	53.1708	53.4166
TcCA1G3	53.1008	53.3461
TcCA1G4	53.4303	53.6752
TcCA1H1	53.1568	53.4025
TcCA1H2	52.8703	53.1163
TcCA1H3	52.9792	53.2243
TcCA1H4	53.1080	53.3531

9 Sept. cont 04

Technetium spiking of test tubes, calcite soln's

Calcite test tube solutions (653/89, 110)
Technetium spike solution was #48A, isotope Tc-99, amount 9.73×10^{-2} mg/g (369/084)

250 uL of the Tc spike solution was transfered with an eppendorf (250 uL) pipett into each of the test tubes (653/89), (653/110).

After the Tc spike was added to the calcite + soln in the test tube they were reweighed on the Mettler AE 240 (SN 101237) scale. A 30 mL glass beaker is placed on the scale and tared. The test tubes are placed in the beaker for stabilization one at a time and the measurement is taken and recorded on table on 653/127.

Initial challenge of balance (target 20.0001 g)
reading 20.0001 g
Final challenge of balance (target 20.0001 g)
reading 20.0000 g

After Tc spiking and weighing the test tubes were swirled and vortexed to mix the calcite and soln. The caps were removed from test tubes for 3 hours, then placed back on loosly to alow soln to reach equilibrium with the atmosphere.

9 Sept cont 04

Photocopied and sent to QA 9-9-04

10 Sept. 04

Labeling and weighing of LSA test tubes for Tc + calcite sorption experiment

67 Liquid Scintillation Analyzer ~~LSA~~ 9-10-04 (LSA) test tubes (2 mL, glass) were labeled on their caps. Each of the 32 test tubes (653/110) with calcite + reference soln + Tc had two LSA test tubes for analysis. Since there are duplicate LSA test tubes for each orignal (653/110) soln test tubes, an A and B were added to the labels to distinguish between the first and second duplicate LSA samples.

Example: TcCA1A1-A and TcCA1A1-B
~~TcCA2~~ 9-10-04 JS TcCA1A2-A and TcCA1A2-B

The Mettler AE240 (SN 101237) scale was used to weigh (g) the LSA test tubes before samples were added. The sample weights are recorded on the table on 653/130.

Initial calibration check (Target 20.0001 g)
reading 20.0001 g
Final calibration check (Target 20.0001 g)
reading 20.0001 g

- A sample Blank was added in begining and two standards at end of sample set (Tc Standard, 48A, 369/84)

9-10-04 BB 10 Sept. 04 cont. BB

Date Measured →	9-10-04 BB 9/14/04	9-14-04
Test Tube ID	Mass (g) of ~~Test Tube~~ LSA VIALS	Mass (g) of Test Tube + sample
Blank	7.3911	7.9081
TcCA1A1-A	7.1571	7.6727
TcCA1A1-B	7.1212	7.6367
TcCA1A2-A	7.1775	7.6925
TcCA1A2-B	7.1702	7.6852
TcCA1A3-A	7.1094	7.6224
TcCA1A3-B	7.2625	7.7788
TcCA1A4-A	7.3235	7.8394
TcCA1A4-B	7.1221	7.6368
TcCA1B1-A	7.2483	7.7526
TcCA1B1-B	7.1994	7.7046
TcCA1B2-A	7.1032	7.6066
TcCA1B2-B	7.2860	7.7895
TcCA1B3-A	7.1897	7.6930
TcCA1B3-B	7.1584	7.6619
TcCA1B4-A	7.1863	7.6910
TcCA1B4-B	7.1594	7.6629
TcCA1C1-A	7.2701	7.7744
TcCA1C1-B	7.1185	7.6231
TcCA1C2-A	7.1366	7.6403
TcCA1C2-B	7.2453	7.7499
TcCA1C3-A	7.3253	7.8253
TcCA1C3-B	7.4100	7.9143
TcCA1C4-A	7.3301	7.8321
TcCA1C4-B	7.3586	7.8616
TcCA1D1-A	7.4912	7.9904
TcCA1D1-B	7.3953	7.8971
TcCA1D2-A	7.4450	7.9468
TcCA1D2-B	7.3839	7.8871
TcCA1D3-A	7.4261	7.9285
TcCA1D3-B	7.4390	7.9404
TcCA1D4-A	7.4996	8.0012
TcCA1D4-B	7.3779	7.8810
TcCA1E1-A	7.2723	7.7738
TcCA1E1-B	7.3516	7.8553
TcCA1E2-A	7.4415	7.9442

10 Sept. 04 cont. BB

Test Tube ID	Mass (g) of ~~Test Tube~~ LSA VIALS BB 14 Sep 04	Mass (g) of Test Tube + sample
TcCA1E2-B	7.3437	7.8436
TcCA1E3-A	7.3165	7.8183
TcCA1E3-B	7.3883	7.8898
TcCA1E4-A	7.4553	7.9558
TcCA1E4-B	7.4178	7.9207
TcCA1F1-A	7.5424	8.0439
TcCA1F1-B	7.3285	7.8293
TcCA1F2-A	7.4463	7.9467
TcCA1F2-B	7.3401	7.8434
TcCA1F3-A	7.3601	7.8608
TcCA1F3-B	7.4780	7.9797
TcCA1F4-A	7.4476	7.9451
TcCA1F4-B	7.3299	7.8305
TcCA1G1-A	7.4089	7.9079
TcCA1G1-B	7.3923	7.8932
TcCA1G2-A	7.4530	7.9526
TcCA1G2-B	7.4382	7.9376
TcCA1G3-A	7.4355	7.9353
TcCA1G3-B	7.3037	7.8055
TcCA1G4-A	7.2799 ~~7.3631~~ 7.3914	7.7808
TcCA1G4-B	7.3464 ~~7.4291~~ 7.4667	7.8471
TcCA1H1-A	7.3914 ~~7.3082~~ 7.2799	7.8924
TcCA1H1-B	7.4667 ~~7.3840~~ 7.3464	7.9673
TcCA1H2-A	7.4105	7.9113
TcCA1H2-B	7.4551	7.9580
TcCA1H3-A	7.3897	7.8893
TcCA1H3-B	7.3730	7.8712
TcCA1H4-A	7.3786	7.8788
TcCA1H4-B	7.4426	7.9442
Tc Standard, 48A 1	7.3867	7.6375
Tc Standard, 48A 2	7.3768	7.6275

9-14-04 BAW

13 Sep 04 BRW

Aeration of technetium-calcite Series I experimental solutions

The technetium-calcite series I experimental solutions (653/128) that we inside the activated gyratory shaker were ~~aer~~ BW 9-13-04 aerated. At 10:15 the shaker was stopped and the caps to the exp solns were removed and placed on a tray with a large Kimwipe underneath. The shaker was restarted. At about 3:15, the shaker was stopped and the caps were placed loosely on the top of the exp solns. The shaker was restarted.

14 Sep 04 JB

Aeration of Technetium - calcite series I ~~experiment~~ 9-14-04 JB experimental solutions

The technetium calcite series I experimental solutions (653/127) that were inside the activated gyratory shaker were swirled and aerated. The caps were removed at 9:45 am and placed back on tightly at 10:45 am to get prepared for the weighing.

9-14-04 JB

14 Sept. 04 cont. JB

Weighing of reference soln + test tubes For Tc + calcite sorption experiment

Same scale and procedures used as on 653/109-110 to weigh (5) the reference soln for the Tc + calcite sorption experiment (653 89).

Initial challenge of balance
(Target 20.0001 g)
reading 20.0001 g

Final challenge of balance
(Target 20.0001 g)
reading 20.0001 g

The measurements were done to get actual weight before aliquots taken.
The weights are recorded on the table that follows.

9-14-04 JB

14 Sept. 04 cont. JB

Date Measured →	9-14-04	9-14-04, 9-15-04
	Mass (g) of Test Tube	pH of test tubes
Test Tube ID	before aliquot taken	after aliquots taken
TcCA1A1	53.9279	9-15-04 JB ~~7.05~~ 6.83
TcCA1A2	54.0512	6.82
TcCA1A3	53.8410	6.80
TcCA1A4	53.9816	6.78
TcCA1B1	53.4344	7.45
TcCA1B2	52.9767	7.47
TcCA1B3	53.1085	7.47
TcCA1B4	53.0668	7.49
TcCA1C1	53.1261	9-15-04 JB ~~7.77~~ ~~7.64~~ 7.52
TcCA1C2	53.1375	9-14-04 JB ~~7.72~~ 7.45
TcCA1C3	53.6637	~~7.69~~ 7.51
TcCA1C4	53.0964	7.48
TcCA1D1	53.1370	7.83
TcCA1D2	52.8001	7.77
TcCA1D3	53.0949	7.74
TcCA1D4	53.0834	7.72
TcCA1E1	53.0824	8.20
TcCA1E2	53.0311	8.20
TcCA1E3	53.0105	8.20
TcCA1E4	53.0611	8.17
TcCA1F1	53.0382	8.38
TcCA1F2	53.1486	8.35
TcCA1F3	53.3991	8.30
TcCA1F4	53.1138	8.20
TcCA1G1	53.0235	8.48
TcCA1G2	53.1284	8.47
TcCA1G3	53.1135	8.47
TcCA1G4	53.3979	8.44
TcCA1H1	53.1401	8.75
TcCA1H2	52.8368	8.70
TcCA1H3	52.9764	8.73
TcCA1H4	53.0644	8.71

9-14-04 JB

14 Sept. 04 cont. JB

Aliquots of Tc + ~~calcite~~ 9-14-04 JB calcite sorption exp reference soln into LSA vials for analysis

Removal of aliquots from the 32 Technetium + calcite series 1 reference solutions (653/127-128). Two 500 µL aliquots were removed from the reference soln with an eppendorf pipett (500 µL), and placed into the corresponding LSA vials (500 µL each). Caution was taken not to extract any calcite from the reference solutions into the LSA vials.

For the "blank" 500 µL of reference soln A was used, from 2 L containers (653/89)

For the two ~~stock~~ 9-14-04 JB standards (Tc Standard 48A 1 and Tc Standard 48A 2) 250 µL of the stock Tc soln (48A, 369/089) was transfered into each of the 2 LSA standard vials with an eppendorf pipett (250 ~~ml~~ 9-14-04 µL)

Weight (g) of LSA vials + sample

The 67 LSA vials with sample ~~filled~~ 9-14-04 JB (653/135) were weighed and recorded in table on (653/130-131). LSA vials weighed (g) on Mettler AE 240 (SN 101237) scale.

9-14-04 JB

14 Sept. 04 cont JB

pH calibration and measurement of reference solutions for Tc + calcite sorption experiment

meter: Orion model 920 A S/N 039518
probe: Thermo Orion 8103BN

Calibration

Two buffer calibration points used. Fisher Buffer solution pH 7.02 (Lot # 033162-24, cat SB108-500) and 10.06 (Lot # 033031-24, cat # SB116-500). The buffer soln used were transfered to 60 mL LDPE containers on 9-3-04 for use in calibration. Temperature was 21.5°C. Calibration slope was 99.9 % (Target for exceptable slope is 92-102 %).

Measurement

pH reading taken of the 32 Tc + calcite reference solutions (653/128, 134). Measurements recorded on table on page 653/134. The stationary probe was put inside the test tube (ref. soln.), while the test tube was held by hand and gently swirled until a stable pH reading was ~~attained~~ 9-14-04 JB established. The probe was rinsed with NanoPure water between samples and patted dry with Kimwipes. Data recorded after ~3 min, once reading stabilized. Samples ~~A1-F4~~ 9-14-04 JB TcCA1A1-TcCA1E4 completed.

15 Sept 04 JB

Continuation of pH measurements of reference solutions

Calibration

Same meter, probe, and calibration soln used as on 653/136. Temperature was 20.1°C. The slope of calibration was 99.6 % (exceptable slope range is 92-102 %).

Measurement

pH readings taken of the remaining 12 samples TcCA1F1 - TcCA1H4 (653/134). The same methodology used as on 653/136. Data recorded on 653/134.

Adding cocktail soln to LSA vials

Paul Bertotti added 5 mL of ULTIMA GOLD AB (Lot#6013309, ~~Lot 96~~ 9-15-04 JB Lot # 91-2111, PO # 35949 ok) cocktail soln to all 67 of the LSA vials (653/129-131), on 9-14-04. A Barnstead/Labindustries Repipet ~~JB~~ 9-15-04 (pat nos 3,211,335; RE28,970; 3,217,761; 3,762,799; 3,955,930) was used to transfer 5 mL of ULTIMA GOLD AB into the LSA vials.

9-21-04 JB

21 Sept. 04 JB

Explanation of LSA vial mass change 653/131

On 9-14-04 while adding experimental solution to LSA vials, two sets of duplicates were filled with the wrong solution. LSA vials weighed and recorded on 653/131, TcCA1G4-A and B were filled with TcCA1H1-A and B respectivly. In an effort to conserve the sample the weights of the 4 LSA vial caps with appropriate lables were weighed and subtracted from their orignal weights taken on 9-10-04 (653/131), which included vial and caps. Next the labled caps were placed on the vial with the sample that matched the lable. ~~and the weight~~ 9-21-04 JB The weight of the new cap was added to the weight of the vial. The new (correct) weight of the LSA vial + cap was then recorded on 653/131.

Analysis results of Tc + CA sorption experimental solutions

The 67 Tc+CA sorption experimental solutions (653/130-131) were analyzed on the Packard TRI-CARB 3100TR Liquid Scintillation Analyzer (model # A3100, S/N 405314) on 9-15-04. The results point offs are on 653/139-142.

21 Sept. 04 cont. JB

9/15/04 12:31:03 PM QuantaSmart (TM) - 1.31 - Serial# 405314 Page # 1

SNC Protocol

Calibration Information
Software Version IC: 2.11
Software Version EC: 1.31
Instrument Model: Tri-Carb 3100TR
Instrument Serial Number: 405314
3H Chi Square: 16.09 Date Processed: 9/15/04 12:31:01 PM
14C Chi Square: 14.83 Date Processed: 9/15/04 12:31:01 PM
3H E^2/B (1-18.6 keV): 278.60 Date Processed: 9/15/04 12:31:01 PM
14C E^2/B (4-156 keV): 540.55 Date Processed: 9/15/04 12:31:01 PM
3H Efficiency (0-18.6 keV): 65.47 Date Processed: 9/15/04 12:31:01 PM
14C Efficiency (0-156 keV): 96.74 Date Processed: 9/15/04 12:31:01 PM
IPA Background Date Processed: 9/15/04 12:31:01 PM
3H Background CPM (0-18.6 keV): 15.42 Date Processed: 9/15/04 12:31:01 PM
14C Background CPM (0-156 keV): 22.48 Date Processed: 9/15/04 12:31:01 PM
3H Calibration DPM: 285000
3H Reference Date: 10/29/99
14C Calibration DPM: 134100

21 Sept. 04 cont. JB

9/15/04 9:20:11 PM QuantaSmart (TM) - 1.31 - Serial# 405314 Page # 1
Protocol# 9 - 99Tc 3% 2sigma.lsa User: Bertetti

Assay Definition-

Assay Description:
Protocol Name: TC-99 CPM
Add'l Heading: BETA CPM TC-99
Original Protocol Settings (actual values may have changed):
Delay Before Burst: 75
Coincidence Time: 18
Count Mode: Normal
Half Life A: 0.00 Hours
Half Life B: 0.00 Hours
Assay imported during upgrade 1/25/00.

Assay Type: CPM
Report Name: 99Tc 3%2sigma
Output Data Path: C:\Packard\Tricarb\Results\Bertetti\99Tc 3% 2sigma
Raw Results Path: C:\Packard\Tricarb\Results\Bertetti\99Tc 3% 2sigma\20040915_1231.results
Comma-Delimited File Name: C:\Packard\Tricarb\Results\Bertetti\99Tc 3% 2sigma\99Tc 2% 2sigma.txt
Assay File Name: C:\Packard\TriCarb\Assays\99Tc 3% 2sigma.lsa

Count Conditions-

Nuclide: 99Tc
Quench Indicator: SIS
External Std Terminator (sec): n/a
Pre-Count Delay (min): 0.00
Quench Set: n/a
Count Time (min): 999.99
Count Mode: Normal
Assay Count Cycles: 1 Repeat Sample Count: 1
#Vials/Sample: 1 Calculate % Reference: Off

Background Subtract: On - 1st Vial
Low CPM Threshold: Off
2 Sigma % Terminator: On - Any Region

Regions	LL	UL	Bkg Subtract	2Sigma % Terminator
A	19.0	300.0	1st Vial	3.00
B	10.0	300.0	1st Vial	0.00
C	0.0	300.0	1st Vial	0.00

Count Corrections-

Static Controller: On Luminescence Correction: Off
Colored Samples: n/a Heterogeneity Monitor: n/a
Coincidence Time (nsec): 18 Delay Before Burst (nsec): 75

Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time
A				
B				
C				

Sample ID Cycle 1 Results

	S#	Count Time	CPMA	A:2S%	CPMB	B:2S%	CPMC	C:2S%	SIS	MESSAGES
9/15/04 1:23:15 PM: Warning: User Has Modified Count Conditions.										
Blank	1	60.00	7	9.72	10	8.19	20	5.83	125.01	B
TcCA1A1-A	2	6.82	645	3.03	736	2.84	828	2.70	161.97	

21 Sept. 04 cont. JB

9/15/04 9:20:11 PM QuantaSmart (TM) - 1.31 - Serial# 405314 Page # 2
Protocol# 9 - 99Tc 3% 2sigma.lsa User: Bertetti

TcCA1A1-B	3	6.97	631	3.03	716	2.85	819	2.68	163.76
A2-A	4	6.89	638	3.03	728	2.84	824	2.69	161.38
A2-B	5	7.00	628	3.04	721	2.84	815	2.68	161.21
A3-A	6	5.89	748	3.03	852	2.84	963	2.69	162.97
A3-B	7	5.86	752	3.03	862	2.83	980	2.67	161.06
A4-A	8	6.95	633	3.03	720	2.85	819	2.69	162.25
A4-B	9	6.88	639	3.03	733	2.84	827	2.69	160.55
TcCA1B1-A	10	6.84	643	3.03	734	2.84	826	2.69	162.23
B1-B	11	6.67	660	3.03	746	2.86	838	2.71	168.51
B2-A	12	6.78	649	3.03	730	2.87	823	2.71	165.37
B2-B	13	6.85	642	3.03	731	2.85	825	2.70	162.69
B3-A	14	6.70	657	3.03	747	2.85	841	2.70	167.72
B3-B	15	6.74	652	3.03	743	2.85	833	2.70	164.50
B4-A	16	6.83	644	3.03	726	2.86	821	2.71	167.29
B4B	17	6.66	662	3.03	752	2.85	846	2.70	164.57
TcCA1C1-A	18	6.86	641	3.03	731	2.84	826	2.69	164.53
C1-B	19	7.03	626	3.03	713	2.85	814	2.68	160.86
C2-A	20	6.83	644	3.03	741	2.83	841	2.67	161.65
C2-B	21	6.83	644	3.03	729	2.85	825	2.70	165.15
C3-A	22	6.70	656	3.03	742	2.86	830	2.72	168.04
C3-B	23	6.78	649	3.03	740	2.85	826	2.71	166.10
C4-A	24	6.81	646	3.03	732	2.85	833	2.69	164.79
C4-B	25	6.93	635	3.03	718	2.86	817	2.69	167.09
TcCA1D1-A	26	6.92	635	3.04	727	2.84	828	2.68	163.02
D1-B	27	6.94	634	3.03	722	2.85	813	2.70	166.62
D2-A	28	6.74	653	3.03	734	2.87	827	2.71	167.11
D2-B	29	6.80	647	3.03	735	2.85	832	2.69	164.23
D3-A	30	6.74	653	3.03	742	2.85	834	2.70	164.89
D3-B	31	6.57	670	3.03	759	2.85	851	2.71	168.68
D4-A	32	6.81	647	3.03	735	2.85	822	2.71	168.82
D4-B	33	6.93	635	3.03	726	2.84	812	2.70	168.86
TcCA1E1-A	34	6.78	649	3.03	741	2.84	834	2.69	165.18
E1-B	35	6.76	651	3.03	743	2.84	836	2.69	163.37
E2-A	36	6.75	652	3.03	742	2.85	839	2.69	167.58
E2-B	37	6.93	635	3.03	719	2.86	816	2.70	166.55
E3-A	38	6.89	638	3.04	727	2.85	819	2.70	165.93
E3-B	39	6.79	648	3.03	740	2.84	838	2.69	165.90
E4-A	40	6.90	637	3.03	721	2.86	814	2.70	165.61
E4-B	41	7.04	625	3.03	711	2.85	803	2.70	166.88
TcCA1F1-A	42	6.70	657	3.03	747	2.85	838	2.70	169.20
F1-B	43	6.82	645	3.03	732	2.85	829	2.70	163.78
F2-A	44	6.86	641	3.03	736	2.84	828	2.69	165.95
F2-B	45	6.66	662	3.03	742	2.87	837	2.71	168.51
F3-A	46	7.01	627	3.03	718	2.84	810	2.69	164.23
F3-B	47	6.70	657	3.03	742	2.86	839	2.70	167.29
F4-A	48	6.90	637	3.03	722	2.86	809	2.71	166.64
F4-B	49	6.82	645	3.03	734	2.85	830	2.69	164.56
TcCA1G1-A	50	6.93	634	3.04	725	2.84	817	2.69	165.77
G1-B	51	6.59	668	3.03	754	2.86	854	2.70	166.44
G2-A	52	6.88	639	3.03	729	2.84	824	2.69	163.79
G2-B	53	6.77	650	3.03	735	2.86	827	2.71	167.11
G3-A	54	7.06	624	3.03	703	2.86	794	2.71	167.05
G3-B	55	6.65	662	3.03	752	2.85	847	2.70	168.32
G4-A	56	6.91	637	3.03	730	2.84	818	2.70	165.92
G4-B	57	6.65	662	3.03	750	2.85	846	2.70	168.54
TcCA1H1-A	58	6.58	669	3.03	757	2.85	853	2.70	166.58
H1-B	59	6.99	629	3.04	716	2.85	817	2.68	165.28
H2-A	60	6.77	650	3.03	735	2.86	835	2.69	162.64
H2-B	61	6.87	640	3.03	733	2.84	829	2.68	163.71
H3-A	62	6.82	646	3.03	734	2.85	830	2.69	166.58
H3B	63	6.79	648	3.03	733	2.86	823	2.71	168.25
H4-A	64	6.99	629	3.04	719	2.84	819	2.68	162.63
H4-B	65	6.81	646	3.03	736	2.85	830	2.70	164.15

21 Sept. 04 cont. ß

9/15/04 9:20:11 PM QuantaSmart (TM) - 1.31 - Serial# 405314 Page # 3
Protocol# 9 - 99Tc 3% 2sigma.lsa User: Bertetti

Tc Standard 43A-1	66	0.12	40801	2.86	46207	2.69	51339	2.55	178.60
43A-2	67	0.11	41211	2.97	46972	2.78	52190	2.64	177.64

12 OCT 2004 BAW

Calcite Ref Soln C (653/89) was not bubbling. New rubber bands were used to seal the moisture tube apparatus and the aeration started again. Time ~ 0915

26 Oct 2004 ß

[Verification of Lab water chemistry]

Water from Bldg. 57 Lab 106 tap, DI, and Nanopure system is to be tested for cations and anions. ~~The DI water will~~ 10-26-04 ß from ~~Lab 101~~ 10-26-04 ß / ~~Lab 101 will also be tested.~~ 10-26-04 ß
Samples taken in 125 ml PA plastic bottles. Samples taken directly from source. The cation

samples are acidified with 200 µl of Trace metal Grade Nitric acid (lot# 1100040, cat# A509-212). Acid transfered into a 30 ml plastic beaker then transfered into the sample bottle with a 200 µl transfer pipett (eppendorf). Each sample taken in duplicate. Sample labels are as follows.

VLWC - CA - T - a (and b) = Verification of Lab Water Chemistry (VLWC) - Cation (CA) - Tap water (T) - a and b are the duplicates.

VLWC - CA - DI - 106 - a and b = Sample from DI hose above sink in Bldg. 57 Lab 106

~~VLWC - CA - DI - 101 a and b = DI from Bldg. 57 Lab 101~~ 10-26-04 ß

VLWC - CA - NP - a and b = Nanopure Water (lab 106)

The same ~~four~~ three 2/9/05 ß samples were taken in duplicate for anion analyses and not acidified. Anion labeles are same as above, replacing CA with AN (example: VLWC - AN - T - a)

2 Nov 04 ß

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2 Nov. 04

SAMPLE LIST/CHAIN OF CUSTODY
Southwest Research Institute
Chemistry and Chemical Engineering Division
6220 Culebra Road
San Antonio, Texas 78238-5166

Shipper Name/Address: Bradley Herling, CNHRA - Div. 20, Bldg 57

Client:

Client Purchase Order/Other ID:

Site/Zone ID:

Requested Turnaround: ☐ 2 Weeks ☐ 3 Weeks ☒ Other: 4 weeks

SwRI Contact: Mike Rummann

Analyses Requested

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Analysis of Major + minor elements ICP										
VLWC-CA-T-a	10-26-04		W		1	X										
VLWC-CA-T-b						X										
VLWC-CA-DI-Db-a						X										
VLWC-CA-DI-Db-b						X										
VLWC-CA-Np-a			W			X										
VLWC-CA-Np-b	10-26-04					X										

REMARKS
Preservation
a = HCl to pH <2
b = HNO_3 to pH <2
c = H_2SO_4 to pH <2
d = NaOH to pH >12
e = Cool (4°C±2°C)
f = Other (specify)

Nuclear Safety related-use appropriate QA procedures

POC Brad Herling X 6565 Fax 5184

Matrix Types:
A – Air
B – Biota
D - Dust
E – Emission/Stack
L - Liquid
P – Product
Sd - Solid
S – Soil
SED – Sediment
T - Tissue
W - Water
WP - Wipe

Sample Types:
D - Duplicate
ER – Equipment Rinsate
ES – Environmental Sample
FB – Field Blank
FD – Field Duplicate
MS – Matrix Spike
MSD – Matrix Spike Dup
TB – Trip Blank

Temp: 22.0°C Therm #: 027

Comments: 655/142

Relinquished by (Print/Signature)	Date	Time
Jonathan Brown / [signature]	11-2-04	2:15 pm
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time

SwRI Project#: 1.20.06002.01.241
Received by SwRI Lab: (Signature) [signature]
Date: 11/2/04 Time: 1410
Samples Disposed: Date Time
Samples Disposed by:

Div 01 COC Form 01-01-001, Rev 8/02

Page 1 of 1

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2 Nov. 04 Cont.

SAMPLE LIST/CHAIN OF CUSTODY
Southwest Research Institute
Chemistry and Chemical Engineering Division
6220 Culebra Road
San Antonio, Texas 78238-5166

Shipper Name/Address: Bradley Herling, CNHRA - Div 20, Bldg 57

Client:

Client Purchase Order/Other ID:

Site/Zone ID:

Requested Turnaround: ☐ 2 Weeks ☐ 3 Weeks ☒ Other: 4 weeks

SwRI Contact: Mike Rummann

Analyses Requested

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Anions by IC except phosphate	Phosphate by 365.3									
VLWC-AN-T-a	10-26-04		W		1	X	X									
VLWC-AN-T-b						X	X									
VLWC-AN-DI-Db-a						X	X									
VLWC-AN-DI-Db-b						X	X									
VLWC-AN-Np-a	10-26-04		W		1	X	X									
VLWC-AN-Np-b						X	X									

REMARKS
Preservation
a = HCl to pH <2
b = HNO_3 to pH <2
c = H_2SO_4 to pH <2
d = NaOH to pH >12
e = Cool (4°C±2°C)
f = Other (specify) none

Nuclear Safety related-use appropriate QA procedures

POC Brad Herling X 6565 Fax 5184

Matrix Types:
A – Air
B – Biota
D - Dust
E – Emission/Stack
L - Liquid
P – Product
Sd - Solid
S – Soil
SED – Sediment
T - Tissue
W - Water
WP - Wipe

Sample Types:
D - Duplicate
ER – Equipment Rinsate
ES – Environmental Sample
FB – Field Blank
FD – Field Duplicate
MS – Matrix Spike
MSD – Matrix Spike Dup
TB – Trip Blank

Temp: 22.0°C Therm #: 027

Comments: 653/142

Relinquished by (Print/Signature)	Date	Time
Jonathan Brown / [signature]	11-2-04	2:15 pm
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time

SwRI Project#: 1.20.06002.01.241
Received by SwRI Lab: (Signature) [signature]
Date: 11/2/04 Time: 1410
Samples Disposed: Date Time
Samples Disposed by:

Div 01 COC Form 01-01-001, Rev 8/02

Page 1 of 1

29 NOV 04 BAW

Div 01 Cation Results for Technetium-Calcite Reference Solns

Samples from 653/100-101
Chain of Custody: 653/103
Legend: 653/100
pH and Inorganic Carbon analyses also performed on these reference solutions
8 samples (A-H) and 1 QA (I) 653/101

For Sample Soln I

Analyte	Target Conc (ppm)	Measured Conc (ppm)	Percent Difference
Calcium	100	101	1.0
Magnesium	100	94.8	-5.2
Potassium	100	91.3	-8.7
Sodium	100	96.0	-4.0
Iron	100	not analyzed	na

Target values - 653/101
Measured values - 653/151

11-29-04 BW

29 NOV 2004 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: Soln A

Lab Name: Southwest Research Institute
Lab Code: SwRI
Matrix: Water
Lab System ID: 250244

Client: Division 20
Date Received: 08/27/04
Project No.: 06002.01.241
SRR: 26440
Task Order: 040827-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Calcium	7105	1
Magnesium	<1	1
Potassium	<2.5	2.5
Sodium	221	2
Strontium	3.71	0.1

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: Soln B

Lab Name: Southwest Research Institute
Lab Code: SwRI
Matrix: Water
Lab System ID: 250245

Client: Division 20
Date Received: 08/27/04
Project No.: 06002.01.241
SRR: 26440
Task Order: 040827-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Calcium	1528	1
Magnesium	<1	1
Potassium	<2.5	2.5
Sodium	214	2
Strontium	0.803	0.1

29 NOV 2004 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: Soln C

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 250246

Client: Division 20

Date Received: 08/27/04

Project No.: 06002.01.241

SRR: 26440

Task Order: 040827-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Calcium	490	1
Magnesium	<1	1
Potassium	<2.5	2.5
Sodium	2199	2
Strontium	0.264	0.1

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: Soln D

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 250247

Client: Division 20

Date Received: 08/27/04

Project No.: 06002.01.241

SRR: 26440

Task Order: 040827-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Calcium	146	1
Magnesium	<1	1
Potassium	<2.5	2.5
Sodium	2151	2
Strontium	<0.1	0.1

29 NOV 2004 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: Soln E

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 250248

Client: Division 20

Date Received: 08/27/04

Project No.: 06002.01.241

SRR: 26440

Task Order: 040827-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Calcium	48.2	1
Magnesium	<1	1
Potassium	<2.5	2.5
Sodium	2197	2
Strontium	<0.1	0.1

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: Soln F

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 250249

Client: Division 20

Date Received: 08/27/04

Project No.: 06002.01.241

SRR: 26440

Task Order: 040827-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Calcium	20.4	1
Magnesium	<1	1
Potassium	<2.5	2.5
Sodium	2237	2
Strontium	<0.1	0.1

29 NOV 2004 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: Soln G

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 250250

Client: Division 20

Date Received: 08/27/04

Project No.: 06002.01.241

SRR: 26440

Task Order: 040827-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Calcium	5.58	1
Magnesium	<1	1
Potassium	<2.5	2.5
Sodium	2237	2
Strontium	<0.1	0.1

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: Soln H

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 250251

Client: Division 20

Date Received: 08/27/04

Project No.: 06002.01.241

SRR: 26440

Task Order: 040827-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Calcium	2.01	1
Magnesium	<1	1
Potassium	<2.5	2.5
Sodium	2353	2
Strontium	<0.1	0.1

29 NOV 2004 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: Soln I

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 250252

Client: Division 20

Date Received: 08/27/04

Project No.: 06002.01.241

SRR: 26440

Task Order: 040827-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Calcium	101	1
Magnesium	94.8	1
Potassium	91.3	2.5
Sodium	96.0	2
Strontium	<0.1	0.1

SOUTHWEST RESEARCH INSTITUTE
DUPLICATE SUMMARY

Sample ID: Soln A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 250244

Client: Division 20

Date Received: 08/27/04

Project No.: 06002.01.241

SRR: 26440

Task Order: 040827-12

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Calcium	7105	7107	0.03%
Magnesium	<1	<1	0.00%
Potassium	<2.5	<2.5	0.00%
Sodium	221	217	1.83%
Strontium	3.71	3.70	0.27%

29 NOV 2004 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
MATRIX SPIKE SUMMARY

Sample ID: Soln A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 250244

Client: Division 20

Date Received: 08/27/04

Project No.: 06002.01.241

SRR: 26440

Task Order: 040827-12

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Calcium	7105	9237	2000	107%
Magnesium	<1	188	200	94.0%
Potassium	<2.5	213	200	107%
Sodium	221	2267	2000	102%
Strontium	3.71	44.4	40.0	102%

SOUTHWEST RESEARCH INSTITUTE
LABORATORY CONTROL SAMPLE

Sample ID: LCSW

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: NA

Client: Division 20

Date Received: NA

Project No.: 06002.01.241

SRR: 26440

Task Order: 040827-12

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Calcium	210	200	105%
Magnesium	187	200	93.5%
Potassium	195	200	97.5%
Sodium	197	200	98.5%
Strontium	41.0	40.0	103%

NA- Not Applicable.

29 NOV 2004 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
BLANK SUMMARY

Sample ID: PBW

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: NA

Client: Division 20

Date Received: NA

Project No.: 06002.01.241

SRR: 26440

Task Order: 040827-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Calcium	<1	1
Magnesium	<1	1
Potassium	<2.5	2.5
Sodium	<2	2
Strontium	<0.1	0.1

NA- Not Applicable.

8 DEC 04 BAW

Preparation of ~~Dilution~~ BW 12-8-04 Dilute Bleach Solution for Cleaning Glassware for Free Chlorine Determination

Transferred ~~5 mL~~ BW 12-8-04 5 mL (oxford pipette) of bleach soln (Fisher SS290-1, lot# 036354-9) into a 1L vol flask and diluted to mark with type I water

8 Dec. 04 cont

Experimental Procedure: Free Chlorine test

Objective: To investigate the Free Chlorine in the tap water, Dionized water (passed through preliminary purification ~~deionization~~ 12-8-04 deionization columns), and type 1 water (passed through all purifications including Barnstead Nanopure Diamond Analytical System (model # D11901)) in Bldg 57, Lab 106.

Conditions:
- run water systems for 5 min before samples taken
- Only glassware used, no plastics
- analysis performed within 1 min of addition of reagent (powder pillow)

Equipment:
- HACH DR/890 Colorimeter (S/N 48470-60)
- Drummon Hirectol, Precision Bores w/ Plunger (cat # 5-000-1100)

Supplies:
- HACH ~~PDP~~ DPD 12-8-04 Free Chlorine Reagent (Lot # A4308) (Cat 21055-69)
- Glass test tube, Sample Cell, 25 mL w/ cap (cat # 24019)
- Dilute bleach soln (653/153)

8 Dec. 04 cont

- 10 mL volumetric pipett, Fisher Brand
- 40 mL volumetric beaker
- Chlorine Soln Ampule 50-75 mg/L (cat# 14268-20)

Procedures For Free Chlorine test For ~~tap water~~ 12-8-04 Type 1 water

Refer to HACH DR/820-DR/850-DR/890 Datalogging Colorimeter Handbook for instrument procedures etc... Method 8021.

After the type 1 water ran for 5 min a 40 mL glass beaker was rinsed several times and filled with the type 1 water. A 10 mL volumetric pipett was used to transfer the sample water from the beaker into to the sample cell. 10 mL transfered. The sample was caped and used to zero the HACH DR/890 Colorimeter. Next the contents of a HACH PDP Free Chlorine Reagent (Cat# 21055-69) powder pillow was emptied into the sample cell, and swirled vigorously for ~25 seconds. The sample cell was then ~~plac~~ 12-8-04 analysed with the Colorimeter. Experiment preformed in triplicate. Reading recorded below.

Sample ID	Free Chlorine reading
Type 1 water - A	0.02 mg/L
Type 1 water - B	0.00 mg/L
Type 1 water - C	0.00 mg/L

8 Dec. 04 cont JB

Standard Addition Method

Standard addition method performed to determine the accuracy of Free Chlorine readings.
A TenSette Pipet was used to transfer 0.1 mL of the Chlorine ~~Ampule~~ 12-8-04 Soln Ampule 50-55 mg/L (cat# 14268-20) into the sample cell. The sample cell was then analyzed by the colorimeter and the reading is recorded below.

Sample ID	Standard Addition Reading
Type 1 water-A	0.65 mg/L
Type 1 water-B	0.60 mg/L
Type 1 water-C	0.60 mg/L

A calculation was run to determine the concentration of mg/L chlorine added to the sample

$$\text{mg/L Chlorine added} = \frac{0.1\,(\text{vol. of standard}) \times \text{Certificate value}}{10.1\,(\text{sample + standard vol})}$$

$$\frac{0.1\text{ mL} \times 65.5\text{ mg/L } Cl_2}{10.1} = 0.65\text{ mg/L}$$

The standard addition reading + Free chlorine reading should = ~0.65 mg/L according to equation above.

8 Dec 04 JB cont.

Free Chlorine Analysis of Dionized water

Procedures and methods used in analysis same as on page 653/155-156. Dionized water (DI) used in analysis as sample.

Sample ID	Free chlorine reading
DI water-A	0.02 mg/L
DI water-B	0.02 mg/L
DI water-C	0.02 mg/L

Sample ID	Standard Addition reading
DI water-A	0.63
DI water-B	0.61
DI water-C	0.62

The Free Chlorine reading + Standard Addition reading should = ~0.65 mg/L according to the calculation on 653/156.

JB-8-04

9 Dec. 04 JB

Free Chlorine Analysis of ~~Type 1~~ Tap water 12-9-04 JB

Procedures and methods used in analysis same as on 653/155-156. ~~Type 1~~ Tap 12-9-04 JB water ~~(passed through all purifications including Barnsted Nanopure Diamond Analytical system model # D11901)~~ 12-9-04 JB in Bldg. 57, lab 106, used in analysis. The Tap water was run for 5 min before sample was taken.

Sample ID	Free Chlorine reading (mg/L)	Standard Addition reading (mg/L)
Tap water-A	0.27	0.89
Tap water-B	0.29	0.88
Tap water-C	0.32	0.92

1-12-05 JB

12 Jan 05 JB

Experimental Procedures: Total Chlorine Test

Objective: To investigate the Total Chlorine in the tap water, Dionized water (passed through preliminary purification deionization columns), and type 1 water (passed through all purifications including Barnstead Nanopure Diamond Analytical System (model # D11901)) in Bldg 57, lab 106.

Conditions:

- run water systems for 5 min before samples taken
- only glassware used, no plastics
- glass tubes soaked with dilute bleach ~~soln~~ 1-12-05 JB soln (653/153) and rinsed throughly with type 1 water then dryed in the oven
- analysis preformed within 1 min of addition of reagent (powder pillow)

Equipment:

- HACH DR/890 Colorimeter (S/N 48470-60)
- ~~DM~~ 1-12-05 JB Drummond Wirecrol, Precision Bores with plunger (Cat # 5-000-1100)

1-12-05 JB

12 Jan 05 cont. [illegible]

Supplies:

- HACH ~~PDPT~~ 1-12-05 DPD Total Chlorine Reagent (Lot # A4324, cat # 21056-69)
- Glass test tube, sample cell, 25 ml with cap (cat. # 24019)
- Dilute bleach ~~Sol~~ 1-12-05 Soln (653/153)
- 10 ml volumetric pipett, Fisher brand
- 410 ml volumetric glass beaker
- Chlorine solution ampule 50-75 mg/L (cat. 14268-20)

Procedures for Total Chlorine test for Type 1 water

Refer to HACH DR/820 - DR/850 - DR/890 Data logging Colorimeter Hand book for instrument procedures etc... Method 8167.

After the type 1 water is run for 5 min a 410 ml glass beaker was rinsed several ~~times~~ 1-12-05 times and filled with the type 1 water. A 10 ml volumetric pipett was used to transfer the sample water from the beaker into the sample cell. The sample was capped and used to zero the HACH DR/890 Colorimeter. Next the contents of a HACH DPD Total Chlorine Reagent (Lot # 21056-69) powder pillow was emptied into

the sample cell and swirled vigerously for ~25 seconds. The sample cell was then analysed with the colorimeter. Experiment preformed in triplicate. Results recorded below.

Sample ID	Total Chlorine reading	Standard Addition reading
Type 1 water A	0.00 mg/L	0.65 mg/L
Type 1 water B	0.00 mg/L	0.64 mg/L
Type 1 water C	0.00 mg/L	0.63 mg/L

Standard Addition Method

Standard addition method preformed to determine the accuracy of the Total Chlorine readings. A Ten Sette pipet was used to transfer 0.1 mL of the Chlorine Soln Ampule 50-75 mg/L (cat # 14268-20) into the sample cell. The sample cell was then analysed by the colorimeter and the ~~reading~~ 1-12-05 recorded ~~below~~ 1-12-05 above.

For calculation and explination refer to 653/156.

Total Chlorine Analysis of Dionized water

Procedures and methods used in analysis same as on page 653/159-160. Dionized water (DI) used in analysis as sample. Results recorded on 653/162.

12 Jan 05 cont. [illegible]

Sample ID	~~Free~~ Total Chlorine Reading 1-12-05 [illegible]	Standard Addition reading
DI water-A	0.00 mg/L	0.63 mg/L
DI water-B	0.00 mg/L	0.63 mg/L
DI water-C	0.01 mg/L	0.63 mg/L

For calculation and explination refer to 653/156.

Total Chlorine analysis for Tap water

Procedures and methods used in analysis same as on 653/159-160 Tap water in Bldg 57, lab 106 used in analysis.

Sample ID	Total Chlorine Reading	Standard Addition reading
Tap water-A	0.42 mg/L	1.01 mg/L
Tap water-B	0.47 mg/L	1.03 mg/L
Tap water C	0.42 mg/L	1.04 mg/L

1-19-05 [illegible]

19 Jan 05 [illegible]

Np sorption experiment on Montmorillonite and Clinoptilolite in groundwater from 40 mi wash

Jon Brown will be preforming this experiment.

Objective: To investigate Np sorption on pure phase minerals (Montmorillonite and Clinoptilolite)

Conditions: $\Sigma Np = 200$ ppb
Equilibrium with atmospheric $CO_2(g)$; $pCO_2 = 10^{-3.5}$
Solution volume = 30 ml
mass of solid = 0.1 g
M/V = 16.7

Equipment: Orion 920A pH meter and combination pH electrode
Gyratory shaker
Fisher Marathon 21K centrifuge
Mettler AE240 balance
Packard 2500 TR/AB LSC
WHEATON ACURA 831 ~~pipet~~ 1-19-05 [illegible] macropipetters + tips
Eppendorf micropipetters + tips
Repipettor for transfer of scintillation cocktail

Supplies: Montmorillonite sample, SAz*Na*<2*FD*SCr
Clinoptilolite sample, CDV*200/325*UC*WA*RL*HL*RFe*NaF
Np spike 46A (60 ppm ^{237}Np stock solution, pH of 5.85)

19 Jan 05 cont. JS

Supplies cont: - Filtered, unacidified water collected from NC-EWDP-19PB; sample NC-EWDP-19PB-SHAL-0504-FUA-2
- polycarbonate centrifuge tubes w/ caps 50 ml capacity
- pH buffer solutions
- Ultima-Gold liquid scintillation cocktail
- 7 ml scintillation vials
- Concentrated HNO_3
- 50/50 v/v HNO_3
- 0.02 M HNO_3
- weighing paper/boats
- deionized ultrapure water, DH_2O
- plastic ware and glassware as needed

Bubbling ground water sample

Ground water sample to be used in this sorption experiment, NC-EWDP-19PB-SHAL-0504-FUA-2, was hooked up to a bubbling apparatus to equilibrate with atmospheric CO_2. The ground water sample has been previously opened and bubbled.

Labeling centrifuge tubes

6 polycarbonate centrifuge tubes with caps (50 ml capacity) were labeled. Three tubes were

19 Jan 05 cont. JS

labeled for Montmorillonite solid (MNp-1 through 3) and three tubes were labeled for Clinoptilolite (CNp-1 through 3). Tubes were acid washed, ~~and~~ 1-19-05 JS rinsed with DI water and dried before experiment.

24 Jan. 05 JS

Weighing Centrifuge tubes + caps

The 6 empty, labled, centrifuge tubes with caps were weighed on the Mettler AE 240 scale (S/N 101237). To stabilize the tubes a 30 ml glass beaker was placed on the scale with the spout to the right and tared. The test tubes were placed in the beaker and weighed.
Initial calibration check (Target 20.0001g)
reading 20.0001g
Final calibration reading 20.0001g
Results recorded on table (653/166)

Adding solid sample to tubes

0.1 g ± 0.001 g of Montmorillonite sample (SAz* Na* <2* FD* SCC) and Clinoptilolite sample (CDr* 200/325* UC* HA* RC* HL* RFE) were added to

24 Jan. 05 cont. JB

the designated tubes, with a spatula. Weight taken by the Mettler AE 240 scale (S/N 101232). Weights of test tube and solid sample recorded in table below. Final calibration of scale (target 20.0001g) reading 20.0001g.

Sample ID	Weight (g) of empty tube	Weight (g) of tube after addition of alluvium
MNp-1	21.8849	21.9860
MNp-2	22.1696	22.2700
MNp-3	21.9396	22.0396
CNp-1	22.1335	22.23~~8~~44 1/24/05 JB
CNp-2	22.1414	22.2405
CNp-3	22.1580	22.2582

Calibration of pH meter

meter: Orion model 920A S/N 039518
probe: Thermo orion 8103BN
Fisher Buffer soln 7.00 (lot 041088-24) and pH 10.00 (~~lot 041060-24~~ 1-24-05 JB) (lot 033031-24)

Two buffer calibration points were used, pH 7 and 10. Temperature was 18.5°C. The slope of the calibration was 99.5% (Target of acceptable slope is 92-102%).

1/24/05 JB

24 Jan 05 cont. JB

pH reading of ground water sample

About 15 mL of groundwater ~~was~~ 1/24/05 JB (NC-EKDP-19PB-SHAL-FUA-2) was transfered into a 15mL plastic beaker with a HHEATON Acura 831 pipet. The pH was measured on the Orion model 920 (S/N 039518) and probe Thermo orion 8103BN.

pH of groundwater = 8.58

Addition of groundwater sample to tubes for Np + pure phase mineral sorption exp

30 ± 0.1 g of NC-EKDP-19PB-SHAL-0504-FUA-2 groundwater sample transfered into each of the polycarbonate centrifuge tubes (653/166), with 1-24-05 JB a HHEATON Acura 831 pipet 5 mL at a time.
A 30 mL glass beaker was placed on the Mettler AE240 scale (S/N 101232) with a PC tube in it with its cap off. The scale is tared then the ground water sample is added. Lastly the cap is placed on the tube and the glass beaker is tared by its self. Then the PC tube is weighed and recorded on ~~653/168~~ 1-24-05 JB. 653/168.

24 Jan 05 cont. [illegible]

Sample ID	Weight (g) of tube after addition of solution
MNp-1	51.9581
MNp-2	52.0507
MNp-3	51.9093
CNp-1	52.2123
CNp-2	52.2263
CNp-3	52.2265

Vortexing samples and equilibrate

Samples vortexed throughly (~30 sec). After vortexing sample caps loosened and sample rack set on hygrator to allow equlibrium with atmosphere for ~3 days.

26 Jan. 05 [illegible]

Adding Np spike to tubes with pure phase minerals and groundwater, Weighing tubes

Each of the 6 centrifuge tubes with groundwater and pure phase minerals were weighed after 2 days of equilibrium with the atmosphere. The Mettler AE 240 scale (S/N 101232) was used to weigh samples.
Inital calibration of scale (Target 20.0001g)
reading 20.0001g
Final calibration reading
Results recorded on 653/169.

1-26-05 [illegible]

26 Jan 05 cont. [illegible]

Sample ID	Weight (g) of tube after solid/soln equilibrium (about 3 days)	Weight (g) of tube after Np Spike added
MNp-1	51.9217	52.0222
MNp-2	51.9913	52.0915
MNp-3	51.8672	51.9663
CNp-1	52.1537	52.2542
CNp-2	52.1026	52.2029
CNp-3	52.1204	52.2160

Addition of Np spike

Spike: 46A 237Np, ~60 ppm (556/84)

About 100 µl of Np spike transfered into each of the 6 centrifuge tubes (653/169) with a 100 µl eppendorf pipet. This should produce Np concentrations of ~200 ppb.

After Np spike added samples were reweighed and recorded in table above. Final calibration check of scale (Target 20.0001g) reading = 20.0001g

28 Jan. 05 [illegible]

Labeling of LSC vials

For each sample solution (MNp-1 through 3 and CNp-1 through 3) two 7 ml Liquid Scintillation (LSC) vials were labled on their caps (e.g. MNp-1a and MNp-1b). A total of 12 LSC vials were labled.

28 Jan 05 [illegible] cont.

Adding 0.5 ml of 0.02 M HNO_3 to LSC vials

0.5 ml of 0.02 M HNO_3 (031/45) was transfered into each of the 12 LSC vials with a 500 ml eppendorf pipett.

Weighing of LSC vials + HNO_3

The 12 LSC vials were then weighed on the Mettler AE 240 scale (S/N 101237) and recorded on the table below.

Inital calibration check of scale (Target 20.0001g) reading = 20.0001g

Final calibration check of scale = 20.0001g

Sample ID	Weight (g) of 7 mL LSC vial plus 0.5 ml of 0.02 M HNO_3	Weight (g) of vial with 0.5 ml of sample solution added
MNp-1a	7.8545	8.3508
MNp-1b	7.9129	8.4156
MNp-2a	7.9333	8.4292
MNp-2b	7.8608	8.3632
MNp-3a	7.8525	8.3468
MNp-3b	7.8762	8.3794
CNp-1a	7.8352	8.3304
CNp-1b	7.8326	8.3291
CNp-2a	7.9169	8.4147
CNp-2b	7.8938	8.3910
CNp-3a	7.8750	8.3718
CNp-3b	7.8346	8.3320

28 Jan. 05 cont. [illegible]

Creation of a Blank

A 7 ml LSC vial was labeled Blank. Then 0.5 ml of 0.02 M HNO_3 and 0.5 ml of groundwater sample (MC-FHDP-19PB-SHAL-0504-FUA-2) was transfered into the vial with a 500 ml eppendorf pipett. Height of Blank LSC vial with 0.5 ml of 0.02 M HNO_3 was 7.9232 g. Height of Blank LSC vial with ~~0.0 g~~ 1-28-05 0.5 ml of groundwater added is 8.4163 g. Measurements taken on the Mettler AE 240 scale (S/N 101237).

31 Jan 05 [illegible]

Weighing of sample soln tubes

The 6 sample soln centrifuge test tubes (653/169) with pure phase minerals, groundwater, and Np spike were reweighed on the Mettler AE 240 (S/N 101237) scale. Weight taken to determine the amount of H_2O lost to evaporation. Weights recorded below

Inital calibration check of scale (Target 20.0001g) reading 20.0001g.

Final cal check reading 20.0001g

Sample ID	Weight (g) of tube before sampling	Weight of tube after sampling
MNp-1	51.9281	50.9265
MNp-2	51.9539	50.9547
MNp-3	51.7805	50.7817
CNp-1	52.1350	51.1428
CNp-2	51.9105	50.9154
CNp-3	51.9059	50.9121

31 Jan 05 cont. [illegible]

Centrafuging Sample tubes

The three ~~Montmorillonite~~ 1-31-05 [illegible] centrafuge test tubes with montmorillonite pure phase mineral ~~ser~~ 1-31-05 [illegible] (MNp-1 to MNp-3) were centrafuged on the Marathon 21K (03220) Fisher Sci centrafuge. The samples were centrafuged for 20 min at 9700 rpm.

Aliquot transfer from centrafuge tube to LSC vials

A 0.5 ml aliquot was transfered into the appropriate 7 ml LSC vial from the corresponding sample soln centrafuge tube (653/171). Samples were taken with a 500 ml eppendorf pipett. A total of 2 aliquots were removed from each of the 6 test tubes.

Weighing of LSC vials and Centrafuge tubes

LSC vials (653/170) were weighed after the addition of HNO_3 and aliquot (0.5 ml) from sample soln. The 6 centrafuge sample soln tubes were reweighed and recorded on 653/171. The LSC vial weights recorded on 653/170. The Mettler

31 Jan 05 cont. [illegible]

AE 240 scale (S/N 101237) was used to determine weights. Initial calibration of scale (Target 20.000g) reading = 20.0001g. Final calibration check of scale reading = 20.0001g.

Addition of cocktail to LSC vials

The 12, 7 ml LSC vials (653/170) and the Blank (653/171) LSC vial had 5 ml of ULTIMA GOLD AB (cat # 6013309, lot 91-211) added to them, by a Repipetter. After the cocktail was added samples mixed by hand and set aside for counting.

Measuring pH of soln in centrafuge test tubes for Np pure phase mineral sorption exp

pH meter: Orion model 920 A (S/N 55518)
probe: Thermo Orion 8103 BN

Calibration with two standards Fisher Buffer soln pH 7.00 (Lot # 041088) and 1-31-05 [illegible] 10.06 (Lot # 033031-24). Temperature was 18.8 °C. Slope of calibration was 100.5 % (acceptable slope range is 92-102 %) Readings of the 6 centrafuge test tubes pH recorded on 653/174.

1-31-05 [illegible]

31 Jan 05 cont. [illegible]

Sample ID	pH
MNp-1	8.43
MNp-2	8.51
MNp-3	8.50
CNp-1	8.56
CNp-2	8.58
CNp-3	8.57

Final calibration check of pH reading with pH Buffer soln 7.02, reading = 7.03

2-4-05 [illegible] 4 Feb 05 [illegible]

Analysis results of Np + pure phase minerals experimental soln experiment, MNp and CNp

The 12 Np + pure phase mineral experimental soln (653/170), Blank (653/171), and 2 spikes (631/37) were analysed on the Packard TRI-CARB 3100TR Liquid Scintillation analyser (model #A3100, S/N 405314). Results print off on 653/175-176.

2-4-05 [illegible]

4 Feb. 05 cont. [illegible]

```
2/4/05  7:20:10 AM          QuantaSmart (TM) - 1.31 - Serial# 405314          Page # 1
Protocol# 15 - Pa_Np_Exp_AB.lsa                                              User: Bertetti


 Assay Definition-

 Assay Description:


 Assay Type: Alpha/Beta
 Report Name: Np_Pa_Exp
 Output Data Path: C:\Packard\Tricarb\Results\Bertetti\Pa_Np_Exp_AB
 Raw Results Path: C:\Packard\Tricarb\Results\Bertetti\Pa_Np_Exp_AB\20050203_1152.results
 Comma-Delimited File Name: C:\Packard\Tricarb\Results\Bertetti\Pa_Np_Exp_AB\Np_Pa_AB.030
 Assay File Name: C:\Packard\TriCarb\Assays\Pa_Np_Exp_AB.lsa

 Count Conditions-

 Nuclide: NP/PA
    Quench Indicator: SIS
    External Std Terminator (sec): n/a
    Pre-Count Delay (min): 0.00
 Alpha/Beta Standards:
    Low Energy: NP/PA
 Count Time (min): 240.00
 Count Mode: Normal
 Assay Count Cycles: 1          Repeat Sample Count: 1
 #Vials/Sample: 1               Calculate % Reference: Off

 Background Subtract: On - 1st Vial
 Low CPM Threshold: Off
 2 Sigma % Terminator: On - Any Region

 In Use Discriminator: 143

 Regions          LL       UL  Bkg Subtract  2Sigma % Terminator
 Beta A          0.0    400.0     1st Vial                 0.00
 Beta B        100.0    400.0     1st Vial                 0.00
 Alpha         100.0    400.0     1st Vial                 2.00

 Count Corrections-

 Static Controller: On          Luminescence Correction: Off
 Colored Samples: n/a           Heterogeneity Monitor: n/a
 Coincidence Time (nsec): 18    Delay Before Burst (nsec): 75

 Half Life-

 Half Life Correction: Off
 Regions    Half Life          Units      Reference Date      Reference Time
 Beta A
 Beta B
 Alpha

 IPA Block Data
 Software Version IC: 2.11
 Software Version EC: 1.31
 Instrument Model: Tri-Carb 3100TR
 Instrument Serial Number: 405314
 3H Chi Square: 24.27     Date Processed: 2/3/05 11:52:36 AM
 14C Chi Square: 39.46    Date Processed: 2/3/05 11:52:36 AM
 3H E^2/B (1-18.6 keV): 284.88  Date Processed: 2/3/05 11:52:36 AM
 14C E^2/B (4-156 keV): 547.02   Date Processed: 2/3/05 11:52:36 AM
 3H Efficiency (0-18.6 keV): 65.41  Date Processed: 2/3/05 11:52:36 AM
 14C Efficiency (0-156 keV): 96.30  Date Processed: 2/3/05 11:52:36 AM
 IPA Background Date Processed: 2/3/05 11:52:36 AM
```

4 Feb. 05 cont. JB

2/4/05 7:20:11 AM QuantaSmart (TM) - 1.31 - Serial# 405314 Page # 2

Protocol# 15 - Pa_Np_Exp_AB.lsa User: Bertetti

3H Background CPM (0-18.6 keV): 15.08 Date Processed: 2/3/05 11:52:36 AM
14C Background CPM (0-156 keV): 21.95 Date Processed: 2/3/05 11:52:36 AM
3H Calibration DPM: 285000
3H Reference Date: 10/29/99
14C Calibration DPM: 134100

Cycle 1 Results

Sample ID	S#	Count Time	CPMA	A:2S%	CPMB	B:2S%	CPMa	alpha2S%	SIS
MESSAGES									
Blank	1	240.00	19.23	2.94	3.14	7.28	0.35	21.69	162.9
B									
MNp - 1a	2	79.66	12.78	10.87	4.70	14.20	125.18	2.01	254.5
1b	3	80.39	13.22	10.52	5.19	13.16	124.05	2.01	277.9
2a	4	79.32	13.09	10.67	5.46	12.78	125.73	2.01	284.1
2b	5	79.28	14.58	9.76	5.99	11.96	125.81	2.01	269.7
3a	6	81.11	12.99	10.64	5.29	12.93	122.95	2.01	282.4
3b	7	79.62	15.64	9.20	6.20	11.65	125.25	2.01	264.3
CNp - 1a	8	69.47	30.01	5.92	11.43	8.26	143.59	2.01	266.9
1b	9	69.20	28.50	6.16	10.60	8.68	144.17	2.01	256.9
2a	10	69.51	26.85	6.42	10.02	8.98	143.52	2.01	262.4
2b	11	69.02	28.97	6.09	10.94	8.52	144.55	2.01	264.9
3a	12	68.39	32.69	5.61	11.83	8.14	145.91	2.01	264.3
3b	13	69.39	34.09	5.40	13.16	7.57	143.76	2.01	276.4
Spike 46A-3	14	2.21	3803.39	2.19	1495.95	3.48	4541.73	2.00	285.5
Spike 46A-4	15	2.19	3901.31	2.17	1594.58	3.39	4579.55	2.00	293.8

8 FEB 05 BAW

Div01 Results for Cation Analyses of Various Bld 57 lab 106 water sources

Samples from 653/142-3
6 total - 3 types analyzed in duplicate
Chain of Custody 653/144
Legend 653/143
No QA samples from CNWRA
The analyses was part of a characterization of the lab waters. Anion, free chlorine, and total chlorine analyses were also performed.

8 FEB 05 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: VLWC-CA-T-a

Lab Name: Southwest Research Institute
Lab Code: SwRI
Matrix: Water
Lab System ID: 254630

Client: Division 20
Date Received: 11/02/04
Project No.: 06002.01.241
SRR: 26806
Task Order: 041103-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.5	0.5
Antimony	<0.1	0.1
Arsenic	<0.05	0.05
Barium	<0.05	0.05
Beryllium	<0.05	0.05
Bismuth	<0.1	0.1
Boron	<0.2	0.2
Cadmium	<0.05	0.05
Calcium	66.6	0.5
Chromium	<0.05	0.05
Cobalt	<0.05	0.05
Copper	<0.05	0.05
Iron	<0.5	0.5
Lanthanum	<0.05	0.05
Lead	<0.05	0.05
Lithium	<0.05	0.05
Magnesium	13.8	0.5
Manganese	<0.05	0.05
Molybdenum	<0.05	0.05
Nickel	<0.05	0.05
Palladium	<0.05	0.05
Phosphorus	<0.2	0.2
Potassium	<2	2
Selenium	<0.05	0.05
Silicon	5.39	0.2
Silver	<0.05	0.05
Sodium	7.23	2
Strontium	0.361	0.05
Sulfur	5.07	0.2
Thallium	<0.15	0.15
Thorium	<0.2	0.2
Tin	<0.05	0.05
Titanium	<0.05	0.05
Tungsten	<0.1	0.1
Uranium	<1	1
Vanadium	<0.05	0.05
Yttrium	<0.05	0.05
Zinc	0.0802	0.05
Zirconium	<0.05	0.05

8 FEB 05 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
VLWC-CA-T-b

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 254631

Client: Division 20

Date Received: 11/02/04

Project No.: 06002.01.241

SRR: 26806

Task Order: 041103-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.5	0.5
Antimony	<0.1	0.1
Arsenic	<0.05	0.05
Barium	<0.05	0.05
Beryllium	<0.05	0.05
Bismuth	<0.1	0.1
Boron	<0.2	0.2
Cadmium	<0.05	0.05
Calcium	66.2	0.5
Chromium	<0.05	0.05
Cobalt	<0.05	0.05
Copper	<0.05	0.05
Iron	<0.5	0.5
Lanthanum	<0.05	0.05
Lead	<0.05	0.05
Lithium	<0.05	0.05
Magnesium	13.7	0.5
Manganese	<0.05	0.05
Molybdenum	<0.05	0.05
Nickel	<0.05	0.05
Palladium	<0.05	0.05
Phosphorus	<0.2	0.2
Potassium	<2	2
Selenium	<0.05	0.05
Silicon	5.37	0.2
Silver	<0.05	0.05
Sodium	7.02	2
Strontium	0.358	0.05
Sulfur	5.16	0.2
Thallium	<0.15	0.15
Thorium	<0.2	0.2
Tin	<0.05	0.05
Titanium	<0.05	0.05
Tungsten	<0.1	0.1
Uranium	<1	1
Vanadium	<0.05	0.05
Yttrium	<0.05	0.05
Zinc	0.0758	0.05
Zirconium	<0.05	0.05

8 FEB 05 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
VLWC-CA-DI-106-a

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 254626

Client: Division 20

Date Received: 11/02/04

Project No.: 06002.01.241

SRR: 26806

Task Order: 041103-4

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

8 FEB 05 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
VLWC-CA-DI-106-b

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 254627

Client: Division 20

Date Received: 11/02/04

Project No.: 06002.01.241

SRR: 26806

Task Order: 041103-4

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

8 FEB 05 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
VLWC-CA-Np-a

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 254628

Client: Division 20

Date Received: 11/02/04

Project No.: 06002.01.241

SRR: 26806

Task Order: 041103-4

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

8 FEB 05 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID
VLWC-CA-Np-b

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 254629

Client: Division 20

Date Received: 11/02/04

Project No.: 06002.01.241

SRR: 26806

Task Order: 041103-4

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

8 FEB 05 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
LABORATORY CONTROL SAMPLE

Sample ID
LCSW - M16H2 / M21H2

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: NA

Client: Division 20

Date Received: NA

Project No.: 06002.01.241

SRR: 26806

Task Order: 041103-4

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Silver	0.503	0.500	100.6%
Aluminum	19.6	20.0	98.0%
Arsenic	20.1	20.0	100.5%
Boron	NA	NA	NA
Barium	19.6	20.0	98.0%
Beryllium	0.492	0.500	98.4%
Bismuth	NA	NA	NA
Calcium	198	200	99.0%
Cadmium	0.490	0.500	98.0%
Cobalt	4.86	5.00	97.2%
Chromium	1.98	2.00	99.0%
Copper	2.43	2.50	97.2%
Iron	10.7	10.0	107.0%
Potassium	182	200	91.0%
Lanthanum	NA	NA	NA
Lithium	36.5	40.0	91.3%
Magnesium	197	200	98.5%
Manganese	4.95	5.00	99.0%
Molybdenum	NA	NA	NA
Sodium	183	200	91.5%
Nickel	4.88	5.00	97.6%
Phosphorus	NA	NA	NA
Lead	4.97	5.00	99.4%
Palladium	NA	NA	NA
Sulfur	NA	NA	NA
Antimony	4.79	5.00	95.8%
Selenium	20.9	20.0	104.5%
Silicon	NA	NA	NA
Tin	NA	NA	NA
Strontium	NA	NA	NA
Thorium	NA	NA	NA
Titanium	NA	NA	NA
Thallium	20.2	20.0	101.0%
Uranium	NA	NA	NA
Vanadium	4.85	5.00	97.0%
Tungsten	NA	NA	NA
Yttrium	NA	NA	NA
Zinc	4.89	5.00	97.8%
Zirconium	NA	NA	NA

NA- Not Applicable.

8 FEB 05 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
BLANK SUMMARY

Sample ID
PBW - M16H2 / M21H2

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: NA

Client: Division 20

Date Received: NA

Project No.: 06002.01.241

SRR: 26806

Task Order: 041103-4

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

NA- Not Applicable.

8 FEB 05 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
DUPLICATE SUMMARY

Sample ID
VLWC-CA-DI-106-a

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 254626

Client: Division 20

Date Received: 11/02/04

Project No.: 06002.01.241

SRR: 26806

Task Order: 041103-4

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Aluminum	<0.5	<0.5	0.00%
Antimony	<0.1	<0.1	0.00%
Arsenic	<0.05	<0.05	0.00%
Barium	<0.05	<0.05	0.00%
Beryllium	<0.05	<0.05	0.00%
Bismuth	<0.1	<0.1	0.00%
Boron	<0.2	<0.2	0.00%
Cadmium	<0.05	<0.05	0.00%
Calcium	<0.5	<0.5	0.00%
Chromium	<0.05	<0.05	0.00%
Cobalt	<0.05	<0.05	0.00%
Copper	<0.05	<0.05	0.00%
Iron	<0.5	<0.5	0.00%
Lanthanum	<0.05	<0.05	0.00%
Lead	<0.05	<0.05	0.00%
Lithium	<0.05	<0.05	0.00%
Magnesium	<0.5	<0.5	0.00%
Manganese	<0.05	<0.05	0.00%
Molybdenum	<0.05	<0.05	0.00%
Nickel	<0.05	<0.05	0.00%
Palladium	<0.05	<0.05	0.00%
Phosphorus	<0.2	<0.2	0.00%
Potassium	<2	<2	0.00%
Selenium	<0.05	<0.05	0.00%
Silicon	<0.2	<0.2	0.00%
Silver	<0.05	<0.05	0.00%
Sodium	<2	<2	0.00%
Strontium	<0.05	<0.05	0.00%
Sulfur	<0.2	<0.2	0.00%
Thallium	<0.15	<0.15	0.00%
Thorium	<0.2	<0.2	0.00%
Tin	<0.05	<0.05	0.00%
Titanium	<0.05	<0.05	0.00%
Tungsten	<0.1	<0.1	0.00%
Uranium	<1	<1	0.00%
Vanadium	<0.05	<0.05	0.00%
Yttrium	<0.05	<0.05	0.00%
Zinc	<0.05	<0.05	0.00%
Zirconium	<0.05	<0.05	0.00%

8 FEB 05 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
MATRIX SPIKE SUMMARY

Sample ID
VLWC-CA-DI-106-a

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 254626

Client: Division 20

Date Received: 11/02/04

Project No.: 06002.01.241

SRR: 26806

Task Order: 041103-4

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Aluminum	<0.5	17.0	20.0	85.0%
Antimony	<0.1	4.23	5.00	84.6%
Arsenic	<0.05	17.7	20.0	88.5%
Barium	<0.05	17.3	20.0	86.5%
Beryllium	<0.05	0.434	0.500	86.8%
Bismuth	NA	NA	NA	NA
Boron	NA	NA	NA	NA
Cadmium	<0.05	0.431	0.500	86.2%
Calcium	<0.5	177	200	88.5%
Chromium	<0.05	1.76	2.00	88.0%
Cobalt	<0.05	4.30	5.00	86.0%
Copper	<0.05	2.13	2.50	85.2%
Iron	<0.5	9.35	10.0	93.5%
Lanthanum	NA	NA	NA	NA
Lead	<0.05	4.37	5.00	87.4%
Lithium	<0.05	32.1	40.0	80.3%
Magnesium	<0.5	175	200	87.5%
Manganese	<0.05	4.36	5.00	87.2%
Molybdenum	NA	NA	NA	NA
Nickel	<0.05	4.31	5.00	86.2%
Palladium	NA	NA	NA	NA
Phosphorus	NA	NA	NA	NA
Potassium	<2	184	200	92.0%
Selenium	<0.05	18.5	20.0	92.5%
Silicon	NA	NA	NA	NA
Silver	<0.05	0.444	0.500	88.8%
Sodium	<2	184	200	92.0%
Strontium	NA	NA	NA	NA
Sulfur	NA	NA	NA	NA
Thallium	<0.15	17.8	20.0	89.0%
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	<0.05	4.29	5.00	85.8%
Yttrium	NA	NA	NA	NA
Zinc	<0.05	4.32	5.00	86.4%
Zirconium	NA	NA	NA	NA

8 FEB 05 CONT BAW

Div 01 Results for Anion Analyses of Various Bld 57 lab 106 water sources

Samples from 653/142-3
6 total - 3 types analyzed in duplicate
Chain of Custody 653/145
Legend 653/143
No QA samples from CNWRA
The analyses was part of a characterization of the lab waters. Cation, free chlorine, and total chlorine analyses were also performed.

BAW 2-8-05

8 FEB 05 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: VLWC-AN-T-a

Lab Name: Southwest Research Institute
Lab Code: SwRI
Matrix: Water
Lab System ID: 254624

Client: Division 20
Date Received: 11/02/04
Project No.: 06002.01.241
SRR: 26806
Task Order: 041103-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	0.110	0.1
Chloride	15.4	0.1
Fluoride	0.237	0.1
Nitrate-N	1.78	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.01	0.01
Sulfate	18.3	0.1

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: VLWC-AN-T-b

Lab Name: Southwest Research Institute
Lab Code: SwRI
Matrix: Water
Lab System ID: 254625

Client: Division 20
Date Received: 11/02/04
Project No.: 06002.01.241
SRR: 26806
Task Order: 041103-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	0.113	0.1
Chloride	15.4	0.1
Fluoride	0.231	0.1
Nitrate-N	1.78	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.01	0.01
Sulfate	18.3	0.1

8 FEB 05 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: VLWC-AN-DI-106-a

Lab Name: Southwest Research Institute
Lab Code: SwRI
Matrix: Water
Lab System ID: 254620

Client: Division 20
Date Received: 11/02/04
Project No.: 06002.01.241
SRR: 26806
Task Order: 041103-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	<0.1	0.1
Fluoride	<0.1	0.1
Nitrate-N	<0.1	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.01	0.01
Sulfate	<0.1	0.1

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: VLWC-AN-DI-106-b

Lab Name: Southwest Research Institute
Lab Code: SwRI
Matrix: Water
Lab System ID: 254621

Client: Division 20
Date Received: 11/02/04
Project No.: 06002.01.241
SRR: 26806
Task Order: 041103-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	<0.1	0.1
Fluoride	<0.1	0.1
Nitrate-N	<0.1	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.01	0.01
Sulfate	<0.1	0.1

8 FEB 05 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: VLWC-AN-Np-a

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 254622

Client: Division 20

Date Received: 11/02/04

Project No.: 06002.01.241

SRR: 26806

Task Order: 041103-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	<0.1	0.1
Fluoride	<0.1	0.1
Nitrate-N	<0.1	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.01	0.01
Sulfate	<0.1	0.1

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Sample ID: VLWC-AN-Np-b

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 254623

Client: Division 20

Date Received: 11/02/04

Project No.: 06002.01.241

SRR: 26806

Task Order: 041103-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	<0.1	0.1
Fluoride	<0.1	0.1
Nitrate-N	<0.1	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.01	0.01
Sulfate	<0.1	0.1

8 FEB 05 CONT BAW

SOUTHWEST RESEARCH INSTITUTE
BLANK SUMMARY

Sample ID: PBW

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: NA

Client: Division 20

Date Received: NA

Project No.: 06002.01.241

SRR: 26806

Task Order: 041103-4

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	<0.1	0.1
Fluoride	<0.1	0.1
Nitrate-N	<0.1	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.01	0.01
Sulfate	<0.1	0.1

SOUTHWEST RESEARCH INSTITUTE
LABORATORY CONTROL SAMPLE

Sample ID: LCSW

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: NA

Client: Division 20

Date Received: NA

Project No.: 06002.01.241

SRR: 26806

Task Order: 041103-4

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Bromide	409	400	102.3%
Chloride	202	200	101.0%
Fluoride	99.8	100	99.8%
Nitrate-N	88.2	90.4	97.6%
Nitrite-N	99.6	100	99.6%
Phosphate-P	2.40	2.44	98.4%
Sulfate	403	400	100.8%

NA- Not Applicable.

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SOUTHWEST RESEARCH INSTITUTE
DUPLICATE SUMMARY

Sample ID
VLWC-AN-DI-106-a

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 254620

Client: Division 20

Date Received: 11/02/04

Project No.: 06002.01.241

SRR: 26806

Task Order: 041103-4

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Bromide	<0.1	<0.1	0.00%
Chloride	<0.1	<0.1	0.00%
Fluoride	<0.1	<0.1	0.00%
Nitrate-N	<0.1	<0.1	0.00%
Nitrite-N	<0.1	<0.1	0.00%
Phosphate-P	<0.01	<0.01	0.00%
Sulfate	<0.1	<0.1	0.00%

SOUTHWEST RESEARCH INSTITUTE
MATRIX SPIKE SUMMARY

Sample ID
VLWC-AN-DI-106-a

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 254620

Client: Division 20

Date Received: 11/02/04

Project No.: 06002.01.241

SRR: 26806

Task Order: 041103-4

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Bromide	<0.1	4.16	4.00	104.0%
Chloride	<0.1	1.96	2.00	98.0%
Fluoride	<0.1	0.965	1.00	96.5%
Nitrate-N	<0.1	0.888	0.904	98.2%
Nitrite-N	<0.1	0.936	1.00	93.6%
Phosphate-P	<0.01	0.245	0.250	98.0%
Sulfate	<0.1	4.02	4.00	100.5%

15 FEB 2005 BAW

Preparation of stock solutions for 19PB shallow string simulated water with calcium.

Objective: To prepare simulated water based on the NC-EWDP-19PB shallow string for use in sorption experiments.

Bradley Werling will prepare the stock solutions.

TOP-010 (Technical Operating Procedure for Preparing Simulated J-13 Water and its Modifications) will be used with some modifications. The amounts and types of compounds used to prepare the simulated water will reflect the composition of 19PB shallow water. The target concentrations for the 19PB shallow simulated water were based on the results of analyses performed on 19PB shallow water samples collected by CNWRA personnel. References for the sample results are as follows: 628/128, 628/197-198, 653/37-48, and 653/67-80. Table 1 contains the target chemical composition (limited to major constituents) of 19PB shallow string well water. Stock solutions are diluted 40 fold in order to prepare the simulated water. Based on a dilution factor of 40, the target chemical composition of the stock solutions are contained in Table 2. Three 1 liter stock solutions will be prepared. Stock solution C will contain only SiO2. Stock solution B will contain sodium bicarbonate and potassium fluoride. Stock solution A will contain all of the remaining compounds. Table 3 contains the masses of each compound to be used for preparing the stock solutions. The masses of the compounds used to prepare the stock solutions will be recoreded and samples from the simulated 19PB water prepared from these stock solutions will be sent to Division 01 for anion and cation analyses in order to assess the actual concentration of species in solution.

BW 2-22-05

~~Table 1: Target chemical composition of major constituents for NC-EWDP-19PB shallow string well water~~

Species	Target Conc (mg/L) in stock solution
Calcium	560
Magnesium	52
Potassium	144
Silicon	800
Sodium	2080
Chloride	280
Fluoride	72
Nitrate	120
Sulfate	1160
HCO3	5720

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+ BW 2-22-05

~~Table 2: Target chemical composition (based on a dilution factor of 40) of stock solutions for preparing 19PB shallow simulated water.~~

Table 1: Target chemical composition of major constituents for NC-EWDP 19PB shallow string well water

Species	Shallow Target Conc mg/L
Calcium	14
Magnesium	1.3
Potassium	3.6
Silicon	20
Sodium	52
Chloride	7
Fluoride	1.8
Nitrate	3
Sulfate	29
HCO3	143

Table 3: Compound masses used for preparing stock solutions for 19PB shallow simulated water

Compound	Mass (g) of compound for 1L of stock soln
NaHCO3	7.8969
KF*2H2O	0.2893
Ca(NO3)2*4H2O	0.2125
CaSO4*2H2O	1.9972
MgCL2*6H2O	0.4066
CaCl2*6H2O	0.3286
SiO2	1.7123

Preparation of Stock Solution C (SiO_2) only

Chemicals

Silicic Acid - $SiO_2 \cdot nH_2O$

Fisher A288-500 lot # 953433

nanopure water - type I

15 FEB 2005 CONT BAW

Equipment

Mettler AE 240 balance SN 101237

1000 mL vol flask

Wt boat

Glass funnel

Stir bar

Stir plate

Challange of balance (Target = 20.0001 g)

Before analyses - 20.0002 g

After analyses - 20.0002 g

Mass of SiO_2 used = 1.7126 g

SiO_2 added to tared weigh boat. Directly added to 1000 mL vol flask w/ about 800 mL type I water + stir bar. Funnel used and weigh boat rinsate added to vol flask solution. Type I water added to mark. Soln left on activated stir plate.

16 FEB 2005 BAW

Continuation of preparation of stock solutions for 19PB shallow string simulated water with calcium. For equipment see 653/195

16 FEB 2005 CONT BAW

Preparation of Stock Solution B (see 653/193)

Additional Equipment = 2L beaker

Challange of balance (Target mass = 20.0001 g)
At start of day = 20.0002 g
At end of day = 20.0002 g

$KF \cdot 2H_2O$ - Sigma Aldrich 221872 lot 09516JC
$NaHCO_3$ - Fisher S233-500 lot 006275

Mass of ~~H~~ BW 2-16-05 $KF \cdot 2H_2O$ = 0.2991 g
Mass of $NaHCO_3$ used = 7.8976 g

Compounds individually added to tared weigh boats. Transfered to 1000 mL beaker with 800 mL of typel water. Washed weigh boat with typel water with rinsate added to
2000 ~~1000~~ BW 2-16-05 mL beaker. Stirred on stir plate until everything dissolved (~5 minutes). Transferred into 1000 mL vol flask. Beaker rinsed with rinsate added to vol flask. Diluted to mark with typel water. Labeled ~~St~~ BW 2-16-05 19PB Stock Soln B.

16 FEB 2005 CONT BAW

Preparation of Stock Solution ~~C~~ A
2-16-05 BW

$Ca(NO_3)_2 \cdot 4H_2O$ - Fisher C109-500 lot 035087
$CaSO_4 \cdot 2H_2O$ - Sigma Aldrich 255548 lot 02631TB
$CaCl_2 \cdot 6H_2O$ - Fisher C78-500 lot 033494
$MgCl_2 \cdot 6H_2O$ Fisher M33-500 lot 006854

Masses (g) used
Calcium nitrate = 0.2120
Calcium sulfate = 1.9991
Calcium chloride = 0.3287
Magnesium Chloride = 0.4096

Calcium sulfated added first, stirred for about three hours before dissolved (see 653/196 for procedure). Then added calcium nitrate, calcium chloride, and magnesium chloride in that order. All dissolved immediately. Labeled 19PB Stock Soln A.

SiO_2 Stock C soln (653/195) still not entirely dissolved. Left on activated stir plate.

2-16-05 BW

17 FEB 2005 BAW

Continuation of preparation of stock solutions for 19PB shallow string simulated water w/ calcium. (see 653/193)

The silicic acid (SiO_2) in stock solution C (653/194) was still not completely dissolved. A stock solution was prepared using a more soluble Si source: sodium meta silicate ($Na_2SiO_3 \cdot 9H_2O$). Using sodium meta silicate will provide a more accurate knowledge of the Si concentration in the prepared solution. However using the sodium meta silicate will also cause the sodium level to surpass the target concentration for the simulated water.

Instead of 1.7123g SiO_3 (Table 3 653/194) a solution will be made using 4.8598g of sodium meta silicate. This would result in a ~~12 mg/L~~ BW 2-17-05 480 mg/L Si level for the stock solution (compare to previous level of 800 mg/L - Table 1 on 653/193) and increase the Na level by 786 mg/L. The resulting concentrations in the simulated water would be 12 mg/L Si and 73.7 mg/L Na. Compare these values to the target simulated water concentrations of 20 mg/L Si and 52 mg/L Na (Table 2 - 653/194)

17 Feb 2005 CONT BAW

Preparation of Stock soln D (Si from sodium meta silicate (see 653/193)

Chemicals
Sodium meta silicate - Fisher S408-500 lot 942853A
Type I water
Equipment
Mettler AE 240 balance SN 101237
1000 mL vol flask, 2000 mL beaker,
Glass funnel, wt boat, spatula,
Stir plate, + stir bar.
Challange of balance (Target mass = 20.0001g)
At start of preparation - 20.0000g
At completion - 20.0000g
Mass of $Na_2SiO_3 \cdot 9H_2O$ used 4.8615g

Compound added to tared wt boat. Directly added to a ~~to~~ BW 2-17-05 2000 mL beaker w/ about 800 mL typeI water + stir bar. Wt boat rinsed with rinsate going into beaker. Stirred on stir plate until compound dissolved (under 1 minute). Transferred contents into 1L vol flask. Rinsed beaker w/ typeI water and added rinsate to vol flask. ~~Dir~~ BW 2-17-05 Added typeI water to mark and labeled vol flask 19PB Stock Soln D.

17 FEB 2005 CONT BAW

END OF SCIENTIFIC NOTEBOOK 653

ENTRIES CONTINUED IN SN 696

I have reviewed this scientific notebook and find it in agreement with QAP-001. There is sufficient information regarding methods used for conducting tests, acquiring and analyzing data so that another qualified individual could repeat the activity.

E. C. Peavey
3/4/2005