

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

628-RT

628-RT  
PROG/NUCLIDE TRNSPRT

CNWRA  
CONTROLLED  
COPY 628

20.06002.01.141 - RT

Issued to Bradley Werling

210-522-6565

9 DEC 2003

INVESTGATOR

SIGNATURE

INITIALS

Bradley Werling  
Jon Brown  
Paul Bertetti  
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Bradley Werling  
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BW  
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10 DEC 03 CONT BAW

This notebook is a continuation of scientific notebook 610 for radionuclide transport

The information starting on 628/3 is a continuation of the Div 01 anion results for the EWDP groundwater samples from the Oct 27-30, 2003 event

12-10-03 BAW

10 DEC 03 CONT BAW

### SOUTHWEST RESEARCH INSTITUTE SAMPLE ANALYSIS DATA SHEET

Sample ID

7SC-24-1003-UFUA-1

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 031106-11

Lab System ID: 237575

Client: Division 20

Date Received: 11/06/03

Project No.: 20.06002.01.141

SRR: 25199

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	17.3	0.1
Fluoride	0.777	0.1
Nitrate-N	<0.1	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.01	0.01
Sulfate	125	1.0

### SOUTHWEST RESEARCH INSTITUTE SAMPLE ANALYSIS DATA SHEET

Sample ID

99Q-1003-FUA-1

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 031106-11

Lab System ID: 237577

Client: Division 20

Date Received: 11/06/03

Project No.: 20.06002.01.141

SRR: 25199

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	5.03	0.1
Fluoride	<0.1	0.1
Nitrate-N	0.454	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.01	0.01
Sulfate	<0.1	0.1

10 DEC 03 - CONT BAW

### SOUTHWEST RESEARCH INSTITUTE DUPLICATE SUMMARY

Sample ID  
16P-1003-FUA-1

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 11/06/03

Matrix: Water

Project No.: 20.06002.01.141

Task Order: 031106-11

SRR: 25199

Lab System ID: 237566

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Bromide	<0.1	<0.1	0.00%
Chloride	9.37	9.45	0.85%
Fluoride	2.61	2.78	6.31%
Nitrate-N	1.17	1.14	2.60%
Nitrite-N	<0.1	<0.1	0.00%
Phosphate-P	0.0248	0.0274	9.96%
Sulfate	52.9	52.7	0.38%

### SOUTHWEST RESEARCH INSTITUTE MATRIX SPIKE SUMMARY

Sample ID  
16P-1003-FUA-1

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 11/06/03

Matrix: Water

Project No.: 20.06002.01.141

Task Order: 031106-11

SRR: 25199

Lab System ID: 237566

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Bromide	<0.1	3.78	4.00	94.5%
Chloride	9.37	11.0	2.00	81.5%
Fluoride	2.61	3.58	1.00	97.0%
Nitrate-N	1.17	2.03	0.904	95.1%
Nitrite-N	<0.1	0.954	1.00	95.4%
Phosphate-P	0.0248	0.243	0.200	109%
Sulfate	52.9	89.0	40.0	90.3%

10 DEC 03 CONT BAW

### SOUTHWEST RESEARCH INSTITUTE LABORATORY CONTROL SAMPLE

Sample ID  
LCSW

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

Matrix: Water

Project No.: 20.06002.01.141

Task Order: 031106-11

SRR: 25199

Lab System ID: NA

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Bromide	393	400	98.3%
Chloride	204	200	102%
Fluoride	99.8	100	99.8%
Nitrate-N	88.7	90.4	98.1%
Nitrite-N	99.3	100	99.3%
Phosphate-P	2.40	2.31	104%
Sulfate	389	400	97.3%

NA- Not Applicable.

### SOUTHWEST RESEARCH INSTITUTE BLANK SUMMARY

Sample ID  
PBW

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

Matrix: Water

Project No.: 20.06002.01.141

Task Order: 031106-11

SRR: 25199

Lab System ID: NA

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.

13 Dec 03

Nye County ~~EAH~~<sup>12-15-03</sup> EWDP soil samples from soil drilling event on Dec 3-5 2003. Sampling done by Paul Bertotti and recorded in ~~8~~<sup>12-15-03</sup> yellow notebook # 333 pg 55-66.

Sample	Weight (g)
<del>350</del> <sup>12-13-03</sup>	
NC-EWDP-19PB	
350.8 - 352.4	725.3
355.0 - 356.6	413.7
356.9 - 357.9	431
357.9 - 359.3	345
360.0 - 361.7	678.6
362.0 - 363.1	638.6
364.9 - 366.7	493.2
367.0 - 368.5	726.1
368.5 - 369.9	894.8
371.0 - 372.9	388.8
372.9 - 373.6	1039.4
373.6 - 374.6	982.3
381.1 - 382.4	543.5
382.4 - 383.7	866.3
383.7 - 386.1	994.6
387.2 - 388.9	496.8
374.6 - 375.4	540.8
19PB	
388.9 - 394.1	3303.4

1-22-04

13 Dec 03 cont.

Sample	Weight (g)
NC-EWDP-19PB <sup>12/17/03</sup>	
401.1 - <del>409.9</del> 406.1 (dry)	697.6 <sup>12/17/03</sup> 1204.0
401.1 - 406.1 (wet)	1212.5 <sup>12/17/03</sup> 2286.1
406.3 - 407.5	1617.5
407.9 - 408.5	642.3
408.5 - 409.9 (dry)	697.6
408.5 - 409.9 (wet)	1493.9
409.9 - 411.9	1619.6
411.9 - 413.1	837.1

<sup>12/17/03</sup> 12/17/03 All samples noted on this and previous page are unconsolidated alluvium collected Dec 3-5, 2003 at NC-EWDP-19PB. Sample weights are approximate and include subtraction of sample bag weight of approximately 17 grams.

Sample added: 374.6 - 375.4 543.0 grams

Added on 1-15-04  
The Sartorius scale (S/N 89030006) was used to weigh samples.

12-18-03

18 DEC 03

BAW

DIV 01 Results for Cation/Trace Metal for EWDP  
Groundwater sampling event 27 Oct - 30 Oct, 2003

Samples from 610/82-88

Chain of Custody 610/92-95

Field blank - none

2 QAs - duplicates - aliquots from same stock  
solution - Provides precision + accuracy info (610/81)

These samples (aliquots from same solns) were  
also analyzed by SGS Lakeland (610/177-180)

Accuracy + Precision Summary data followed by  
complete results.

QA Accuracy Results

For Sample 98Q-1003-FA5

Analyte	Target Conc (ppm)	Measured Conc (ppm)	Percent Difference
Calcium	10	10.1	1.00
Potassium	6	5.25	-12.50
Sodium	30	27.0	-10.00
Silicon	20	19.4	-3.00

For Sample 98Q-1003-FA6

Analyte	Target Conc (ppm)	Measured Conc (ppm)	Percent Difference
Calcium	10	9.91	-0.90
Potassium	6	5.32	-11.33
Sodium	30	26.6	-11.33
Silicon	20	19.4	-3.00

QA Precision Results

Percent Difference between 98Q-1003-FA5 and 98Q-1003-FA6

Analyte	Percent Difference
Calcium	-1.88
Potassium	1.33
Sodium	-1.48
Silicon	0.00

SOURCE

18 DEC 03

CONT

BAW

SOUTHWEST RESEARCH INSTITUTE  
SAMPLE ANALYSIS DATA SHEET

Sample ID

16P-1003-FA-5

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 237578

Client: Division 20

Date Received: 11/06/03

Project No.: 20.06002.01.141

SRR: 25200

TO: 031106-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	0.620	0.05
Antimony	<0.01	0.01
Arsenic	0.014	0.005
Barium	0.022	0.005
Beryllium	<0.005	0.005
Bismuth	<0.015	0.015
Boron	0.204	0.025
Cadmium	<0.005	0.005
Calcium	2.17	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	1.14	0.05
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.081	0.005
Magnesium	0.388	0.05
Manganese	0.024	0.005
Molybdenum	0.063	0.01
Nickel	<0.005	0.005
Palladium	<0.01	0.01
Phosphorus	0.043	0.04
Potassium	1.92	0.2
Selenium	<0.015	0.015
Silicon	21.1	0.05
Silver	<0.005	0.005
Sodium	110	0.2
Strontium	0.028	0.005
Sulfur	20.2	0.025
Thallium	<0.025	0.025
Thorium	<0.01	0.01
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.015	0.015
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.015	0.005
Zirconium	<0.005	0.005

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**DUPLICATE SUMMARY**

Lab Name: Southwest Research Institute  
 Lab Code: SwRI  
 Matrix: Water  
 Lab System ID: 237578

Client: Division 20  
 Date Received: 11/06/03  
 Project No.: 20.06002.01.141  
 SRR: 25200  
 TO: 031106-12

Sample ID  
 16P-1003-FA-5

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Aluminum	0.620	0.659	6.19%
Antimony	<0.01	<0.01	0.00%
Arsenic	0.014	0.008	54.9%
Barium	0.022	0.020	10.3%
Beryllium	<0.005	<0.005	0.00%
Bismuth	<0.015	<0.015	0.00%
Boron	0.204	0.206	0.95%
Cadmium	<0.005	<0.005	0.00%
Calcium	2.17	2.18	0.63%
Chromium	<0.005	<0.005	0.00%
Cobalt	<0.005	<0.005	0.00%
Copper	<0.005	<0.005	0.00%
Iron	1.14	1.23	7.02%
Lanthanum	<0.005	0.005	200%
Lead	<0.005	<0.005	0.00%
Lithium	0.081	0.081	0.43%
Magnesium	0.388	0.373	3.89%
Manganese	0.024	0.025	0.12%
Molybdenum	0.063	0.064	2.48%
Nickel	<0.005	<0.005	0.00%
Palladium	<0.01	<0.01	0.00%
Phosphorus	0.043	0.040	6.90%
Potassium	----	----	----
Selenium	<0.015	<0.015	0.00%
Silicon	21.1	21.4	1.55%
Silver	<0.005	<0.005	0.00%
Sodium	----	----	----
Strontium	0.028	0.028	0.40%
Sulfur	20.2	19.6	2.61%
Thallium	<0.025	<0.025	0.00%
Thorium	<0.01	<0.01	0.00%
Tin	<0.01	<0.01	0.00%
Titanium	<0.005	<0.005	0.00%
Tungsten	<0.015	<0.015	0.00%
Uranium	<0.1	<0.1	0.00%
Vanadium	<0.005	<0.005	0.00%
Yttrium	<0.005	<0.005	0.00%
Zinc	0.015	0.015	0.34%
Zirconium	<0.005	<0.005	0.00%

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**SAMPLE ANALYSIS DATA SHEET**

Lab Name: Southwest Research Institute  
 Lab Code: SwRI  
 Matrix: Water  
 Lab System ID: 237579

Client: Division 20  
 Date Received: 11/06/03  
 Project No.: 20.06002.01.141  
 SRR: 25200  
 TO: 031106-12

Sample ID  
 16P-1003-FUA-5

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	0.340	0.05
Antimony	<0.01	0.01
Arsenic	0.011	0.005
Barium	0.008	0.005
Beryllium	<0.005	0.005
Bismuth	<0.015	0.015
Boron	0.210	0.025
Cadmium	<0.005	0.005
Calcium	1.85	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	0.262	0.05
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.082	0.005
Magnesium	0.269	0.05
Manganese	0.014	0.005
Molybdenum	0.066	0.01
Nickel	<0.005	0.005
Palladium	<0.01	0.01
Phosphorus	<0.04	0.04
Potassium	1.79	0.2
Selenium	<0.015	0.015
Silicon	20.7	0.05
Silver	<0.005	0.005
Sodium	105	0.2
Strontium	0.022	0.005
Sulfur	19.8	0.025
Thallium	<0.025	0.025
Thorium	<0.01	0.01
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.015	0.015
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.007	0.005
Zirconium	<0.005	0.005

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**SAMPLE ANALYSIS DATA SHEET**

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 237580

Sample ID

16P-1003-UFUA-5

Client: Division 20

Date Received: 11/06/03

Project No.: 20.06002.01.141

SRR: 25200

TO: 031106-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	0.354	0.05
Antimony	<0.01	0.01
Arsenic	0.019	0.005
Barium	0.038	0.005
Beryllium	<0.005	0.005
Bismuth	<0.015	0.015
Boron	0.273	0.025
Cadmium	<0.005	0.005
Calcium	6.53	0.05
Chromium	<0.005	0.005
Cobalt	0.010	0.005
Copper	0.009	0.005
Iron	1.07	0.05
Lanthanum	<0.005	0.005
Lead	0.005	0.005
Lithium	0.112	0.005
Magnesium	0.901	0.05
Manganese	0.054	0.005
Molybdenum	0.063	0.01
Nickel	<0.005	0.005
Palladium	<0.01	0.01
Phosphorus	0.061	0.04
Potassium	1.98	0.2
Selenium	<0.015	0.015
Silicon	27.1	0.05
Silver	<0.005	0.005
Sodium	117	0.2
Strontium	0.078	0.005
Sulfur	27.7	0.025
Thallium	<0.025	0.025
Thorium	<0.01	0.01
Tin	0.011	0.01
Titanium	<0.005	0.005
Tungsten	<0.015	0.015
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.045	0.005
Zirconium	<0.005	0.005

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**SAMPLE ANALYSIS DATA SHEET**

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 237581

Sample ID

19D-1003-FA-5

Client: Division 20

Date Received: 11/06/03

Project No.: 20.06002.01.141

SRR: 25200

TO: 031106-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.01	0.01
Arsenic	0.007	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.015	0.015
Boron	0.232	0.025
Cadmium	<0.005	0.005
Calcium	2.23	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	0.275	0.05
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.249	0.005
Magnesium	0.103	0.05
Manganese	0.040	0.005
Molybdenum	0.039	0.01
Nickel	<0.005	0.005
Palladium	<0.01	0.01
Phosphorus	<0.04	0.04
Potassium	2.99	0.2
Selenium	<0.015	0.015
Silicon	7.10	0.05
Silver	<0.005	0.005
Sodium	173	0.2
Strontium	0.006	0.005
Sulfur	9.97	0.025
Thallium	<0.025	0.025
Thorium	<0.01	0.01
Tin	0.010	0.01
Titanium	<0.005	0.005
Tungsten	<0.015	0.015
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

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**SAMPLE ANALYSIS DATA SHEET**

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 237582

Sample ID  
 19D-1003-FUA-5

Client: Division 20

Date Received: 11/06/03

Project No.: 20.06002.01.141

SRR: 25200

TO: 031106-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.01	0.01
Arsenic	0.008	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.015	0.015
Boron	0.233	0.025
Cadmium	<0.005	0.005
Calcium	2.24	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	0.202	0.05
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.247	0.005
Magnesium	0.106	0.05
Manganese	0.039	0.005
Molybdenum	0.038	0.01
Nickel	<0.005	0.005
Palladium	<0.01	0.01
Phosphorus	<0.04	0.04
Potassium	3.08	0.2
Selenium	<0.015	0.015
Silicon	7.13	0.05
Silver	<0.005	0.005
Sodium	173	0.2
Strontium	0.006	0.005
Sulfur	9.89	0.025
Thallium	<0.025	0.025
Thorium	<0.01	0.01
Tin	0.025	0.01
Titanium	<0.005	0.005
Tungsten	<0.015	0.015
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

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**SAMPLE ANALYSIS DATA SHEET**

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 237583

Sample ID  
 19D-1003-UFUA-5

Client: Division 20

Date Received: 11/06/03

Project No.: 20.06002.01.141

SRR: 25200

TO: 031106-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	0.096	0.05
Antimony	<0.01	0.01
Arsenic	0.007	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.015	0.015
Boron	0.234	0.025
Cadmium	<0.005	0.005
Calcium	2.18	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	1.33	0.05
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.256	0.005
Magnesium	0.111	0.05
Manganese	0.049	0.005
Molybdenum	0.035	0.01
Nickel	<0.005	0.005
Palladium	<0.01	0.01
Phosphorus	0.046	0.04
Potassium	2.93	0.2
Selenium	<0.015	0.015
Silicon	7.80	0.05
Silver	<0.005	0.005
Sodium	173	0.2
Strontium	0.007	0.005
Sulfur	9.85	0.025
Thallium	<0.025	0.025
Thorium	<0.01	0.01
Tin	0.024	0.01
Titanium	<0.005	0.005
Tungsten	<0.015	0.015
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.014	0.005
Zirconium	<0.005	0.005

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
SAMPLE ANALYSIS DATA SHEET

Sample ID

19IM1-25-1003-FA-5

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 11/06/03

Matrix: Water

Project No.: 20.06002.01.141

Lab System ID: 237584

SRR: 25200

TO: 031106-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	0.167	0.05
Antimony	<0.01	0.01
Arsenic	0.035	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.015	0.015
Boron	0.179	0.025
Cadmium	<0.005	0.005
Calcium	0.543	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	0.074	0.05
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.125	0.005
Magnesium	0.071	0.05
Manganese	0.015	0.005
Molybdenum	<0.01	0.01
Nickel	<0.005	0.005
Palladium	<0.01	0.01
Phosphorus	<0.04	0.04
Potassium	3.04	0.2
Selenium	<0.015	0.015
Silicon	27.9	0.05
Silver	<0.005	0.005
Sodium	94.7	0.2
Strontium	<0.005	0.005
Sulfur	5.56	0.025
Thallium	<0.025	0.025
Thorium	<0.01	0.01
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.015	0.015
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

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
SAMPLE ANALYSIS DATA SHEET

Sample ID

19IM1-25-1003-FUA-5

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 11/06/03

Matrix: Water

Project No.: 20.06002.01.141

Lab System ID: 237585

SRR: 25200

TO: 031106-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	0.132	0.05
Antimony	<0.01	0.01
Arsenic	0.034	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.015	0.015
Boron	0.162	0.025
Cadmium	<0.005	0.005
Calcium	0.538	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.05	0.05
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.125	0.005
Magnesium	0.068	0.05
Manganese	0.014	0.005
Molybdenum	<0.01	0.01
Nickel	<0.005	0.005
Palladium	<0.01	0.01
Phosphorus	0.040	0.04
Potassium	2.92	0.2
Selenium	<0.015	0.015
Silicon	28.2	0.05
Silver	<0.005	0.005
Sodium	94.4	0.2
Strontium	<0.005	0.005
Sulfur	5.48	0.025
Thallium	<0.025	0.025
Thorium	<0.01	0.01
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.015	0.015
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

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**SAMPLE ANALYSIS DATA SHEET**

Sample ID

19IM1-25-1003-UFUA-5

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 11/06/03

Matrix: Water

Project No.: 20.06002.01.141

Lab System ID: 237586

SRR: 25200

TO: 031106-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	0.204	0.05
Antimony	<0.01	0.01
Arsenic	0.033	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.015	0.015
Boron	0.163	0.025
Cadmium	<0.005	0.005
Calcium	0.761	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	0.195	0.05
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.128	0.005
Magnesium	0.094	0.05
Manganese	0.025	0.005
Molybdenum	<0.01	0.01
Nickel	<0.005	0.005
Palladium	<0.01	0.01
Phosphorus	0.045	0.04
Potassium	3.04	0.2
Selenium	<0.015	0.015
Silicon	28.7	0.05
Silver	<0.005	0.005
Sodium	94.8	0.2
Strontium	<0.005	0.005
Sulfur	5.63	0.025
Thallium	<0.025	0.025
Thorium	<0.01	0.01
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.015	0.015
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.019	0.005
Zirconium	<0.005	0.005

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**SAMPLE ANALYSIS DATA SHEET**

Sample ID

19IM2-25-1003-FA-5

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 11/06/03

Matrix: Water

Project No.: 20.06002.01.141

Lab System ID: 237587

SRR: 25200

TO: 031106-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	0.158	0.05
Antimony	<0.01	0.01
Arsenic	0.037	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.015	0.015
Boron	0.157	0.025
Cadmium	<0.005	0.005
Calcium	0.360	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	0.074	0.05
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.126	0.005
Magnesium	<0.05	0.05
Manganese	<0.005	0.005
Molybdenum	<0.01	0.01
Nickel	<0.005	0.005
Palladium	<0.01	0.01
Phosphorus	0.040	0.04
Potassium	2.96	0.2
Selenium	<0.015	0.015
Silicon	28.5	0.05
Silver	<0.005	0.005
Sodium	95.6	0.2
Strontium	<0.005	0.005
Sulfur	5.69	0.025
Thallium	<0.025	0.025
Thorium	<0.01	0.01
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.015	0.015
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

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**SAMPLE ANALYSIS DATA SHEET**

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 237588

Sample ID

19IM2-25-1003-FUA-5

Client: Division 20

Date Received: 11/06/03

Project No.: 20.06002.01.141

SRR: 25200

TO: 031106-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	0.120	0.05
Antimony	<0.01	0.01
Arsenic	0.035	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.015	0.015
Boron	0.157	0.025
Cadmium	<0.005	0.005
Calcium	0.359	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.05	0.05
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.127	0.005
Magnesium	<0.05	0.05
Manganese	<0.005	0.005
Molybdenum	<0.01	0.01
Nickel	<0.005	0.005
Palladium	<0.01	0.01
Phosphorus	<0.04	0.04
Potassium	3.09	0.2
Selenium	<0.015	0.015
Silicon	28.5	0.05
Silver	<0.005	0.005
Sodium	97.1	0.2
Strontium	<0.005	0.005
Sulfur	5.81	0.025
Thallium	<0.025	0.025
Thorium	<0.01	0.01
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.015	0.015
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

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**SAMPLE ANALYSIS DATA SHEET**

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 237589

Sample ID

19IM2-25-1003-UFUA-5

Client: Division 20

Date Received: 11/06/03

Project No.: 20.06002.01.141

SRR: 25200

TO: 031106-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	0.174	0.05
Antimony	<0.01	0.01
Arsenic	0.032	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.015	0.015
Boron	0.157	0.025
Cadmium	<0.005	0.005
Calcium	0.409	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	0.190	0.05
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.127	0.005
Magnesium	<0.05	0.05
Manganese	0.034	0.005
Molybdenum	<0.01	0.01
Nickel	<0.005	0.005
Palladium	<0.01	0.01
Phosphorus	<0.04	0.04
Potassium	3.11	0.2
Selenium	<0.015	0.015
Silicon	28.7	0.05
Silver	<0.005	0.005
Sodium	97.3	0.2
Strontium	<0.005	0.005
Sulfur	5.69	0.025
Thallium	<0.025	0.025
Thorium	<0.01	0.01
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.015	0.015
Uranium	<0.1	0.1
Vanadium	0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.006	0.005
Zirconium	<0.005	0.005

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**SAMPLE ANALYSIS DATA SHEET**

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 237590

Sample ID  
 7SC-24-1003-FA-5

Client: Division 20

Date Received: 11/06/03

Project No.: 20.06002.01.141

SRR: 25200

TO: 031106-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.01	0.01
Arsenic	<0.005	0.005
Barium	0.056	0.005
Beryllium	<0.005	0.005
Bismuth	<0.015	0.015
Boron	0.259	0.025
Cadmium	<0.005	0.005
Calcium	28.1	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.05	0.05
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.105	0.005
Magnesium	28.9	0.05
Manganese	0.075	0.005
Molybdenum	<0.01	0.01
Nickel	<0.005	0.005
Palladium	<0.01	0.01
Phosphorus	<0.04	0.04
Potassium	8.08	0.2
Selenium	<0.015	0.015
Silicon	13.7	0.05
Silver	<0.005	0.005
Sodium	82.2	0.2
Strontium	0.413	0.005
Sulfur	45.0	0.025
Thallium	<0.025	0.025
Thorium	<0.01	0.01
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.015	0.015
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

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**SAMPLE ANALYSIS DATA SHEET**

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 237591

Sample ID  
 7SC-24-1003-FUA-5

Client: Division 20

Date Received: 11/06/03

Project No.: 20.06002.01.141

SRR: 25200

TO: 031106-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.01	0.01
Arsenic	0.005	0.005
Barium	0.056	0.005
Beryllium	<0.005	0.005
Bismuth	<0.015	0.015
Boron	0.260	0.025
Cadmium	<0.005	0.005
Calcium	28.3	0.05
Chromium	<0.005	0.005
Cobalt	0.005	0.005
Copper	<0.005	0.005
Iron	<0.05	0.05
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.104	0.005
Magnesium	28.9	0.05
Manganese	0.071	0.005
Molybdenum	<0.01	0.01
Nickel	<0.005	0.005
Palladium	<0.01	0.01
Phosphorus	0.042	0.04
Potassium	8.16	0.2
Selenium	<0.015	0.015
Silicon	13.7	0.05
Silver	<0.005	0.005
Sodium	82.0	0.2
Strontium	0.413	0.005
Sulfur	43.7	0.025
Thallium	<0.025	0.025
Thorium	<0.01	0.01
Tin	0.016	0.01
Titanium	<0.005	0.005
Tungsten	<0.015	0.015
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

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**SAMPLE ANALYSIS DATA SHEET**

Sample ID

7SC-24-1003-UFUA-5

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 11/06/03

Matrix: Water

Project No.: 20.06002.01.141

Lab System ID: 237592

SRR: 25200

TO: 031106-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.01	0.01
Arsenic	<0.005	0.005
Barium	0.057	0.005
Beryllium	<0.005	0.005
Bismuth	<0.015	0.015
Boron	0.260	0.025
Cadmium	<0.005	0.005
Calcium	28.2	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	0.081	0.05
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	0.105	0.005
Magnesium	28.9	0.05
Manganese	0.071	0.005
Molybdenum	<0.01	0.01
Nickel	<0.005	0.005
Palladium	<0.01	0.01
Phosphorus	<0.04	0.04
Potassium	8.12	0.2
Selenium	<0.015	0.015
Silicon	13.7	0.05
Silver	<0.005	0.005
Sodium	81.6	0.2
Strontium	0.416	0.005
Sulfur	44.3	0.025
Thallium	<0.025	0.025
Thorium	<0.01	0.01
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.015	0.015
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	0.016	0.005
Zirconium	<0.005	0.005

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**SAMPLE ANALYSIS DATA SHEET**

Sample ID

98Q-1003-FA-5

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 11/06/03

Matrix: Water

Project No.: 20.06002.01.141

Lab System ID: 237593

SRR: 25200

TO: 031106-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.01	0.01
Arsenic	<0.005	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.015	0.015
Boron	<0.025	0.025
Cadmium	<0.005	0.005
Calcium	10.1	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.05	0.05
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	0.065	0.05
Manganese	<0.005	0.005
Molybdenum	<0.01	0.01
Nickel	<0.005	0.005
Palladium	<0.01	0.01
Phosphorus	<0.04	0.04
Potassium	5.25	0.2
Selenium	<0.015	0.015
Silicon	19.4	0.05
Silver	<0.005	0.005
Sodium	27.0	0.2
Strontium	<0.005	0.005
Sulfur	0.114	0.025
Thallium	<0.025	0.025
Thorium	<0.01	0.01
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.015	0.015
Uranium	<0.1	0.1
Vanadium	<0.005	0.005
Yttrium	<0.005	0.005
Zinc	<0.005	0.005
Zirconium	0.008	0.005

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**SAMPLE ANALYSIS DATA SHEET**

Lab Name: Southwest Research Institute  
 Lab Code: SwRI  
 Matrix: Water  
 Lab System ID: 237594

Sample ID: 98Q-1003-FA-6  
 Client: Division 20  
 Date Received: 11/06/03  
 Project No.: 20.06002.01.141  
 SRR: 25200  
 TO: 031106-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.01	0.01
Arsenic	<0.005	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.015	0.015
Boron	<0.025	0.025
Cadmium	<0.005	0.005
Calcium	9.91	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.05	0.05
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	<0.05	0.05
Manganese	<0.005	0.005
Molybdenum	<0.01	0.01
Nickel	<0.005	0.005
Palladium	<0.01	0.01
Phosphorus	<0.04	0.04
Potassium	5.32	0.2
Selenium	<0.015	0.015
Silicon	19.4	0.05
Silver	<0.005	0.005
Sodium	26.6	0.2
Strontium	<0.005	0.005
Sulfur	<0.025	0.025
Thallium	<0.025	0.025
Thorium	<0.01	0.01
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.015	0.015
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

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**MATRIX SPIKE SUMMARY**

Lab Name: Southwest Research Institute  
 Lab Code: SwRI  
 Matrix: Water  
 Lab System ID: 237579

Sample ID: 16P-1003-FUA-5  
 Client: Division 20  
 Date Received: 11/06/03  
 Project No.: 20.06002.01.141  
 SRR: 25200  
 TO: 031106-12

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Aluminum	0.340	2.30	2.00	98.2%
Antimony	<0.01	0.370	0.500	74.0%
Arsenic	0.011	2.12	2.00	105.4%
Barium	0.008	2.05	2.00	102.0%
Beryllium	<0.005	0.053	0.050	105.9%
Bismuth	NA	NA	NA	NA
Boron	NA	NA	NA	NA
Cadmium	<0.005	0.052	0.050	103.5%
Calcium	1.85	22.6	20.0	103.9%
Chromium	<0.005	0.184	0.200	91.8%
Cobalt	<0.005	0.520	0.500	103.9%
Copper	<0.005	0.259	0.250	103.6%
Iron	0.262	1.23	1.00	97.2%
Lanthanum	NA	NA	NA	NA
Lead	<0.005	0.523	0.500	104.5%
Lithium	NA	NA	NA	NA
Magnesium	0.269	21.2	20.0	104.6%
Manganese	0.014	0.523	0.500	102.0%
Molybdenum	NA	NA	NA	NA
Nickel	<0.005	0.509	0.500	101.9%
Palladium	NA	NA	NA	NA
Phosphorus	NA	NA	NA	NA
Potassium	-----	-----	-----	-----
Selenium	<0.015	2.32	2.00	116.0%
Silicon	NA	NA	NA	NA
Silver	<0.005	0.042	0.050	84.5%
Sodium	-----	-----	-----	-----
Strontium	NA	NA	NA	NA
Sulfur	NA	NA	NA	NA
Thallium	<0.025	2.28	2.00	114.2%
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	<0.005	0.514	0.500	102.9%
Yttrium	NA	NA	NA	NA
Zinc	0.007	0.536	0.500	105.8%
Zirconium	NA	NA	NA	NA

NA- Not Applicable.

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**DUPLICATE SUMMARY**

Lab Name: Southwest Research Institute  
 Lab Code: SwRI  
 Matrix: Water  
 Lab System ID: 237580

Sample ID  
 16P-1003-UFUA-5

Client: Division 20  
 Date Received: 11/06/03  
 Project No.: 20.06002.01.141  
 SRR: 25200  
 TO: 031106-12

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Aluminum	----	----	----
Antimony	----	----	----
Arsenic	----	----	----
Barium	----	----	----
Beryllium	----	----	----
Bismuth	----	----	----
Boron	----	----	----
Cadmium	----	----	----
Calcium	----	----	----
Chromium	----	----	----
Cobalt	----	----	----
Copper	----	----	----
Iron	----	----	----
Lanthanum	----	----	----
Lead	----	----	----
Lithium	----	----	----
Magnesium	----	----	----
Manganese	----	----	----
Molybdenum	----	----	----
Nickel	----	----	----
Palladium	----	----	----
Phosphorus	----	----	----
Potassium	1.98	1.89	4.72%
Selenium	----	----	----
Silicon	----	----	----
Silver	----	----	----
Sodium	117	117	0.31%
Strontium	----	----	----
Sulfur	----	----	----
Thallium	----	----	----
Thorium	----	----	----
Tin	----	----	----
Titanium	----	----	----
Tungsten	----	----	----
Uranium	----	----	----
Vanadium	----	----	----
Yttrium	----	----	----
Zinc	----	----	----
Zirconium	----	----	----

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**LABORATORY CONTROL SAMPLE**

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

Sample ID  
 LCSW - L11W1/L24W1

Client: Division 20  
 Date Received: NA  
 Project No.: 20.06002.01.141  
 SRR: 25200  
 TO: 031106-12

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Aluminum	1.92	2.00	95.9%
Antimony	0.515	0.500	102.9%
Arsenic	2.08	2.00	104.1%
Barium	2.02	2.00	101.2%
Beryllium	0.054	0.050	108.4%
Bismuth	NA	NA	NA
Boron	NA	NA	NA
Cadmium	0.052	0.050	104.9%
Calcium	20.8	20.0	104.0%
Chromium	0.203	0.200	101.7%
Cobalt	0.515	0.500	103.0%
Copper	0.251	0.250	100.4%
Iron	1.03	1.00	103.1%
Lanthanum	NA	NA	NA
Lead	0.527	0.500	105.4%
Lithium	NA	NA	NA
Magnesium	20.4	20.0	101.9%
Manganese	0.516	0.500	103.1%
Molybdenum	NA	NA	NA
Nickel	0.511	0.500	102.2%
Palladium	NA	NA	NA
Phosphorus	NA	NA	NA
Potassium	18.3	20.0	91.4%
Selenium	2.15	2.00	107.3%
Silicon	NA	NA	NA
Silver	0.052	0.050	104.4%
Sodium	18.6	20.0	93.2%
Strontium	NA	NA	NA
Sulfur	NA	NA	NA
Thallium	2.22	2.00	110.9%
Thorium	NA	NA	NA
Tin	NA	NA	NA
Titanium	NA	NA	NA
Tungsten	NA	NA	NA
Uranium	NA	NA	NA
Vanadium	0.510	0.500	102.0%
Yttrium	NA	NA	NA
Zinc	0.531	0.500	106.2%
Zirconium	NA	NA	NA

NA- Not Applicable.

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**BLANK SUMMARY**

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: NA

Sample ID  
 PBW - L11W1 / L24W2

Client: Division 20

Date Received: NA

Project No.: 20.06002.01.141

SRR: 25200

TO: 031106-12

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Aluminum	<0.05	0.05
Antimony	<0.01	0.01
Arsenic	<0.005	0.005
Barium	<0.005	0.005
Beryllium	<0.005	0.005
Bismuth	<0.015	0.015
Boron	<0.025	0.025
Cadmium	<0.005	0.005
Calcium	<0.05	0.05
Chromium	<0.005	0.005
Cobalt	<0.005	0.005
Copper	<0.005	0.005
Iron	<0.05	0.05
Lanthanum	<0.005	0.005
Lead	<0.005	0.005
Lithium	<0.005	0.005
Magnesium	<0.05	0.05
Manganese	<0.005	0.005
Molybdenum	<0.01	0.01
Nickel	<0.005	0.005
Palladium	<0.01	0.01
Phosphorus	<0.04	0.04
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	<0.025	0.025
Thallium	<0.025	0.025
Thorium	<0.01	0.01
Tin	<0.01	0.01
Titanium	<0.005	0.005
Tungsten	<0.015	0.015
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.

18 DEC 03 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**MATRIX SPIKE SUMMARY**

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 237581

Sample ID  
 19D-1003-FA-5

Client: Division 20

Date Received: 11/06/03

Project No.: 20.06002.01.141

SRR: 25200

TO: 031106-12

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Aluminum	----	----	----	----
Antimony	----	----	----	----
Arsenic	----	----	----	----
Barium	----	----	----	----
Beryllium	----	----	----	----
Bismuth	----	----	----	----
Boron	----	----	----	----
Cadmium	----	----	----	----
Calcium	----	----	----	----
Chromium	----	----	----	----
Cobalt	----	----	----	----
Copper	----	----	----	----
Iron	----	----	----	----
Lanthanum	----	----	----	----
Lead	----	----	----	----
Lithium	----	----	----	----
Magnesium	----	----	----	----
Manganese	----	----	----	----
Molybdenum	----	----	----	----
Nickel	----	----	----	----
Palladium	----	----	----	----
Phosphorus	----	----	----	----
Potassium	2.99	23.0	20.0	100.1%
Selenium	----	----	----	----
Silicon	----	----	----	----
Silver	----	----	----	----
Sodium	173	189	20.0	84.5%
Strontium	----	----	----	----
Sulfur	----	----	----	----
Thallium	----	----	----	----
Thorium	----	----	----	----
Tin	----	----	----	----
Titanium	----	----	----	----
Tungsten	----	----	----	----
Uranium	----	----	----	----
Vanadium	----	----	----	----
Yttrium	----	----	----	----
Zinc	----	----	----	----
Zirconium	----	----	----	----

NA- Not Applicable.

22 DEC 03 BAW

STABLE ISOTOPE RESULTS FROM COASTAL SCIENCE LABS FOR Sep 27-Oct 03 and Oct 27 - Oct 30, 2003 NYE COUNTY EWDP groundwater sampling events

EWDP Groundwater samples analyzed in duplicate by Coastal Science Labs only. Duplicate tap water blanks were also collected

Sep 27-Oct 3 Samples: 610/42-43

Oct 27-30 Samples: 610/80

Purchase order #'s

Sep 27-Oct 3 = 470276N

Oct 27-30 = 477101N

Data from both PO's were accepted on 22 Dec 03 by Bradley Werling (Bradley Werling) based on methods used (see PO's for details).

See 628/45 1-14-04 BAW

12-22-03 BAW

22 DEC 03 CONT BAW



COASTAL SCIENCE LABORATORIES, INC.

6000 Mountain Shadows Drive • Austin, Texas 78735 • (512) 288-5533

December 16, 2003

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.

Yours truly,

Kenneth Winters  
Laboratory Manager

CSL Ref.#EM16,EM96

See 628/45 1-14-04 BAW

12-22-03 BAW

22 DEC 03 CONT BAW

STABLE ISOTOPE ANALYSES OF WATER SAMPLES FOR SOUTHWEST RESEARCH INSTITUTE. ATTN: DR. BRADLEY WERLING.

PO#470276N

SAMPLE	$\delta D_{SMOW}$	$\delta^{18}O_{SMOW}$
19P-1003-S-FUA-1	107, 106	-13.6
19P-1003-S-FUA-2	107	-13.6
28P-0903-S-FUA-1	109, 108	-13.8
4PB-1003-S-FUA-2	111	-13.9
4FB-1003-S-FUA-2	3.1	-4.3
4FB-1003-S-FUA-1	33, 32	-4.2, -4.4
24P-0903-S-FUA-2	108	-13.6
4PB-1003A-FUA-1	109, 109	-14.0, -13.8
29P-1003-S-FUA-1	106, 107	-13.4
29P-1003-S-FUA-2	107, 107	-13.4
24P-0903-S-FUA-1	107, 105	-13.8
28P-0903-S-FUA-2	109	-13.8
88Q-1003-S-FUA-2	30, 30	-4.5
27P-0903-S-FUA-1	108, 107	-13.7, -13.8
88Q-1003-S-FUA-1	30	-4.5
27P-0903-S-FUA-2	108, 107	-13.7

CSL Ref#EM16

See 628/45  
1-14-04 BAW

22 DEC 03 CONT BAW

STABLE ISOTOPE ANALYSES OF WATER SAMPLES FOR SOUTHWEST RESEARCH INSTITUTE. ATTN: DR. BRADLEY WERLING.

PO#477101N

SAMPLE	$\delta D_{SMOW}$	$\delta^{18}O_{SMOW}$
16P-1003-5-FUA-1	109	-13.8
16P-1003-5-FUA-2	108	-13.7, -13.8
19D-1003-S-FUA-1	108	-13.7
19D-1003-S-FUA-2	109	-13.8
19IM1-Z5-1003-5-FUA-1	112	-14.0
19IM1-Z5-1003-5-FUA-2	111	-14.0
19IM2-Z5-1003-S-FUA-1	112	-14.1, -13.8
19IM2-Z5-1003-S-FUA-2	111	-13.9
7SC-Z4-1003-S-FUA-1	105, 104	-13.4, -13.4
7SC-Z4-1003-S-FUA-2	103, 105	-13.5
91Q-1003-S-FUA-2	31	-4.4
91Q-1003-S-FUA-1	31, 32	-4.3, -4.4

CSL Ref#EM96

See 628/45  
1-14-04 BAW

30 DEC 03 BAW

## Testing of new ORP Probe

New Corning 476516 Redox Combo Probe  
ordered as NOVA Scientific thru Fisher  
Rec 12-29-03

### Reagents

water - type 1

buffer powder pillow - pH 4 - Fisher cat #

22269-66 lot # A3164

buffer powder pillows - pH 7 - Fisher cat #

22270-66 lot # 3192

quinhydrone - Acros cat # 41877-1000 lot #  
B0010437-2

Added estimated (visual) 1g of quinhydrone to  
a 125 mL pp bottle. Added estimated (visual) 100 mL  
of type 1 water. Added one pH 4 pillow + mixed.  
Repared for pH 7 soln. Used Orion 290A+  
SN 012953 with 9179BN ORP Triode Probe,  
Hach EC20 pH/ISE meter SN 981100001527 with  
new Corning 476516 Redox probe, (mV Ag/AgCl)

	Target 20°C	Orion 290A+	EC20
pH 4	268 mV	267.1 mV at 20.3°C	265.9 mV
pH 7	92 mV	86.7 mV at 20.3°C	90.2 mV

<sup>1-5-04</sup>  
X 8 Jan 04  
Sieve Analysis

Twelve core samples were selected from the  
Archived NC-EWDP 19PB samples, collected  
between 12/2/03 - 12/5/03, by Paul  
Bertetti. The 12 sample depths range  
between 350.8 and 411.9 ft.

Each sample is put on a column of sieves  
<sup>1/19/04</sup>  
~~starting~~ from mesh # 5 (4 mm), # 10 (2 mm),  
and # 35 (0.5 mm) for 15 minutes on  
the ~~new tap~~ <sup>1/19/04</sup> ~~machine~~ <sup>1/19/04</sup> Ro-Tap machine  
(Model-B, SPEC # 3463-5506, Combustion  
Engineering). (SN ~~39030006~~) <sup>1/19/04</sup>

Once the sieving is complete the material  
accumulated on each screen is weighed on the  
Santorius scale (Type 3808MP8-1120) and  
recorded on pages 41 and 43. Material that  
did not pass through the # 5 sieve is recorded  
as > # 5 <sup>1/19/04</sup> mesh and the same applies for the other  
sieves. All material found on mesh #'s 5, 10 and  
35 was placed in a 1 gallon ziplock bag and  
labeled > # 35 mesh.

Material that passed through # 35 mesh was  
caught by the pan and recorded as Pan < # 35  
mesh. The separation of this material is  
further discussed on page <sup>1/19/04</sup> 42.

Added on 1-15-04  
SN 39030006





8 Jan 04

PB

Twelve core samples were selected from the NC-EWDP 19PB archive, which were collected between 12/2/03 - 12/5/03 by Paul Bertetti.

Each sample was put through 15 minutes of Ro-Tapping (Model B, SPEC# 3463-5506).

The material that passed through # 35 mesh is collected in the pan. This material is weighed and recorded on page 41 and 43. The Santorius scale Type 3808MP8-1V20 was used to take measurements. (SN 39030006)

The sample was then quartered to ensure we had a representative sample and about 10.0 g <sup>1/3/04</sup> ~~15g~~ was removed and placed into a plastic container for XRD analysis.

The rest of the material from <sup>the</sup> quartered segment that the XRD sample was taken from is placed into a separate plastic container labeled Archive, for future use (Surface Area etc...)

The rest of the material in the pan is weighed, recorded, and placed into a gallon Ziplock bag, labeled <# 35 mesh A.

(continued on page 44)

8 Jan 04

PB

NC-EWDP 19PB Core Sample Depth	Pan <# 35 Mesh	XRD Sample (g)	Archive (g)	<# 35, A Mesh (g)
350.8 - 352.4 (1/9/04)	92.2	10.0	12.4	69.8
355.0 - 356.6 (1/8/04)	64.5	10.0	9.0	45.5
364.9 - 366.7 (1/8/04)	48.8	10.1	8.0	30.7
367.0 - 368.5 (1/12/04)	51.0	10.0	11.1	29.9
373.6 - 374.6 (1/9/04)	130.6	10.0	21.9	98.7
374.6 - 375.4 (1/9/04)	101.8	10.0	13.6	78.2
382.4 - 383.7 (1/12/04)	118.2	10.0	18.9	89.3
387.2 - 388.9 (1/12/04)	59.9	<del>10.3</del> 10.0	10.3	39.6
401.1 - 406.1 <sup>(dry)</sup> (1/12/04)	199.3	10.0	34.1	155.2
406.3 - 407.5 (1/13/04)	135.0	10.0	25.0	100.0
408.5 - 409.9 <sup>(dry)</sup> 1/12/04	<del>331.5</del> 112.2	10.0	18.0	84.2
409.9 - 411.9 (1/12/04)	166.1	10.0	29.0	127.1

13 Jan 04 *JB*

(Continued From pg 42)

Two NC-EWDP 19PB core samples at depths of 367.0-368.5 and 406.3-407.5 were dried overnight. The two samples were placed on a tray with nonstick paper and left exposed to the air for about 24 hours. This was done prior to Sieve Analysis due to the moisture present in the samples.

The initial entry of sample collection and recordings are found in Yellow Field notebook # 333 on pages 55-66.

Initial sample weights are recorded on pages 6 and 7 of Scientific notebook number 628.

The 12 NC-EWDP 19PB core samples that Sieve Analysis was conducted on were selected based on multiple parameters. We selected samples that represented the different grain size fractions and ~~are~~<sup>are</sup> spaced out over the depth of the core. Dry samples were chosen over wet samples due to efficiency of laboratory techniques.

14 JAN 04 BAW

STABLE ISOTOPE RESULTS FROM  
COASTAL SCIENCE LABS FOR Sep 27-Oct 03  
and Oct 27-Oct 30, 2003 NYE  
COUNTY EWDP groundwater Sampling Events  
UPDATE

Original results 628/32-35

~~Corrects~~ BAW 1-14-03 Corrections were required due to transcription errors between the original data and the delivered report. Two corrections were made:

- 1- All  $\delta D_{\text{snow}}$  values were changed from positive to negative and
- 2- The  $\delta D_{\text{snow}}$  value for sample 4FB-1003-S-FUA-2 was changed from 3.1 to 31.

We requested that Coastal verify that <sup>8w</sup> 1-14-04 these two items and indeed transcription errors had occurred. We requested they provide an updated report (following pages). These new values reflect expected values based on previous experience.

1-14-04 BAW

14 JAN 04 CONT BAW



**COASTAL  
SCIENCE  
LABORATORIES, INC.**

6000 Mountain Shadows Drive • Austin, Texas 78735 • (512) 288-5533

January 7, 2004

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

Dear Dr. Werling:

Please find enclosed the corrected data report for hydrogen and oxygen isotopic analyses recently completed on your water samples. I am sorry for the incorrect data report and the inconvenience caused by our negligence.

Yours truly,

Kenneth Winters  
Laboratory Manager

CSL Ref.#EM16,EM96

14 JAN 04 CONT BAW

STABLE ISOTOPE ANALYSES OF WATER SAMPLES FOR SOUTHWEST RESEARCH  
INSTITUTE. ATTN: DR. BRADLEY WERLING.

PO#470276N

SAMPLE	$\delta D_{SMOW}$	$\delta^{18}O_{SMOW}$
19P-1003-S-FUA-1	-107, -106	-13.6
19P-1003-S-FUA-2	-107	-13.6
28P-0903-S-FUA-1	-109, -108	-13.8
4PB-1003-S-FUA-2	-111	-13.9
4FB-1003-S-FUA-2	-31	-4.3
4FB-1003-S-FUA-1	-33, -32	-4.2, -4.4
24P-0903-S-FUA-2	-108	-13.6
4PB-1003A-FUA-1	-109, -109	-14.0, -13.8
29P-1003-S-FUA-1	-106, -107	-13.4
29P-1003-S-FUA-2	-107, -107	-13.4
24P-0903-S-FUA-1	-107, -105	-13.8
28P-0903-S-FUA-2	-109	-13.8
88Q-1003-S-FUA-2	-30, -30	-4.5
27P-0903-S-FUA-1	-108, -107	-13.7, -13.8
88Q-1003-S-FUA-1	-30	-4.5
27P-0903-S-FUA-2	-108, -107	-13.7

CSL Ref#EM16

1-14-04 BAW

14 JAN 04 CONT BAW

STABLE ISOTOPE ANALYSES OF WATER SAMPLES FOR SOUTHWEST RESEARCH  
INSTITUTE. ATTN: DR. BRADLEY WERLING.

PO#477101N

SAMPLE	$\delta D_{SMOW}$	$\delta^{18}O_{SMOW}$
16P-1003-5-FUA-1	-109	-13.8
16P-1003-5-FUA-2	-108	-13.7, -13.8
19D-1003-S-FUA-1	-108	-13.7
19D-1003-S-FUA-2	-109	-13.8
19IM1-Z5-1003-5-FUA-1	-112	-14.0
19IM1-Z5-1003-5-FUA-2	-111	-14.0
19IM2-Z5-1003-S-FUA-1	-112	-14.1, -13.8
19IM2-Z5-1003-S-FUA-2	-111	-13.9
7SC-Z4-1003-S-FUA-1	-105, -104	-13.4, -13.4
7SC-Z4-1003-S-FUA-2	-103, -105	-13.5
91Q-1003-S-FUA-2	-31	-4.4
91Q-1003-S-FUA-1	-31, -32	-4.3, -4.4

CSL Ref#EM96

Coastal Science Laboratories Phone/Fax 512-288-5533 email: info@csl-sira.com

1-14-04 BAW

16 Jan 04 B

Twelve core samples were selected from NC-EHDP 1998 archive, which were collected between 12/2/03 and 12/5/03 by Paul Bertetti.

The samples were run through a series of sieves, then weighed, recorded and split into subsamples. This process is documented on pages 37-44.

The material that passed through #35 sieve was divided into three samples (page 43). The material leftover after the XRD and Archive samples were collected was labeled <#35 A mesh, which consists of ~75% of the material that passed through the #35 sieve.

This material is what will be used to do further sieve analysis. The <#35<sup>1-16-04</sup> mesh<sup>A</sup> sample that is stored in one gallon ziplock bags, will be put through a series of sieves, consisting of #100 mesh (150 micrometer opening), #200 mesh (75 micrometer opening), and #325 mesh (45 micrometer opening). The sample will be placed in the sieve column and put on the Ro-Top machine (Model B, SPEC# 3463-5506) for 15 minutes.

The material that is caught by the #100

16 Jan 04 Coast *FB*

mesh sieve will be recorded as  $> \#100$  mesh and the same goes for the other sieves. The material that passes through the  $\#325$  mesh sieve will be caught by the pan and this material will be recorded as  $< \#325$  mesh.

The material that is caught by each sieve and pan will be weighed by the Mettler Toledo PB5002 scale (SN 112242730). After the weights are recorded all the sample fractions will be put back together into the 2 gallon ziplock bag labeled  $< \#35$  mesh<sup>A</sup>. The only exception to this is that NC-EWDP 19PB core sample at depth of 401.1-406.1 will have samples taken from each sieve size to be <sup>1/16/04</sup> for chemical and mineralogical analysis.

19 Jan 04 *FB*

NC-EWDP 19PB core sample at a depth of 401.1-406.1 was put through Ro-Tap like the other samples, but then the material captured  $> \#100$  mesh was Ro-Taped for an additional 15 min due to the large quantity of sediment. Weight corrections made to other sieves.

16 Jan 04 *FB*

NC-EWDP 19PB Core Sample Depth	$> \#100$ mesh (g)	$> \#200$ mesh (g)	$> \#325$ mesh (g)	Pan $< \#325$ mesh (g)
350.8-352.4 (1/16/04)	56.60	10.43	1.00	<del>0.05</del> 0.06 <sup>1/16/04</sup>
355.0-356.6 (1/16/04)	32.51	7.83	2.62	1.53
364.9-366.7 (1/19/04)	22.07	3.81	0.50	0.20
367.0-368.5 (1/19/04)	19.64	4.12	2.10	3.43
373.6-374.6 (1/19/04)	57.62	19.74	9.98	9.91
374.6-375.4 (1/19/04)	39.66	16.07	9.27	11.76
382.4-383.7 (1/19/04)	54.33	17.68	8.29	7.27
387.2-388.9 (1/19/04)	24.86	7.55	3.12	2.62
401.1-406.1 (1/19/04)	105.20	<del>28.00</del> 29.59 <sup>1/19/04</sup>	<del>11.33</del> 11.39 <sup>1/19/04</sup>	<del>8.07</del> 8.57 <sup>1/19/04</sup>
406.3-407.5 (1/21/04)	58.71	18.84	9.37	12.70
408.5-409.9 (1/21/04)	55.14	16.88	6.59	3.84
409.9-411.9 (1/21/04)	85.19	25.13	10.01	4.64

29 Jan 04  $\beta$ 

The NC-EHDP 19PB samples and subsamples that were created ~~on 1/9/04~~<sup>1-29-04</sup> between 1-9-04 and 1-21-04 and referred to on pages 37-44 and 49-51 are stored in Lab 102 in building 57.

The NC-EHDP 19PB < # 35 mesh samples are divided into two samples. The first is < # 35 A, which is about 75% of the material that passed through the # 35 sieve. The second is labeled < # 35 mesh B Archive, which is about 25% of the material that passed through the # 35 sieve. The < # 35 mesh B Archive sample had an aliquot removed of about 10.0 g for XRD analysis.

Sample NC-EHDP 19PB 401.1-406.1 < # 35 A was run through mesh numbers 100, 200, and 325 just as the other < # 35 A samples. The difference is that sample 401.1-406.1 < # 35 A was divided into four samples for further analysis. The material retained on the # 100 sieve is labeled 401.1-406.1 < # 35 A, > # 100 mesh. The same is applied for material caught on sieve mesh #'s 200, 325 and < 325. All sample data is recorded on the RT Database.

2 Feb 04  $\beta$ 

Aliquots were removed from the NC-EHDP-19PB < # 35 B Archive samples for Surface Area analysis. Aliquots were removed and weighed on the Mettler AE 240 (SN 101237) scale located in L106, Bldg. 57. The aliquot weight is recorded on page 54. After the removal and weighing of the aliquot it was outgassed and analyzed by the Coulter SA 3100 (SN HA6020).

2-2-04  $\beta$

2 Feb 04 CONT

Aliquots

B

NC-EWDP 19PB ← #35 B Archive Core Sample Depth	Surface Area Aliquot (g)
350.8 - 352.4 (2/2/04)	2.1942
355.0 - 356.6 (2/2/04)	2.1716
364.9 - 366.7 (2/2/04)	2.1245
367.0 - 368.5 (2/3/04)	2.1284
373.6 - 374.6 (2/3/04)	2.183
374.6 - 375.4 (2/3/04)	2.2273
382.4 - 383.7 (2/5/04)	2.1420
387.2 - 388.9 (2/5/04)	2.1846
401.1 - 406.1 (2/5/04)	2.0704
406.3 - 407.5 (2/6/04)	2.1556
408.5 - 409.9 (2/6/04)	2.0881
409.9 - 411.9 (2/6/04)	1.9317

5 Feb 04

BAW, B

Fourteen sonic core samples from Nye County were received on 4 Feb 04. These samples were from NC-EWDP-19B from the depths of 418 to 633 feet. CNWRA previously collected samples from depths of 350 to 413 feet (see 628/6). The Transfer of Custody Form is included in this entry. The CNWRA will use the same sample ID's (minus the SC suffix) that Nye County used on the Transfer of Custody Form. In order to characterize the samples, analyses such as XRD and Surface Area Analysis will be performed.

These samples will initially be weighed <sup>BAW 2-5-04</sup> and ~~air dried~~. Then the samples will be air dried.

The samples were weighed by the Satorious Scale (SN 3903006). Before weighing the samples the scale was challenged and was found to be accurate. The samples were weighed in the original plastic bags and a correction was made to subtract the weight of the bag.



6 Feb 04  $\beta$ Drying + dividing of core samples

The fourteen NC-EWDP 19PB core samples (denoted on page 56) were removed from plastic bags and placed on sheets of polyshield paper (grade 4002) and stored on a countertop in Bldg 51 for four days.

A large Kimwipe was placed over each sample and weighed down to protect the sample from contamination and loss of material.

NC-EWDP 19PB core samples at depths of 470.5-474.3, 496.7-499.0, 503.4-506.0, and 555.2-557.8 were treated differently from the above. The four samples were approximately divided in half. One half was dried like the rest of the samples, while the other was stored in a ziploc bag (labeled intact) for future analysis of intact core material properties.

10 Feb 04  $\beta$ Sieve Analysis

Concerning the 14 NC-EWDP 19PB sonic core samples that are denoted on pages 55-58. Each sample <sup>2-10-04</sup> ~~is~~ is placed on a column of sieves with mesh # 5 (4 mm), 10 (2 mm), and # 35 (0.5 mm) for 15 minutes on the Ro-Tap machine (Model-B, SPEC # 3463-5506, Combustion Engineering). Once the sieving is complete the material accumulated on each screen is weighed on the Santorius scale (S/N 39030006) and recorded on pages 628/61-63. Material that did not pass through the # 5 mesh sieve is recorded as <sup>2-10-04</sup> ~~2~~ # 5 > # 5 mesh. Material that passes through # 5 sieve and is caught by # 10 sieve is recorded as 5-10 mesh. The same applies to 10-35 mesh. All the material that is caught by sieve #'s 5, 10, and 35 is placed in a 1 gallon ziploc bag and labeled > # 35 mesh.

Material that passes through # 35 sieve is caught in the pan and is recorded as < # 35 mesh. This material is further divided. The < # 35 mesh material is approximately quartered to ensure a

10 Feb 04 cont. JS

representative sample: From one of the quarters ~10 g is removed and placed into a 5 dram plastic container for XRD analysis. This sample is labeled <# 35 mesh XRD B. The rest of the <# 35 mesh material from the quarter that the XRD sample was taken from was placed into a separate container and labeled <# 35 mesh B, for future use (Surface Area etc...). The other three quarters (~75% of the <# 35 mesh) was weighed and placed into a 1 gallon ziploc bag and labeled <# 35 mesh A.

10 Feb 04 JS

## Sieve Analysis

Core Sample Depth	># 35 mesh			<# 35 mesh (g)
	># 5 mesh (g)	5-10 mesh (g)	10-35 mesh (g)	
418.4-419.6 (2-10-04)	227.6	135.7	106.3	70.0
419.6-421.2 (2-10-04)	411.9	138.0	146.6	103.3
422.5-424.4 (2/10/04)	428.3	65.9	94.6	69.1
424.6-428.7 (2/10/04)	378.9	106.5	141.3	74.5
441.2-442.9 (2/11/04)	200.6	107.3	190.6	118.5
457.2-460.7 (2/11/04)	365.1	130.1	199.1	97.5
470.5-474.3 (2/11/04)	316.5	85.7	109.6	83.3
496.7-499.0 (2/11/04)	223.1	50.1	75.5	44.5
503.4-506.0 (2/11/04)	156.9	97.2	97.2	57.3
547.6-549.6 (2/11/04)	327.3	115.4	163.0	123.8
555.2-557.8 (2/11/04)	152.9	50.4	96.9	85.9

2-10-04  
 2 10 Feb 04 Cont.  $\beta$

NL-EWDP 19PB Core Sample Depth	># 35 mesh			
	># 5 mesh (g)	5-10 mesh (g)	10-35 mesh (g)	<# 35 mesh (g)
584.1-587.4 (2/11/04)	271.7	115.2	127.6	89.4
595.2-596.2 (2/11/04)	227.4	158.6	182.4	166.4
631.1-633.8 (2/11/04)	388.9	168.0	180.1	149.9

Creating subsamples NL-EWDP-19PB <# 35 mesh A and B from material that passes through # 35 mesh sieve. XRD sample is an aliquot from the NL-EWDP-19PB <# 35 mesh B sample, below.

NL-EWDP 19PB Core Sample Depth	<# 35 B			
	<# 35 mesh (g)	XRD Aliquot (g)	Archive Sample (g)	<# 35 A mesh (g)
418.4-419.6 (2/10/04)	70.0	10.0	12.1	47.9
419.6-421.2 (2/10/04)	103.3	10.0	23.9	69.4
422.5-424.4 (2/10/04)	69.1	10.0	12.7	46.4
424.6-428.7 (2/10/04)	74.5	10.0	12.1	52.4
441.2-442.9 (2/11/04)	118.5	10.0	19.3	89.2
457.2-460.7 (2/11/04)	97.5	10.0	15.6	72.0

10 Feb 04 Cont  $\beta$

NL-EWDP 19PB Core Sample Depth	<# 35 B			
	<# 35 mesh (g)	XRD Aliquot (g)	Archive Sample (g)	<# 35 A mesh (g)
470.5-474.3 (2/11/04)	83.3	10.0	16.3	57.0
496.7-499.0 (2/11/04)	44.5	10.0	9.8	24.7
503.4-506.0 (2/11/04)	57.3	10.0	10.1	37.1
547.6-549.6 (2/11/04)	123.8	10.0	19.7	94.1
555.2-557.8 (2/11/04)	85.9	10.0	12.9	63.0
584.1-587.4 (2/11/04)	89.4	10.0	11.4	68.0
595.2-596.2 (2/11/04)	166.4	10.0	25.7	130.7
631.1-633.8 (2/11/04)	149.9	10.0	25.6	114.3

12 Feb 04 JB

Aliquot removal from NC-EWDP-19PB < # 35 mesh B  
air dried samples for Surface Area analysis.

Aliquots were removed from the NC-EWDP-19PB  
< # 35 mesh B air dried sonic core samples.  
Sample information located on 628/55-63. One  
aliquot was removed from each sample with a  
spatula and placed onto a piece of Fisher Scientific  
3" x 3" weighing paper, which was tared before  
the addition of the aliquot. The aliquot weights  
were recorded in ~~SN/628/64~~<sup>2-12-04 JB</sup> SN 628/64-65.  
The Mettler AE 240 (S/N 101237) scale, located  
in L106, Bldg 57, was used to weigh ~~sample~~<sup>2-12-04 JB</sup>  
aliquots. After the removal and weighing of the  
aliquots, they were outgassed and analyzed  
by the Coulter SA 3100 (S/N HA6020).

12 Feb 04 Cont. JB

NC-EWDP-19PB < # 35 mesh B air dried sonic  
core samples, aliquot weights for Surface  
Area analysis, denoted on 628/64

NC-EWDP-19PB Core Sample Depth	Date of Aliquot Removal	Weight of Aliquot (g)
418.4-419.6	2-12-04	2.0862
419.6-421.2	2-12-04	2.1792
422.5-424.4	2-12-04	2.3168
424.6-428.7	2-13-04	1.9476
441.2-442.9	2-13-04	2.1534
457.2-460.7	2-13-04	2.1605
470.5-474.3	2-16-04	2.1415
496.7-499.0	2-16-04	2.1610
503.4-506.0	2-16-04	2.1196
547.6-549.6	2-17-04	2.3435
555.2- <del>555</del> <sup>2-12-04 JB</sup> 557.8	2-17-04	2.1705
584.1-587.4	2-17-04	2.2057
595.2-596.2	2-19-04	2.2098
631.1-633.8	2-19-04	2.2864

12 Feb 04

B

NC-EWDP-19PB < # 35 mesh A, 14 air dried sonic core samples from depths 418-633  
Sieve analysis (# 100, 200, 325 mesh sieves)

There are 14 NC-EWDP-19PB sonic core samples.

Four of which were approximately split in half, including sample depths of 470.5-474.3, 496.7-499.0, 503.4-506.0, and 555.2-557.8. One half of the sample remains wet and intact, while the other half is air dried with the other 10 samples.

The 4 halved and 10 whole air dried NC-EWDP-19PB sonic core samples <sup>WCC</sup><sub>2/12/04</sub> run through a series of sieves, then weighed, recorded and split into subsamples. This process is further explained on 628/55-63.

The material that passed through # 35 mesh sieve was divided into three samples (628/61-63)

The material left over after the XRD and Archive (NC-EWDP-19PB < # 35 mesh B) samples were collected was labeled NC-EWDP-19PB < # 35 mesh A, which consists of ~ 75% of the material that passed through the # 35 mesh sieve. This material (NC-EWDP-19PB < # 35 mesh A) is what will be used to do further sieve analysis.

12 Feb 04 cont.

B

The 14 air dried NC-EWDP-19PB < # 35 mesh A samples that are stored in 1 gallon ziploc bags in 2102, Bldg. 57 are put through a series of sieves. The sieves consist of # 100 mesh (150 micrometer opening), # 200 (75 micrometer opening), and # 325 mesh (45 micrometer opening). The samples will be placed in the sieve column one at a time and put on the Ro-Tap machine (Model B, SPEC# 34163-5506) for 15 minutes.

The material that is caught by the # 100 mesh sieve will be recorded as > # 100 mesh. The material that passes through the # 100 mesh and is caught by the # 200 mesh sieve will be recorded as 100-200 mesh. The same goes for the 200-325 mesh material. Material that passes through the # 325 mesh sieve is caught by the pan and will be recorded as < # 325 mesh.

The Mettler Toledo PR 5002 scale (S/N 1122142730) will be used to weigh the material that is caught by each sieve. The weights will be recorded on 628/68-69. After the weights are recorded the fractions will be put <sup>2/12/04</sup> together back together in a 1 gallon ziploc bag labeled NC-EWDP-19PB < # 35 mesh A.

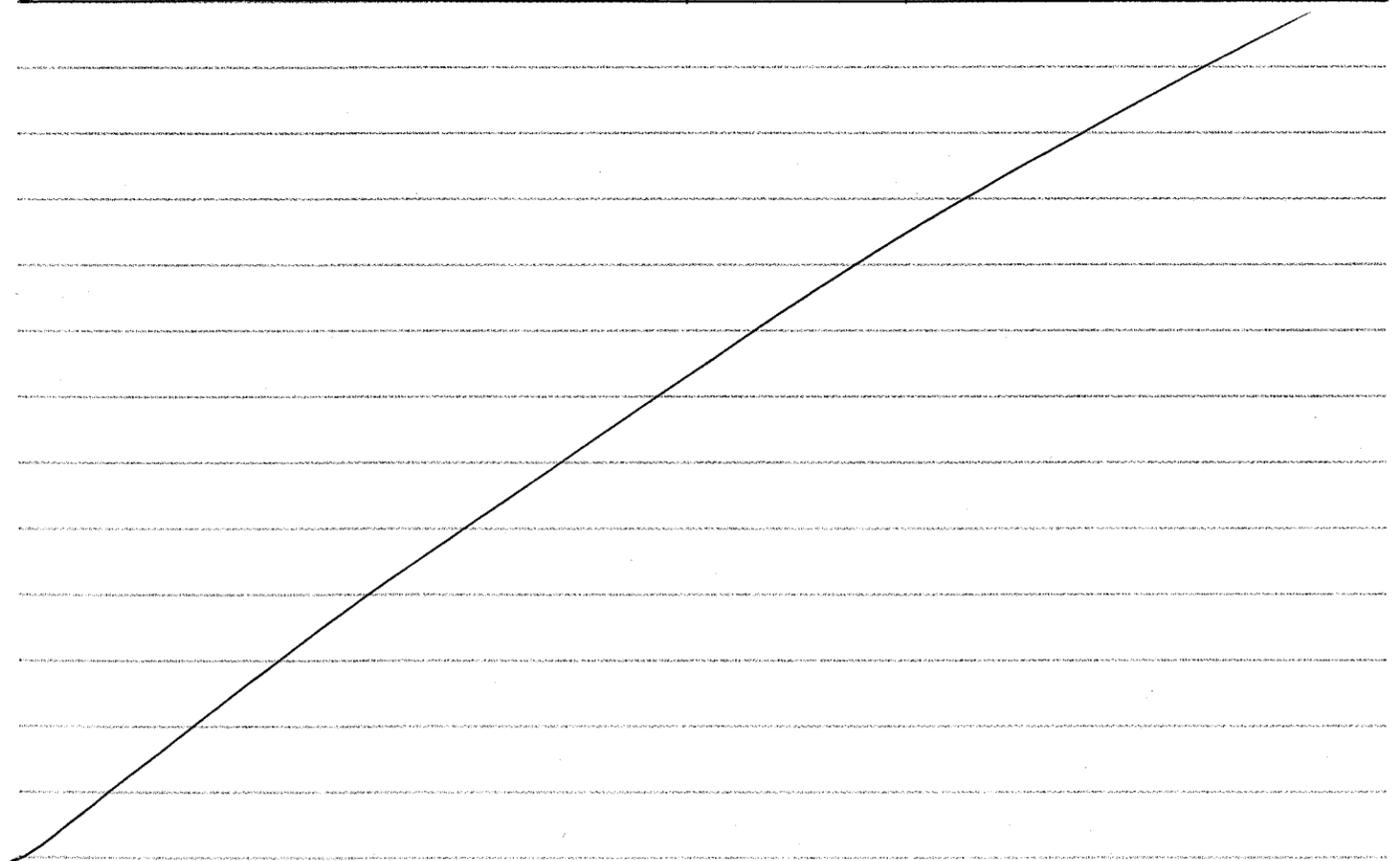
12 Feb 04 Cont.  $\beta$

Fourteen airdried NL-EWDP-19PTS <sup>2-12-04</sup> ~~ATF~~  
 < # 35 mesh A sonic core samples Sieve  
 Analysis (explained on 658/66-67).

NL-EWDP-19PTS	> # 100	100-200	200-325	< # 325
Core Sample Depth	mesh (g)	mesh (g)	mesh (g)	mesh (g)
418.4-419.6 (2/12/04)	29.22	8.07	4.07	6.24
419.6-421.2 (2/12/04)	38.29	13.48	6.93	10.19
422.5-424.4 (2/12/04)	25.49	9.43	4.59	6.52
424.6-428.7 (2/13/04)	34.23	8.39	4.16	5.62
441.2-442.9 (2/13/04)	53.72	15.82	7.68	11.56
457.2-460.7 (2/13/04)	45.95	11.63	5.77	8.21
470.5-474.3 (2/13/04)	33.20	11.53	6.37	10.16
496.7-499.0 (2/13/04)	15.81	4.51	1.84	2.20
503.4-506.0 (2/13/04)	21.47	6.92	3.54	4.79

12 Feb 04 Cont.  $\beta$

NL-EWDP-19PTS	> # 100	100-200	200-325	< # 325
Core Sample Depth	mesh (g)	mesh (g)	mesh (g)	mesh (g)
547.6-549.6 (2/13/04)	58.36	18.26	7.70	9.58
555.2-557.8 (2/13/04)	36.77	13.65	5.46	6.53
584.1-587.4 (2/16/04)	41.29	12.35	5.73	8.26
595.2-596.2 (2/16/04)	78.34	27.74	10.45	13.74
631.1-633.8 (2-16-04)	63.86	22.44	11.13	<del>16.29</del> 16.33



20 Feb 04 JS

- Relabeling of NC-EWDP-19PB <# 35 mesh B XRD aliquots
- Aliquots taken from NC-EWDP-19PB <# 35 <sup>2-20-04</sup> mesh A at a depth of 401.1-406.1 and mesh fractions of 100, 200, 325 and <# 325 sieve
- Creation of three XRD controls/standards
- Relabeling of containers to hide identity
- Weighing of fractions
- Table of original ID #'s verse new <sup>2-20-04</sup> ID #'s.

Relabeling of NC-EWDP-19PB <# 35 mesh B XRD <sup>2-20-04</sup> aliquots, depths 350.8-411.9

The twelve NC-EWDP-19PB <# 35 mesh B XRD aliquots from depths of 350.8-411.9, denoted <sup>2-20-04</sup> on 628/6-7 and 628/37-44, are relabeled to obscure identity during the shipment and analysis of samples at an external lab.

The new <sup>2-20-04</sup> labels have the scientific notebook number followed by a dash and a two digit number. For example, this set of samples new ID #'s range from 628-01 to 628-12.

20 Feb 04 Cost. JS

Aliquots removed from NC-EWDP-19PB 401.1-406.1 <# 35 mesh A, sieve fractions > 100, 200, 325 and < 325

Aliquots were removed from the four NC-EWDP-19PB 401.1-406.1 <# 35 mesh A (mesh fractions, which are denoted on 628/52). A 10.02 g aliquot was removed from the ># 100 mesh fraction. A 10.01 g and 10.00 g aliquot was removed from the ># 200 and ># 325 mesh fraction respectively. An aliquot of 8.34 g was removed from the <# 325 mesh fraction, which consumed the remainder of the sample. The aliquots were weighed individually using the Mettler Toledo PR 5002 scale (S/N 1122142730).

These four new aliquots are labeled 628-27 to 628-30 to hide their identity while being analyzed for XRD.

Relabeling of NC-EWDP-19PB <# 35 mesh B XRD aliquots, depths 418.4-633.8

The fourteen NC-EWDP-19PB <# 35 mesh B XRD aliquots from depths 418.4-633.8, denoted on 628/55-69, are relabeled and

20 Feb 04 Cont. ~~β~~

sent out for XRD analysis. This set of samples are relabeled with new ID #'s ranging from 628-13 to 628-26.

A table of original ID's correlated with new ID's can be found on 628/74-76

Creation of three known standards to include in group of XRD samples

Three known standards/controls are included in the group of samples being sent out for XRD analysis to determine the validity of the lab's results. The first standard is 99a Sodium Feldspar and the other two are mixes of various minerals, explained below and in the table on 628/73

Mix 1 and Mix 2, labeled 628-32 and 628-33 respectively, consist of four separate mineral fractions. These two standards <sup>3-29-04</sup> include consist of Quartz (W510 \* 60/100 \* UC \* RC \* HL), Clinoptilolite (CDV \* 200/325 \* UC \* WA \* RC \* HL \* RFe, SN 420/63, 4/17/01), montmorillonite (SA<sub>2</sub>-1)\* and Calcium (S<sub>2</sub> 309/146) respectively.

The weights of each mineral fraction contained in the two mixes can be found on 628/73.

\* (City of Missouri - Columbia, SourceClay Minerals Repository, Arizona)\*

20 Feb 04 Cont. ~~β~~

Weighing of standard material fractions (ID #'s 628-31 to 628-33)

The material fractions of the three standards included in the set of XRD samples to be sent for analysis were weighed <sup>2-20-04</sup> ~~by~~ on the Mettler Toledo PR 5002 scale (S/N 1122142730). Each mineral fraction was weighed individually then combined and stored in a 15 dr plastic container

Fraction weights of two mix standards for XRD analysis, ID's 628-32, 628-33

	Mix # 1 ID: 628-32	Mix # 2 ID: 628-33
Mineral	Fraction Weight (g)	Fraction Weight (g)
Quartz	4.00	6.00
Montmorillonite	2.00	1.00
Clinoptilolite	2.00	4.00
Calcium	1.00	0.50
Total	9.00	11.5

20 Feb 04 Cont.  $\beta$ 

## Labeling of XRD aliquots

The NC-EHDP-KPB and standard aliquots are placed into 15 dr plastic containers. The original labels are removed and a new label is added with the Scientific Notebook number 628 followed by a dash and a two digit number. The date of the aliquot creation and the initials of the technician who created the labels is also added to the new labels. Reference the table on 628/74-76 to correlate the original label to the new ID #.

## Table of XRD Aliquots original labels correlated with new ID'S

Original Label NC-EHDP-19PB <# 35 mesh B, XRD Core Sample Depth	New aliquot ID for XRD analysis
350.8-352.4	628-01
355.0-356.0	628-02
364.9-366.7	628-03
367.0-368.5	628-04
373.6-374.6	628-05
374.6-375.4	628-06
382.4-383.7	628-07

20 Feb 04

Cont.  $\beta$ 

Original Label

NC-EHDP-19PB

&lt;# 35 mesh B, XRD

Core Sample Depth

New aliquot ID

for XRD analysis

387.2-388.9	628-08
401.1-406.1	628-09
406.3-407.5	628-10
408.5-409.9	628-11
409.9-411.9	628-12
418.4-419.6	628-13
419.6-421.2	628-14
422.5-424.4	628-15
424.6-428.7	628-16
441.2-442.9	628-17
457.2-460.7	628-18
470.5-474.3	628-19
496.7-499.0	628-20
503.4-506.0	628-21
547.6-549.6	628-22
555.2-557.8	628-23
584.1-587.4	628-24
595.2-596.2	628-25
631.1-633.8	628-26

20 Feb 04 cont. *BAW*

Table of XRD aliquots original labels correlated with new ID's and aliquot weights for NC-EWDP-19PB 401.1-406.1 <# 35 mesh A Sieve Fractions

Original ID	New ID for XRD analysis	Aliquot Weight (g)
NC-EWDP-19PB		
401.1-406.1		
<# 35 A Fraction		
># 100 mesh	628-27	10.02
># 200 mesh	628-28	10.01
># 325 mesh	628-29	10.00
<# 325 mesh	628-30	8.34

Table of XRD standard sample, original label, new label and weight

Original ID	New ID for XRD analysis	Sample Weight (g)
99a Sodium Feldspar	628-31	5.01
Mix 1 (reference 628/12-13)	628-32	9.00
Mix 2 (reference 628/12-13)	628-33	11.50

2-23-04

*BAW*

2-23-04

*BAW*

### Receipt of Nopal Rock Sample

David Pickett requested Pena Blanca core samples. Pat Dobson (Law, Berkley Labs) arranged for the CNWRA to receive the samples. The samples were sent to David by Mike Murrell (curator) and Hector Mendoza of the Autonomous University of Chihuahua. Receipt documents will be placed in the notebook at the end of this entry. David <sup>BAW</sup> at <sup>2-23-04</sup> 2-23-04 delivered the samples to the lab on 2-20-04.

The samples were screened for radioactivity using the Ludlum model 14C meter (id 83561) and 44-6 probe (id 077580). Battery Power scale multiplier at 0.1. Baseline  $\sim 0.01$  mR/hr. Values above baseline recorded on 628/78.

Approximate masses of samples were recorded. Mass of samples taken while samples were in a ziplock bag. An empty ziplock bag was tared on the Mettler Toledo PR5002 (1122142730) (pint or gallon as appropriate). Mass recorded on 628/78. ~~Two ziplock bag size~~ <sup>BAW</sup> 2-23-04  
 Challenge at start (target = 400.00g) = 400.00g  
 Challenge at end (target = 400.00g) = 400.00g

2-23-04 BAW CONT

SAMPLE ID	mR/hr above baseline	Mass (g)
NOPAL PB 1024052 MTM5	0	59.26
NOPAL PB 1024009 MTM4	0.02	8.68
NOPAL PB 1023935 MTM6	0	59.93
NOPAL PB 1023849 MTM6	0.02	28.65
NOPAL PB 1023812 MTM5	0.01	<sup>2-23-04</sup> <del>200.05</del> 23.00
NOPAL PB 1023798 MTM4	0	23.17
NOPAL PB 1023775 MTM5	0.02	58.68

A prefix "Nopal" was added to DOE sample ids.  
The samples were added to the custody database

Each sample had a small <sup>BAW 2-23-04</sup> piece of masking tape with the sample ID on the inside of the bag. The tape was no longer on the rock itself.

There were seven samples total.

23 Feb 04 CONT BAW



Department of Energy  
Office of Civilian Radioactive Waste Management  
Office of Repository Development  
1551 Hillshire Drive  
Las Vegas, NV 89134-6321

QA: N/A  
Project No. WM-00011

FEB 12 2004

## OVERNIGHT MAIL

ATTN: Document Control Desk  
Chief, High-Level Waste Branch, DWM/NMSS  
U.S. Nuclear Regulatory Commission  
11555 Rockville Pike  
Rockville, MD 20852-2738

## INFORMATION ON TRANSMITTAL OF PENA BLANCA SAMPLE SPLITS

Reference: Ltr, Schlueter to Ziegler, dtd 1/02/04

In the referenced letter, the U.S. Nuclear Regulatory Commission (NRC) requested splits of samples from the Nopal I uranium ore deposits at Pena Blanca in Chihuahua, Mexico, be sent to the Center for Nuclear Waste Regulatory Analyses (CNWRA). Per your request, sample splits were shipped on January 27, 2004, to:

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

The samples were selected during cataloging of the core in September 2003. The samples for Dr. Pickett were selected from areas of elevated gamma activity generally associated with fractures. The samples were labeled with the Sample Management Facility sample numbers. No additional documentation was included. The samples sent were:

Sample ID	Depth (m)	Formation
PB1023775 MTM5	8.95	Nopal rhyolitic ash-flow tuff
PB1023798 MTM4	29.78	Coloradas ash-flow tuff
PB1023812 MTM5	37.75	Coloradas ash-flow tuff
PB1023849 MTM6	66.50	Coloradas ash-flow tuff
PB1023935 MTM6	135.90	Coloradas ash-flow tuff (just above conglomerate contact)
PB1024009 MTM4	190.80	Pozos conglomerate
PB1024052 MTM5	221.14	Pozos conglomerate (near the top of the water table)

Orig: MP  
CC: EP  
Rout: EM/Div

23 Feb 04

CONT

BAW

Chief, High-Level Waste Branch

-2-

FEB 12 2004

These samples fulfilled the request for:

- Fracture-filling materials from various levels, with more concentrated sampling in zones of gamma activity gradients.
- Matrix tuff and breccia, from same zones as fracture fillings.
- More concentrated sampling in any apparent high-gamma zones possibly associated with the water table (i.e., possibly from secondary accumulation).

Samples were not available to fulfill the request for:

- Representative samples in which uranium ore is visible or is likely to be present, based on gamma measurements (log or contact). Any occurrences of reduced uranium ore minerals (e.g., uraninite) would be of particular interest.
- Any occurrences of previously unidentified minerals.

There are no new regulatory commitments in this letter. If you require any additional information, please contact Neal K. Hunemuller at (702) 794-5081.

*Joseph D. Ziegler*  
Joseph D. Ziegler, Director  
Office of License Application and Strategy

OLA&amp;S:NKH-0685

From: PFDobson@lbl.gov  
Sent: Thursday, January 29, 2004 12:14 PM  
To: david.pickett@swri.org  
Cc: mmurrell@lanl.gov  
Subject: Pena Blanca core samples for your use

*Patrick Dobson*

Importance: High

Hi David,

We received a request from the NRC (passed along from Eric Smistad of the DOE) that you would like to examine some core samples from the PB-1 well at Pena Blanca. The following seven samples were sent to you by Hector Mendoza of the Autonomous University of Chihuahua.

Sample ID	Depth(m)	Formation
-PB1023775 MTM5	8.95	Nopal rhyolitic ash-flow tuff
-PB1023798 MTM4	29.78	Coloradas ash-flow tuff
-PB1023812 MTM5	37.75	Coloradas ash-flow tuff
-PB1023849 MTM6	66.50	Coloradas ash-flow tuff
-PB1023935 MTM6	135.90	Coloradas ash-flow tuff (just above conglomerate contact)
-PB1024009 MTM4	190.80	Pozos conglomerate
-PB1024052 MTM5	221.14	Pozos conglomerate (near the top of the water table)

The samples were sent out on Jan. 27th via DHL. The tracking number is 7005982664.

Please let me and Mike Murrell (the official curator of the samples) know when you have received them. I can provide you with some additional information about the samples if you are interested.

Regards,

Pat

23 Feb 04

CONT

BAW

From: PFDobson@lbl.gov  
Sent: Thursday, January 29, 2004 4:34 PM  
To: David Pickett  
Subject: Re: RE: Pena Blanca core samples for your use

Hi David,

The reports containing the well logs have already been submitted to Records, so you probably can just obtain them from the RISWEB. The pointers for these documents are:

MOL.20040108.0359 PACKAGE TABLE OF CONTENTS FOR PENA BLANCA CFE ENGINEERING REPORTS AND ASSOCIATED TELEVIEWER LOG DATA FOR NATURAL ANALOGUES SYNTHESIS REPORT, TDR-NBS-GS-000027 REVISION 01

MOL.20040108.0360 REPORT STUDY OF GEOPHYSICAL LOGS IN FOUR WELLS LOCATED IN THE NOPAL FIELD, ALDAMA, CHIHUAHUA, FOR THE UNIVERSITY OF CHIHUAHUA (INCLUDES ORIGINAL SPANISH VERSION AND ENGLISH TRANSLATION)

MOL.20040108.0361 REPORT DRILLING AND INSTRUMENTATION OF THREE PIEZOMETERS, "UACH" PROJECT, "EL NOPAL" DEPOSIT, WELLS: PB-1, PB-2, AND PB-3 (INCLUDES ORIGINAL SPANISH VERSION AND ENGLISH TRANSLATION)

MOL.20040108.0362 REPORT REPORT ON THE TELEVIEWER LOG OF THE BOREHOLES PB-1 AND PB-3 AND WELL PB-4 IN NOPAL, MUNICIPALITY OF ALDAMA, CHIHUAHUA (INCLUDES ORIGINAL SPANISH VERSION OF ENGLISH TRANSLATION)

MOL.20040108.0363 DATA SPECIAL INSTRUCTION SHEET FOR TWO FLOPPY DISKS CONTAINING PENA BLANCA CFE ENGINEERING REPORTS AND ASSOCIATED TELEVIEWER LOG DATA FOR NATURAL ANALOGUES SYNTHESIS REPORT, TDR-NBS-GS-000027 REVISION 01

Let me know if you need any additional information. Core photos, core descriptions, and petrographic descriptions of thin sections from the Pena Blanca samples will be submitted to Records soon. This information will be included in the revision of the Natural Analogues Synthesis Report. This revision is currently underway, and should be completed around midyear.

I hope that you had a pleasant holiday season. While things still look bleak for the Rangers, prospects for the other baseball team in Texas are looking up. Give my regards to Pat.

Regards,

Pat

----- Original Message -----

From: David Pickett <dpickett@cnwra.swri.edu>  
Date: Thursday, January 29, 2004 1:47 pm  
Subject: RE: Pena Blanca core samples for your use

&gt; Mike and Pat,

&gt;

&gt; I just got the samples. Thanks!

&gt;

&gt; I had meant (and failed) to include well log information in that

&gt; request. I'll set that in motion with John Bradbury at NRC. I'll

&gt; get back to Pat if

> I have any other questions. We don't want to know too much

&gt; about the

&gt; samples because we consider this to be independent confirmatory

&gt; analysis.

&gt; Thanks again for the quick response,

26 FEB 04

BAW

## Calibration of Nanopure Diamond Analytical ultrapure water system

Water system: Barnstead model D1901 serial number 11900 10979691

Calibration module: Barnstead model E896X5 serial number 896020321720 with current certification performed by SWRI cal lab

Performed calibration of sensing electronics on water system following instructions listed in the "Nanopure Diamond Analytical<sup>BW</sup> 2-26-04 Analytical ultrapure water system operation Manual Series 1190" (11/2/00) under the N.I.S.T Calibration Module Section (page 29)

System responded with LED displaying "passed", Label placed on unit indicating date, status, and reference to this page.

3-4-04 BAW

3 MARCH 04

BAW

## Preparation of samples for LSA Analysis

Samples: 10 samples from Bobby Pabalan labeled Np1A, Np1B, Np2A, Np2B, Np3A, Np3B, Np4A, Np4B, Np5A, + Np5B. Each sample contained ~1.5 mL of solution. Cocktail ✓ Ultima Gold AB Packard Bioscience cat # 6013309, lot # 91-2111

Added 5 mL (Repipit dispenser) of cocktail to each sample. Thoroughly shaken by hand. Glass on sample Np1A ~~was~~ <sup>BW</sup> 3-4-04 ~~was~~ <sup>BW</sup> 3-4-04 vial was chipped. It was carefully closed and sealed with scotch tape.

3-30-04

BAW

## Preparing Organic Carbon Stock Solution Standard for TOC Analysis

Target concentration for stock solution is 1000 mg/L Carbon from potassium hydrogen phthalate (PHP)

FW PHP = 204.22 Carbon = 12.011

PHP formula<sup>BW</sup> is  $C_8H_5KO_4$   
3-30-04

30 Mar 04 CONT BAW

For 1 Liter soln 1000 ppm C has 1000 mg C

$$X \text{ g PHP} \left( \frac{1 \text{ mol PHP}}{204.22 \text{ PHP}} \right) \left( \frac{8 \text{ mol C}}{1 \text{ mol PHP}} \right) \left( \frac{12.011 \text{ g C}}{1 \text{ mol C}} \right) \left( \frac{1 \times 10^3 \text{ mg}}{\text{g}} \right) = 1000 \text{ mg C}$$

X = 2.1253 g of PHP in 1 L for 1000 ppm C

Reagents - PHP - Fisher P243-100 lot # 033580  
 opened 3-30-04  
 type 1 water

Challenge of Balance at start (target 20,000) = 20,000 g

Jon Brown performed this work:

A Weighing boat was tared on the Mettler AE 240 electronic balance (SN 101237). The PHP was carefully transferred with a spatula into the weighing boat. The final mass of the PHP was 2.1252 g

Challenge of Balance at end (target 20,000) = 20,000 g

The PHP was transferred into a clean 250 mL beaker with about 75 mL of type 1 water. The weighing boat was rinsed several times with type 1 water. The rinsate was also decanted into the beaker. The beaker was placed on a stir plate and a magnetic stir bar was added. Soln was stirred a few minutes. The beaker contents were decanted into a 1000 mL volumetric

30 Mar 04 CONT BAW

Flask. The beaker was rinsed several times with the rinsate transferred into the 1 L vol. flask. Flask was inverted + ~~stir~~ <sup>BW</sup> shaken. Soln transferred to a 1 Liter amber glass bottle. Labeled 1000 ppm Carbon-organic from potassium acid phthalate, Soln stored in refrigerator in L106.

1<sup>st</sup> April 04 JB

Preparing Inorganic Carbon Stock  
 Solution Standard For IC Analysis

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

FW SC = 105.99 Carbon = 12.011

SC Formula is  $\text{Na}_2\text{CO}_3$ 

For 1 Liter soln 1000 ppm C has 1000 mg C

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

X = 8.824 g of SC in 1 L for 1000 ppm C

mixed with type 1 water

1 April 04 *JB*

Challenge of balance at start

(target 20.0001g) = 20.0000g

A weigh boat was tared on the Metler AE 240 electronic balance (SN 101237).

The SL was carefully transferred with a spatula into the weighing boat. The final mass of the SL was 8.824g.

Challenge of balance at End

(target 20.0001g) = 20.0001g

The SL was transferred into a clean 250ml beaker with about 100 ml of type 1 water. The weighing boat was rinsed several with type 1 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 for a few minutes. The beakers contents were decanted into a 1000 ml volumetric flask. The beaker was rinsed several times with the rinsate transferred into the 1 L vol. flask. Flask was inverted and shaken. Soln transferred to a 1 L amber glass bottle, labeled 1000 ppm Carbon-inorganic from Sodium Carbonate *JB* 4-1-04. Stored in refrigerator in 2106, Bldg 57.

5 April 04 *JB*

Preparation of 10% Persulfate and 5% Phosphoric Acid Reagent Mixture for TOL

25.0553 g  $\left\{ \begin{array}{l} \text{of } 98+ \% \text{ sodium persulfate} \\ \text{(Na}_2\text{S}_2\text{O}_8) \text{ (Aros 20202-5000) }^{4-12-04} \\ \text{(UAN 1505, Lot \# B0104212)} \end{array} \right.$

was weighed on the Metler AE 240 electronic balance (SN 101237). The sodium persulfate (SP) was carefully transferred with a spatula into a weighing boat.

Initial challenge of balance

(target 20.0001g) = 20.0002

Challenge of balance at end

(target 20.0001g) = 20.0003

213 ml of type 1 water was measured in a graduated cylinder. About half of the water was transferred into a 1000 ml plastic container.

The sodium persulfate was then poured into the 1000 ml container. The weighing boat was rinsed with the rest of the type 1 water thoroughly, to get all sodium persulfate.

Lastly, 9 ml of 85% phosphoric acid ( $\text{H}_3\text{PO}_4$ ) (A242, Lot # 001815) was added.

12 April 04  $\beta$

Measure CO<sub>2</sub> Level in Lab

Gas Hound LI-800 (~~SN AKO~~<sup>4-12-04</sup>) (SN AKC0162) used to measure ambient CO<sub>2</sub> levels in lab 106 Bldg 57. Instrument calibrated with zero air (Prax air, Batch # 530900701) and 1000 ppm CO<sub>2</sub> air (Speciality Gas Products SN 4455434). ~~Before~~<sup>Before</sup> calibration Gas Hound is purged with air for ~ 1 min. ~~Before~~<sup>4-12-04</sup> calibration. A flow meter is used to control flow at ~ 1 L/min.

Ambient air is pumped through the system after calibration by the Profile 4000 Aquarium air pump. After ~ 5 min a reading is taken to ensure stabilization.

~~4-12-04~~<sup>4-12-04</sup>

CO<sub>2</sub> measured at 381 ppm at 12:20 pm after 5 min of purging.

13 April 04  $\beta$

Measure CO<sub>2</sub> Level in Lab

The Gas Hound LI-800 (SN AKC0162) used to measure ambient CO<sub>2</sub> levels in lab 106 Bldg 57. The instrument is calibrated with zero air (Prax Air, Batch # 530900701) and 1000 ppm CO<sub>2</sub> in air (Speciality Gas Products, SN 4455434). Before calibration of Gas Hound at zero air the system is purged with zero air for about 1 min. Before calibration at 1000 ppm CO<sub>2</sub> in air, the system is purged for about 1 min. A flow meter is used to control flow between 0.5 and 1.0 L/min.

Ambient air is pumped through the system after calibration by the Profile Aquarium Air Pump 4000. To ensure stabilization, a reading is taken after ~ 5 min.

CO<sub>2</sub> measured at 392 ppm CO<sub>2</sub> in lab at 12:10 pm.

13 April 04 cont BAW

QA standards for Div 01 Analysis for Anion and Cation

Anion - Target 2 ppm Nitrate

Reagents: Spex Certiprep Anion Std Cat #  
AS-NO39-2X, lot # 25-68AS 1000 ppm Nitrate  
type 1 water =

Added 2 mL (vol pipet) to a 1000 mL vol flask  
of 1000 ppm Nitrate and diluted to mark  
with type 1 water, Labelled Anion Std.

Cation - Target 5 ppm Ca and 10 ppm Na

Reagents: Spex Certiprep - 1000 ppm Calcium  
cat # PLCA2-2X lot # 9-186CA  
Spex Certiprep 1000 ppm Sodium  
cat # ~~10-46NA~~ lot # 10-46NA  
<sup>BW 4-13-04</sup>  
PLNA2-2Y

Type 1 water

Added 5 mL (vol pipet) of 1000 ppm <sup>Calcium</sup> ~~vol flask~~ <sup>4-13-04</sup> and  
10 mL (vol pipet) of 1000 ppm of sodium to a  
1000 mL vol flask and diluted to mark  
with type 1 water. Labelled Cation Std.

Transferred both standards

13 April 04 cont BAW

Legend for first set of samples

CATION ANALYSIS

CNWRA 1 = Summit

CNWRA 2 = S 10TA

CNWRA 3 = S 2TA

CNWRA 4 = S 7TB

CNWRA 5 = S 3TB

ANION ANALYSIS

CNWRA A - Summit

CNWRA B = S 10TA <sup>BW 4-13-04</sup>

CNWRA C = S 2TA

CNWRA D = S 7TB

CNWRA E = S 3TB

Samples in 30 mL pp bottles

Reanalysis of EWDP samples - Investigation  
of results <sup>BW 4-13-04</sup> ~~at~~ over time

Anion: Cation samples taken from FUA sample and  
transferred into 30 mL pp bottle

NC EWDP 22PB Zone 1 (881-979) FUA 8-29-02

523/37 cation = CNWRA 6 anion = CNWRA F

NC EWDP 19D-1003-FUA 10-29-03 610/78

cation = CNWRA 7 anion = CNWRA G

NC-EWDP 10P Zone 1 (663-702) FUA 8-27-02

523/34 cation CNWRA 8 anion CNWRA H

NC-EWDP 29P-1003-FUA 10-1-03 610/39

cation CNWRA 9 anion CNWRA I

NC-EWDP-225-Zone 2 662-759 FUA 9-10-02

523/43 CNWRA 10 = cation <sup>BW 4-13-04</sup> ~~at~~ anion = CNWRA J

13 April 04 CONT BAW

QA Samples for analysis by Div. 01

Cation - 5 ppm Ca + 10 ppm Na target

Filled 30 mL pp bottle with cation std  
from 628/90. Labeled <NWRA 11

Anion - 2 ppm Nitrate

Filled 30 mL pp bottle with Anion std  
from 628/90. Labeled <NWRA K

14 April 04 *JB*

Measure CO<sub>2</sub> Levels in Lab

CO<sub>2</sub> measured at 383 ppm CO<sub>2</sub> in

lab at 10:15 am.

Refer to 628/89 For methods and set up.

4-14-04 *JB*

14 April 04 *JB* cont

Chain of custody For Div. 01 Anion and  
Cation / trace metal reanalysis including  
EWDP groundwater samples

11 Anion Samples <sup>4-14-04</sup> *JB*

10 samples 628/91

1 QA 628/92

11 Cation Samples

10 samples 628/91

1 QA 628/92

4-14-04 *JB*

14 April 04 cont JB

Shipper Name/Address		SAMPLE LIST/CHAIN OF CUSTODY										Requested Turnaround:					
BRAD WERLING CNWRA-DIV 20 BLD-57		Southwest Research Institute Chemistry and Chemical Engineering Division 6220 Culebra Road San Antonio, Texas 78238-5166										<input type="checkbox"/> 2 Weeks <input type="checkbox"/> 3 Weeks <input checked="" type="checkbox"/> Other: 4 wk					
Client		Client Purchase Order/Other ID					Site/Zone ID					SwRI Contact					
												Mike Dammann					
		Analyses Requested										REMARKS					
Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers											Preservation a = HCl to pH <2 b = HNO <sub>3</sub> to pH <2 c = H <sub>2</sub> SO <sub>4</sub> to pH <2 d = NaOH to pH >12 e = Cool (4°C±2°C) f = Other (specify) none	
CNWRA A	4-13-04		W		1	X										Nuclear Safety related - use appropriate QA procedures	
CNWRA B						X											
CNWRA C						X											
CNWRA D						X											
CNWRA E						X											
CNWRA F						X											
CNWRA G						X											
CNWRA H						X											
CNWRA I						X											
CNWRA J						X											
Matrix Types:		Sample Types:		Relinquished by (Print/Signature)		Date	Time	SwRI Project#:									
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		D - Duplicate ER - Equipment Rinsate ES - Environmental Sample FB - Field Blank FD - Field Duplicate MS - Matrix Spike MSD - Matrix Spike Dup TB - Trip Blank		Jim Brown		4-13-04	10:45	20.06002.01.141									
Temp: 22.0°C		Therm #: 027		Received by (Print/Signature)		Date	Time	Received by SwRI Lab: (Signature)									
Comments:																	
628/91																	

Shipper Name/Address		SAMPLE LIST/CHAIN OF CUSTODY										Requested Turnaround:					
BRAD WERLING CNWRA-DIV 20 BLD 57		Southwest Research Institute Chemistry and Chemical Engineering Division 6220 Culebra Road San Antonio, Texas 78238-5166										<input type="checkbox"/> 2 Weeks <input type="checkbox"/> 3 Weeks <input checked="" type="checkbox"/> Other: 4 wk					
Client		Client Purchase Order/Other ID					Site/Zone ID					SwRI Contact					
												Mike Dammann					
		Analyses Requested										REMARKS					
Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers											Preservation a = HCl to pH <2 b = HNO <sub>3</sub> to pH <2 c = H <sub>2</sub> SO <sub>4</sub> to pH <2 d = NaOH to pH >12 e = Cool (4°C±2°C) f = Other (specify) none	
CNWRA K	4-13-04		W		1	X										Nuclear Safety Related - use appropriate QA procedures	
Matrix Types:		Sample Types:		Relinquished by (Print/Signature)		Date	Time	SwRI Project#:									
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		D - Duplicate ER - Equipment Rinsate ES - Environmental Sample FB - Field Blank FD - Field Duplicate MS - Matrix Spike MSD - Matrix Spike Dup TB - Trip Blank		Jim Brown		4-13-04	10:45	20.06002.01.141									
Temp: 22.0°C		Therm #: 027		Received by (Print/Signature)		Date	Time	Received by SwRI Lab: (Signature)									
Comments:																	
628/91																	

14 April 04 cont JB

Shipper Name/Address		SAMPLE LIST/CHAIN OF CUSTODY					Requested Turnaround:	
BRAD WERLING CNWRA - DIV 20 BLD-57		Southwest Research Institute Chemistry and Chemical Engineering Division 6220 Culebra Road San Antonio, Texas 78238-5166					<input type="checkbox"/> 2 Weeks <input type="checkbox"/> 3 Weeks <input checked="" type="checkbox"/> Other: 4 wk	
Client		Client Purchase Order/Other ID			Site/Zone ID		SwRI Contact	
							Mike Damman	
Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Analyses Requested	REMARKS	
CNWRA 1	4-13-04		W		1	X	Preservation a = HCl to pH <2 b = HNO <sub>3</sub> to pH <2 c = H <sub>2</sub> SO <sub>4</sub> to pH <2 d = NaOH to pH >12 e = Cool (4°C±2°C) f = Other (specify) none	
CNWRA 2						X	Nuclear Safety	
CNWRA 3						X	related-use	
CNWRA 4						X	appropriate QA	
CNWRA 5						X	procedures	
CNWRA 6						X	POC - Brad Werling	
CNWRA 7						X	X6565 fax 5184	
CNWRA 8						X		
CNWRA 9						X		
CNWRA 10						X		
<b>Matrix Types:</b> 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 Temp: 22.0°C		<b>Sample Types:</b> D - Duplicate ER - Equipment Rinsate ES - Environmental Sample FB - Field Blank FD - Field Duplicate MS - Matrix Spike MSD - Matrix Spike Dup TB - Trip Blank Therm #: 027		Relinquished by (Print/Signature) Date: 4/14/04 Time: 10:45 Received by (Print/Signature) Date: Time:		SwRI Project#: 20.06002.01.141 Received by SwRI Lab (Signature) Date: 4/14/04 Time: 1045 Samples Disposed: Date: Time:		
Comments: 628/91		Relinquished by (Print/Signature) Date: Time:		Relinquished by (Print/Signature) Date: Time:		Samples Disposed by:		

14 April 04 cont p3

Shipper Name/Address		SAMPLE LIST/CHAIN OF CUSTODY					Requested Turnaround:	
BRAD WERLING CNWRA - DIV 20 BLD57		Southwest Research Institute Chemistry and Chemical Engineering Division 6220 Culebra Road San Antonio, Texas 78238-5166					<input type="checkbox"/> 2 Weeks <input type="checkbox"/> 3 Weeks <input checked="" type="checkbox"/> Other: 4 wk	
Client		Client Purchase Order/Other ID			Site/Zone ID		SwRI Contact	
							Mike Damman	
Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Analyses Requested	REMARKS	
CNWRA 11	4-13-04		W		1	X	Preservation a = HCl to pH <2 b = HNO <sub>3</sub> to pH <2 c = H <sub>2</sub> SO <sub>4</sub> 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 Werling	
							X6565 fax 5184	
<b>Matrix Types:</b> 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 Temp: 22.0°C		<b>Sample Types:</b> D - Duplicate ER - Equipment Rinsate ES - Environmental Sample FB - Field Blank FD - Field Duplicate MS - Matrix Spike MSD - Matrix Spike Dup TB - Trip Blank Therm #: 027		Relinquished by (Print/Signature) Date: 4/13/04 Time: 10:45 Received by (Print/Signature) Date: Time:		SwRI Project#: 20.06002.01.141 Received by SwRI Lab (Signature) Date: 4/14/04 Time: 1045 Samples Disposed: Date: Time:		
Comments: 628/91		Relinquished by (Print/Signature) Date: Time:		Relinquished by (Print/Signature) Date: Time:		Samples Disposed by:		

14 April 04 cont p3

15 April 04

JS

Aliquot removal from NC-EWDP-19PTS  
 < # 35 mesh A, for XRF analysis

The twenty six NC-EWDP-19PTS < # 35 mesh A sonic core samples, at depths ranging from 350.8 - 633.8, are having aliquots removed. About 15<sup>4-15-04 JS</sup> g of material is removed from each to be sent to Washington State Univ for XRF analysis. The samples are carefully removed with a spatula and placed directly into a tared 15 dr plastic container. The Sartorius scale (39030006)<sup>SIN</sup> is used to measure aliquots. No aliquot available from depth 401.1-406.1.

Labeling of XRF aliquots, from  
 NC-EWDP-19PTS mesh A, depth of 350.8-633.8

The twenty six NC-EWDP-19PTS < # 35 mesh A, 15 g aliquots, at depths of 350.8-633.8, are obscuringly labeled to hide identity during shipping and analysis at an external lab. The labels will have the scientific notebook number (628) followed by -XRF and a number (1-26). They will also have the date of creation and initials of creator.

15 April 04 cont JS

Labeling of XRF aliquots from  
 NC-EWDP-19PTS < # 35 mesh A  
 depths 350.8 - 633.8

NC-EWDP-19PTS < # 35 mesh A Sonic Core Depth	New Aliquot ID for XRF analysis
350.8 - 352.4	628-XRF-01
355.0 - 356.0	628-XRF-02
364.9 - 366.7	628-XRF-03
367.0 - 368.5	628-XRF-04
373.6 - 374.6	628-XRF-05
374.6 - 375.4	628-XRF-06
382.4 - 383.7	628-XRF-07
387.2 - 388.9	628-XRF-08
<del>401.1 - 406.1</del> <sup>4-15-04 JS</sup>	<del>628-XRF-09</del>
406.3 - 407.5	628-XRF-10
408.5 - 409.9	628-XRF-11
409.9 - 411.9	628-XRF-12
418.4 - 419.6	628-XRF-13
419.6 - 421.2	628-XRF-14
422.5 - 424.4	628-XRF-15
424.6 - 428.7	628-XRF-16
441.2 - 442.9	628-XRF-17
457.2 - 460.7	628-XRF-18
470.5 - 474.3	628-XRF-19

sample  
 Skipped  
 NA

15 April 04 cont	
NGEWDP-19PB	
< # 35 mesh A	New aliquot ID
Sonic Core Depth	For XRF analysis
496.7-499.0	628-XRF-20
503.4-506.0	628-XRF-21
547.6-549.6	628-XRF-22
555.2-557.8	628-XRF-23
584.1-587.4	628-XRF-24
595.2-596.2	628-XRF-25
631.1-633.8	628-XRF-26
Standard NBS 70a	628-XRF-27
Standard NBS 99a	628-XRF-28
Standard NBS 278	628-XRF-29
Standard RGM-1	628-XRF-30

Four standards are included with the 25 sonic core samples to test the validity of the analysis. 10g of each.

NBS = National Bureau of Standards

RGM = Glass Mountain Rhyolite

NBS 70a = Potassium Feldspar

NBS 99a = Sodium Feldspar

NBS 278 = Obsidian Rock

RGM-1 = Obsidian

19 April 04

### Additional XRF Samples

Three additional samples are being sent out for XRF analysis with those documented on 628/99-100. The samples are from Mexico.

### Labeling of XRF Samples

Sample	New Sample ID
	For XRF Analysis → 33
Ash, crater Summit	628-XRF-30
Soil A-1	628-XRF-31
Soil A-2	628-XRF-32

33 samples mis-labeled on shipment  
Ash on this page will be changed to 628-XRF-33. PB  
4/21/2004

### Creation of TOC Standards

Organic carbon standard for TOC analysis preparation. Same methods used as on page 628/83-85.

Challenge of balance at start (target 20.0001)

reading = 20.0003

Challenge of balance at end (target 20.0001) = 20.0002

20 April 04 JB

Trial Total Organic Carbon (TOC) analysis of EMDP groundwater samples

Preliminary analysis conducted to identify the calibration range/ranges to use for future analysis.

Analyzed on Phoenix 8000 TOC instrument in TOC mode with range of 20 to 200 ppm TOC using 40 ml amber glass bottles. Standards run individually (3 reps) at 0, 1, 20, 100, 200 ppm TOC. Samples run individually (2 reps) straight from the sample collection vials. PRN File was 04201207. The prn File was imported into an excel spreadsheet. The columns were numbered (legend at 610 p1 from Phoenix 8000 manual). Sample ID's are in column 8 and area counts are in column 30.

4-26-04

21 April 04 JB

1	2	3	4	5	6	7	8	9
~V2.0	1	1	Done	0	4/20/2004 12:13	USER1	TOC zero	TOC Range 20 - 200 ppm C
~V2.0	1	1	Done	0	4/20/2004 12:16	USER1	TOC zero	TOC Range 20 - 200 ppm C
~V2.0	1	1	Done	0	4/20/2004 12:19	USER1	TOC zero	TOC Range 20 - 200 ppm C
~V2.0	1	1	Done	0	4/20/2004 12:29	USER1	TOC 1.0 ppm	TOC Range 20 - 200 ppm C
~V2.0	1	1	Done	0	4/20/2004 12:32	USER1	TOC 1.0 ppm	TOC Range 20 - 200 ppm C
~V2.0	1	1	Done	0	4/20/2004 12:35	USER1	TOC 1.0 ppm	TOC Range 20 - 200 ppm C
~V2.0	1	1	Done	0	4/20/2004 12:45	USER1	TOC 20 ppm	TOC Range 20 - 200 ppm C
~V2.0	1	1	Done	0	4/20/2004 12:49	USER1	TOC 20 ppm	TOC Range 20 - 200 ppm C
~V2.0	1	1	Done	0	4/20/2004 12:53	USER1	TOC 20 ppm	TOC Range 20 - 200 ppm C
~V2.0	1	1	Done	0	4/20/2004 13:03	USER1	TOC 100 ppm	TOC Range 20 - 200 ppm C
~V2.0	1	1	Done	0	4/20/2004 13:08	USER1	TOC 100 ppm	TOC Range 20 - 200 ppm C
~V2.0	1	1	Done	0	4/20/2004 13:12	USER1	TOC 100 ppm	TOC Range 20 - 200 ppm C
~V2.0	1	1	Done	0	4/20/2004 13:24	USER1	TOC 200 ppm	TOC Range 20 - 200 ppm C
~V2.0	1	1	Done	0	4/20/2004 13:29	USER1	TOC 200 ppm	TOC Range 20 - 200 ppm C
~V2.0	1	1	Done	0	4/20/2004 13:34	USER1	TOC 200 ppm	TOC Range 20 - 200 ppm C
~V2.0	7	1	Done	0	4/20/2004 13:39	USER1	Blank	Blank TC Ranges 3 4 & 5
~V2.0	7	1	Done	0	4/20/2004 13:42	USER1	Blank	Blank TC Ranges 3 4 & 5
~V2.0	7	1	Done	0	4/20/2004 13:45	USER1	Blank	Blank TC Ranges 3 4 & 5
~V2.0	7	1	Done	0	4/20/2004 13:47	USER1	Blank	Blank TC Ranges 3 4 & 5
~V2.0	7	1	Done	0	4/20/2004 13:50	USER1	Blank	Blank TC Ranges 3 4 & 5
~V2.0	7	1	Done	0	4/20/2004 13:53	USER1	Blank	Blank TC Ranges 3 4 & 5
~V2.0	0	1	Done	0	4/20/2004 14:07	USER1	NC-EWDP 7SC-1003-FUA-2	TOC Range 20 - 200 ppm C
~V2.0	0	1	Done	0	4/20/2004 14:10	USER1	NC-EWDP 7SC-1003-FUA-2	TOC Range 20 - 200 ppm C
~V2.0	0	1	Done	0	4/20/2004 14:19	USER1	NC-EWDP 16P-1003-FUA-2	TOC Range 20 - 200 ppm C
~V2.0	0	1	Done	0	4/20/2004 14:22	USER1	NC-EWDP 16P-1003-FUA-2	TOC Range 20 - 200 ppm C
~V2.0	0	1	Done	0	4/20/2004 14:32	USER1	NC-EWDP 27P-0903-S-FUA-IC-2	TOC Range 20 - 200 ppm C
~V2.0	0	1	Done	0	4/20/2004 14:35	USER1	NC-EWDP 27P-0903-S-FUA-IC-2	TOC Range 20 - 200 ppm C
~V2.0	0	1	Done	0	4/20/2004 14:44	USER1	NC-EWDP 4PB-1003-IC-FUA-2	TOC Range 20 - 200 ppm C
~V2.0	0	1	Done	0	4/20/2004 14:47	USER1	NC-EWDP 4PB-1003-IC-FUA-2	TOC Range 20 - 200 ppm C
~V2.0	0	1	Done	0	4/20/2004 14:57	USER1	NC-EWDP 29P-1003-IC-FUA-2	TOC Range 20 - 200 ppm C
~V2.0	0	1	Done	0	4/20/2004 15:00	USER1	NC-EWDP 29P-1003-IC-FUA-2	TOC Range 20 - 200 ppm C
~V2.0	0	1	Done	0	4/20/2004 15:10	USER1	NC-EWDP 28P-0903-IC-FUA-2	TOC Range 20 - 200 ppm C
~V2.0	0	1	Done	0	4/20/2004 15:13	USER1	NC-EWDP 28P-0903-IC-FUA-2	TOC Range 20 - 200 ppm C
~V2.0	0	1	Done	0	4/20/2004 15:23	USER1	1.0 ppm	TOC Range 20 - 200 ppm C
~V2.0	0	1	Done	0	4/20/2004 15:26	USER1	1.0 ppm	TOC Range 20 - 200 ppm C

TOC low conc using 20-200ppm	0	2	3	1	1	TOC1-200	0.5	20	0	5	1	0.5	10	0	120	1	5.494	6.492	64	208243	0
TOC low conc using 20-200ppm	0	2	3	2	1	TOC1-200	0.5	20	0	5	1	0.5	10	0	120	1	5.565	6.561	63	197518	0
TOC low conc using 20-200ppm	0	2	3	3	1	TOC1-200	0.5	20	0	5	1	0.5	10	0	120	1	5.535	6.533	63	209241	0
TOC low conc using 20-200ppm	0	2	3	1	2	TOC1-200	0.5	20	0	5	1	0.5	10	0	120	1	5.449	6.444	69	353281	0
TOC low conc using 20-200ppm	0	2	3	2	2	TOC1-200	0.5	20	0	5	1	0.5	10	0	120	1	5.499	6.497	68	343282	0
TOC low conc using 20-200ppm	0	2	3	3	2	TOC1-200	0.5	20	0	5	1	0.5	10	0	120	1	5.475	6.466	70	349969	0
TOC low conc using 20-200ppm	0	2	3	1	3	TOC1-200	0.5	20	0	5	1	0.5	10	0	120	1	5.404	6.403	104	2669177	0
TOC low conc using 20-200ppm	0	2	3	2	3	TOC1-200	0.5	20	0	5	1	0.5	10	0	120	1	5.827	6.82	99	2668574	0
TOC low conc using 20-200ppm	0	2	3	3	3	TOC1-200	0.5	20	0	5	1	0.5	10	0	120	1	5.622	6.621	101	2661305	0
TOC low conc using 20-200ppm	0	2	3	1	4	TOC1-200	0.5	20	0	5	1	0.5	10	0	120	1	5.335	6.334	155	13201233	0
TOC low conc using 20-200ppm	0	2	3	2	4	TOC1-200	0.5	20	0	5	1	0.5	10	0	120	1	5.56	6.559	144	13049911	0
TOC low conc using 20-200ppm	0	2	3	3	4	TOC1-200	0.5	20	0	5	1	0.5	10	0	120	1	5.543	6.543	142	13088532	0
TOC low conc using 20-200ppm	0	2	3	1	5	TOC1-200	0.5	20	0	5	1	0.5	10	0	120	1	5.241	6.24	204	27309899	0
TOC low conc using 20-200ppm	0	2	3	2	5	TOC1-200	0.5	20	0	5	1	0.5	10	0	120	1	5.496	6.493	185	27540555	0
TOC low conc using 20-200ppm	0	2	3	3	5	TOC1-200	0.5	20	0	5	1	0.5	10	0	120	1	5.68	6.677	178	27094164	0
default	1	2	6	1	1001	TOC1-200	0	0	0	5	1	0	10	0	0	0.5	5.362	5.861	70	247822	0
default	1	2	6	2	1001	TOC1-200	0	0	0	5	1	0	10	0	0	0.5	5.172	5.67	70	218745	0
default	1	2	6	3	1001	TOC1-200	0	0	0	5	1	0	10	0	0	0.5	5.121	5.62	73	222751	0
default	1	2	6	4	1001	TOC1-200	0	0	0	5	1	0	10	0	0	0.5	5.099	5.597	71	216475	0
default	1	2	6	5	1001	TOC1-200	0	0	0	5	1	0	10	0	0	0.5	5.061	5.559	73	215768	0
default	1	2	6	6	1001	TOC1-200	0	0	0	5	1	0	10	0	0	0.5	5.071	5.566	73	214723	0
TOC low conc using 20-200ppm	0	2	2	1	6	EWDP-200	0.5	20	0	5	1	0.5	10	0	120	1	5.181	6.179	68	354387	0.5133
TOC low conc using 20-200ppm	0	2	2	2	6	EWDP-200	0.5	20	0	5	1	0.5	10	0	120	1	5.211	6.205	67	314555	0.366
TOC low conc using 20-200ppm	0	2	2	1	7	EWDP-200	0.5	20	0	5	1	0.5	10	0	120	1	5.122	6.118	66	291377	0.2802
TOC low conc using 20-200ppm	0	2	2	2	7	EWDP-200	0.5	20	0	5	1	0.5	10	0	120	1	5.137	6.136	66	271413	0.2063
TOC low conc using 20-200ppm	0	2	2	1	8	EWDP-200	0.5	20	0	5	1	0.5	10	0	120	1	5.014	6.011	69	300430	0.3137
TOC low conc using 20-200ppm	0	2	2	2	8	EWDP-200	0.5	20	0	5	1	0.5	10	0	120	1	5.079	6.072	66	274060	0.2161
TOC low conc using 20-200ppm	0	2	2	1	9	EWDP-200	0.5	20	0	5	1	0.5	10	0	120	1	5.012	6.007	67	287740	0.2667
TOC low conc using 20-200ppm	0	2	2	2	9	EWDP-200	0.5	20	0	5	1	0.5	10	0	120	1	4.938	5.936	67	280969	0.2417
TOC low conc using 20-200ppm	0	2	2	1	10	EWDP-200	0.5	20	0	5	1	0.5	10	0	120	1	4.842	5.837	67	290723	0.2778
TOC low conc using 20-200ppm	0	2	2	2	10	EWDP-200	0.5	20	0	5	1	0.5	10	0	120	1	4.903	5.901	67	273703	0.2148
TOC low conc using 20-200ppm	0	2	2	1	11	EWDP-200	0.5	20	0	5	1	0.5	10	0	120	1	4.857	5.852	85	905330	2.552
TOC low conc using 20-200ppm	0	2	2	2	11	EWDP-200	0.5	20	0	5	1	0.5	10	0	120	1	4.959	5.954	82	864179	2.3997
TOC low conc using 20-200ppm	0	2	2	1	16	EWDP-200	0.5	20	0	5	1	0.5	10	0	120	1	4.759	5.754	69	385084	0.6269
TOC low conc using 20-200ppm	0	2	2	2	16	EWDP-200	0.5	20	0	5	1	0.5	10	0	120	1	4.817	5.817	70	374773	0.5888

Q1 April 04 cont.

0	143919	2.40E+05	4/6/2004 9:58	0	0	4201207	4201212
0	143919	2.40E+05	4/6/2004 9:58	0	0	4201207	4201215
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201218
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201227
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201230
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201233
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201243
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201246
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201250
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201300
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201305
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201309
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201320
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201325
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201330
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201338
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201341
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201343
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201346
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201349
0	0	0.00E+00	1/1/1970 0:00	0	0	4201207	4201351
1.0267	215655	2.70E+05	4/20/2004 13:58	0.99942	54635	4201400	4201405
0.7319	215655	2.70E+05	4/20/2004 13:58	0.99942	54635	4201400	4201408
0.5604	215655	2.70E+05	4/20/2004 13:58	0.99942	54635	4201400	4201417
0.4126	215655	2.70E+05	4/20/2004 13:58	0.99942	54635	4201400	4201421
0.6274	215655	2.70E+05	4/20/2004 13:58	0.99942	54635	4201400	4201430
0.4322	215655	2.70E+05	4/20/2004 13:58	0.99942	54635	4201400	4201433
0.5335	215655	2.70E+05	4/20/2004 13:58	0.99942	54635	4201400	4201443
0.4834	215655	2.70E+05	4/20/2004 13:58	0.99942	54635	4201400	4201446
0.5555	215655	2.70E+05	4/20/2004 13:58	0.99942	54635	4201400	4201455
0.4296	215655	2.70E+05	4/20/2004 13:58	0.99942	54635	4201400	4201458
5.104	215655	2.70E+05	4/20/2004 13:58	0.99942	54635	4201400	4201508
4.7994	215655	2.70E+05	4/20/2004 13:58	0.99942	54635	4201400	4201511
1.2539	215655	2.70E+05	4/20/2004 13:58	0.99942	54635	4201400	4201521
1.1776	215655	2.70E+05	4/20/2004 13:58	0.99942	54635	4201400	4201524

4-21-04

Q1 April 04 cont.

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Total Organic Carbon (TOC)  
Method 20 ppm to 200 ppm TOC  
Calibration Curve range 1 to 200 ppm OC

## TOC Standard Data

TOC Std (ppm)	TOC expected mass (ug)	Raw Data Ave
0	0	205001
1	0.5	348844
20	10	2666352
100	50	13113225
200	100	27314873
Blank (last 3)	0	215655

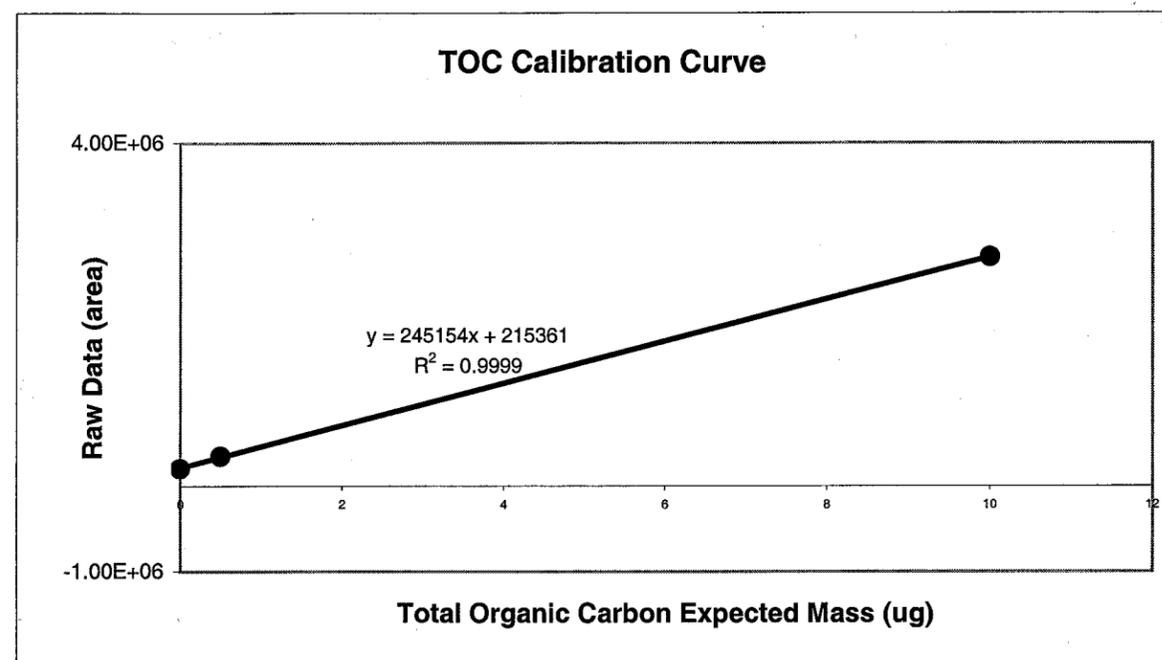
## TOC Sample Data

Sample ID	Raw Data Ave
NC-EWDP 7SC-1003-FUA-2	334471
NC-EWDP 16P-1003-FUA-2	281395
NC-EWDP 27P-0903-S-FUA-IC-2	287245
NC-EWDP 4PB-1003-IC-FUA-2	284354.5
NC-EWDP 29P-1003-IC-FUA-2	282213
NC-EWDP 28P-0903-IC-FUA-2	884754.5
1.0 ppm TOC	379928.5

Each sample was run for two reps. Most sample area counts were below 1.0 ppm TOC area curve (most around 0.5 ppm TOC). Four EWDP 19 samples were saved for analysis in 0.1 to 20 ppm method.

Calibration curve used is located on 628/107, with an  $R^2$  of 0.9999.

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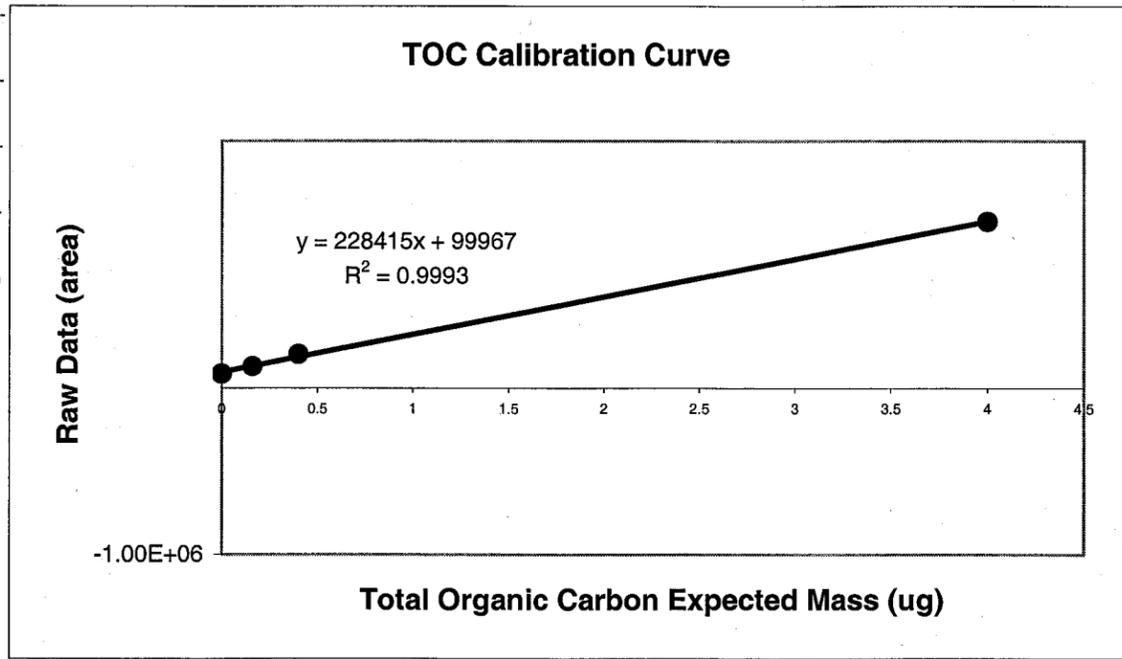
26 April 04 JS

Total Organic Carbon (TOC) analysis of EWDP groundwater samples

Analysis done to identify the calibration range/ranges to use for future analysis.

Four NC-EWDP water samples were analyzed on the Phoenix 8000 TOC instrument in TOC mode with a range of 0.04-20 ppm TOC. The 0.1-20 ppm TOC method was used. Standards were run individually at 0, 0.04, 0.1, 1, 10, 20 ppm.

26 April 04 cont. *AS*  
 TOC. Three reps of the 0-0.1 range were run, while two reps of the 1, 10, and 20 were run. Samples were run individually (3 reps) straight from the sample collection vials. The PRN File, 04221956, was imported into an excel spreadsheet. The columns were numbered (legend at 610/11 from Phoenix 8000 manual). Sample ID's are in column ~~8~~<sup>4-26-04</sup> 8 and area counts are in column 30 (628/109.ni).



Calibration curve used in analysis of TOC samples with an  $R^2$  of 0.9993.

26 April 04 cont. *AS*

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
-----v2.0	1	1	Done	0	4/22/2004 13:02	USER1	0 ppm	TOC	TOC Range 0.1 - 20 ppm	C	0	1	3	1
-----v2.0	1	1	Done	0	4/22/2004 13:08	USER1	0 ppm	TOC	TOC Range 0.1 - 20 ppm	C	0	1	3	2
-----v2.0	1	1	Done	0	4/22/2004 13:14	USER1	0 ppm	TOC	TOC Range 0.1 - 20 ppm	C	0	1	3	3
-----v2.0	1	1	Done	0	4/22/2004 13:20	USER1	0.04 ppm	TOC	TOC Range 0.1 - 20 ppm	C	0	1	3	1
-----v2.0	1	1	Done	0	4/22/2004 13:26	USER1	0.04 ppm	TOC	TOC Range 0.1 - 20 ppm	C	0	1	3	2
-----v2.0	1	1	Done	0	4/22/2004 13:32	USER1	0.04 ppm	TOC	TOC Range 0.1 - 20 ppm	C	0	1	3	3
-----v2.0	1	1	Done	0	4/22/2004 13:39	USER1	0.10 ppm	TOC	TOC Range 0.1 - 20 ppm	C	0	1	3	1
-----v2.0	1	1	Done	0	4/22/2004 13:45	USER1	0.10 ppm	TOC	TOC Range 0.1 - 20 ppm	C	0	1	3	2
-----v2.0	1	1	Done	0	4/22/2004 13:51	USER1	0.10 ppm	TOC	TOC Range 0.1 - 20 ppm	C	0	1	3	3
-----v2.0	1	1	Done	0	4/22/2004 13:58	USER1	1.0 ppm	TOC	TOC Range 0.1 - 20 ppm	C	0	1	2	1
-----v2.0	1	1	Done	0	4/22/2004 14:05	USER1	1.0 ppm	TOC	TOC Range 0.1 - 20 ppm	C	0	1	2	2
-----v2.0	1	1	Done	0	4/22/2004 14:12	USER1	10 ppm	TOC	TOC Range 0.1 - 20 ppm	C	0	1	2	1
-----v2.0	1	1	Done	0	4/22/2004 14:20	USER1	10 ppm	TOC	TOC Range 0.1 - 20 ppm	C	0	1	2	2
-----v2.0	1	1	Done	0	4/22/2004 14:28	USER1	20 ppm	TOC	TOC Range 0.1 - 20 ppm	C	0	1	2	1
-----v2.0	1	1	Done	0	4/22/2004 14:36	USER1	20 ppm	TOC	TOC Range 0.1 - 20 ppm	C	0	1	2	2
-----v2.0	6	1	Done	0	4/22/2004 14:39	USER1	Blank	Blank	TOC 0-20 ppm for 40mL	C	1	1	6	1
-----v2.0	6	1	Done	0	4/22/2004 14:41	USER1	Blank	Blank	TC pt1 to 20 ppm	C	1	1	6	2
-----v2.0	6	1	Done	0	4/22/2004 14:44	USER1	Blank	Blank	TC pt1 to 20 ppm	C	1	1	6	3
-----v2.0	6	1	Done	0	4/22/2004 14:46	USER1	Blank	Blank	TC pt1 to 20 ppm	C	1	1	6	4
-----v2.0	6	1	Done	0	4/22/2004 14:49	USER1	Blank	Blank	TC pt1 to 20 ppm	C	1	1	6	5
-----v2.0	6	1	Done	0	4/22/2004 14:51	USER1	Blank	Blank	TC pt1 to 20 ppm	C	1	1	6	6
-----v2.0	0	1	Done	0	4/22/2004 14:58	USER1	19P	TOC Range 0.1 - 20 ppm	C	0	1	2	1	7
-----v2.0	0	1	Done	0	4/22/2004 15:04	USER1	19P	TOC Range 0.1 - 20 ppm	C	0	1	2	2	7
-----v2.0	0	1	Done	0	4/22/2004 15:10	USER1	19D	TOC Range 0.1 - 20 ppm	C	0	1	2	1	8
-----v2.0	0	1	Done	0	4/22/2004 15:17	USER1	19D	TOC Range 0.1 - 20 ppm	C	0	1	2	2	8
-----v2.0	0	1	Done	0	4/22/2004 15:23	USER1	19M2	TOC Range 0.1 - 20 ppm	C	0	1	2	1	9
-----v2.0	0	1	Done	0	4/22/2004 15:30	USER1	19M2	TOC Range 0.1 - 20 ppm	C	0	1	2	2	9
-----v2.0	0	1	Done	0	4/22/2004 15:36	USER1	19M1	TOC Range 0.1 - 20 ppm	C	0	1	3	1	10
-----v2.0	0	1	Done	0	4/22/2004 15:42	USER1	19M1	TOC Range 0.1 - 20 ppm	C	0	1	3	2	10
-----v2.0	0	1	Done	0	4/22/2004 15:49	USER1	19M1	TOC Range 0.1 - 20 ppm	C	0	1	3	3	10
-----v2.0	0	1	Done	0	4/22/2004 15:53	USER1	Clean	Cleaning Procedure	default	C	4	2	6	1
-----v2.0	0	1	Done	0	4/22/2004 15:57	USER1	Clean	Cleaning Procedure	default	C	4	2	6	2
-----v2.0	0	1	Done	0	4/22/2004 16:00	USER1	Clean	Cleaning Procedure	default	C	4	2	6	3
-----v2.0	0	1	Done	0	4/22/2004 16:03	USER1	Clean	Cleaning Procedure	default	C	4	2	6	4
-----v2.0	0	1	Done	0	4/22/2004 16:08	USER1	Clean	Cleaning Procedure	default	C	4	2	6	5
-----v2.0	0	1	Done	0	4/22/2004 16:12	USER1	Clean	Cleaning Procedure	default	C	4	2	6	6

26 April 04 cont. AS

16	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	5.409	6.401	54	29	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	5.281	6.275	52	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	5.195	6.191	53	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	5.066	6.064	57	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	5.03	6.023	55	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	4.979	5.97	57	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	5.063	6.058	61	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	5.035	6.031	60	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	5.036	6.029	59	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	4.975	5.972	77	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	4.94	5.934	77	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	4.828	5.827	131	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	5.048	6.047	125	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	4.777	5.776	179	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	4.986	5.983	158	28	30	31	32	33	34	35	36
	EWDPTOC	0	0	0	0	5	1	0	10	0	0	0.5	5.122	5.621	61	174637	0	0	0	0	0	0	0	0	0
	EWDPTOC	0	0	0	0	5	1	0	10	0	0	0.5	4.824	5.321	66	127833	0	0	0	0	0	0	0	0	0
	EWDPTOC	0	0	0	0	5	1	0	10	0	0	0.5	4.837	5.337	62	104749	0	0	0	0	0	0	0	0	0
	EWDPTOC	0	0	0	0	5	1	0	10	0	0	0.5	4.857	5.357	62	105958	0	0	0	0	0	0	0	0	0
	EWDPTOC	0	0	0	0	5	1	0	10	0	0	0.5	4.725	5.222	65	123079	0	0	0	0	0	0	0	0	0
	EWDPTOC	0	0	0	0	5	1	0	10	0	0	0.5	4.757	5.255	63	89759	0	0	0	0	0	0	0	0	0
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	4.744	5.74	63	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	4.928	5.922	61	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	4.938	5.931	65	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	4.887	5.879	66	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	4.834	5.83	67	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	4.804	5.797	69	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	4.851	5.848	65	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	4.696	5.69	66	28	30	31	32	33	34	35	36
	EWDPTOC	4	8	0	0	1	0.5	0	1	0.5	0	0	120	1	4.782	5.782	65	28	30	31	32	33	34	35	36
	EWDPTOC	20	0	0	0	1	0	20	0	0	0.5	4.745	5.244	93	333548	0.4912	0	0	0	0	0	0	0	0	0
	EWDPTOC	20	0	0	0	1	0	20	0	0	0.5	4.601	5.101	116	309401	0.3906	0	0	0	0	0	0	0	0	0
	EWDPTOC	20	0	0	0	1	0	20	0	0	0.5	4.639	5.138	85	114560	-0.4212	0	0	0	0	0	0	0	0	0
	EWDPTOC	20	0	0	0	1	0	20	0	0	0.5	4.627	5.126	90	135321	-0.3347	0	0	0	0	0	0	0	0	0
	EWDPTOC	20	0	0	0	1	0	20	0	0	0.5	4.661	5.16	135	165452	-0.2092	0	0	0	0	0	0	0	0	0
	EWDPTOC	20	0	0	0	1	0	20	0	0	0.5	4.683	5.182	134	167884	-0.199	0	0	0	0	0	0	0	0	0

26 April 04 cont AS

37	27244	4221256	4221300
	27244	4221256	4221306
	27244	4221256	4221312
	27244	4221256	4221319
	27244	4221256	4221325
	27244	4221256	4221331
	27244	4221256	4221337
	27244	4221256	4221343
	27244	4221256	4221350
	27244	4221256	4221356
	27244	4221256	4221403
	27244	4221256	4221409
	27244	4221256	4221417
	27244	4221256	4221424
	27244	4221256	4221432
	12795	4221256	4221438
	12795	4221256	4221440
	12795	4221256	4221442
	12795	4221256	4221445
	12795	4221256	4221447
	12795	4221256	4221449
	27244	4221256	4221456
	27244	4221256	4221502
	27244	4221256	4221508
	27244	4221256	4221515
	78311	4221256	4221521
	78311	4221256	4221528
	78311	4221256	4221534
	78311	4221256	4221541
	78311	4221256	4221547
	0	4221256	4221551
	0	4221256	4221554
	0	4221256	4221558
	0	4221256	4221601
	0	4221256	4221605
	0	4221256	4221609

Total Organic Carbon (TOC) Analysis

Method 0.1 ppm to 20 ppm TOC

Range of calibration points 0.04-20 ppm TOC

TOC Standard Data

TOC Standard (ppm)	TOC expected mass (ug)	Raw Data Ave
0	0	89093
0.04	0.16	133191
0.1	0.4	206961
1	4	1012196
10	40	9935190
20	80	20663620
Blank (last 3)	0	106265

TOC Sample Data

Sample ID	Conc (ppm)# using blank
19P	0.14
19D	0.24
19IM2	0.24
19IM1	0.21

# Calculated by dividing the mass by the volume of sample (0.5mL)

TOC trial run on old EWDPT samples. The calibration curve raw data is given above.

Four NC-EWDPT ground water samples analyzed for TOC and found to have ~ 0.2 ppm TOC.

26 April 04 cont. *JS*Creation of TOC standards

Organic carbon standard for TOC analysis

Preparation Same methods used as on

page 628/83-85

Challenge of balance at start (target 20.0001g)

(reading 20.0003g)

Challenge of balance at end (target 20.0005g)

(reading 20.0003g)

Inorganic Carbon Standard

Inorganic carbon standard preparation

for TOC analysis. Same methods

used as on page 628/85-86

Challenge of balance at start (20.0001g target)

(reading 20.0002g)

Challenge of balance at end (target 20.0001g)

(reading 20.0001g)

~~4-27-04 *JS*~~27 April 04 *JS*Creation of TOC calibration curve standards, Organic and Inorganic CarbonSix organic and inorganic carbon standards were made to ~~create~~<sup>4-27-04 *JS*</sup> to use in the creation of

a calibration curve for Total Organic Carbon

(TOC) analysis by the Phoenix 8000 TOC.

Initial 1000 ppm OC and IC standards

(628/113) were used to create the six standards

for the calibration curve points.

Standard*	Method
50 ppm	10 ml of 1000 ppm into a 200 ml flask
10 ppm	5 ml of 1000 ppm into a 500 ml flask
1 ppm	20 ml of 10 ppm into a 200 ml flask
0.5 ppm	10 ml of 10 ppm into a 200 ml flask
0.1 ppm	5 ml of 10 ppm into a 500 ml flask
0.05 ppm	5 ml of 10 ppm into a 1000 ml flask

\* Both Organic and inorganic standards made

Volumetric pipets were used to transfer stock solution into volumetric flasks. Type 1 water used to dilute solution. Flasks were inverted and swirled to ensure mixing. Storage in Bldg 57, L106 refrigerator.

27 April 04 *JS*

## Preparation of 21% Acid Reagent

A 21% acid reagent was prepared for use by the Phoenix 8000 TOC. 37 ml of 85% phosphoric acid ( $H_3PO_4$ ) (Fisher A242-4 lot # 001815) was added to 188 ml of Type 1 water. Water measured in a 250 ml graduated cylinder. The solution was mixed and stored in a 500 ml plastic container.

## Preparation of 10% Persulfate and 5% Phosphoric Acid Reagent Mixture

A 10% Persulfate and 5% Phosphoric Acid reagent mixture was made for use by the Phoenix 8000 TOC. Same methods used as on page 628/87.

4-28-04

28 April 04 *JS*Sample preparation for TOC  
trial run 4-27-04

Four known samples were created for analysis by the Tekmar Dohmann Phoenix 8000 <sup>4-28-04</sup> ~~100%~~ Total Organic Carbon analyzer on 4-27-04. The samples were created by transferring known standards (stock solution, 628/112-113) with volumetric pipets into 40 ml vials. Vials were inverted and swirled to ensure mixing.

Sample Concentration (ppm)	Method
0.25 OC	20 ml of 0.5 ppm IC and
0.25 IC	20 ml of 0.5 ppm OC
5.0 OC	20 ml of 10 ppm OC and
5.0 IC	20 ml of 10 ppm IC
0.5 IC	20 ml of 1 ppm IC and
5.0 OC	20 ml of 10 ppm OC
0.5 OC	20 ml of 1 ppm OC and
5.0 IC	20 ml of 10 ppm IC

30 April 04 *JS*

The TOC trial run on 4-28-04 was terminated due to malfunctions with the method being used.

30 April 04

cont

B

TOC trial run on 4-29-04 with new method

After the ~~4-28-04~~<sup>4-30-04</sup> unsatisfactory trial run on 4-28-04 the process and methods were reconsidered. New methods were created to ensure that we would have enough fluid in the UV chamber to do the TOC analysis. These new methods are TOC Range 20-200 ppm (2 ml IV), IC Range 20-200 (IV 2 ml), and TC-IC Range 20-200 (IV 2 ml). These new methods have an injection volume (IV) of 2.0 ml, sparger vol. of 20 ml, water vol. of 5 ml, and a reagent vol. of 1 ml.

Standards and samples for TOC

The same standards were used as on page 628/113. The only difference is that the organic C standards were ~~run~~<sup>4-30-04</sup> run first and the IC standards were run second.

The same samples were used as documented on page 628/115.

5/5/2004:

The following solutions were used to calibrate the Sonde/Surveyor 4a in-line probe: (and will be used for recalibration/calibration check during the upcoming Nye County sampling event):

pH 10 buffer: Fisher, Cat # SB115-500 Lot # 033158-24  
Exp date June 2005, 500 mL

pH 7 buffer: Fisher Cat # SB107-500 Lot # 033032-24  
Exp date April 2005, 500 mL

Quinhydrone: Acros Organics 98%, cat 418771000

Lot # A015118301, 100 g (used 1g in 100 ml)

pH 4 buffer pillows (2 in Quinhydrone solution above)

Hach, Cat # 22269-66 pk/50, Lot # A3164

Exp June-05

Conductivity: Hach Singlet conductivity std (3)

Cat # 27705, 20 mL Lot # A1348 exp 12/06

1000  $\mu$ S/cm

Solutions to be used for calibration in the field

include those listed above, plus the following for individual meters & probes:

pH 7 Buffer - Hach Cat # 27701-20, Lot # A3207, exp 7/05

pH 10 Buffer - Hach Cat # 27702-20, Lot # A2298, exp 10/04

pH 4 Buffer - Hach Cat # 27700-20, Lot # A2039, exp 2/06

Conductivity - Hach Cat # 27704-20, 180  $\mu$ S/cm, Lot # 27704-20

pH 7 Buffer pillows - Hach Cat # 22270-66, Lot A3192, exp 7/05

5/5/04 continued

Bromocresol Green-Methyl Red Indicator Powder - Hach  
Cat # 943-99, Lot # A1327, exp 11/04

Phenolphthalein Indicator Powder - Hach Cat # 942-99  
Lot # A2039, exp 02/06

Sulfuric Acid cartridges: 0.16 N Hach Cat # 14388-01  
Lot # A3218 exp 2/05

Sulfuric Acid cartridges: 1.60 N Hach Cat # 14389-01  
Lot # A3204 exp 3/05

ORP premade calibration solution: Thermo Orion  
Cat # 967901 Lot # H51

Nitric acid made into 1:1 solution with water

Fisher trace metal grade Cat # A509-212, lot 1100040

Conductivity - Fisher Scientific cat # 09-328-2

100.6 ug no Lot # listed, exp date 1/13/2005

5/7/04 *J*

Meters and Probes to be used in the field  
on the NC-EDDP sampling trip from  
5/9/04 - 5/13/04

The following meters will be used to take  
measurements on groundwater samples while  
in the field on the upcoming NC-EDDP  
sampling trip from 5-9-04 to 5-13-04.

5/7/04 cont. *J*

Dissolved oxygen meter: Oxi 330i (SN 02270024)  
probe: OxiCal-SL (SN 02180156)

pH meter: HACH EC20 pH/ISE Meter  
(SN 981100001572)

probe: HACH (51935-22 pH 3218 046)

secondary probe: HACH Comb. pH Electrode  
50200 with Temp. (P2117110)

Conductivity Meter: HACH (0150) Conductivity Meter  
(SN 990200007161)

probe: HACH Conductivity Probe 50161 (K=1.0)  
(RC23)

ORP <sup>5704</sup> meter: Thermo Orion model 290  
(SN 08953)

probe: Thermo Orion Low Maintenance ORP Triode  
(SN 91793N) (HX1, W756)

10 May 04 JB

NL-EWDP 19PTS Deep zone  
ground water sampling event

pH calibration

probe: HACH (51935-22 pH  
3218 046)

temperature ~~21.5~~<sup>5-10-04 JB</sup> C 21.3°C

calibration solutions used pH 7.00

slope 56.8

calibration solution pH 10.01

slope 57.3

Buffer solutions used from sigjet packets.

ORP calibration

Meter and probe used are recorded  
on 628/119.

temp 24.7°C

solutions used recorded on 628/118

calibration: 463.0  $\mu$ V at 25.4°C  
in Quinhydrone cal solution.

10 May 04 last JB

DO calibration

temp 24.5°C <sup>5-10-04</sup> 25.1°C

meter and probe used is recorded

on page 628/119.

slope 0.92

Conductivity Calibration

The conductivity meter and probe  
are recorded on 628/119.

calibration solution: conductivity 100  $\mu$ S

temp 26.3°C

Entered 102.1 for the calibration number.

After calibration we had a reading of

100.9  $\mu$ S

Sample Measurements

pH temp 23.4°C

pH reading 7.97

ORP temp 26.0°C

ORP reading 630.0  $\mu$ V mv

97.3 mv

DO temp 25.5°C

DO reading 5.71 mg/L

10 May 04 cont  $\beta$

Sample Measurements at  
NL-ENTP KPTS

Conductivity temp  $26.9^{\circ}\text{C}$   
Conductivity reading  $375 \mu\text{S}$

Air Temperature is  $26^{\circ}\text{C}$

Challenge of Meters

Conductivity temp  $26.7^{\circ}\text{C}$   
Conductivity reading  $96.0 \mu\text{S}$

pH temp  $24.0^{\circ}\text{C}$   
pH reading at 7.00 standard = 7.05

ORP challenge with the premade  
ORP standard

ORP temp  $25.9$   
ORP reading  $502.5 \text{ Rel mV}$   
 $221.3 \text{ mV}$

10 May 04 cont  $\beta$

Titration

Test strip Total Alkalinity ppm estimation  
is between 120 and 180.

Two Bromocresol Green-Methyl Red indicator powder  
pillows (Lot A1327) added to 100 mL of  
filtered sample. Stir bar added and placed  
on a stirplate.

A S-hook was attached to a Sulfuric Acid  
 $1.6 \pm 0.008 \text{ N}$  (Lot A3204) Digital Titration  
cartridge. After the cartridge was attached  
to the digital titrator the air was forced out  
of the S-hook.

Acid was slowly added to the sample until it  
reached a pH of 5.1, which took 151 digits  
( $\text{mL} = \text{Digits} \div 800$ )

Second end point, pH 4.8, took 190 digits  
Third end point, pH 4.5, took 203 digits.

~~5-11-04~~

11 May 04 ~~FB~~

NC-EWDP-19PB groundwater sampling  
trip (shallow) Calibration of equipment  
5-11-04

DO Calibration

Temperature  $21.5^{\circ}\text{C}$ 

slope 0.93

Meter and probe checked on 6/28/119

pH Calibration

Meter HACH EC20 pH/ISE Meter  
(SN 981105001572)

Probe HACH (51935-22, pH 3218 046)

Singlet pH Buffer Solutions used are

pH 7.00 and 10.01

Calibration of 7.00 pH

temp  $18.3^{\circ}\text{C}$

slope 57.3

Calibration of pH ~~10.01~~ <sup>5-11-04</sup> 10.01

~~5-11-04~~

~~slope~~

5-11-04

11 May 04 cont ~~FB~~

Conductivity Calibration

Meter and probe recorded on 6/28/119

initial reading 98.3

temp  $23.7^{\circ}\text{C}$

Entered 97.9  $\mu\text{S}$  as calibration value

Recal due to temp change

temp =  $24.8^{\circ}\text{C}$

Entered 100  $\mu\text{S}$  as cal value

ORP Calibration

Meter and probe recorded on 6/28/119

temp  $25.4^{\circ}\text{C}$

calibrated 4620 Rel mV

Checked cal by viewing reading of

mV = 257

Measurements of groundwater at  
NC-EWDP-19PB shallow depth

Air temp  $20.0^{\circ}\text{C}$

DO Measurement

reading 4.30 mg/L

temp  $20.7^{\circ}\text{C}$

11 May 04 cont. ~~JS~~

### pH Measurement

Temp ~~21.0°C~~ <sup>5-11-04 JS</sup> 20.0°C  
 Reading ~~7.59~~ <sup>5-11-04 JS</sup> pH 8.38 pH

### ORP Measurement

Temp 23.2°C  
 Reading 311.5 Rel mV  
 105.0 mV

### Conductivity Measurement

Temp 22.9  
 reading 337  $\mu$ S

### Calibration

#### Cal Verification

pH reading 7.01 for the 7.00 standard  
 Temp 20.8°C

Conductivity cal verification for 100  $\mu$ S standard  
 equals 102.8  $\mu$ S at 23.1°C

#### ORP cal. verification

Temp 21.0°C  
 Reading 462.0 Rel mV  
 257.7 mV

11 May 04 cont. ~~JS~~

### Titration

Test skip Total Alkalinity ppm estimation  
 is ~~between~~ <sup>5-11-04 JS</sup> about 120

Two Bromocresol Green Methyl Red indicator  
 powder pillows (Lot A1327) added to  
 100 ml of filtered sample. A sticker  
 was added and placed on a stir plate.  
 A J-hook was attached to a sulfuric acid  
 1.6  $\pm$  0.008 N (A3204 Lot) Digital  
 titration cartridge. After the cartridge was  
 attached to the digital titrator the air was  
 forced out of the J-hook.

Acid was slowly added to the sample until  
 it reached ~~at~~ <sup>5-11-04 JS</sup> the three desired end points  
 First end pt, pH 5.1, took 96 digits  
 Second end pt, pH 4.8, took 111 digits  
 Third end pt, pH 4.5 took 116 digits  
~~JS~~ <sup>5-11-04 JS</sup> ( $\mu$ L = Digits  $\div$  800)

Local Well Number

NC-EWDP-19PB

Zone (if applicable)

Shallow

Time

9:45 am

Date

5/11/04

Sampled by

Miriam Luckett / Brian Strye

State

NV

District

County

Nye County

Value	Value	Units
Yeild when sampling (GPM) 0.5	Water temperatruce 25.90C	C
Minutes pumped before sampling 3 days plus 1 hr (morning)	Air temperature 20.00C	C
Sampling method	Specific conductance 337	microS/cm
Sampling condition	Dissolved Oxygen 4.30	mg/L
Static water level (feet) 368.5	Eh 311.5 Red.mV 105.0 mV	mV
Depth to top sample interval 375.0	pH field 8.38	
Depth to bottom sample interval 395.0	Alkalinity total field 111/116	mg/L as CaCO3
Finished well depth (feet) 405.3	REMARKS: pH 4.8 / pH 4.5	
Hole depth (feet) 411.5		

Sample ID	Volume	Sample Treatment Key
NC-EWDP-19PB-SHAL-0504-FA	1L	
NC-EWDP-19PB-SHAL-0504-FUA (1-7)	7 x 1L	F - filtered
NC-EWDP-19PB-SHAL-0504-UFUA-500	500 mL	A - acidified
NC-EWDP-19PB-SHAL-0504-UFUA (1-4)	4 x 1L	U - prefix "un"
NC-EWDP-19PB-SHAL-0504-S-FUA (1-2)	2 x 250 mL	S - stable isotope
NC-EWDP-19PB-SHAL-0504-IC-FUA (1-4)	4 x 40 mL	IC - inorganic carbon
NC-EWDP-19PB-SHAL-0504-OR-UFUA (1-3)	3 x 40z	OR = for organics

Local Well Number

NC-EWDP-19PB

Zone (if applicable)

Deep

Time

9:30 am

Date

5/10/04

Sampled by

Miriam Luckett / Brian Strye

State

NV

District

County

Nye County

Value	Value	Units
Yeild when sampling (GPM) 0.5	Water temperatruce 25.10C	C
Minutes pumped before sampling over 7 days	Air temperature 26.00C	C
Sampling method	Specific conductance 375	microS/cm
Sampling condition	Dissolved Oxygen 5.71	mg/L
Static water level (feet) 368	Eh 97.3	mV (630 R.mV)
Depth to top sample interval 514.7	pH field 7.97	
Depth to bottom sample interval 534.7	Alkalinity total field 190/203	mg/L as CaCO3
Finished well depth (feet) 545.0	REMARKS: pH 4.8 / pH 4.5	
Hole depth (feet) 545.2		

Sample ID	Volume	Sample Treatment Key
NC-EWDP-19PB-DEEP-0504-FA	1L	
NC-EWDP-19PB-DEEP-0504-FUA (1-7)	7 x 1L	F - filtered
NC-EWDP-19PB-DEEP-0504-UFUA-500	500 mL	A - acidified
NC-EWDP-19PB-DEEP-0504-UFUA (1-4)	4 x 1L	U - prefix "un"
NC-EWDP-19PB-DEEP-0504-S-FUA (1-2)	2 x 250 mL	S - stable isotope
NC-EWDP-19PB-DEEP-0504-IC-FUA (1-4)	4 x 40 mL	IC - inorganic carbon
NC-EWDP-19PB-DEEP-0504-OR-UFUA (1-3)	3 x 40z	

MPD  
S/17/04

MPD  
S/17/04

Local Well Number

NC-EWDP-35

Zone (if applicable)

3

Time

10:45 am

Date

5/12/04

Sampled by

Miriam Juckett / Brian Strye

State

NV

District

County

Nye

Value

very erratic

Value

Units

C

Yield when sampling (GPM)

Water temperature

Minutes pumped before sampling

Air temperature

Sampling method

Specific conductance

Sampling condition

Dissolved Oxygen

Static water level (feet)

Eh

Depth to top sample interval

pH field

Depth to bottom sample interval

Alkalinity total field

Finished well depth (feet)

pH 4.8 / pH 4.5

Hole depth (feet)

REMARKS:

no field measurements taken due to extremely high turbidity + green sediment (clay)

Sample ID

NC-EWDP-35-UFWA-1

Volume

1L

Sample Treatment Key

NC-EWDP-35-UFWA-2

1L

F - filtered

Blank:

A - acidified

NC-EWDP-FB-0504-UFWA

1L

U - prefix "un"

S - stable isotope

IC - inorganic carbon

18 May 04

JS

Creation of inorganic Standard For TOC analysis of EWDP samples

The creation of 100 ppm IC standard was done by dilution of 200 ppm IC standard, 5-10-04 (SN 653/6-7). A 100 ml volumetric flask was rinsed several times with type 1 water. Then 50 ml of 200 ppm IC standard was transferred into the clean volumetric flask with a volumetric pipet, 50 ml of type 1 water was then added to the flask.

Inorganic Carbon (IC) analysis of NC-EWDP-FPB-SHAL-0504-FWA-1 and NC-EWDP-FPB-DEEP-0504-FWA-1

The Tekmar Dohrmann Phoenix 8000 (SN 00343010) was used to do IC analysis on two groundwater samples gathered during the Nye County EWDP sampling trip 5/9-13/04. The two samples used are NC-EWDP-19PB-SHAL-0504-IC-FWA-1 and NC-EWDP-19PB-DEEP-0504-IC-FWA-1, which are recorded on 628/128 and 129. The samples were collected in the field in 40 ml amber glass vials.

The method used in the IC analysis is IC Range 20-200 ppm. The expected detection

18 May 04 cont. JS

range is between 1 and 200 ppm IC. The calibration points used are 0 ppm, 1 ppm, 10 ppm, 50 ppm, 100 ppm, 200 ppm IC.

The standards and samples were each run for 3 reps, while the blanks and cleaning procedures were run for 6 reps.

After the two groundwater samples were run a 10 ppm IC and 50 ppm IC standard was run to check calibration status.

19 May 04 JS

### Creation of Cation and Anion Standards

Two cation and two anion standards were created to send out for analysis with EWDP groundwater samples to determine accuracy of results.

Cation standard 1, Added 10 mL of Instrument calibration Standard 3 (Lot # 26-63AS, Cat # CL-CAL-3) with volumetric pipett into a 1 L volumetric flask and filled to the mark with nanopure water. Labeled Cation 1, CL-CAL-3.

Cation Standard 2, Added 10 mL of Total Calibration Verification Standard (Lot # 25-116AS, Cat # CL-ICV-1) with volumetric

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pipett into a 1 L volumetric flask and filled to the mark with nanopure water. Labeled Cation 2, CL-ICV-1.

Anion Standard 1, Added 10 mL of IC Instrument Check Standard 2 (Lot # 24-79AS, Cat # IC MIX 2-100) with volumetric pipett into a 500 mL volumetric flask and filled to the mark with nanopure water. Labeled (Anion 1, IC MIX 2-100). Anion Standard 2, (10 ppm Cl and 2 ppm nitrate) Added 10 mL chloride anion standard (Lot # 7-147UY, Cat # AS-CL9-2X) and 2 mL nitrate anion standard (Lot # 25-68AS, Cat # AS-NO39-2X) with volumetric pipettes into a 1 L volumetric flask and filled to the mark with nanopure water. Labeled, Anion 2, 10 ppm Cl, 2 ppm nitrate.

The chemical brand used in the creation of standards is Spex CertiPrep.

5-20-04 JS

20 May 04  $\beta$ 

Creation of aliquots for cation, anion, and stable isotope analysis from NC-EWDP-1993 groundwater samples

Aliquots were removed from some NC-EWDP-1993-SHAL and DEEP groundwater samples to be sent out for analysis.

Aliquots were poured from the parent container into the designated polypropylene container, minimizing headspace. Parafilm was applied to prevent leaking.

In order to hide sample identity, they were given new IDs. A key to the new IDs is located on 628/135. Anion and cation samples with the new ID suffix "A" are to be sent to division 1 for analysis, while a suffix of "B" denotes the bottle to be sent to SGS for analysis. Samples labeled stable # A, are to be sent to Coastal for stable isotope analysis. Cation samples are stored in 60 mL polypropylene bottles, while anion samples are stored in 125 mL polypropylene bottles. Stable isotope samples are stored in 60 mL polypropylene bottles.

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20 May 04 cont.  $\beta$ 

Aliquot ID's and reference ID's

## Cation Samples

Original ID	DIV 01 Aliquot ID	SGS Aliquot ID
NC-EWDP-1993-		
SHAL-0504-FA	Cation 1A	Cation 1B
DEEP-0504-FA	Cation 2A	Cation 2B
SHAL-0504-FUA	Cation 3A	Cation 3B
DEEP-0504-FUA	Cation 4A	Cation 4B
Cation 1, CL-CAL-3*	Cation 5A	Cation 5B
Cation 2, CL-ICV-1*	Cation 6A	Cation 6B
Blank-UFUA	Cation 7A	
SHAL-0504-UFUA	Cation 8A	
DEEP-0504-UFUA	Cation 9A	

## Anion Samples

SHAL-0504-FUA	Anion 1A	Anion 1B
DEEP-0504-FUA	Anion 2A	Anion 2B
Anion 1, ICME x2-100*	Anion 3A	Anion 3B
Anion 2, 10 ppm Cl, 2 ppm NO <sub>3</sub> *	Anion 4A	Anion 4B
Blank-UFUA	Anion 5A	
SHAL-0504-UFUA	Anion 6A	
DEEP-0504-UFUA	Anion 7A	

\* QA standards created and denoted on 628/132-133.

20 May 04 cont ~~FB~~

Aliquots ID's and reference ID's  
for Stable isotope analysis

Original ID  
~~NC-EWDP-19P13~~  
~~SHAL-0504-S-FUA~~ Stable 1A  
~~DEEP-0504-S-FUA~~  
~~QA~~  
~~QA~~  
~~SH.~~

5-20-04 ~~FB~~

Aliquots ID's and reference ID's  
for Stable isotope analysis

Original ID	Coastal Aliquot ID
NC-EWDP-19P13	
SHAL-0504-S-FUA	Stable 1A
<del>SHAL</del> SHAL-0504-S-FUA	Stable 2A
QA*	Stable 3A
QA*	Stable 4A
DEEP-0504-S-FUA	Stable <del>5A</del> <sup>5-20-04</sup> 5A
DEEP-0504-S-FUA	Stable 6A

\* QA standards, created by collecting tap water from Lab 106 after running sink for 5 min. A 60 ml bottle was rinsed 3 times, filled, and parafilm'd.

20 May 2004 ~~FB~~

Receipt and acceptance of Core Lab XRD analyses of NC-EWDP-19PB samples.

Several samples of alluvium collected during drilling of NC-EWDP-19PB (sonic coring) were sent to Core Lab for semi-quantitative x-ray diffraction analyses to determine mineral type and mineral content. Results were received during the week of 19 Apr 2004. This entry documents the results. Details of samples can be found on pages 72-76 of this notebook.

of the 33 samples sent to Core Lab as part of this purchase order (#U31485E), three were 'known' samples included as blind QA checks. Several acceptance criteria were developed as part of the QA process, although these criteria had not been previously applied.

A. Sample results (tables, xrd patterns, and electronic files) were received as specified in the P.O.

B. The overall results of the analyses are acceptable as received. A detailed discussion follows.

i. Appropriate identification of mineral composition of standards - satisfactory

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Acceptance of Core Lab XRD analyses (cont'd)

B.1. (cont'd) The three QA check standards were samples

628-31 - NBS 99a (sodium feldspar)

628-32 - mix of quartz, clinoptilolite, smectite, calcite

628-33 - same as 628-32 but with different ratio of minerals

The Core Lab results correctly identify all expected mineral phases in all check standards.

2. Qualitative agreement of peak proportions with previously analyzed samples from Core Lab. - satisfactory

A comparison of Core Lab's previous analyses of quartz and clinoptilolite (from same samples) shows the same peak distribution and intensity ratios.

3. Appropriate relative concentrations of minerals in the mixed QA check standards - satisfactory

Concentrations of mixed standards based on weight of each mineral added (as reported)

	Qtz	Calcite	Clinop.	Clay
628-32	44 (53)	11 (15)	22 (15)	22 (15)
628-33	52 (65)	4 (4)	35 (21)	9 (8)

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the ratios (relative proportions) of each mineral are correctly reported and follow the correct trends.

For example, equal clinop. and clay in 628-32.

There are significant uncertainties; however, most can be attributed to the large overlap in peaks

for the silicate phases. It appears the zeolite is underreported while quartz is overestimated.

4. Quantitative agreement within approximately 5 wt % - only partially satisfied

Agreement for calcite and clay is adequate, but quartz is reported at a level higher than expected and clinoptilolite is reported at a level lower than expected.

There are several possible reasons for this disagreement.

1. The QA check sample provided was not ground to a fine powder, but rather submitted as a mixture (as homogeneous as possible) of varying grain sizes. It is possible that some loss of material occurred during processing. This would affect all samples, however, and one would expect higher quartz and lower zeolite for the remainder of the samples. While possible, it is unlikely that processing was the source of error (or at least, most error)

2. A review of the sample xrd patterns shows that (patterns on subsequent pages) the clinoptilolite peaks are small relative to the other silicates present in all samples. Also, the maximum intensity peak

20 May 2004 PZ

is slightly affected (obscured) by quartz peaks. This interference likely contributes to some error.

3. The intensity of clinoptilolite peaks can vary with composition making interpretation more difficult.

~~Ex~~ ~~po~~ ~~sl~~ ~~ol~~ ~~ol~~

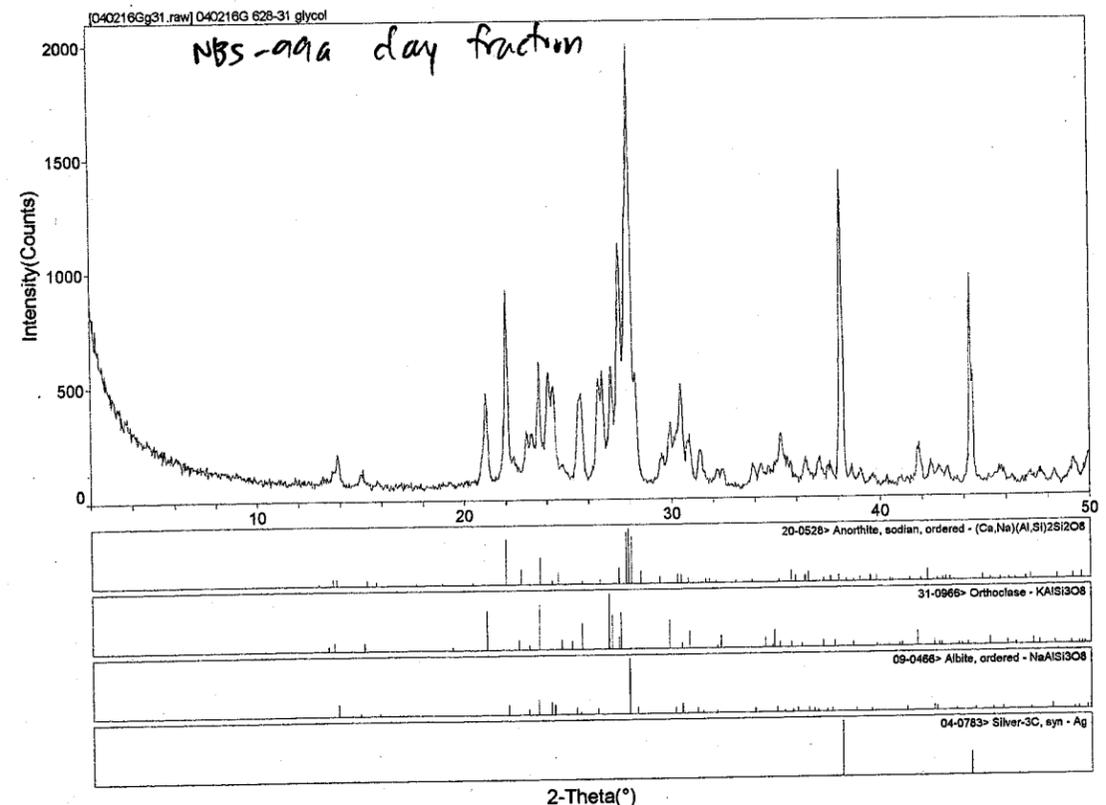
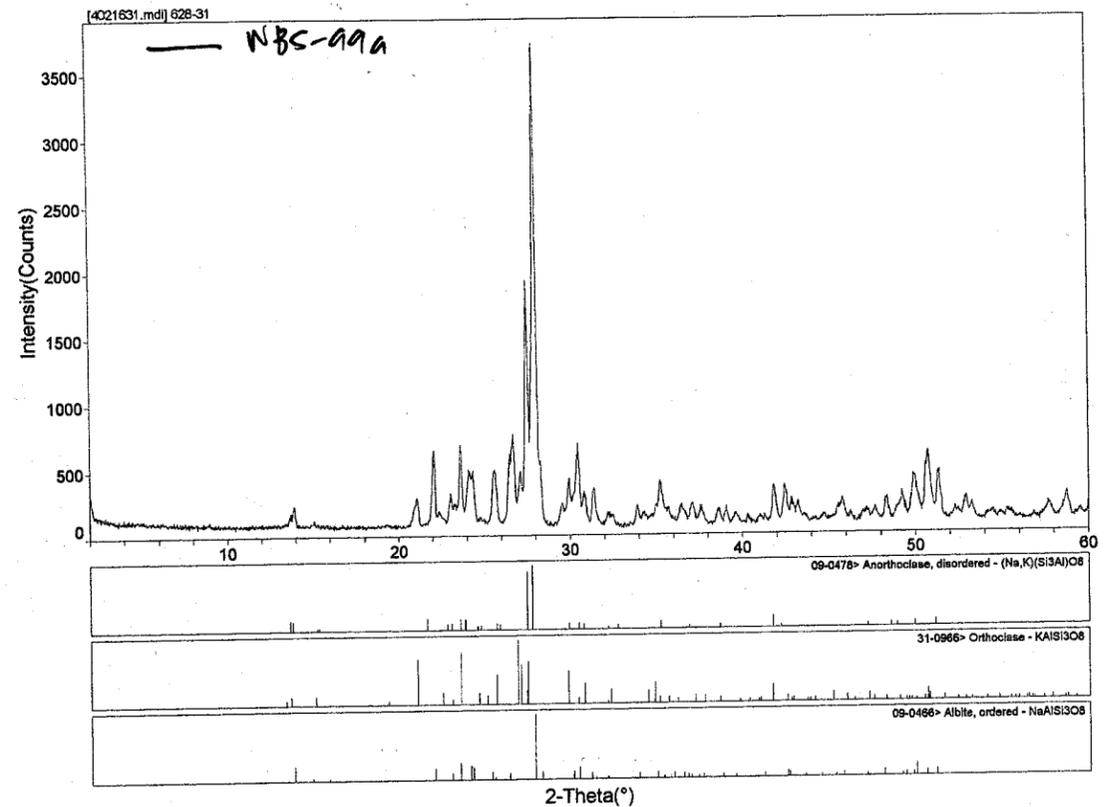
4. ~~Over~~ ~~po~~ ~~sl~~ ~~ol~~ ~~ol~~ Overestimate of the contribution of quartz resulted in underestimation of the other silicate phases. [likely contributor]

Nevertheless, the general trends of composition and magnitude of the mineral phases in the QA check standards are okay. Since most of the 'unknowns' have lower quartz content, but have more complex silicates, we should expect that the zeolite content is underestimated by as much as 1/3. The xrd results will be useful even with this potential uncertainty.

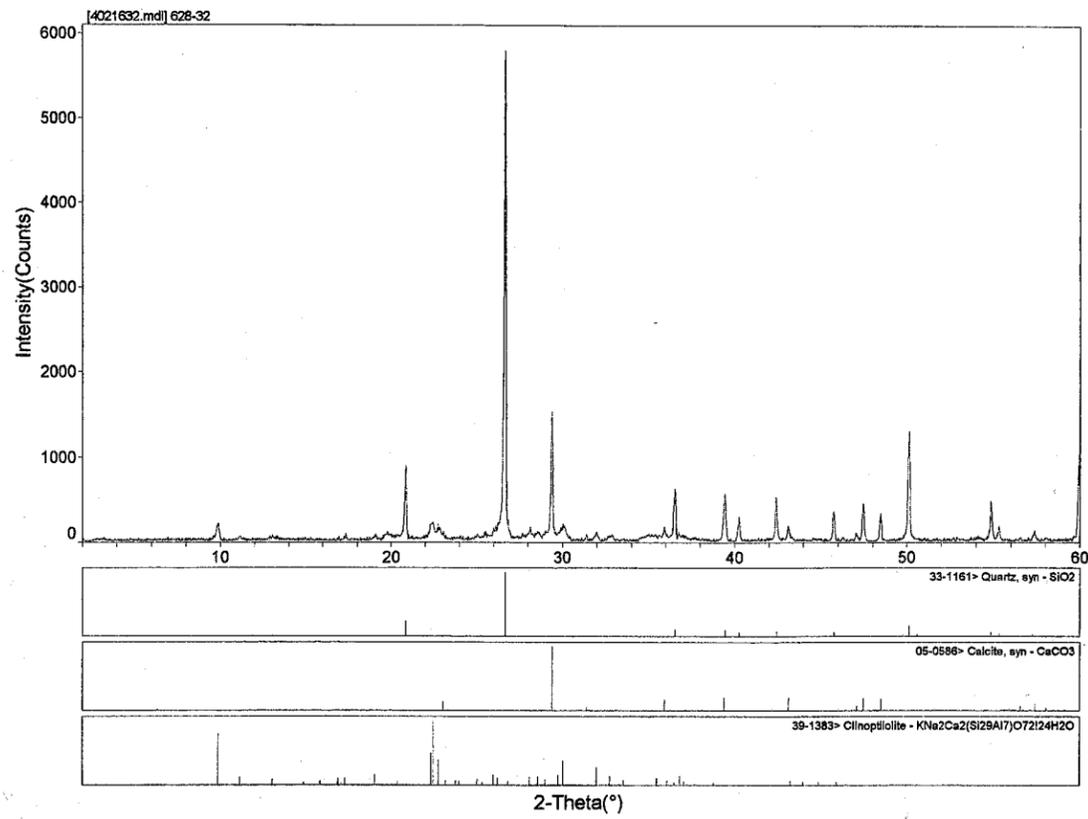
Patterns of the QA check sources (620-31, 32, and 33) along with identification of peaks in each pattern are shown on the following pages. Note that the peak identification is done ~~independ~~ independently using our own Jade software and the exact phases are provided for information only, not as a strict indication of what phase is present.

Complete data and results are found on the CD attached to this notebook (CD label: X-ray diffraction mineralogy for SWRC CMRA sediment samples).

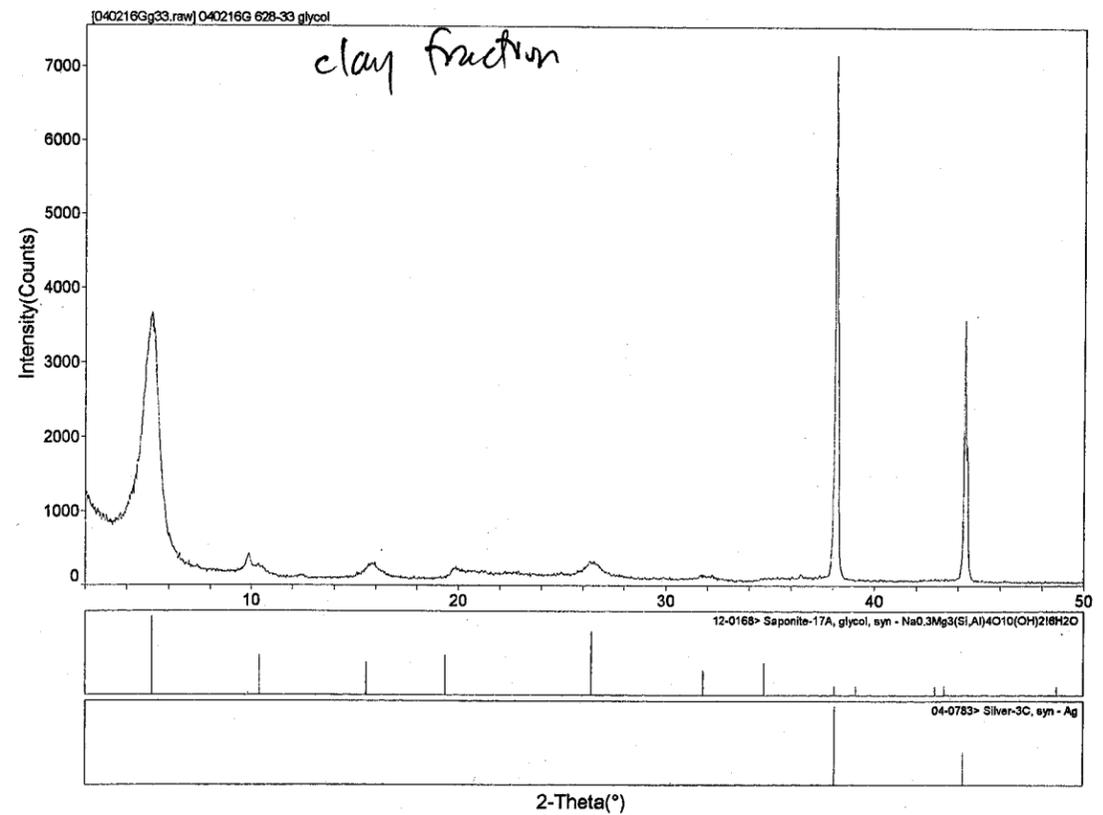
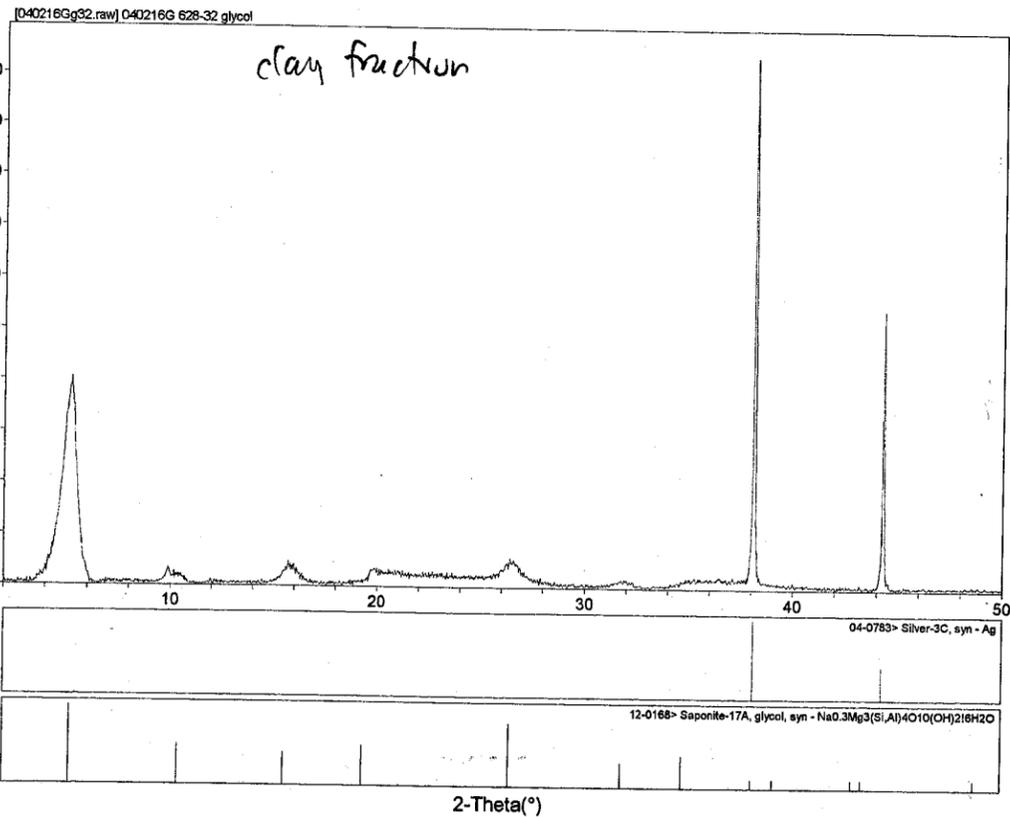
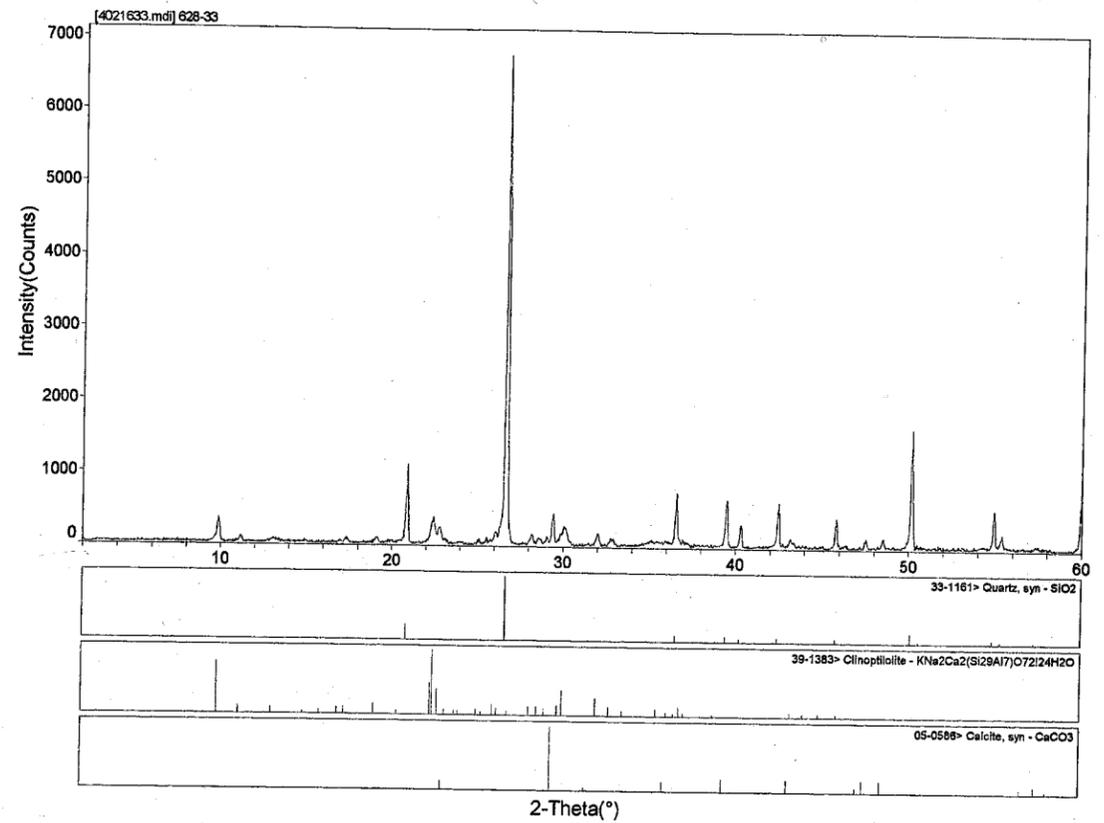
20 May 2004 PZ



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5/21/04

Samples taken to Division 1 on 5/20/04 & 5/21/04 were given the following names:

NEW

NCEWDP-19PB-SHAL-0504-UFUA-1	}	UFUA-GCMS-S
" " UFUA-2		
" " UFUA-3	}	UFUA-GCMS-S
" " UFUA-4		

LCMS  
5/21/04

NCEWDP-19PB-DEEP-0504-UFUA-1	}	UFUA-GCMS-D
" " UFUA-2		
" " UFUA-3	}	UFUA-LCMS-D
" " UFUA-4		

Each of the above were delivered as two bottles per sample name. New names also for the following:

OLD

NEW

NC-EWDP-19PB-SHAL-02-UFUA-1	UFUA-TOC-S
" " -2	UFUA-IC-S
" " -3	UFUA-CE-S
NC-EWDP-19PB-DEEP-02-UFUA-1	UFUA-TOC-D
" " -2	UFUA-IC-D
" " -3	UFUA-CE-D

Three 4oz aliquots were removed from NC-EWDP 10P Zone 1 UFUA and named UFUA-TOC-P, UFUA-IC-P, UFUA-CE-P.

5-24-04 BAW

Chain of Custody for Divol Analyses of EWDP Groundwater Samples - Anion, Cation, + Misc Organic

Samples from EWDP groundwater sampling event of May 10-12, 2004 - 628/128-130

Aliquots removed (628-135 to 136) and poured into pp bottles (anions = 125mL, cations = 60mL) Aliquots taken for analyses by Divol and SES Lakefield, Legend on ref. page

Samples - Anion = 4 plus 1 blank and 2 QAs  
Cation = 7 plus 5-24-04  
6 plus 1 blank and 2 QAs

Misc organic Analyses (Organic Carbon, GC/MS, IC, EC, + LC/MS)

Samples were taken whole (no aliquots). Rebat <sup>2005</sup> 5-24-04 relabeled with legend on 628/144. In addition to the May 2004 samples, one old sample (NC-EWDP-10P Zone 1 UFUA) was split into 3 aliquots and sent for organic carbon, IC, and CE analyses.

24 MAY 2004 CONT BAUS

Shipper Name/Address		SAMPLE LIST/CHAIN OF CUSTODY					Requested Turnaround:	
Brad Werling CNWRA - DIV 20 BLD - 57		Southwest Research Institute Chemistry and Chemical Engineering Division 6220 Culebra Road San Antonio, Texas 78238-5166					<input type="checkbox"/> 2 Weeks <input type="checkbox"/> 3 Weeks <input checked="" type="checkbox"/> Other: <u>4 wk</u>	
Client		Client Purchase Order/Other ID			Site/Zone ID		SwRI Contact	
							Mike Dammann	
Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Analysis of design + minor elements ICP	REMARKS	
Cation 1A	5/20/04		W		1	X	Nuclear Safety related - use appropriate QA procedures	
Cation 2A						X		
Cation 3A						X		
Cation 4A						X		
Cation 5A						X		
Cation 6A						X	FOC - Brad Werling x6565 fax 5184	
Cation 7A						X		
Cation 8A						X		
Cation 9A						X		
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		Relinquished by (Print/Signature) Received by (Print/Signature)		Date	Time	SwRI Project#:
Temp: 22.0°C		Therm #: 027		Miriam Juckett / Miriam Juckett				20.06002.01.141
Comments: 628/134-136				Relinquished by (Print/Signature)		Date	Time	Received by SwRI Lab (Signature)
						5/20/04	1500	
						Date	Time	Samples Disposed:
								Date Time
								Samples Disposed by:

24 MAY 2004 CONT BAUS

Shipper Name/Address		SAMPLE LIST/CHAIN OF CUSTODY					Requested Turnaround:	
Brad Werling CNWRA - DIV 20 BLD - 57		Southwest Research Institute Chemistry and Chemical Engineering Division 6220 Culebra Road San Antonio, Texas 78238-5166					<input type="checkbox"/> 2 Weeks <input type="checkbox"/> 3 Weeks <input checked="" type="checkbox"/> Other: <u>4 wks</u>	
Client		Client Purchase Order/Other ID			Site/Zone ID		SwRI Contact	
							Mike Dammann	
Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Analysis of design + minor elements ICP	REMARKS	
Anion 1A	5/20/04		W		1	X	Nuclear Safety Related - use appropriate QA procedures	
Anion 2A						X		
Anion 3A						X		
Anion 4A						X		
Anion 5A						X		
Anion 6A						X		
Anion 7A						X	FOC: Brad Werling phone 6565 Fax 5184	
Anion 8A						X		
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		Relinquished by (Print/Signature) Received by (Print/Signature)		Date	Time	SwRI Project#:
Temp: 22.0°C		Therm #: 027		X Miriam Juckett / Miriam Juckett		5/20/04		20.06002.01.141
Comments: 628/134-136				Relinquished by (Print/Signature)		Date	Time	Received by SwRI Lab (Signature)
						5/20/04	1500	
						Date	Time	Samples Disposed:
								Date Time
								Samples Disposed by:

24 MAY 2004 CONT BRW

Shipper Name/Address		SAMPLE LIST/CHAIN OF CUSTODY										Requested Turnaround:		
Miriam Juckett Div 20 - CNWRA Building 57		Southwest Research Institute Chemistry and Chemical Engineering Division 6220 Culebra Road San Antonio, Texas 78238-5166										<input type="checkbox"/> 2 Weeks <input type="checkbox"/> 3 Weeks <input checked="" type="checkbox"/> Other: <u>4 wks</u>		
Client		Client Purchase Order/Other ID					Site/Zone ID					SwRI Contact Herb Schattenberg		
Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Dissolved + Total Organic Carbon	Ion Chromatography	Capillary Electrophoresis	Analyses Requested				REMARKS Preservation a = HCl to pH <2 b = HNO <sub>3</sub> to pH <2 c = H <sub>2</sub> SO <sub>4</sub> to pH <2 d = NaOH to pH >12 e = Cool (4°C±2°C) f = Other (specify)	
UFUA-TOC-P	5/21/04		W		1	X								Nuclear Safety related - use appropriate QA procedures  ROC - Miriam Juckett x3266 Fax x5184
UFUA-IC-P	5/21/04		↓		1		X							
UFUA-CE-P	5/21/04		↓		1			X						
<b>Matrix Types:</b> 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 Temp: 3.0°C		<b>Sample Types:</b> D - Duplicate ER - Equipment Rinsate ES - Environmental Sample FB - Field Blank FD - Field Duplicate MS - Matrix Spike MSD - Matrix Spike Dup TB - Trip Blank Therm #: 027		Relinquished by (Print/Signature) Miriam Juckett / Miriam Juckett		Date	Time	SwRI Project#: 20.06002.01.141						
Comments: Return samples to Brad Werling				Received by (Print/Signature)		Date	Time	Received by SwRI Lab (Signature)						
				Relinquished by (Print/Signature)		Date	Time	Date: 5/21/04 Time: 1345		Samples Disposed:				
				Received by (Print/Signature)		Date	Time	Date: / / Time:		Samples Disposed by:				
				Relinquished by (Print/Signature)		Date	Time	Date: / / Time:		Samples Disposed by:				

24 MAY 2004 CONT BRW

Shipper Name/Address		SAMPLE LIST/CHAIN OF CUSTODY										Requested Turnaround:				
Brad werling CNWRA - DIV 20 BLDG - 57		Southwest Research Institute Chemistry and Chemical Engineering Division 6220 Culebra Road San Antonio, Texas 78238-5166										<input type="checkbox"/> 2 Weeks <input type="checkbox"/> 3 Weeks <input checked="" type="checkbox"/> Other: <u>4 wks</u>				
Client		Client Purchase Order/Other ID					Site/Zone ID					SwRI Contact Herb Schattenberg				
Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Total + Dissolved Organic Carbon	GC/MS Specific for EDTA	Ion Chromatography	Capillary Electrophoresis	LC/MS	Analyses Requested				REMARKS Preservation a = HCl to pH <2 b = HNO <sub>3</sub> to pH <2 c = H <sub>2</sub> SO <sub>4</sub> to pH <2 d = NaOH to pH >12 e = Cool (4°C±2°C) f = Other (specify)	
UFUA-TOC-S	5/11/04		W		1	X					All analyses per email agreement					Nuclear Safety related - use appropriate QA procedures  POC - Brad Werling x6560 Fax x5184
UFUA-TOC-D	5/10/04				1	X										
UFUA-IC-S	5/11/04				1			X								
UFUA-IC-D	5/10/04				1			X								
UFUA-CE-S	5/11/04				1				X							
UFUA-CE-D	5/10/04				1				X							
UFUA-GCMS-S	5/11/04				2	X										
UFUA-GCMS-D	5/10/04				2	X										
UFUA-LCMS-S	5/11/04				2					X						
UFUA-LCMS-D	5/10/04				2					X						
<b>Matrix Types:</b> 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 Temp: 22.0°C		<b>Sample Types:</b> D - Duplicate ER - Equipment Rinsate ES - Environmental Sample FB - Field Blank FD - Field Duplicate MS - Matrix Spike MSD - Matrix Spike Dup TB - Trip Blank Therm #: 027		Relinquished by (Print/Signature) Miriam Juckett / Miriam Juckett		Date	Time	SwRI Project#: 20.06002.01.141								
Comments: 628/134-136				Received by (Print/Signature)		Date	Time	Received by SwRI Lab (Signature)								
				Relinquished by (Print/Signature)		Date	Time	Date: 5/20/04 Time: 1500		Samples Disposed:						
				Received by (Print/Signature)		Date	Time	Date: / / Time:		Samples Disposed by:						

25 MAY 04

BAW

Results of Inorganic Carbon Analysis of EWDP groundwater samples - May 2004 event

Samples analyzed on 18 May 04 <sup>628</sup> 623/131+132  
2 samples and 2 calibration checks, <sup>8W</sup> 5-25-04

Included in the data set here is the raw data file (PRN file 05181205), Area counts are in column 30. Not all of the cal pts were used. I selected or limited the cal pts used to those close to the sample values. These cal pts also resulted in the best calculations for the calibration checks. The y-int value was high relative to the blank and other y-int from curves using other cal pts. I felt <sup>8W 5-25-04</sup> that the 5-25-04 BW this curve gave the best results for these particular samples. Per directions of the TOC manufacturer, the y-int is used for cal verification standard calculations and the blank is used for sample calculations.

8W

5-25-04

25 MAY 04

CONT

BAW

Inorganic Carbon analysis for EWDP Groundwater samples collected during May 10-11, 2004 event

PRN number 05181205 analyzed on May 18, 2004

1	2	3	1	Done	2	5/18/04	12:38	USER1	0 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	1	3	1	51804	0.5	0	0	5	0	0.5
v2.0	3	1	Done	2	5/18/04	12:42	USER1	0 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	2	3	2	3	51804	0.5	0	0	5	0	0.5
v2.0	3	1	Done	2	5/18/04	12:46	USER1	0 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	3	3	3	3	51804	0.5	0	0	5	0	0.5
v2.0	3	1	Done	0	5/18/04	12:50	USER1	1 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	1	4	4	4	51804	0.5	0	0	5	0	0.5
v2.0	3	1	Done	0	5/18/04	12:53	USER1	1 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	2	4	4	4	51804	0.5	0	0	5	0	0.5
v2.0	3	1	Done	0	5/18/04	12:56	USER1	1 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	3	4	4	4	51804	0.5	0	0	5	0	0.5
v2.0	3	1	Done	0	5/18/04	13:00	USER1	10 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	1	5	5	5	51804	0.5	0	0	5	0	0.5
v2.0	3	1	Done	0	5/18/04	13:04	USER1	10 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	2	5	5	5	51804	0.5	0	0	5	0	0.5
v2.0	3	1	Done	0	5/18/04	13:07	USER1	10 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	3	5	5	5	51804	0.5	0	0	5	0	0.5
v2.0	3	1	Done	0	5/18/04	13:12	USER1	10 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	1	6	6	6	51804	0.5	0	0	5	0	0.5
v2.0	3	1	Done	0	5/18/04	13:16	USER1	50 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	2	6	6	6	51804	0.5	0	0	5	0	0.5
v2.0	3	1	Done	0	5/18/04	13:20	USER1	50 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	3	6	6	6	51804	0.5	0	0	5	0	0.5
v2.0	3	1	Done	0	5/18/04	13:24	USER1	50 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	1	7	7	7	51804	0.5	0	0	5	0	0.5
v2.0	3	1	Done	0	5/18/04	13:28	USER1	100 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	2	7	7	7	51804	0.5	0	0	5	0	0.5
v2.0	3	1	Done	0	5/18/04	13:32	USER1	100 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	3	7	7	7	51804	0.5	0	0	5	0	0.5
v2.0	3	1	Done	0	5/18/04	13:37	USER1	100 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	1	8	8	8	51804	0.5	0	0	5	0	0.5
v2.0	3	1	Done	0	5/18/04	13:42	USER1	200 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	2	8	8	8	51804	0.5	0	0	5	0	0.5
v2.0	3	1	Done	0	5/18/04	13:46	USER1	200 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	3	8	8	8	51804	0.5	0	0	5	0	0.5
v2.0	10	1	Done	0	5/18/04	13:49	USER1	blank	Blank IC Ranges 3 4 & 5	IC 20ppm up	2	2	6	1	1001	1001	1001	51804	0	0	0	5	0	0.5
v2.0	10	1	Done	0	5/18/04	13:51	USER1	blank	Blank IC Ranges 3 4 & 5	IC 20ppm up	2	2	6	2	1001	1001	1001	51804	0	0	0	5	0	0.5
v2.0	10	1	Done	0	5/18/04	13:54	USER1	blank	Blank IC Ranges 3 4 & 5	IC 20ppm up	2	2	6	3	1001	1001	1001	51804	0	0	0	5	0	0.5
v2.0	10	1	Done	0	5/18/04	13:56	USER1	blank	Blank IC Ranges 3 4 & 5	IC 20ppm up	2	2	6	4	1001	1001	1001	51804	0	0	0	5	0	0.5
v2.0	10	1	Done	0	5/18/04	13:58	USER1	blank	Blank IC Ranges 3 4 & 5	IC 20ppm up	2	2	6	5	1001	1001	1001	51804	0	0	0	5	0	0.5
v2.0	10	1	Done	0	5/18/04	14:00	USER1	blank	Blank IC Ranges 3 4 & 5	IC 20ppm up	2	2	6	6	1001	1001	1001	51804	0	0	0	5	0	0.5
v2.0	0	1	Done	0	5/18/04	14:04	USER1	SHAL-IC-1	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	1	9	9	9	51804	0.5	0	0	5	0	0.5
v2.0	0	1	Done	0	5/18/04	14:08	USER1	SHAL-IC-1	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	2	9	9	9	51804	0.5	0	0	5	0	0.5
v2.0	0	1	Done	0	5/18/04	14:12	USER1	SHAL-IC-1	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	3	9	9	9	51804	0.5	0	0	5	0	0.5
v2.0	0	1	Done	0	5/18/04	14:16	USER1	DEEP-IC-1	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	1	10	10	10	51804	0.5	0	0	5	0	0.5
v2.0	0	1	Done	0	5/18/04	14:20	USER1	DEEP-IC-1	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	2	10	10	10	51804	0.5	0	0	5	0	0.5
v2.0	0	1	Done	0	5/18/04	14:24	USER1	DEEP-IC-1	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	3	10	10	10	51804	0.5	0	0	5	0	0.5
v2.0	0	1	Done	0	5/18/04	14:27	USER1	0 ppm	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	1	11	11	11	51804	0.5	0	0	5	0	0.5
v2.0	0	1	Done	0	5/18/04	14:30	USER1	0 ppm	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	2	11	11	11	51804	0.5	0	0	5	0	0.5
v2.0	0	1	Done	0	5/18/04	14:33	USER1	0 ppm	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	3	11	11	11	51804	0.5	0	0	5	0	0.5
v2.0	0	1	Done	0	5/18/04	14:37	USER1	10 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	1	12	12	12	51804	0.5	0	0	5	0	0.5
v2.0	0	1	Done	0	5/18/04	14:41	USER1	10 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	2	12	12	12	51804	0.5	0	0	5	0	0.5
v2.0	0	1	Done	0	5/18/04	14:44	USER1	10 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	3	12	12	12	51804	0.5	0	0	5	0	0.5
v2.0	0	1	Done	0	5/18/04	14:49	USER1	50 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	1	13	13	13	51804	0.5	0	0	5	0	0.5
v2.0	0	1	Done	0	5/18/04	14:52	USER1	50 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	2	13	13	13	51804	0.5	0	0	5	0	0.5
v2.0	0	1	Done	0	5/18/04	14:56	USER1	50 ppm IC	IC Range 20 - 200 ppm C	IC 20ppm up	2	2	3	3	13	13	13	51804	0.5	0	0	5	0	0.5

25 MAY 04

CONT

BAW

23	0	10	0	1	5.402	48332	0	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5181205	5181236
24	0	10	0	1	5.368	54470	0	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5181205	5181239
25	0	10	0	1	5.391	57114	0	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5181205	5181243
26	0	10	0	1	5.376	295052	0	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5181205	5181248
27	5.407	5.368	5.391	5.376	5.385	291467	0	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5181205	5181251
28	5.402	5.366	5.405	6.375	6.381	291651	0	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5181205	5181254
29	5.402	5.366	5.405	6.375	6.381	291651	0	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5181205	5181258
30	5.407	5.368	5.391	5.376	5.385	291467	0	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5181205	5181301
31	5.407	5.368	5.391	5.376	5.385	291467	0	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5181205	5181305
32	5.407	5.368	5.391	5.376	5.385	291467	0	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5181205	5181309
33	5.407	5.368	5.391	5.376	5.385	291467	0	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5181205	5181313
34	5.407	5.368	5.391	5.376	5.385	291467	0	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5181205	5181317
35	5.407	5.368	5.391	5.376	5.385	291467	0	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5181205	5181321
36	5.407	5.368	5.391	5.376	5.385	291467	0	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5181205	5181325
37	5.407	5.368	5.391	5.376	5.385	291467	0	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5181205	5181329
38	5.407	5.368	5.391	5.376	5.385	291467	0	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5181205	5181334
39	5.407	5.368	5.391	5.376	5.385	291467	0	0	0	0	0.00E+00	1/1/70 0:00	0.99993	129934	5181205	5181338

25 MAY 04

CONT

BAW

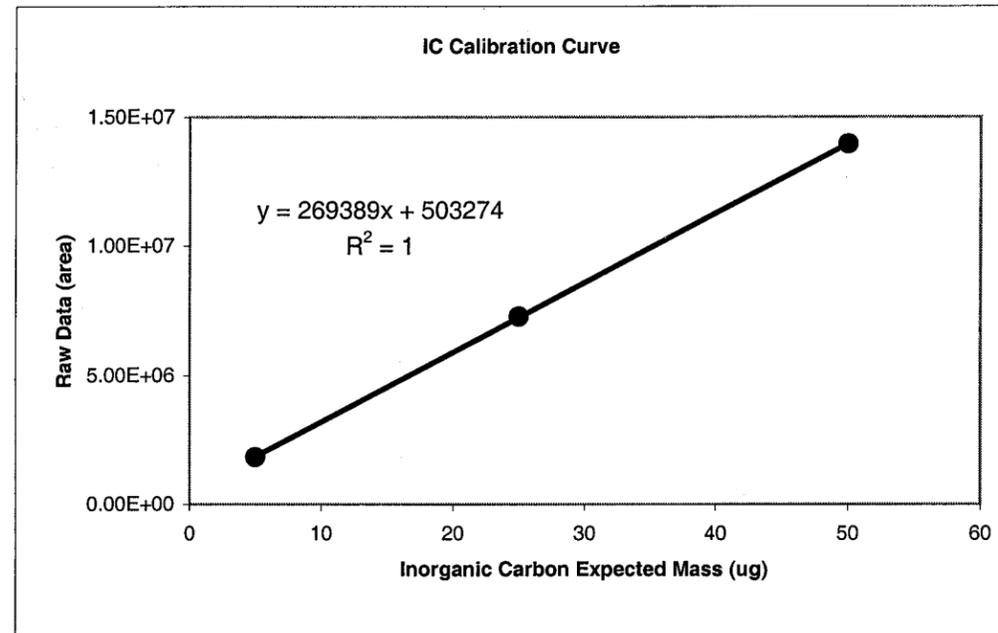
**Inorganic Carbon (IC) Analysis**  
**Method IC 20-200 ppm (standard method)**  
**Range 1.0 ppm to 200 ppm IC**

**Inorganic Carbon Standard Data**

IC Std (ppm)	IC expected mass (ug)	Raw Data			Raw Data Ave
		rep 1	rep 2	rep 3	
0*	0	48332	54470	57114	53305
1*	0.5	295052	291467	291651	292723
10	5	1834759	1824901	1821243	1826968
50	25	7295320	7229811	7314420	7279850
100*	50	13885376	13957924	14019061	13954120
200*	100	29689788	29461440	29214855	29455361
Blank (last 3)	0	59224	60828	58150	59401

\* Not used for calibration curve.

Selected cal points that most closely encompassed sample values



**Inorganic Carbon Sample Data**

Sample ID	Raw Data	Raw Data	Raw Data	Raw Data	Mass (ug)	Conc (ppm)
	rep 1	rep 2	rep 3	Ave		
19PB Shallow	3887908	3873222	3892334	3884488	14.2	28.4
19PB Deep	5496919	5494810	5532394	5508041	20.2	40.5
10 ppm IC	1872709	1880798	1880823	1878110	5.10	10.2
50 ppm IC	6808392	6866164	6858489	6844348	23.5	47.1

Sample Mass calculated using blank value in equation

Calibration Verification Mass calculated using y-intercept in equation

Concentration calculated by dividing the mass by the sample injection volume (0.5mL)

Full sample names were NC-EWDP-19PB-SHAL-0504-IC-FUA-1 and NC-EWDP-19PB-DEEP-0504-IC-FUA-1

25 May 04 *JB*

Organic Carbon Analysis of EWDP groundwater samples from May 2004 and Sept + Oct 2003 sampling events

Samples from May 2004 event (628/128-130) were analyzed directly from 40ml vials used for sample collection.

Aliquots were taken from samples collected during the Sept + Oct 2003 event (610/36-41). 40ml was removed from NC-EWDP-28P and 29P-S-FUA and about 30ml aliquot was removed from NC-EWDP-27P-0903-S-FUA because that is all the sample available.

Samples analyzed on Phoenix 8000 TOC analyzer (SN 00343010)

Method ID is TOC Range 0.1-20 ppm which is a standard method.

Standards used (653/10-12) were 0, 0.04, 0.1, 0.5, 1, 10, 25 ppm TOC in 40ml amber VOA bottles. All standards and samples run in triplicate besides for sample NC-EWDP-27P-0903-S-FUA, which is only run for 1 sep because the sample vol is too low.

The samples run from May 2004 event are

25 May 04 cont. *JB*

NC-EWDP-19PIS-SHAL-0504-IL-FUA-2 and NC-EWDP-19PIS-DEEP-0504-IL-FUA-2.

The three samples run from the Sept and Oct sampling event are NC-EWDP-27P-0903-S-FUA, NC-EWDP-28P-0903-S-FUA and NC-EWDP-29P-1003-S-FUA.

26 May 04 *JB*

Receipt of NC-EWDP-19PIS well core samples

<sup>5-26-04</sup> *JB* Two shipments of samples were sent from John Stamatatos to Paul Bertetti. The first set of samples were sent on 5/6/04 and arrived at 5/10/04 (92 samples). The second set of samples was sent on 5/17/04 and arrived on 5/21/04 (2 samples).

The samples are Graco Samples from NC-EWDP-19PIS well core. <sup>5/26/04</sup> *JB* Both sets of samples are double bagged with labeling on both bags. Samples are labeled SMF Borehole Specimen, with an ID # and the depth from which the sample was taken. The two samples sent on

The document from John Stamatatos states that the <sup>5-26-04</sup> *JB*

5-26-04

26 May 04 cont.  $\beta$ 

5/17/04 were bubble wrapped individually.

The document sent from John Stamatatos states that all the samples are ~100g. In order to get more accurate readings the samples were weighed on the Mettler Toledo PR5002 (SN 1122142730). In order to compensate for the weight of the plastic bags, one sample was completely removed from its bag. The two bags were placed on the scale and tared. The rest of the samples were weighed in their bags, but compensated for by the taring of the scale initially. Sample measurements were recorded to the nearest gram (g).

Initial scale challenge (target 400.00g)

(reading 400.00g)

Final scale challenge (target 400.00g)

(reading 400.00g)

Samples are labeled to ensure unique ID's by taping a printoff of sample label. The new label is

$\uparrow$  (age locs)       $\uparrow$  (well)       $\uparrow$  (MNY)       $\uparrow$  (depth range)  
 NC-EWDP-19PB-0504-400.5-400.6

Samples are added to the RT-database and stored in lab 102, Bldg 57. A table of the weights of each sample is located after this entry along with the receipts/documents received from John Stamatatos. See (628/163-167) for receipts. 5-27-04  $\beta$

26 May 04 cont.  $\beta$ 

Core Sample	Weight rounded to nearest gram (g)
NC-EWDP-19PB-0504-0404	
Depth range (ft)	
400.5-400.6	117
408.5-408.6	120
411.0-411.1	139
415.0-415.1	105
416.8-416.9	115
418.0-418.1	94
418.9-419.0	97
419.2-419.3	122
421.4-421.5	83
424.0-424.1	81
425.5-425.6	72
429.0-429.1	64
430.0-430.1	114
433.0-433.1	70
436.0-436.1	117
442.0-442.1	130
445.0-445.1	96
446.0-446.1	64
456.0-456.1	75
461.0-461.1	64
464.0-464.1	90
465.0-465.1	65

Core Sample	Weight rounded to nearest gram (g)
NC-EWDP-19PB-0504-0404	
Depth range (ft)	
400.5-400.6	117
408.5-408.6	120
411.0-411.1	139
415.0-415.1	105
416.8-416.9	115
418.0-418.1	94
418.9-419.0	97
419.2-419.3	122
421.4-421.5	83
424.0-424.1	81
425.5-425.6	72
429.0-429.1	64
430.0-430.1	114
433.0-433.1	70
436.0-436.1	117
442.0-442.1	130
445.0-445.1	96
446.0-446.1	64
456.0-456.1	75
461.0-461.1	64
464.0-464.1	90
465.0-465.1	65

26 May 04 cont.  $\beta$ 

Core Sample

NC-FLDP-19PIS- <sup>5/26/04</sup> <del>0504</del> 0404	Height rounded to nearest (g)
467.0-467.1	73
469.0-469.1	111
471.0-471.1	102
472.5-472.6	84
474.8-474.9	106
477.5-477.6	103
485.0-485.1	123
487.2-487.3	113
488.5-488.6	123
490.0-490.1	100
491.5-491.6	102
494.0-494.1	93
495.5-495.6	67
496.5-496.6	116
498.0-498.1	83
500.1-500.2	66
501.5-501.6	136
504.0-504.1	87
506.0-506.1	77
507.0-507.1	68
509.1-509.2	101
510.5-510.6	107
514.0-514.1	111
515.3-515.4	95

26 May 04 cont.  $\beta$ 

Core Sample

NC-FLDP-19PIS- <sup>5/26/04</sup> <del>0504</del> 0404	Height rounded to nearest (g)
516.5-516.6	76
524.4-524.5	89
526.0-526.1	87
528.8-528.9	87
530.5-530.6	114
533.0-533.1	79
535.0-535.1	101
536.5-536.6	93
538.5-538.6	113
539.5-539.6	98
541.0-541.1	107
542.0-542.1	63
544.0-544.1	86
545.0-545.1	107
546.0-546.1	63
560.0-560.1	82
565.0-565.1	119
567.0-567.1	94
570.0-570.1	95
572.0-572.1	77
574.0-574.1	112
576.8-576.9	95
578.5-578.6	110
580.0-580.1	104

26 May 04 cont. JB

Core Sample

NC-EWDP-19PB-0504  
5/26/04Height rounded to  
nearest (ft)

Depth range (ft) 584.0-584.1 92

586.0-586.1 84

587.3-587.4 138

590.0-590.1 138

592.0-592.1 81

594.0-594.1 76

595.5-595.6 73

597.0-597.1 100

598.5-598.6 90

602.5-602.6 101

604.0-604.1 74

606.5-606.6 64

608.0-608.1 103

610.0-610.1 68

612.0-612.1 64

614.0-614.1 39

616.0-616.1 33

618.5-618.6 27

626.0-626.1 19

626.0-627.1 41

630.0-630.1 21

633.0-633.1 32

~~5/26/04 JB~~

26 May 04 cont. JB

Height of NC-EWDP-19PB well core grab samples  
Second shipment received on 5/21/04

Core Sample

NC-EWDP-KPB-0504

Height rounded to

Depth range (ft) nearest (ft)

411.8-411.9 80

427.0-427.1 82

27 MAY 04 BAW

Results for Organic Carbon Analyses of  
EWDP ground water samples - May 2004 event  
and selected Sep/Oct 2003 event

Analyses from 628/154-155

Initial analyses for May 2004 samples  
Repeat analyses for Sep/Oct 2003 samples  
see 628/106+111

The area counts for the 0.04 and 0.1 ppm  
calibration standards were not good. The <sup>BAW</sup> 5-27-04  
Some samples were similar in area count, so the  
analyses will be redone. All of the sample from  
278 was consumed previous, so it will not be  
reanalyzed.

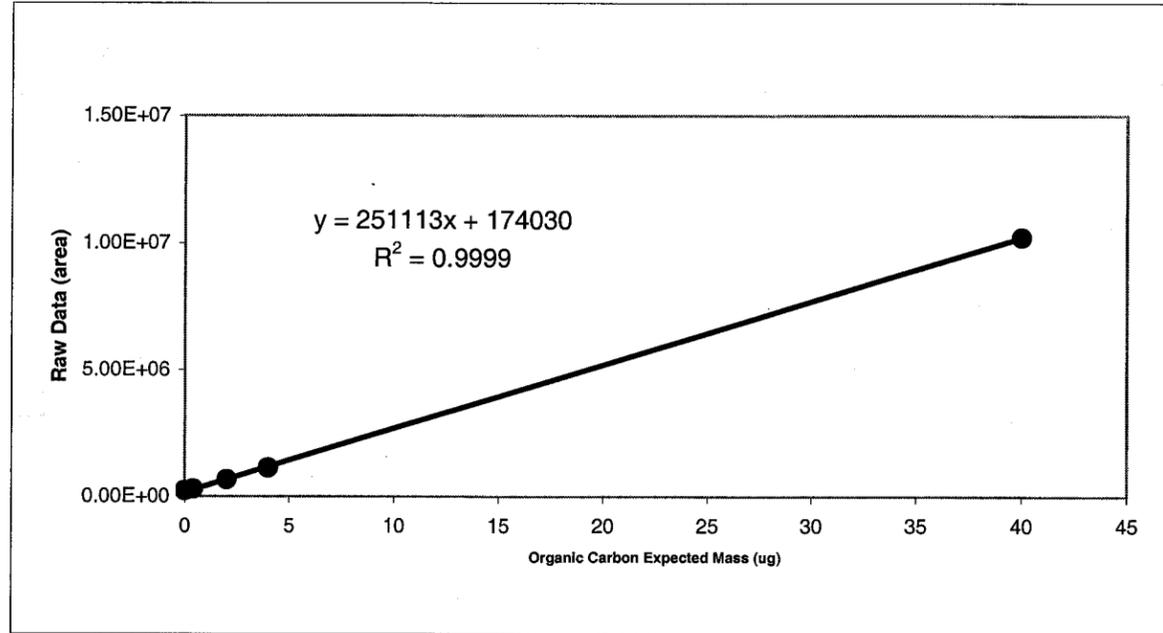
27 May 04 CONT BAW

**Organic Carbon Analysis**  
 Range 0.04 ppm to 25 ppm TOC  
 Method TOC 0.1 to 20 ppm

Organic Carbon Standard Data

Organic Carbon Std (ppm)	Expected mass (ug)	Raw Data			Raw Data Ave
		rep 1	rep 2	rep 3	
0	0	243633	219183	219898	227571
0.04*	0.16	338700	308864	295896	314487
0.1	0.4	301122	288991	284544	291552
0.5	2	662932	654532	658083	658516
1	4	1117089	1119647	1120068	1118935
10	40	10211294	10260653	10203764	10225237
25*	100	26788095	26784921	26878624	26817213
Blank (last 3)	0	62192	63867	64289	63449

\*not used in calibration curve



Organic Carbon Sample Data

Sample ID	Raw Data				Mass (ug)	Conc# (ppm)
	rep 1	rep 2	rep 3	Ave		
EWDP-19PB-SHAL-IC-2	443728	441578	443619	442975	1.511	0.38
EWDP-19PB-DEEP-IC-2	327027	334688	341159	334291.3	1.079	0.27
EWDP-27P-0903-S	607833	N/A	N/A	607833	2.168	0.54
EWDP-28P-0903-S	4428618	4559276	4628826	4538907	17.822	4.46
EWDP-29P-1003-S	415698	370836	380799	389111	1.297	0.32
TOC 0.1 ppm	267982	267425	272265	269224	0.38	0.09
TOC 10 ppm	10119308	10184756	10106271	10136778	39.67	9.92

# Calculated by dividing the mass by the volume of sample (4mL)

Samples used blank and calibration challenges used y-intercept for calculation

27 May 04 CONT BAW

See 628/156

**SMF Specimen Custody Receipt**

QA:QA  
CSITS v.1

**Requestor:** John Stamatakos (ID#490)  
 Southwest Research Institute  
 6220 Culebra Rd  
 San Antonio, TX 78238-0000

**Ship To:** Paul Bertetti (ID#546)  
 CNWRASWRI  
 6220 Culebra Road  
 Building 57  
 San Antonio, TX 78238-5166

Date Received: 10 May 2004  
 Shipment ID: 01000682  
 Shipping Date: 06-may-2004  
 SMF Geotechnician: *[Signature]* Date: 5-6-04

Container ID: 01006240

Specimen ID	Type	Condition		Parent Borehole:
		Top	Bottom	
01025851	Frag	400.5	400.6	NC-EWDP-19PB
01025850	Frag	408.5	408.6	NC-EWDP-19PB
01025849	Frag	411.0	411.1	NC-EWDP-19PB
01025847	Frag	415.0	415.1	NC-EWDP-19PB
01025846	Frag	416.8	416.9	NC-EWDP-19PB
01025845	Frag	418.0	418.1	NC-EWDP-19PB
01025848	Frag	418.9	419.0	NC-EWDP-19PB
01025844	Frag	419.2	419.3	NC-EWDP-19PB
01025843	Frag	421.4	421.5	NC-EWDP-19PB
01025842	Frag	424.0	424.1	NC-EWDP-19PB
01025841	Frag	425.5	425.6	NC-EWDP-19PB
01025840	Frag	429.0	429.1	NC-EWDP-19PB
01025839	Frag	430.0	430.1	NC-EWDP-19PB
01025838	Frag	433.0	433.1	NC-EWDP-19PB
01025837	Frag	436.0	436.1	NC-EWDP-19PB
01025836	Frag	442.0	442.1	NC-EWDP-19PB
01025835	Frag	445.0	445.1	NC-EWDP-19PB
01025834	Frag	446.0	446.1	NC-EWDP-19PB
01025833	Frag	456.0	456.1	NC-EWDP-19PB
01025832	Frag	461.0	461.1	NC-EWDP-19PB
01025831	Frag	464.0	464.1	NC-EWDP-19PB
01025830	Frag	465.0	465.1	NC-EWDP-19PB
01025829	Frag	467.0	467.1	NC-EWDP-19PB
01025828	Frag	469.0	469.1	NC-EWDP-19PB
01025827	Frag	471.0	471.1	NC-EWDP-19PB

Specimens in this container: 92

Recipient: *[Signature]* Date: 25 May 2004

I hereby acknowledge the receipt of the Specimens listed above.  
 I will return this form to the SMF within 10 business days of receipt.

Please Sign this form and return to:  
 Sample Management Facility  
 Yucca Mountain Site Characterization Project  
 P.O. Box 617  
 Mercury, NV 89023-0617

### SMF Specimen Custody Receipt

<b>Requestor:</b> John Stamatakos (ID#490) Southwest Research Institute 6220 Culebra Rd San Antonio, TX 78238-0000		<b>Ship To:</b> Paul Bertetti (ID#546) CNWRA/SWRI 6220 Culebra Road Building 57 San Antonio, TX 78238-5166		Date Received: <u>10 May 2004</u>	
				Shipment ID: 01000682 Shipping Date: 06-may-2004	
				SMF Geotechnician <u>[Signature]</u> Date <u>5-6-04</u>	

Container ID: 01006240

Specimens in this container: 92

Condition	Specimen ID	Type	Top	Bottom	Parent Borehole:
	01025826	Frag	472.5	472.6	NC-EWDP-19PB
	01025825	Frag	474.8	474.9	NC-EWDP-19PB
	01025824	Frag	477.5	477.6	NC-EWDP-19PB
	01025823	Frag	485.0	485.1	NC-EWDP-19PB
	01025822	Frag	487.2	487.3	NC-EWDP-19PB
	01025821	Frag	488.5	488.6	NC-EWDP-19PB
	01025820	Frag	490.0	490.1	NC-EWDP-19PB
	01025819	Frag	491.5	491.6	NC-EWDP-19PB
	01025818	Frag	494.0	494.1	NC-EWDP-19PB
	01025817	Frag	495.5	495.6	NC-EWDP-19PB
	01025816	Frag	496.5	496.6	NC-EWDP-19PB
	01025815	Frag	498.0	498.1	NC-EWDP-19PB
	01025814	Frag	500.1	500.2	NC-EWDP-19PB
	01025813	Frag	501.5	501.6	NC-EWDP-19PB
	01025812	Frag	504.0	504.1	NC-EWDP-19PB
	01025811	Frag	506.0	506.1	NC-EWDP-19PB
	01025810	Frag	507.0	507.1	NC-EWDP-19PB
	01025809	Frag	509.1	509.2	NC-EWDP-19PB
	01025808	Frag	510.5	510.6	NC-EWDP-19PB
	01025807	Frag	514.0	514.1	NC-EWDP-19PB
	01025806	Frag	515.3	515.4	NC-EWDP-19PB
	01025805	Frag	516.5	516.6	NC-EWDP-19PB
	01025804	Frag	524.4	524.5	NC-EWDP-19PB
	01025803	Frag	526.0	526.1	NC-EWDP-19PB
	01025802	Frag	528.8	528.9	NC-EWDP-19PB

Please Sign this form and return to:  
**Sample Management Facility**  
**Yucca Mountain Site Characterization Project**  
**P.O. Box 617**  
**Mercury, NV 89023-0617**

I hereby acknowledge the receipt of the Specimens listed above.  
 I will return this form to the SMF within 10 business days of receipt.  
 Recipient Paul Bertetti Date 25 May 2004

27 MAY 04 CONT BAW

### SMF Specimen Custody Receipt

<b>Requestor:</b> John Stamatakos (ID#490) Southwest Research Institute 6220 Culebra Rd San Antonio, TX 78238-0000		<b>Ship To:</b> Paul Bertetti (ID#546) CNWRA/SWRI 6220 Culebra Road Building 57 San Antonio, TX 78238-5166		Date Received: <u>10 May 2004</u>	
				Shipment ID: 01000682 Shipping Date: 06-may-2004	
				SMF Geotechnician <u>[Signature]</u> Date <u>5-6-04</u>	

Container ID: 01006240

Specimens in this container: 92

Condition	Specimen ID	Type	Top	Bottom	Parent Borehole:
	01025801	Frag	530.5	530.6	NC-EWDP-19PB
	01025800	Frag	533.0	533.1	NC-EWDP-19PB
	01025799	Frag	535.0	535.1	NC-EWDP-19PB
	01025798	Frag	536.5	536.6	NC-EWDP-19PB
	01025797	Frag	538.5	538.6	NC-EWDP-19PB
	01025796	Frag	539.5	539.6	NC-EWDP-19PB
	01025795	Frag	541.0	541.1	NC-EWDP-19PB
	01025794	Frag	542.0	542.1	NC-EWDP-19PB
	01025793	Frag	544.0	544.1	NC-EWDP-19PB
	01025792	Frag	545.0	545.1	NC-EWDP-19PB
	01025791	Frag	546.0	546.1	NC-EWDP-19PB
	01025790	Frag	560.0	560.1	NC-EWDP-19PB
	01025789	Frag	565.0	565.1	NC-EWDP-19PB
	01025788	Frag	567.0	567.1	NC-EWDP-19PB
	01025787	Frag	570.0	570.1	NC-EWDP-19PB
	01025786	Frag	572.0	572.1	NC-EWDP-19PB
	01025785	Frag	574.0	574.1	NC-EWDP-19PB
	01025784	Frag	576.8	576.9	NC-EWDP-19PB
	01025783	Frag	578.5	578.6	NC-EWDP-19PB
	01025782	Frag	580.0	580.1	NC-EWDP-19PB
	01025781	Frag	584.0	584.1	NC-EWDP-19PB
	01025780	Frag	586.0	586.1	NC-EWDP-19PB
	01025779	Frag	587.3	587.4	NC-EWDP-19PB
	01025778	Frag	590.0	590.1	NC-EWDP-19PB
	01025777	Frag	592.0	592.1	NC-EWDP-19PB

Please Sign this form and return to:  
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**Yucca Mountain Site Characterization Project**  
**P.O. Box 617**  
**Mercury, NV 89023-0617**

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 I will return this form to the SMF within 10 business days of receipt.  
 Recipient Paul Bertetti Date 25 May 2004

27 MAY 04 CONT BAW

### SMF Specimen Custody Receipt

<b>Requestor:</b> John Stamatakos (ID#490) Southwest Research Institute 6220 Culebra Rd San Antonio, TX 78238-0000		<b>Ship To:</b> Paul Bertetti (ID#546) CNWRA/SWRI 6220 Culebra Road Building 57 San Antonio, TX 78238-5166		Date Received: <u>10 May 2004</u>
				Shipment ID: 01000682 Shipping Date: 06-may-2004
				SMF Geotechnician <u>[Signature]</u> Date <u>5-6-04</u>

Container ID: 01006240

Specimens in this container: 92

Condition	Specimen ID	Type	Top	Bottom	Parent Borehole:
	01025776	Frag	594.0	594.1	NC-EWDP-19PB
	01025775	Frag	595.5	595.6	NC-EWDP-19PB
	01025774	Frag	597.0	597.1	NC-EWDP-19PB
	01025773	Frag	598.5	598.6	NC-EWDP-19PB
	01025772	Frag	602.5	602.6	NC-EWDP-19PB
	01025771	Frag	604.0	604.1	NC-EWDP-19PB
	01025770	Frag	606.5	606.6	NC-EWDP-19PB
	01025769	Frag	608.0	608.1	NC-EWDP-19PB
	01025768	Frag	610.0	610.1	NC-EWDP-19PB
	01025767	Frag	612.0	612.1	NC-EWDP-19PB
	01025766	Frag	614.0	614.1	NC-EWDP-19PB
	01025765	Frag	616.0	616.1	NC-EWDP-19PB
	01025764	Frag	618.5	618.6	NC-EWDP-19PB
	01025763	Frag	626.0	626.1	NC-EWDP-19PB
	01025762	Frag	627.0	627.1	NC-EWDP-19PB
	01025761	Frag	630.0	630.1	NC-EWDP-19PB
	01025760	Frag	633.0	633.1	NC-EWDP-19PB

27 MAY 04

cont

Paul

Please Sign this form and return to:  
**Sample Management Facility**  
**Yucca Mountain Site Characterization Project**  
**P.O. Box 617**  
**Mercury, NV 89023-0617**

I hereby acknowledge the receipt of the Specimens listed above.  
 I will return this form to the SMF within 10 business days of receipt.

Recipient Paul Bertetti Date 24 25 May 2004

### SMF Specimen Custody Receipt

<b>Requestor:</b> John Stamatakos (ID#490) Southwest Research Institute 6220 Culebra Rd San Antonio, TX 78238-0000		<b>Ship To:</b> Paul Bertetti (ID#546) CNWRA/SWRI 6220 Culebra Road Building 57 San Antonio, TX 78238-5166		Date Received: <u>21 May 2004</u>
				Shipment ID: 01000684 Shipping Date: 17-may-2004
				SMF Geotechnician <u>[Signature]</u> Date <u>5-18-04</u>

Container ID: 01006312

Specimens in this container: 2

Condition	Specimen ID	Type	Top	Bottom	Parent Borehole:
	01025860	Frag	411.8	411.9	NC-EWDP-19PB
	01025861	Frag	427.0	427.1	NC-EWDP-19PB

27 MAY 04

cont

Paul

Please Sign this form and return to:  
**Sample Management Facility**  
**Yucca Mountain Site Characterization Project**  
**P.O. Box 617**  
**Mercury, NV 89023-0617**

I hereby acknowledge the receipt of the Specimens listed above.  
 I will return this form to the SMF within 10 business days of receipt.

Recipient Paul Bertetti Date 25 May 2004

27 MAY 04 CONT BAW

Anion Results for Reanalyses of EWDP groundwater samples

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

Description w/ legend and chain of custody at 628/91-95.

A sample (CNWRA K) target of 2 ppm nitrate. Divol results in Nitrate-N, conversion: N=14.0067

$\text{NO}_3 = 62.0049$

$$0.380N \left( \frac{62.0049 \text{ NO}_3}{14.0067 N} \right) = 1.68 \text{ ppm NO}_3$$

For an 84% recovery (16% difference)

5-27-04 BAW

27 MAY 04 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
SAMPLE ANALYSIS DATA SHEET

Sample ID  
CNWRA F

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 04/14/04

Matrix: Water

Project No.: 06002.01.141

Task Order: 040415-2

SRR: 25770

Lab System ID: 243238

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	6.84	0.1
Fluoride	1.06	0.1
Nitrate-N	1.55	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.1	0.1
Sulfate	25.1	2

**SOUTHWEST RESEARCH INSTITUTE**  
SAMPLE ANALYSIS DATA SHEET

Sample ID  
CNWRA G

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 04/14/04

Matrix: Water

Project No.: 06002.01.141

Task Order: 040415-2

SRR: 25770

Lab System ID: 243239

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	7.96	0.1
Fluoride	3.99	0.1
Nitrate-N	<0.1	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.1	0.1
Sulfate	26.5	2

27 MAY 04 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
SAMPLE ANALYSIS DATA SHEET

Sample ID  
CNWRA H

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 04/14/04

Matrix: Water

Project No.: 06002.01.141

Task Order: 040415-2

SRR: 25770

Lab System ID: 243240

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	6.74	0.1
Fluoride	2.11	0.1
Nitrate-N	1.57	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.1	0.1
Sulfate	21.0	2

**SOUTHWEST RESEARCH INSTITUTE**  
SAMPLE ANALYSIS DATA SHEET

Sample ID  
CNWRA I

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 04/14/04

Matrix: Water

Project No.: 06002.01.141

Task Order: 040415-2

SRR: 25770

Lab System ID: 243241

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	6.50	0.1
Fluoride	1.85	0.1
Nitrate-N	1.10	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.1	0.1
Sulfate	23.6	2

27 MAY 04 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
SAMPLE ANALYSIS DATA SHEET

Sample ID  
CNWRA J

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 04/14/04

Matrix: Water

Project No.: 06002.01.141

Task Order: 040415-2

SRR: 25770

Lab System ID: 243242

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	6.85	0.1
Fluoride	1.26	0.1
Nitrate-N	0.161	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.1	0.1
Sulfate	20.7	2

**SOUTHWEST RESEARCH INSTITUTE**  
SAMPLE ANALYSIS DATA SHEET

Sample ID  
CNWRA K

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 04/14/04

Matrix: Water

Project No.: 06002.01.141

Task Order: 040415-2

SRR: 25770

Lab System ID: 243243

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	0.380	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.1	0.1
Sulfate	<0.1	0.1

27 MAY 04 CONT BAW

### SOUTHWEST RESEARCH INSTITUTE LABORATORY CONTROL SAMPLE

Sample ID  
LCSW

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

Matrix: Water

Project No.: 06002.01.141

Task Order: 040415-2

SRR: 25770

Lab System ID: NA

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Bromide	412	400	103%
Chloride	205	200	103%
Fluoride	101	100	101%
Nitrate-N	87.2	90.4	96.5%
Nitrite-N	99.0	101	98.0%
Phosphate-P	196	191	103%
Sulfate	411	400	103%

NA- Not Applicable.

### SOUTHWEST RESEARCH INSTITUTE BLANK SUMMARY

Sample ID  
PBW

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

Matrix: Water

Project No.: 06002.01.141

Task Order: 040415-2

SRR: 25770

Lab System ID: NA

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	<0.1	0.1
Sulfate	<0.1	0.1

NA- Not Applicable.

27 MAY 04 CONT BAW

The results of the comparison (for anions) between initial and reanalysis samples is on page 174 of this notebook. Please note the data and source information at the bottom. Samples came from the following EWDP Sampling events:

Aug 26-29, 2002,  
Sep 9-13, 2002,  
Sep 29-Oct 2, 2003, and  
Oct 27-28 BW 5-27-04 30, 2003,

The percent recoveries look good except for two exceptions: nitrate analyses for 225 zone 2 and 29P. These were from different sampling events (Sep 02 and Sep/Oct 03). The two samples from the Aug 2002 event had good BW 5-27-04 good nitrate recoveries. The sample from the Oct 2003 event also had a good nitrate recovery.

5-27-04 BAW

27 MAY 04

CONT

BAW

NC-EWDP-10P Zone 1

Analysis	Initial	Second	% Recovery
Fluoride	1.99	2.11	106
Chloride	6.57	6.74	103
Nitrite	<0.1	<0.1	na
Bromide	<0.1	<0.1	na
Nitrate	1.67	1.57	94.0
Sulfate	20.1	21.0	104
Phosphate-P	0.0371	<0.1	na

NC-EWDP-22PB Zone 1

Analysis	Initial	Second	% Recovery
Fluoride	1.01	1.06	105
Chloride	6.68	6.84	102
Nitrite	<0.1	<0.1	na
Bromide	<0.1	<0.1	na
Nitrate	1.68	1.55	92.3
Sulfate	24.9	25.1	101
Phosphate-P	0.0483	<0.1	na

NC-EWDP-22S Zone 2

Analysis	Initial	Second	% Recovery
Fluoride	1.54	1.26	81.8
Chloride	6.41	6.85	107
Nitrite	<0.1	<0.1	na
Bromide	<0.1	<0.1	na
Nitrate	1.05	0.161	15.3
Sulfate	18.7	20.7	111
Phosphate-P	0.0285	<0.1	na

NC-EWDP-29P

Analysis	Initial	Second	% Recovery
Fluoride	1.90	1.85	97.4
Chloride	6.80	6.50	95.6
Nitrite	<0.1	<0.1	na
Bromide	<0.1	<0.1	na
Nitrate	5.27	1.10	20.9
Sulfate	22.8	23.6	104
Phosphate-P	0.0302	<0.1	na

NC-EWDP-19D

Analysis	Initial	Second	% Recovery
Fluoride	3.90	3.99	102
Chloride	8.30	7.96	95.9
Nitrite	<0.1	<0.1	na
Bromide	<0.1	<0.1	na
Nitrate	<0.1	<0.1	na
Sulfate	26.2	26.5	101
Phosphate-P	0.0163	<0.1	na

Well	Sample collection date	Initial analysis documented	Source	Second analysis documented	Source
NC-EWDP-10P Zone 1	27-Aug-02	8-Oct-02	523/77-79	27-May-04	628/168-172
NC-EWDP-22PB Zone 1	29-Aug-02	8-Oct-02	523/93	27-May-04	628/168-172
NC-EWDP-22S Zone 2	10-Sep-02	8-Oct-02	523/95	27-May-04	628/168-172
NC-EWDP-29P	1-Oct-03	9-Dec-03	610/182	27-May-04	628/168-172
NC-EWDP-19D	29-Oct-03	10-Dec-03	610/196	27-May-04	628/168-172

10 June 2004 mgj

Procedures for May 2004 EWDP trip are on the following pages

Information potentially subject to copyright protection was redacted from this page through 182. The redacted material is from the following references:  
 pH Procedure: Hach EC20 portable pH/ISE meter manual  
 Dissolved oxygen procedure: WTW Oxi 330I and Oxi 340i meter manual  
 ORP procedure: ASTM method D 1498-93 Standard Practice for Oxidation-Reduction Potential for water  
 ThermoOrion A+ instruction manual  
 Conductivity procedure: Hach CO150 Conductivity Meter instruction manual  
 Digital titration procedure: Hach digital titrator model 16900 manual

6/10/2004 UMRJ

10 June 2004 UMRJ

### Sampling Procedure

Groundwater samples were collected in two 4 liter pp bottles and two 2 liter pp bottles. Each bottle was rinsed several times with sample water before being filled. One 2-L bottle was given to the person conducting field analyses. All field analyses were conducted using unfiltered groundwater except for alkalinity. The other bottles were given to the person taking the sample splits for the laboratory analyses and alkalinity. Sample types and quantities for subsequent laboratory analyses are listed in Table 1.

**Table 1. Sample Types and Volumes Collected for Each Groundwater Zone During the October 27-30, 2003 Early Warning Drilling Program Sampling Event.**

Sample volume and container type	Filtration	Preservation	Analyses
Four 40mL, amber glass	filtered, 0.45 $\mu$ m	none	Inorganic carbon (in duplicate)
Two 250 mL, amber glass	filtered, 0.45 $\mu$ m	none	stable isotope ratio, (H/D and $^{16}\text{O}/^{18}\text{O}$ )
4 1L and 1-500 mL, high density polyethylene	not filtered	none	anions, cations, trace metals
1 liter, high density polyethylene (7 for 19PB wells)	filtered, 0.45 $\mu$ m	none	anions, cations, trace metals
1 liter, high density polyethylene	filtered, 0.45 $\mu$ m	1+1 HNO <sub>3</sub> (trace metal grade)	cations, trace metals
3- 4oz. high density polyethylene	not filtered	not preserved	organic analysis

Filtering was conducted using a Masterflex E/S Model 07571-00 sample pump with an Easy-load Masterflex L/S Model 7518-02 head, L/S 24 tygon tubing (Fisher 06429-24), and a Pall Gelman 12178 high capacity in-line groundwater sampling capsule. New tubing and filters were used for each zone. The bottles were not rinsed with sample before filling. The 40mL bottles were IChem T146-0040 VOA with septa. The 250mL bottles were IChem 349-0250 certified 300 series. The 500mL bottles were IChem N319-0500 certified 300 series. The 1000mL bottles were IChem N319-1000 certified 300 series. Sample bottles were filled completely to minimize headspace. Preservation consisted of 3mL (oxford pipet) of 1:1 nitric into 1 liter of solution. Samples were labeled, parafilm, ziplocked, and placed in a cooler until placed in refrigerator at hotel.

UMRJ  
6/10/04

10 June 2004 MRF

**MiniSonde and Surveyor4a Preparation Procedure:****Conductivity**

- Rinse the probe with several portions of nanopure water (cap and shake).
- Rinse the probe with a small portion of 1000 uS conductivity standard (cap and shake). Empty.
- Add 1000 uS conductivity standard to the probe, covering the electrodes.
- Wait a few minutes for the reading to stabilize. If the reading is close to 1000 uS, (within a few percent), calibration is assumed good.
- If the reading is off, follow the calibration instructions for conductivity.

**pH**

- Rinse the probe with several portions of nanopure water (cap and shake).
- Rinse the probe with a small portion of pH 7 standard (cap and shake).
- Add pH 7 buffer standard to the probe, covering the electrodes.
- Wait a few minutes for the reading to stabilize. If the reading is close (within a few percent), calibration is assumed good. Additional confirmation can be achieved by repeating this procedure with pH 10 buffer.
- If the reading is off, follow the calibration instructions for pH.

**Redox**

- Prepare a fresh container of quinhydrone solution as follows:
  - Add two pH 4 powder pillows and 100 mL nanopure water to a pre-measured quinhydrone bottle.
  - Cap and shake until most of the powders are dissolved.
- Rinse the probe with several portions of nanopure water (cap and shake).
- Rinse the probe with a small portion of quinhydrone solution (cap and shake).
- Add quinhydrone solution to the probe, covering the electrodes.
- Wait a few minutes for the reading to stabilize. If the reading is close (within a few percent), calibration is assumed good. If the reading is off, follow the calibration instructions for Redox. (Save quinhydrone solution for calibration)

**At the sampling event**

- Contact Kathy Gilmore (or other head of Nye County crew) to determine where the in-line probe can be set up and how long you can sample.
- Remove the travel/calibration cup and screw the flow-through cup onto the sonde.
- Attach tubing and fittings from the well head, using any adapters necessary.
- Rinse the probe and inside of tubing, where possible, with nanopure water prior to hooking up to well head.
- Prop the probe upright if possible. If it is upright, the in-tube should be at the bottom of the flow through cell with exit out the top (to force out the gases).
- If the probe must lie on the ground, either configuration of in/out tubing is okay.
- Shade the probe if possible.
- Turn on the circulator using the following Surveyor4a commands:
  - "Setup/Cal"

10 June 2004 MRF

Cont from previous

- "Setup"
- "Sonde"
- "Circulator On/Off"
- Change 0 to 1 (yes).
- Go back to main display.
- Begin "collecting data" procedure.

**Collecting data**

- Observe the readings on the probe to be sure that the following settings are displayed and are taking readings: Time, battery life, pH, conductivity, ORP, dissolved oxygen, latitude, longitude, altitude, barometric pressure. Any other readings are ok, but not necessary.
- To store data, follow these steps:
  - Go to "Files"
  - Choose "Svr4a"
  - "create"
  - "time-trig"
  - Enter the name in the following format: well-zone-month-day-year (for example: "19PB-Deep-05-10-04" Eliminate hyphens if the name is too long, then "Done." (If there's no zone, then well-month-day-year.)
  - Enter start date in MMDDYY format, then "Done"
  - Enter start time (give yourself at least 2 minutes advance) in HHMMSS, then "Done"
  - Enter stop date (same as start date) in MMDDYY format, then "Done"
  - Enter stop time in HHMMSS format according to how long Nye County said we could sample with the inline probe, then "Done."
  - Enter warmup as "000030" then "Done"
  - Check parameters- "Done"
  - Press any key.
- Monitor the Surveyor4a periodically to be sure it is taking data and that the battery life does not drop below 5.0. If it starts to reach 5.0, contact Miriam to move car to use as a battery source.

**After Data Collection**

- Check that data is saved by briefly reviewing the file. ("Files" "Srv4a" "Review" and choose the file name you just created. Scroll down to verify, then "Go Back" to main display.
- Turn off the circulator by using the same procedure as to turn it on, except change "1" to "0." Then power down the Surveyor4a.
- Remove tubing from flow-through cell. Empty and remove the cell and rinse with nanopure water several times. Replace the calibration/storage cup on the probe and rinse several times with nanopure water (cap and shake). Leave some nanopure water in the cup to keep the probes moist.
- Dry and remove as much dirt from the sonde as possible, store in storage case.
- Charge battery for Surveyor4a every night.

14 JUNE 04 BAW

## QA stds (anion + cation) for Divol Analysis

## - Cation std

Target conc - 15 ppm Fe, K, Ca, Na, + Mg

Spex Certiprep CL-CAL-3 lot # 26-63AS

std of 1000 ppm Fe, K, Ca, Na, + Mg

Added 15 mL of std (vol pipet) to a 1000 mL vol flask and diluted to mark w/ type 1 water. Labeled cation std.

## - Anion std

Target conc - 9 ppm  $\text{HPO}_4$ 6 ppm = Br,  $\text{NO}_3$ ,  $\text{SO}_4$ 

3 ppm = Cl

1.5 ppm = F

Spex Certiprep IC MIX 2-100 lot # 24-79AS

std of 600 ppm  $\text{HPO}_4$ ; 400 ppm Br,  $\text{NO}_3$ , +  $\text{SO}_4$ ;

200 ppm Cl; + 100 ppm F.

Added 15 mL of std (vol pipet) to a 1000 mL vol flask and diluted to mark w/ type 1 water. Labeled Anion std.

14 JUNE 04 CONT BAW

## Anion Results for EWDP May 2004 groundwater samples

Anion results (except phosphate by EPA method 365.3) from May 2004 EWDP event  
 Chain of Custody 628/147 (also 628/145)  
 Aliquots + Legend 628/134-135

- According to legend - (628/135) here is the associations: (sample = Divol label)

Anion 1 QA standard = Anion 3A

Anion 2 QA standard = Anion 4A

Blank QA standard = Anion 5A

Shal 0504 samples (FUA, UFUA) = Anion 1A, 6A

Deep 0504 samples (FUA, UFUA) = Anion 2A, 7A.

- Analyses of the results reveals ~~a~~ different associations  
 BW 6-14-04

Anion 1 QA standard = Anion 1A 3A BW 6-14-04

Anion 2 QA standard = Anion 3A 1A BW 6-14-04

Blank QA standard = Anion 6A

one sample pair (?) = Anion 2A, 4A

second sample pair (?) = Anion 5A, 7A

- Unsure if problem is with Div 20 legend or Div 01. Div 01 informed. They are investigating at their end. Div 20 will take new aliquots + send for analyses.

14 JUNE 04 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**SAMPLE ANALYSIS DATA SHEET**

Sample ID  
 Anion 1A

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: 245101

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	9.75	0.1
Fluoride	<0.1	0.1
Nitrate-N	0.370	0.1
Nitrite-N	<0.1	0.1
Sulfate	<0.1	0.1

**SOUTHWEST RESEARCH INSTITUTE**  
**SAMPLE ANALYSIS DATA SHEET**

Sample ID  
 Anion 2A

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: 245102

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	6.68	0.1
Fluoride	1.95	0.1
Nitrate-N	0.916	0.1
Nitrite-N	<0.1	0.1
Sulfate	28.5	2

14 JUNE 04 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**SAMPLE ANALYSIS DATA SHEET**

Sample ID  
 Anion 3A

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: 245103

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	7.97	0.1
Chloride	3.80	0.1
Fluoride	1.96	0.1
Nitrate-N	1.59	0.1
Nitrite-N	<0.1	0.1
Sulfate	8.08	0.1

**SOUTHWEST RESEARCH INSTITUTE**  
**SAMPLE ANALYSIS DATA SHEET**

Sample ID  
 Anion 4A

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: 245104

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	6.50	0.1
Fluoride	1.86	0.1
Nitrate-N	0.917	0.1
Nitrite-N	<0.1	0.1
Sulfate	27.6	2

14 JUNE 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	5.79	0.1
Fluoride	1.64	0.1
Nitrate-N	0.747	0.1
Nitrite-N	<0.1	0.1
Sulfate	22.0	2

### 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	<0.1	0.1
Fluoride	<0.1	0.1
Nitrate-N	<0.1	0.1
Nitrite-N	<0.1	0.1
Sulfate	<0.1	0.1

14 JUNE 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	5.79	0.1
Fluoride	1.66	0.1
Nitrate-N	0.741	0.1
Nitrite-N	<0.1	0.1
Sulfate	21.7	2

6-14-04 BAW

14 JUNE 04 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**MATRIX SPIKE SUMMARY**

Sample ID

Anion 1A

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: 245101

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Bromide	<0.1	4.00	4.00	100%
Chloride	9.75	11.7	2.00	97.5%
Fluoride	<0.1	0.923	1.00	92.3%
Nitrate-N	0.370	1.14	0.904	85.2%
Nitrite-N	<0.1	0.869	1.00	86.9%
Sulfate	<0.1	3.94	4.00	98.5%

**SOUTHWEST RESEARCH INSTITUTE**  
**DUPLICATE SUMMARY**

Sample ID

Anion 1A

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: 245101

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Bromide	<0.1	<0.1	0.00%
Chloride	9.75	9.79	0.41%
Fluoride	<0.1	<0.1	0.00%
Nitrate-N	0.370	0.371	0.27%
Nitrite-N	<0.1	<0.1	0.00%
Sulfate	<0.1	<0.1	0.00%

14 JUNE 04 CONT BAW

**SOUTHWEST RESEARCH INSTITUTE**  
**LABORATORY CONTROL SAMPLE**

Sample ID

LCSW

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

Matrix: Water

Project No.: 06002.01.141

Task Order: 040521-5

SRR: 25943

Lab System ID: NA

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Bromide	404	400	101%
Chloride	199	200	99.5%
Fluoride	98.0	100	98.0%
Nitrate-N	83.9	90.4	92.8%
Nitrite-N	92.7	100	92.7%
Sulfate	404	400	101%

NA- Not Applicable.

**SOUTHWEST RESEARCH INSTITUTE**  
**BLANK SUMMARY**

Sample ID

PBW

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

Matrix: Water

Project No.: 06002.01.141

Task Order: 040521-5

SRR: 25943

Lab System ID: NA

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
Sulfate	<0.1	0.1

NA- Not Applicable.

14 JUNE 04 CONT BAW

Div 01 Anion Results for EWDP groundwater sampling event May 2004

QA Accuracy results

For Sample Anion 1A (assumed to be Anion 2 from 628/133)

Analyte	Target Conc (ppm)	Measured Conc (ppm)	Percent Difference
Chloride	10	9.75	-2.50
Nitrate - N*	0.452	0.370	-18.14

\* 2 ppm NO3 converts to 0.452 ppm NO3 as N

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

Analyte	Target Conc (ppm)	Measured Conc (ppm)	Percent Difference
Bromide	8	7.97	-0.38
Chloride	4	3.80	-5.00
Fluoride	2	1.96	-2.00
Nitrate-N	1.81	1.59	-12.01
Sulfate	8	8.08	1.00

\* 8 ppm NO3 converts to 1.81 ppm NO3 as N

N = 14.0067 g/mol

NO3 = 62.0049 g/mol

Aliquots for Anion Reanalyses of EWDP May 2004 Groundwater Sampling Event

Aliquots decanted into 125 mL pp bottle, capped and parafilmmed, labeled via legend below:

original ID	New label
NC-EWDP-19PB-SHAL-0504-FUA-1	Anion 1C
NC-EWDP-19PB-SHAL-0504-UFUA-500	Anion 2C
NC-EWDP-19PB-DEEP-0504-FUA-1	Anion 3C
NC-EWDP-19PB-DEEP-0504-UFUA-500	Anion 4C
Field Blank NC-EWDP-FB-0504-UFUA	Anion 5C
Anion Std 628/186	Anion 6C

15 JUNE 04 BAW

Delivery of Anion Samples (EWDP May 2004) to Div 01 for reanalyses

Samples sent to Div 01 from EWDP May 2004 event.  
 5 samples + 1 QA 628/194  
 Initial analyses results 628/187  
 Phosphate by 365.3 method for lower detection limit.  
 Chain of Custody on next page.

BAW 6-15-04

15 JUNE 04 CONT BAW

<b>SAMPLE LIST/CHAIN OF CUSTODY</b> Southwest Research Institute Chemistry and Chemical Engineering Division 6220 Culebra Road San Antonio, Texas 78238-5166		Requested Turnaround: <input type="checkbox"/> 2 Weeks <input type="checkbox"/> 3 Weeks <input checked="" type="checkbox"/> Other: 4 weeks
Shipper Name/Address BRAD WERLING CNURA DIV 20 BLD 57	Client Mike O'Connell	SWRI Contact Mike O'Connell
Client Purchase Order/Other ID 3653	Site/Zone ID	Preservation a = HCl to pH <2 b = HNO <sub>3</sub> to pH <2 c = H <sub>2</sub> SO <sub>4</sub> to pH <2 d = NaOH to pH >12 e = Cool (4°C/2°C) f = Other (specify) none
Analyses Requested except phosphate then by IC	Relinquished by (Print/Signature) Brad Werling / Brad Werling	Remarks Nuclear Safety Related - use appropriate OH procedures POC - Brad Werling Phone 6565 Fax 5784
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 Temp: 3.5°C	Sample Types: D - Duplicate ER - Equipment Rinse ES - Environmental Sample FB - Field Blank FD - Field Duplicate MS - Matrix Spike MSD - Matrix Spike Dup TB - Trip Blank Therm #: 027 * Samples Intact	Received by SWRI Lab: (Signature) Date: 6/15/04 Time: 10:05 Samples Disposed: Date: 6/15/04 Time: 10:05 Samples Disposed by:
Sample ID Anion 1C Anion 2C Anion 3C Anion 4C Anion 5C Anion 6C	Sample Collection Date (m/d/yyyy) 6/14/04	Sample Collection Time W
Matrix Type W	Sample Type W	# of Containers 1

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

16 JUNE BAW

SGS Results for Anion Analysis of MAY 2004 EWDP groundwater samples

Samples from 628/134-135  
 Chain of custody 628/BW 6/16/2004  
 Two samples + Two QA stds,  
 Analysis also performed by PIVOL  
 Legend 628/135

QA data below followed by sample results

For QA Sample Anion 3B (Anion 1 from 628/133)

Analyte	Target Conc (ppm)	Measured Conc (ppm)	Percent Difference
Fluoride	2	1.99	-0.50
Tot. Reactive Phosphate - P in mg/L	3.87	3.68	-4.91
Chloride	4	4.0	0.00
Sulfate	8	8.2	2.50
Bromide	8	7.7	-3.75
Nitrate as N	1.81	1.81	0.00

For QA Sample Anion 4B (Anion 2 from 628/133)

Analyte	Target Conc (ppm)	Measured Conc (ppm)	Percent Difference
Chloride	10	9.7	-3.00
Nitrate as N	0.452	0.45	-0.44

N = 14.0067 g/mol  
 NO<sub>3</sub> = 62.0049 g/mol  
 8 ppm NO<sub>3</sub> converts to 1.81 ppm NO<sub>3</sub> as N  
 2 ppm NO<sub>3</sub> converts to 0.452 ppm NO<sub>3</sub> as N

12 ppm HPO<sub>4</sub> converts to 3.87 ppm HPO<sub>4</sub> as P  
 P = 30.97376 g/mol  
 HPO<sub>4</sub> = 95.97926 g/mol

Data Accepted BAW 6-16-04 per procurement plan (PO 476597P). Criteria = majority of major analytes ± 20% range from target concentrations

16 JUNE 04

CONT

BAW

30 JUNE 04

BAW

Project : PO#:476597P

Wednesday, June 16, 2004

Date Rec.: 25 May 2004

LR Report: CA10384-MAY04

Copy: #1

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

Southwest Research Institute  
Attn : Bradley Werling bwerling@swri.org

6220 Culebra Road, San Antonio, TX  
USA, 78238-5166  
Phone: 210-522-6565, Fax:

# CERTIFICATE OF ANALYSIS

## Final Report

Analysis	1: *Approved Date	2: *Approved Time	3: Anlon 1B QA Nuclear	4: Anlon 2B QA Nuclear	5: Anlon 3B QA Nuclear	6: Anlon 4B QA Nuclear	7: Env Blank Nuclear	8: Env Standard
	Date		Date:NA	Date:NA	Date:NA	Date:NA		
Sample Date & Time								
Temperature [°C]			19.2	19.2	19.2	19.2		
Fluoride [mg/L]	27-May-04	08:57	1.83	1.71	1.99	< 0.06	< 0.06	99%
Tot.Reactive Phos. [mg/L]	29-May-04	09:17	< 0.03	< 0.03	3.68	< 0.03	< 0.03	92%
Chloride [mg/L]	04-Jun-04	07:44	6.7	5.7	4.0	9.7	< 0.2	100%
Sulphate [mg/L]	04-Jun-04	07:44	28	21	8.2	< 0.5	< 0.5	100%
Bromide [mg/L]	28-May-04	16:03	< 0.3	< 0.3	7.7	< 0.3	< 0.3	102%
Nitrite (as nitrogen) [mg/L]	28-May-04	16:03	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	99%
Nitrate (as nitrogen) [mg/L]	28-May-04	16:03	1.06	0.88	1.81	0.45	< 0.05	101%
Nitrate + Nitrite (as nitrogen) [mg/L]	28-May-04	16:03	1.06	0.88	1.81	0.45		

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

END OF SCIENTIFIC NOTEBOOK  
ENTRIES CONTINUED in SN 653

SN 653 was started while SN628 was  
still in service. see note on 653/3.

6-30-04

BAW

30 JUNE 04

CONT

BAUS

*Intentionally left blank*

0-30-04

BAUS

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.

*P. C. Peary  
8/18/2004*

**ADDITIONAL INFORMATION FOR SCIENTIFIC NOTEBOOK NO. 628**

<b>Document Date:</b>	12/10/2003
<b>Availability:</b>	Southwest Research Institute® Center for Nuclear Waste Regulatory Analyses 6220 Culebra Road San Antonio, Texas 78228
<b>Contact:</b>	Southwest Research Institute® Center for Nuclear Waste Regulatory Analyses 6220 Culebra Road San Antonio, TX 78228-5166 Attn.: Director of Administration 210.522.5054
<b>Data Sensitivity:</b>	<input checked="" type="checkbox"/> "Non-Sensitive" <input type="checkbox"/> Sensitive <input type="checkbox"/> "Non-Sensitive - Copyright" <input type="checkbox"/> Sensitive - Copyright
<b>Date Generated:</b>	04/01/2004
<b>Operating System:</b> (including version number)	Windows NT
<b>Application Used:</b> (including version number)	Excel, Word
<b>Media Type:</b> (CDs, 3 1/2, 5 1/4 disks, etc.)	1- CD
<b>File Types:</b> (.exe, .bat, .zip, etc.)	Various
<b>Remarks:</b> (computer runs, etc.)	Media contains: X-ray diffraction mineralogy sediment samples.