LABORATORY NOTEBOOK

LABORATORY NOTEBOOK

NOTEBOOK NO. 800

CONTINUED FROM NOTEBOOK NO. CONTINUED TO NOTEBOOK NO.

Radionuclide Transport in The Saturated Zone (20.06002.01.242) and The Unsaturated Zone (20.06002.01.232)

ASSIGNED TO:

NAME Bradley Werling - 210.522.6565

SIGNATURE DATE

DATE ISSUED BY

PHONE EMAIL

COMPANY

DEPARTMENT

ADDRESS

CITY STATE ZIP

DATE NOTEBOOK COMPLETED NUMBER OF PAGES FILLED IN

NOTES:

CNWRA
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COPY 800

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BOOK NO.

PAGE	SUBJECT	DATE
	QA Copy pp 1-83	9/27/06

BOOK NO. | PROJECT: 5 June 2006 | PAGE: 1

Investigator	Signature	Initials
Marla Roberts	Marla Roberts	MR
Bradley Werling	Bradley Werling	BAW
Sandra Watson	Sandra Watson	SCW
Paul Bertetti	Paul Bertetti	PB

Initial Entry for Scientific Notebook 800

This notebook contains work for Radionuclide Transport (RT) in both the saturated zone and unsaturated zone (ISIs 20.06002.02.242 and 20.06002.01.232 respectively). RT is concerned with identification of key geochemical processes that may control radionuclide transport at Yucca Mountain. Radionuclide retardation is dependent on the hydrochemistry and mineralogy along the groundwater flow paths from the proposed repository. Typical activities associated with these investigations would include conducting laboratory batch sorption experiments, collecting field samples, and analyses of field samples.

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

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

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

This scientific notebook (SN) is a continuation of SN 742. That notebook concludes with Sample List/Chain of Custody documents used for delivering samples to Div 01. The initial entry for the NC-EWDP-19PB and NC-EWDP-22PC With and Without Calcite Sorption Experiment is in 742/45-46 (also see 800/10). SN 800 will start with a summary initial entry of the NC-EWDP-19PB and NC-EWDP-22PC With and Without Calcite Sorption Experiment.

INVENTOR SIGNATURE	PRINTED NAME	DATE
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BOOK NO.

6 June 2006 MR
PROJECT

Continuation from SN 742 of NC-EWDP-19PB and NC-EWDP-22PC With and Without Calcite Sorption Experiment

Personnel initially involved: Marla Roberts and Sandra Watson

Objectives: To investigate Np sorption on a NC-EWDP-19PB 0305 Consolidated Alluvium (with and without Calcite) and NC-EWDP-22PC 1005 Consolidated Alluvium (with and without Calcite) using simulated water (with calcium) based on the chemistry from water collected from the shallow string of drillhole NC-EWDP-19PB over a range of pHs.

Samples:
NC-EWDP-19PB-0305-Sonic Core Composite - 696/64-66
NC-EWDP-19PB-0305-Sonic Core Composite w/o Calcite- 742/25
NC-EWDP-22PC-1005-Sonic Core Composite – 742/8
NC-EWDP-22Pc-1005-Sonic Core Composite w/o Calcite- 742/25

Previous Key Entries for these analyses:
Original Initial Entry: 742/45-46
Evaluation of Experimental Results: 800/10
Experiment Contained In: 742/45-91, 800/2-10

Equipment: See 742/45-46

Reagents: See 742//45-46

6 June 2006 MR

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Page ___ of ___

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

Client Purchase Order/Other ID | Site/Zone ID

Requested Turnaround: ☐ 2 Weeks ☐ 3 Weeks ☒ Other: 24 hrs

SwRI Contact: Mike Dennison

Analyses Requested: 19 Sep 2006 – See 800/10 (Anions by IC)

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

Nuclear Safety related use appropriate QA procedure

DC-Butterfly x 60505 – FAX SLA

SwRI Project#: 20.06002.242

Received by SwRI Lab: (Signature) [signature] Date 6/6/06 Time 1400

Samples Disposed: Date ___ Time ___

Samples Disposed by: Date ___ Time ___

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers
W19222-51A	4/5/06		W		1
W19222-52A					
W19222-53A					
W19222-54A					
W19222-55A					
W19222-56A					
W19222-57A					
W19222-58A					
W19222-59A					
W19222-60A					1

Client: DIV 20
Shipper Name/Address: Brad Wenting DIV 20 Bldg 57

Relinquished by (Print/Signature): Marla Roberts
Date 6/6/06 Time 1400

Received by (Print/Signature): ___ Date ___ Time ___

Relinquished by (Print/Signature): ___ Date ___ Time ___

Received by (Print/Signature): ___ Date ___ Time ___

Relinquished by (Print/Signature): ___ Date ___ Time ___

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

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: 22.0°C | Therm #: 077

Comments: Reactivate 4UP237ET 0.5x10-4 x 1.4x10-4 solution 742/76 SW

6 June 06 MR

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

6 June 06 MR

DISCLO... INVENT

SAMPLE LIST/CHAIN OF CUSTODY

Southwest Research Institute®
Chemistry and Chemical Engineering Division
6220 Culebra Road
San Antonio, Texas 78238-5166

Shipper Name/Address: Brad Werling, Div 20, Bldg 57

Client: Div 20

Client Purchase Order/Other ID:

Site/Zone ID:

Requested Turnaround:
- ☐ 2 Weeks
- ☐ 3 Weeks
- ☒ Other: 4 week

SwRI Contact: Mike Dammann

Analyses Requested: Anions by IC — 19 Sep 2006 - Sec 800/10 (PB)

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Anions by IC
W1922-61A	5 June 06		W		1	✓
L01A	↓		↓		↓	✓
L02A	↓		↓		↓	✓
A1A	↓		↓		↓	✓
A2A	↓		↓		↓	✓

REMARKS

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

Nuclear Safety related - use appropriate QA procedure

NOTE
Analyze as N

DOC - B Werling
X 105165
fax 5184

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

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

Temp: 22.0°C

Therm #: D27

Comments: Radioactive - Np237 at 8.5x10-7M or 1.4x10-4 uCi/mL SN 742/76-77

Relinquished by (Print/Signature)	Date	Time
Marla Roberts Marla Roberts	6/6/06	1600
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time

SwRI Project#: 20.06002.242

Received by SwRI Lab (Signature):

Date: 6/6/06 Time: 1600

Samples Disposed: Date: Time:

Samples Disposed by:

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

6 June 06 MR

DISCLO

INVENT

PAGE 4

SAMPLE LIST/CHAIN OF CUSTODY

Southwest Research Institute®
Chemistry and Chemical Engineering Division
6220 Culebra Road
San Antonio, Texas 78238-5166

Shipper Name/Address: Brad Werling, Div 20, Bldg 57

Client: Div 20

Client Purchase Order/Other ID:

Site/Zone ID:

Requested Turnaround:
- ☐ 2 Weeks
- ☐ 3 Weeks
- ☒ Other: 4 week

SwRI Contact: Mike Dammann

Analyses Requested: Anions by IC — 19 Sep 2006 – Sec 800/10

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Anions by IC									REMARKS
W1922-61A	5 June 06		W		1	✓									Nuclear Safety
L01A						✓									related-use
L02A						✓									appropriate
A1A						✓									QA procedure
A2A						✓									*NOTE*
															Analyze AS IS
															DOC-B-Werling
															X105605
															fax 5184

Signature of Client

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

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

Temp: 22.0°C

Therm #: 027

Comments: Radioactive - Np237 at 8.5x10⁻⁷M or 1.4x10⁻⁴ uCi/mL SN 742/76-77

Relinquished by (Print/Signature)	Date	Time
Marla Roberts Marla Roberts	6/6/06	1600
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time

SwRI Project#: 20.06002.242

Received by SwRI Lab (Signature):

Date: 6/6/06 Time: 1600

Samples Disposed: Date: Time:

Samples Disposed by:

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

Page of

Liquid Scintillation Analyses Results for 19PB and 22PC with and without ~~Calcium~~ Calcite Sorption Experimental Solutions

Task initially assigned to Marla Roberts

Objective

To determine the amount of neptunium in the experimental solution at the end of the sorption experiments.

Initial Entry 742/45-46 and 800-10

LSA sample preparation 742/64-69

Sample Info

Blank (one sample from simulated water with calcium): w Ca 742/64
Neptunium spikes (two samples) – Spike 61A1-11 and Spike 61A1-12 (742/64)
Four experiments derived from 4 solids and 1 type of simulated water
NC-EWDP-19PB-0305-Sonic Core Composite - 696/64-66 using simulated water with calcium
NC-EWDP-19PB-0305-Sonic Core Composite w/o Calcite- 742/25 using simulated water with calcium
NC-EWDP-22PC-1005-Sonic Core Composite – 742/8 using simulated water with calcium
NC-EWDP-22PC-1005-Sonic Core Composite w/o Calcite- 742/25 using simulated water with calcium

Printout of LSA analyses following:

19 Sep 2006 MR – Do not use – See 800/10

9 June 2006 MR

6/8/06 10:29:47 PM QuantaSmart (TM) - 1.31 - Serial# 405314 Page # 1
Protocol# 15 - Pa_Np_Exp_AB.lsa User: Bertetti

Assay Definition-

Assay Description:

Assay Type: Alpha/Beta
Report Name: Np_Pa_Exp
Output Data Path: C:\Packard\Tricarb\Results\Bertetti\Pa_Np_Exp_AB
Raw Results Path: C:\Packard\Tricarb\Results\Bertetti\Pa_Np_Exp_AB\20060602_1711.results
Comma-Delimited File Name: C:\Packard\Tricarb\Results\Bertetti\Pa_Np_Exp_AB\Np_Pa_AB.041
Assay File Name: C:\Packard\TriCarb\Assays\Pa_Np_Exp_AB.lsa

Count Conditions-

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

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

In Use Discriminator: 143

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

Count Corrections-

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

Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time
Beta A				
Beta B				
Alpha				

IPA Block Data
Software Version IC: 2.11
Software Version EC: 1.31
Instrument Model: Tri-Carb 3100TR
Instrument Serial Number: 405314
3H Chi Square: 21.73 Date Processed: 6/2/06 5:11:17 PM
14C Chi Square: 11.24 Date Processed: 6/2/06 5:11:17 PM
3H E^2/B (1-18.6 keV): 281.02 Date Processed: 6/2/06 5:11:17 PM
14C E^2/B (4-156 keV): 532.37 Date Processed: 6/2/06 5:11:17 PM
3H Efficiency (0-18.6 keV): 65.26 Date Processed: 6/2/06 5:11:17 PM
14C Efficiency (0-156 keV): 96.39 Date Processed: 6/2/06 5:11:17 PM
IPA Background Date Processed: 6/2/06 5:11:17 PM

19 Sep 2006 - Do not use - see 800/10 PM

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6/8/06 10:29:48 PM QuantaSmart (TM) - 1.31 - Serial# 405314 Page # 2
Protocol# 15 - Pa_Np_Exp_AB.lsa User: Bertetti

3H Background CPM (0-18.6 keV): 15.15 Date Processed: 6/2/06 5:11:17 PM
14C Background CPM (0-156 keV): 21.77 Date Processed: 6/2/06 5:11:17 PM
3H Calibration DPM: 285000
3H Reference Date: 10/29/99
14C Calibration DPM: 134100

Cycle 1 Results

S#	Count Time	CPMA	A:2S%	CPMB	B:2S%	CPMa	alpha2S%	SIS	
MESSAGES									Blank-
1	240.00	19.48	2.93	3.30	7.10	0.41	20.20	170.2	w/Ca 742/64
B									19PB with Calcite
Missing vial 2.									
3	65.83	10.83	13.59	3.79	18.40	151.54	2.01	251.0	19W-1a
4	67.66	9.98	14.40	3.64	18.74	147.40	2.01	270.0	19W-1b
5	66.95	11.61	12.72	3.52	19.32	149.00	2.01	220.0	" - 2a
6	66.10	11.80	12.62	4.02	17.57	150.88	2.01	250.5	" - 2b
7	67.50	10.90	13.38	3.90	17.82	147.75	2.01	275.5	" - 3a
8	66.98	12.27	12.15	3.73	18.49	148.93	2.01	228.3	" - 3b
9	66.15	15.28	10.19	4.95	15.04	150.76	2.01	238.5	" - 4a
10	67.10	15.98	9.77	5.43	13.98	148.64	2.01	249.4	" - 4b
11	67.42	14.76	10.40	4.08	17.20	147.93	2.01	220.1	" - 5a
12	66.30	14.82	10.44	5.04	14.83	150.44	2.01	242.6	" - 5b
13	65.27	16.99	9.42	5.43	14.15	152.82	2.01	250.9	" - 6a
14	65.84	18.16	8.90	6.04	13.07	151.49	2.01	241.6	" - 6b
15	67.59	19.98	8.16	6.59	12.14	147.57	2.01	251.7	" - 7a
16	67.46	21.26	7.79	6.69	12.03	147.86	2.01	235.2	" - 7b
17	65.59	14.31	10.79	4.88	15.25	152.07	2.01	242.9	" - 8a
18	66.20	13.49	11.29	4.91	15.12	150.65	2.01	256.1	" - 8b
19	65.93	13.64	11.20	4.73	15.56	151.31	2.01	246.4	" - 9a
20	64.43	14.86	10.55	5.43	14.23	154.81	2.01	250.7	" - 9b
21	70.88	18.70	8.42	6.36	12.18	140.69	2.01	247.9	" - 10a
22	71.74	17.63	8.77	6.47	11.98	139.00	2.01	256.1	" - 10b
23	69.52	20.83	7.81	8.00	10.50	143.45	2.01	264.4	" - 11a
24	69.64	18.43	8.58	6.73	11.80	143.19	2.01	255.4	" - 11b
25	70.41	36.68	5.11	14.09	7.25	141.65	2.01	275.2	" - 12a
26	68.77	35.87	5.25	13.04	7.69	145.00	2.01	254.8	" - 12b
Missing vial 27.									19PB without Calcite
28	67.77	11.82	12.47	4.69	15.47	147.19	2.01	295.1	19W0-1a
29	67.84	13.50	11.16	4.70	15.45	147.00	2.01	259.6	19W0-1b
30	68.88	12.00	12.23	4.71	15.32	144.79	2.01	281.9	" - 2a
31	69.27	13.92	10.79	5.39	13.85	143.97	2.01	275.7	" - 2b
32	66.54	13.50	11.25	5.08	14.72	149.88	2.01	271.8	" - 3a
33	66.53	12.93	11.66	5.31	14.26	149.90	2.01	285.6	" - 3b
34	68.08	13.81	10.93	4.92	14.91	146.49	2.01	257.8	" - 4a
35	66.58	14.21	10.78	5.47	13.95	149.79	2.01	283.2	" - 4b
36	71.59	11.12	12.83	3.50	18.86	139.29	2.01	235.3	" - 5a
37	71.29	12.45	11.68	4.61	15.33	139.88	2.01	261.7	" - 5b
38	67.19	14.89	10.34	5.45	13.93	148.45	2.01	260.2	" - 6a
39	69.01	13.98	10.76	5.22	14.20	144.51	2.01	255.0	" - 6b
40	72.19	13.62	10.79	5.23	13.90	138.12	2.01	262.2	" - 7a
41	71.93	13.90	10.62	5.05	14.27	138.63	2.01	261.9	" - 7b
42	68.43	17.20	9.13	7.26	11.29	145.74	2.01	291.9	" - 8a
43	67.55	16.85	9.34	5.80	13.29	147.64	2.01	251.7	" - 8b
44	67.13	16.54	9.50	5.92	13.14	148.59	2.01	257.1	" - 9a
45	66.61	16.99	9.33	6.56	12.27	149.72	2.01	270.9	" - 9b
46	66.41	16.56	9.54	6.84	11.93	150.22	2.01	280.4	" - 10a
47	67.92	17.27	9.13	6.99	11.64	146.84	2.01	277.8	" - 10b
48	70.37	34.37	5.35	13.49	7.45	141.71	2.01	271.0	" - 11a
49	71.60	34.09	5.34	12.94	7.58	139.26	2.01	270.1	" - 11b
50	71.36	36.20	5.13	13.08	7.54	139.73	2.01	260.1	" - 12a
51	73.88	34.98	5.17	13.64	7.23	134.96	2.01	276.5	" - 12b
Missing vial 52.									

19 Sep 2006 - Do not use - see 800/10 PM

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6/8/06 10:29:48 PM QuantaSmart (TM) - 1.31 - Serial# 405314 Page # 3

Protocol# 15 - Pa_Np_Exp_AB.lsa User: Bertetti

									22PC without ~~metal~~ alpha calcite
53	66.23	23.22	7.34	8.64	10.20	150.60	2.01	268.8	22W-1a
54	66.91	22.63	7.45	8.53	10.24	149.05	2.01	270.0	22W-1b
55	65.05	24.83	7.03	9.41	9.72	153.32	2.01	264.2	" -2a
56	64.81	25.32	6.94	9.44	9.72	153.94	2.01	264.9	" -2b
57	65.13	25.57	6.88	9.78	9.48	153.16	2.01	270.4	" -3a
58	64.69	25.00	7.01	9.37	9.77	154.18	2.01	262.5	" -3b
59	67.11	25.63	6.77	8.84	9.98	148.60	2.01	261.0	" -4a
60	67.78	25.57	6.75	9.72	9.34	147.16	2.01	258.6	" -4b
61	66.34	32.89	5.67	12.46	8.05	150.35	2.01	266.2	" -5a
62	65.96	31.30	5.89	11.84	8.33	151.21	2.01	268.0	" -5b
63	67.10	30.82	5.91	11.51	8.42	148.62	2.01	259.1	" -6a
64	66.59	29.24	6.17	11.29	8.55	149.79	2.01	276.2	" -6b
65	66.89	22.49	7.49	7.61	11.06	149.11	2.01	249.6	" -7a
66	67.11	22.28	7.53	8.48	10.26	148.66	2.01	276.5	" -7b
67	66.64	28.17	6.33	10.10	9.18	149.70	2.01	254.1	" -8a
68	66.51	26.20	6.69	9.69	9.44	149.99	2.01	266.1	" -8b
69	70.06	22.29	7.38	7.56	10.87	142.33	2.01	244.5	" -9a
70	70.64	20.09	7.97	7.23	11.17	141.17	2.01	256.5	" -9b
71	70.64	22.19	7.38	8.12	10.32	141.15	2.01	262.9	" -10a
72	69.58	21.74	7.55	8.14	10.38	143.34	2.01	269.1	" -10b
73	69.36	22.34	7.41	8.62	10.00	143.77	2.01	270.7	" -11a
74	68.82	22.21	7.46	8.04	10.51	144.91	2.01	250.8	" -11b
75	68.96	18.88	8.46	7.04	11.50	144.62	2.01	266.2	" -12a
76	69.09	19.07	8.38	7.71	10.79	144.36	2.01	279.5	" -12b
Missing vial 77.									
									22PC without calcite
78	68.15	19.69	8.23	7.38	11.19	146.33	2.01	267.1	22W0-1a
79	68.86	20.04	8.08	7.72	10.80	144.84	2.01	273.2	22W0-1b
80	70.03	21.38	7.63	8.15	10.34	142.42	2.01	268.8	" -2a
81	67.35	22.04	7.58	8.71	10.07	148.07	2.01	282.4	" -2b
82	68.95	20.28	8.00	7.62	10.89	144.64	2.01	267.6	" -3a
83	67.99	18.96	8.48	7.65	10.93	146.69	2.01	275.7	" -3b
84	67.60	19.59	8.29	7.01	11.64	147.55	2.01	255.2	" -4a
85	67.13	22.13	7.57	8.40	10.32	148.57	2.01	272.6	" -4b
86	67.71	21.72	7.65	8.07	10.57	147.28	2.01	266.2	" -5a
87	67.24	22.93	7.36	8.49	10.25	148.31	2.01	270.4	" -5b
88	70.84	22.06	7.41	8.53	9.97	140.77	2.01	278.4	" -6a
89	69.51	22.33	7.40	8.32	10.23	143.48	2.01	265.5	" -6b
90	70.69	24.19	6.91	9.61	9.22	141.05	2.01	269.4	" -7a
91	68.60	23.72	7.11	9.12	9.68	145.38	2.01	268.2	" -7b
92	70.45	25.49	6.65	9.64	9.22	141.61	2.01	271.6	" -8a
93	71.23	25.13	6.69	9.51	9.25	139.98	2.01	262.8	" -8b
94	71.69	26.70	6.38	9.96	8.95	139.08	2.01	261.8	" -9a
95	70.13	22.99	7.21	9.24	9.50	142.20	2.01	283.7	" -9b
96	70.96	32.13	5.60	12.48	7.79	140.52	2.01	271.3	" -10a
97	71.48	31.50	5.66	12.63	7.70	139.52	2.01	280.6	" -10b
98	73.73	31.36	5.60	11.64	7.99	135.24	2.01	266.1	" -11a
99	71.79	31.62	5.63	12.37	7.79	138.93	2.01	269.0	" -11b
100	68.65	21.69	7.61	8.07	10.50	145.27	2.01	274.9	" -12a
101	69.55	23.16	7.20	8.87	9.79	143.37	2.01	266.8	" -12b
Missing vial 102.									
Missing vial 103.									
Missing vial 104.									
									19PB redos
105	56.55	27.78	6.89	11.64	9.06	176.44	2.01	289.7	19W-8a
106	68.66	25.22	6.78	9.69	9.30	145.25	2.01	267.0	19W-8b
107	69.33	26.84	6.45	10.18	8.96	143.86	2.01	265.7	19W-9a
108	69.30	27.15	6.40	10.19	8.96	143.89	2.01	267.3	19W-9b
109	68.82	22.08	7.50	8.76	9.93	144.93	2.01	269.6	19W0-1a
110	68.10	21.05	7.81	8.52	10.16	146.45	2.01	278.9	19W0-1b
111	68.39	21.04	7.80	8.88	9.87	145.83	2.01	281.1	" -2a
112	69.13	21.13	7.74	8.07	10.47	144.25	2.01	267.8	" -2b
113	67.03	22.13	7.57	8.99	9.88	148.79	2.01	280.9	" -3a
114	65.95	22.60	7.50	8.57	10.28	151.22	2.01	275.3	" -3b
115	69.18	23.41	7.15	9.55	9.36	144.17	2.01	283.3	" -4a

Do not use - See 800/10 - 19 Sep 2006 MR

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Protocol# 15 - Pa_Np_Exp_AB.lsa User: Bertetti

									19PB redos cont.
116	62.41	26.30	6.86	10.59	9.18	159.82	2.01	283.9	19W0-4b
117	68.51	22.04	7.52	8.39	10.24	145.58	2.01	267.5	" -5a
118	68.94	23.68	7.10	8.76	9.92	144.65	2.01	260.7	" -5b
119	71.96	26.47	6.41	10.81	8.47	138.57	2.01	280.6	" -7a
120	59.48	32.91	5.96	13.46	8.08	167.73	2.01	277.5	" -7b
Missing vial 121.									
									22PC-redo
122	71.10	24.39	6.85	9.03	9.58	140.24	2.01	268.0	22W-11a
123	72.49	22.81	7.15	9.58	9.14	137.56	2.01	292.3	22W-11b
Missing vial 124.									
Missing vial 125.									
Missing vial 126.									
									19PB checks
127	67.25	25.66	6.76	10.05	9.17	148.29	2.01	276.6	19W0-C-1
128	68.65	23.76	7.10	8.98	9.78	145.32	2.01	269.6	19W0-C-2
129	66.30	24.66	7.01	9.35	9.68	150.42	2.01	262.1	" -C-3
130	68.37	23.92	7.07	9.67	9.33	145.87	2.01	287.1	" -C-4
131	70.86	23.10	7.15	9.55	9.25	140.73	2.01	287.7	" -C-5
132	68.45	25.87	6.67	10.11	9.06	145.73	2.01	277.1	" -C-6
133	70.61	22.11	7.41	9.07	9.58	141.23	2.01	277.0	" -C-7
134	67.69	24.92	6.89	9.93	9.21	147.32	2.01	279.8	" -C-8
135	65.96	24.63	7.03	9.72	9.46	151.20	2.01	274.9	" -C-9
136	68.60	25.38	6.76	10.11	9.05	145.39	2.01	274.6	" -C-10
137	70.70	43.78	4.51	16.67	6.53	141.03	2.01	268.8	" -C-11
138	71.83	44.89	4.40	17.15	6.37	138.81	2.01	268.5	" -C-12
Missing vial 139.									
Missing vial 140.									
Missing vial 141.									
									Spikes
142	1.29	1509.98	4.56	576.54	7.35	7814.32	1.99	272.6	61A1-11
143	1.23	1652.07	4.46	652.79	7.08	8166.26	2.00	275.6	61A1-12

Do not use - See 800/10 - 19 Sep 2006 MR

9 June 2006 MR

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BOOK NO.

13 June 2006 MR
PROJECT

Evaluation of NC-EWDP-19PB and NC-EWDP-22PC With and Without Calcite Sorption Experiment Results

Initial Entry for Entire Experiment: 742/45-46

Samples: NC-EWDP-19PB-0305-Sonic Core Composite - 696/64-66
NC-EWDP-19PB-0305-Sonic Core Composite w/o Calcite- 742/25
NC-EWDP-22PC-1005-Sonic Core Composite – 742/8
NC-EWDP-22Pc-1005-Sonic Core Composite w/o Calcite- 742/25

Water Used: 19PB-2 Simulated Groundwater with Calcium 742/41

Personnel Involved: Marla Roberts, Sandra Watson

Summary:

After review of the results of the LSA analyses (742/6-9) and a review of the recorded masses and pHs of the experimental solutions (742/48-72) it was decided the data collected from the experiment is un-usable. Errors within the experiment include, mass(g) discrepancies between 'before' and 'after' weights, inconsistent pH adjustments with nitric acid lowered the pH of the experimental solutions below a usable range and the LSA analyses of the Np-spikes were inconsistent with previous analyses of the same Np spikes (61A1).

The experiment will be repeated after an evaluation of the amount of pH adjustment needed to add to the experimental solutions in order to create pH values in the range of interest. See 800/11-12 for information about the pH adjustment.

19 Sep 2006 Note: Detailed corrective actions and issues are described in NCR No. 2006-18, which I completed on 25 Jul 2006.
13 June 2006 MR

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BOOK NO.

13 June 06 MR
PROJECT

Evaluation of pH adjustments required for 19PB-0305-Sonic Core Composite with and without Calcite and NC-EWDP-22PC-1005-Sonic Core Composite with and without Calcite

Personnel initially assigned to task: Marla Roberts

Objective: Determine the amount of acid needed to add to experimental solution in order to reach a specific range of pH values for use in sorption experiments.

Previous Initial Entries of Importance: 742/45-46 and 800/10

Sample info: NC-EWDP-19PB-0305-Sonic Core Composite - 696/64-66
NC-EWDP-19PB-0305-Sonic Core Composite w/o Calcite- 742/25
NC-EWDP-22PC-1005-Sonic Core Composite – 742/8
NC-EWDP-22Pc-1005-Sonic Core Composite w/o Calcite- 742/25

Solution info: 19PB-2 Simulated Groundwater with Calcium 742/41

Reagents: pH buffer 4 (Fisher SB98 lot # 041614)
pH buffer 7 (Fisher SB108 lot # 044065)
pH buffer 10 (Fisher SB 116 lot # 044060)
0.4 M HNO3 (696/195) for pH adjustment

Equipment: Orion meter 920A (sn 039518)
Thermo Orion combination electrode 8103BN (ID 3G)
New Brunswick Scientific Gyratory shaker model G33 (sn 290127990)
Mettler Toledo XP205DR (sn 1126461033)
Stir Plate

Supplies: Polycarbonate centrifuge tubes with caps (50 ml capacity)
Pipettes and tips

Procedure:

Four pc centrifuge tubes were labeled: 19W, 19WO, 22W and 22WO. About 0.1g of sediment was added to each of the tubes according to: 19W = NC-EWDP-19PB-0305-Sonic Core Composite , 19WO = NC-EWDP-19PB-0305-Sonic Core Composite w/o Calcite, 22W = NC-EWDP-22PC-1005-Sonic Core Composite and 22WO = NC-EWDP-22Pc-1005-Sonic Core Composite w/o Calcite. Prior to sediment transfer, each sample container was rolled gently to avoid bias. Next, approximately 30 mL of solution was added. Each tube was weighed and the mass recorded (800/12). Using an eppendorff pipette 10 µL of 0.4 M nitric acid was added. The tube was weighed and the mass recorded. The tubes were uncapped and placed on an activated shaker and left to equilibrate for a few hours. The addition of acid was a step-wise process, in which the tube weighed (and mass recorded), pH measured, acid was added, and left to equilibrate. The process repeated until ~210µL had been added. . This process used an increment of 50 µL of acid.

The pH of the experimental solutions was taken. Fresh pH buffers of 4, 7 and 10 (60mL bottles with stir bars) were used to calibrate the pH meter (using stir plate). The temperature, calibration set points and slope were recorded. The acceptable range for the slope is 92-102% from page 5 of Orion Ross pH Electrode Instruction Manual, 2003. See 800/13.

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19PB-W	Initial Mass (g)	Mass (g) after Equilibrization	pH
Tube, Sediment & Solution	53.06597		
Tube, Sediment, Solution & 10 µL acid	53.07530	53.06300	7.94 ①
+ 50µL acid	53.11299	52.98907	8.16 ②
+ 50µL acid	53.03901	53.00245	6.82 ③
+ 50µL acid	53.05246	52.91720	7.28 ④
+ 50µL acid	52.96720	52.90813	3.84 ⑤

19PB-WO	Initial Mass (g)	Mass (g) after Equilibrization	pH
Tube, Sediment & Solution	52.58008		
Tube, Sediment, Solution & 10 µL acid	52.58962	52.57382	7.68 ①
+ 50µL acid	52.62382	52.48307	7.85 ②
+ 50µL acid	52.53282	52.50029	6.71 ③
+ 50µL acid	52.55042	52.42986	6.79 ④
+ 50µL acid	52.47995	52.43493	4.19 ⑤

22PC-W	Initial Mass (g)	Mass (g) after Equilibrization	pH
Tube, Sediment & Solution	52.94711		
Tube, Sediment, Solution & 10 µL acid	52.95671	52.94431	7.90 ①
+ 50µL acid	52.99434	52.87285	7.81 ②
+ 50µL acid	52.92269	52.88726	6.63 ③
+ 50µL acid	52.93757	52.81022	6.94 ④
+ 50µL acid	52.86023	52.82003	3.65 ⑤

22PC-WO	Initial Mass (g)	Mass (g) after Equilibrization	pH
Tube, Sediment & Solution	52.79303		
Tube, Sediment, Solution & 10 µL acid	52.80248	52.78638	7.88 ①
+ 50µL acid	52.83637	52.74245	7.00 ②
+ 50µL acid	52.79211	52.75954	5.98 ③
+ 50µL acid	52.80934	52.68492	4.72 ④
+ 50µL acid	52.73482	52.69657	3.45 ⑤

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BOOK NO. 13 June 2006 MR PROJECT

In process Entry
pH Calibration

① Date: 13 June 2006 4:00 pm
temp: 20.3°C
13 June 2006 MR Set pts ~~Slope~~: 4.01, 7.01, 10.06
13 June 2006 MR Slope ~~Set pts~~: 98.6

② Date: 14 June 2006, 9:15 am
temp: 19.2°C
Slope: 97.9
Set pts: 4.00, 7.02, 10.07

③ Date: 14 June 2006, 1:15 pm
temp: 19.7°C
Slope: 97.8
Set pts: 4.00, 7.01, 10.07

④ Date: 15 June 2006, 9:55 am
temp: 18.9°C
Slope: 97.6
Set pts: 4.00, 7.02, 10.08

⑤ Date: 15 June 2006 2:10 pm
temp: 19.4°C
Slope: 97.7
Set pts: 4.00, 7.02, ~~10.08~~ 15 June 06 MR 10.07

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BOOK NO. 16 June 2006 MR PROJECT

Initial Entry – 19 CAL Series 1 and 22 CAL Series 1 with and without Calcite Sorption Experiments – Np-237 on Consolidated Alluvium with 19PB Simulated Waters with Calcium over a pH range

Personnel initially assigned to task: Marla Roberts and Sandra Watson

Objective: To investigate Np sorption on a NC-EWDP-19PB 0305 Consolidated Alluvium and NC-EWDP-22PC 1005 Consolidated Alluvium using simulated water (with calcium) based on the chemistry from water collected from the shallow string of drillhole NC-EWDP-19PB over a range of pHs.

Background: This is a repeat of a previous experiment (742/45-71). The results from the previous experiment were unusable. See 800/10 for further explanation.

Conditions:
- $\sum Np = 200$ ppb
- equilibrium with lab $CO_2(g)$; $pCO_2 = 10^{-3.42}$
- solution volume = 30 ml
- mass of solid = 0.1 g
- M/V (g/L) = 3.33

Samples
19PB-2 Simulated Groundwater with Ca – 742/41
NC-EWDP-19PB-0305-Sonic Core Composite - 696/64-66
NC-EWDP-19PB-0305-Sonic Core Composite w/o Calcite- 742/25
NC-EWDP-22PC-1005-Sonic Core Composite – 742/8
NC-EWDP-22Pc-1005-Sonic Core Composite w/o Calcite- 742/25

Reagents
Neptunium Spike # 61A-1 (369/100) - 60 ppm Np-237 at pH of 5.63
pH buffer 4 (Fisher SB98 lot # 041614)
pH buffer 7 (Fisher SB108 lot # 044065)
pH buffer 10 (Fisher SB 116 lot # 044060)
Ultima-Gold AB liquid scintillation cocktail (Packard 6013309 lot # 91-050201)
0.02 M HNO_3 (SN 696/29-30) for LSA matrix
0.4 M HNO3 (696/195) for pH adjustment
0.1 M NaOH (696/30) for pH adjustment
Type 1 water (Barnstead/Thermolyne model D11901 sn1190010979691)

Equipment:
Orion meter 920A (sn 039518)
Thermo Orion combination electrode 8103BN (ID 3G)
New Brunswick Scientific Gyratory shaker model G33 (sn 290127990)
Fisher Marathon 21K centrifuge model D7209 (sn 15930025)
Mettler Toledo XP205DR (sn 1126461033)
Packard Tricard 3100TR Liquid Scintillation Analyzer model B2505 (sn 405314)
Stir Plate
Centrifuge Tube Holder (Aluminum)

Supplies:
Pipettes and tips
Repipettor for transfer of scintillation cocktail
Polycarbonate centrifuge tubes with caps (50 ml capacity)
Stirs bars
Kimwipes

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7 ml scintillation vials
Weighing paper/boats
10 mL microbeakers
Plasticware and glassware as needed
Squirt bottle for water

Basic Outline of Procedure
- Equilibrate simulated water sample with laboratory CO_2.
- Measure the pH of simulated water samples.
- Add solids to experimental solutions.
- Add simulated water to experimental solutions.
- Add pH adjustment solutions to experimental solutions.
- Add neptunium spike to experimental solutions.
- Place experimental solutions on activated gyrator
- For the experiment, during regular business hours the tubes are loosely capped and tightly capped at night.
- Analyze aliquots of experimental solution for pH and neptunium concentration (LSA)

Summary of Tables:

Table 1-Initial mass of tube and mass of tube & solid
Table 2-Initial mass of tube, solid & simulated water
Table 3-Mass after pH adjustment, Mass after pH equilibration (overnight)
Table 4-Mass after Np spike added
Table 5-Mass of LSA vial & acid, mass of vial, acid and sample
Table 6-Mass of exp. soln tube before LSA sampling, pH of exp. soln.

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PROJECT

Equilibration of Simulated Waters used in 19CAL Series 1 and 22CAL Series 1 with and without Calcite Sorption Experimental Solutions

Personnel initially assigned to task: Marla Roberts

Objective: To equilibrate with ambient atmosphere the simulated water used in the experimental solutions.

Initial Entry: 800/14-15

Procedure

Aeration of simulated water conducted since 17 May 2006– see 742/41 and 43

In process:

This experiment will use all remaining 19PB-2 simulated water. New water will need to be made.
See 800/20.

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PROJECT

Addition of Solids to 19CAL Series 1 and 22CAL Series 1 with and without Calcite Sorption Experiments

Personnel initially assigned to task: Marla Roberts

Objective: To prepare the experimental solutions by adding the solid substrate.

Initial Entry: 800/14-15

Sample info NC-EWDP-19PB-0305-Sonic Core Composite - 696/64-66
NC-EWDP-19PB-0305-Sonic Core Composite w/o Calcite- 742/25
NC-EWDP-22PC-1005-Sonic Core Composite – 742/8
NC-EWDP-22Pc-1005-Sonic Core Composite w/o Calcite- 742/25

Procedure

Four sets of twelve polycarbonate centrifuge tubes were labeled as follows: 19CALW1- 1 to 12, 19CAL1-1 to 12, 22CALW1-1 to 12 and 22CAL1-1 to 12. The mass of each tube (with cap) was measured and recorded on 800/18-19. An individual experimental tube was uncapped and a funnel made from weighing paper was inserted in the top. Prior to aliquot removal the jar containing the solid was gently rolled to ensure an unbiased aliquot. Approximately 0.1 g of solid was transferred to a piece of tared weighing paper on the balance. The solid was transferred into the appropriate experimental tube and the tube was capped. This "solid addition" step was repeated until all experimental tubes contained the appropriate solid. The mass of each experimental tube was measured again and recorded on 800/18-19.

The centrifuge tubes labeled with a "CALW1" indicate the solid contains calcite and the aliquot was removed from a sampling containing calcite (NC-EWDP-19PB-0305-Sonic Core Composite and NC-EWDP-22PC-1005-Sonic Core Composite). The centrifuge tubes labeled with a "CAL1" indicate the solid does not contain calcite and was removed from a treated sample (NC-EWDP-19PB-0305-Sonic Core Composite w/o Calcite and NC-EWDP-22PC-1005-Sonic Core Composite w/o Calcite). See 742/25 for further information about calcite removal.

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BOOK NO. PROJECT

6/16/06 MR ~~Tabe~~ Table 1: Initial Masses of Tube & Tube and Solid.

Sample ID	Mass (g) Empty Tube	Mass (g) Tube & Solid
19CALW1-1	22.08945	22.19415
19CALW1-2	22.28084	22.38360
19CALW1-3	22.51443 6/16/06 MR 7	22.61869
19CALW1-4	22.50671	22.61146
19CALW1-5	22.31737	22.42238
19CALW1-6	22.31480	22.41578
19CALW1-7	22.03424	22.13926
19CALW1-8	22.55030	22.65355
19CALW1-9	22.28583	22.38726
19CALW1-10	22.05585	22.15936
19CALW1-11	22.28512	22.38848
19CALW1-12	22.06583	22.17389
19CAL1-1	22.49990	22.60406
19CAL1-2	22.29016	22.39332
19CAL1-3	22.05599	22.15996
19CAL1-4	22.30012	22.40464
19CAL1-5	22.30772	22.41165
19CAL1-6	22.53214	22.63526
19CAL1-7	22.28317	22.38976
19CAL1-8	22.45773	22.56266
19CAL1-9	22.28038	22.38401
19CAL1-10	22.51939	22.62662
19CAL1-11	22.14562	22.25028
19CAL1-12	22.52322	22.62662
22CALW1-1	22.30729	22.40856
22CALW1-2	22.12833	22.23082
22CALW1-3	22.11933	22.22433
22CALW1-4	22.32512	22.43031
22CALW1-5	21.95116	22.05716
22CALW1-6	21.98516	22.08939
22CALW1-7	22.12658 6/16/06 MR 65	22.22996
22CALW1-8	22.32982	22.43483
22CALW1-9	22.06263	22.16709
22CALW1-10	22.08419 6/16/06 MR 29	22.18858
22CALW1-11	21.99121	22.09242
22CALW1-12	22.25239	22.35773
22CAL1-1	22.17338	22.27896
22CAL1-2	22.02233	22.12549
22CAL1-3	22.28934	22.39422
22CAL1-4	22.32968	22.43426
22CAL1-5	22.25744	22.36286
22CAL1-6	22.29812	22.40229
22CAL1-7	22.01044	22.11358
22CAL1-8	22.28917	22.39274

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16 June 2006 MR cont.

Table 1 cont.:

Sample ID	Mass (g) Empty Tube	Mass (g) Tube & Solid
22CAL1-9	22.18218	22.28650
22CAL1-10	22.12809	22.23299
22CAL1-11	22.14914	22.25316
22CAL1-12	22.30308	22.40581

Challenge Balance: Target 20.0001 g
Before: 20.00002 After: 20.00000 for empty tube.
Before: 20.00012 After: 20.00004 for tube + solid

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BOOK NO. 19 June 2006 MR PROJECT

Preparation of 19PB Shallow String Simulated Groundwater with Calcium (3rd Batch)

Task Assigned To: Marla Roberts

Objective: To prepare simulated groundwater (from stock solutions) that can be used for sorption experiments.

Background: 19PB Shallow String Simulated Groundwater with Calcium is created by combining Stock Solutions A, B and C. To achieving the appropriate concentrations as described on 742/27-28, a 40 fold dilution factor is used. Meaning, 25 mL of each stock solution is required per liter of simulated water. The goal is to prepare 4L of 19PB Simulated Water with Calcium. Therefore 100mL of each stock solution is necessary to create 19PB Shallow String Simulated Groundwater with Calcium.

Equipment:

2 L volumetric flask	Glass gas dispersion tube
1 L volumetric flask	Moisture bottle
100 mL volumetric flask	Pump
4 L HDPE carboy	50 mL beaker
100 mL beaker	Disposable pipet

Reagents:

Stock Solution A (742/29)
Stock Solution B (742/31)
Stock Solution C (742/33)
Type 1 water

Procedure:

2 L (via 2L volumetric flask) of Type 1 water was added to the 4L carboy. 100mL (volumetric flask of Stock Solution A was collected. Taken to mark using disposable pipet and 50 mL beaker (filled with Stock Solution A). The 100 mL was transferred to 4L carboy. Following the same steps, 100mL of Stock Solution B and Stock Solution C were added to the 4L carboy. After Stock Solution A, B and C was added to the 4L carboy, the total volume of the carboy was 2300mL. The carboy was filled with an additional 1700 mL of Type 1 water. The carboy was swirled by hand. The carboy was labeled 19PB-3 Simulated Groundwater With Calcium. The '3' is to indicate this is the third batch of 19PB Simulated Groundwater with Calcium (see background 742/35). Finally, the carboy was set-up with an aeration device. A glass gas dispersion tube was inserted into the 4L carboy with a 'moisture bottle' between the carboy and the pump. The carboy opening is covered with a cut-out pieced of bench paper.

Fresh pH buffers 4, 7 and 10 (60mL bottles with stir bars) were used to calibrate the pH meter (using stir plate). The temperature, calibration set points and slope were recorded. The acceptable range for the slope is 92-102% from page 5 of Orion Ross pH Electrode Instruction Manual, 2003.

Temp: 19.0°C Set Pts: 4.00 7.02 10.08 Slope: 96.9

pH of 19PB-3 Simulated Groundwater With Calcium: 8.45

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BOOK NO. 19 June 2006 MR PROJECT

Addition of Simulated Water Solution to 19CAL Series 1 and 22CAL Series 1 with and without Calcite Sorption Experiment

Personnel initially assigned to task: Marla Roberts

Objective: To add simulated water to centrifuge tubes as preparation for sorption experiment.

Initial Entry: 800/14-15

Sample Info: 19PB-2 Simulated Groundwater with Calcium 742/41

Procedure

About 30mL (10mL pipet) of the simulated water was added to the experimental pc tubes (800/18-19). The mass was recorded on 800/22-23

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Table 2: Mass of tube, Solid + Sim. water.

Sample ID	Mass (g) Tube, Solid & Solution
19CALW1-1	52.66434
19CALW1-2	52.85099
19CALW1-3	52.63299
19CALW1-4	53.05285
19CALW1-5	52.97377
19CALW1-6	52.78012
19CALW1-7	52.60841
19CALW1-8	53.03538
19CALW1-9	52.98966
19CALW1-10	52.56745
19CALW1-11	52.68104
19CALW1-12	52.54982
19CAL1-1	53.01043
19CAL1-2	52.81002
19CAL1-3	52.72151
19CAL1-4	~~52.81313~~ 52.81299
19CAL1-5	52.84171
19CAL1-6	53.15984
19CAL1-7	52.83510
19CAL1-8	52.27467
19CAL1-9	52.70549
19CAL1-10	53.15165
19CAL1-11	52.71899
19CAL1-12	53.24302
22CALW1-1	52.84369
22CALW1-2	52.53885
22CALW1-3	51.89420
22CALW1-4	52.93225
22CALW1-5	52.58236
22CALW1-6	52.63386
22CALW1-7	52.76257
22CALW1-8	52.81284
22CALW1-9	51.35980
22CALW1-10	52.56353
22CALW1-11	52.06510
22CALW1-12	52.79628
22CAL1-1	51.56258
22CAL1-2	52.26164
22CAL1-3	52.86093
22CAL1-4	52.61559
22CAL1-5	52.44538
22CAL1-6	52.50789
22CAL1-7	52.60884
22CAL1-8	52.90883

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Table 2: cont.

22CAL1-9	52.76939
22CAL1-10	52.57580
22CAL1-11	52.60716
22CAL1-12	52.60107

Challenge Balance: Target – 20.0001g
Before: 20.00004 After: 20.00002

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Addition of pH Adjusting solution to 19CAL Series 1 and 22CAL Series 1 with and without Calcite Sorption Experimental Solutions

Personnel initially assigned to task: Marla Roberts

Objective: To prepare the experimental solutions by adding the pH adjusting solution.

Initial Entry: 800/14-15

Background: pH experiment (800/11-13) on NC-EWDP-19PB-0305-Sonic Core Composite (696/64-66), NC-EWDP-19PB-0305-Sonic Core Composite w/o Calcite (742/25) NC-EWDP-22PC-1005-Sonic Core Composite (742/8) and NC-EWDP-22Pc-1005-Sonic Core Composite w/o Calcite (742/25) resulted in an adjustment to the ph scheme used in original experiment (742/53). The pH experiment showed the sediment and the simulated water were less able to buffer the solution when large amounts of acid are added. In addition the pH drifted back up when left to equilibrate for a couple of hours. As a result the pH scheme was altered to reduce the acid added. See below for details.

Procedure:

Used adjustable eppendorfs 100-1000μL and 10/20/25 μL to add 0.4 M HNO3 (696/195) for pH adjustment according to the schemes listed below. The tubes were weighed and the masses recorded 800/25-26. The solutions were then votexed for ~30 seconds and placed loosely capped on an activated gyrator overnight. The tubes were re-weighed the next day and the mass recorded (*Mass After Equilibration*) 800/25-26.

pH SCHEME FOR:

19CAL1W 1-12,
19CAL1 1-12,
22CALW 1-12

ID	Vol (µL) of 0.4 M HNO_3	Vol (µL) of 0.1 M NaOH
1	210	na
2	205	na
3	200	na
4	195	na
5	190	na
6	185	na
7	180	na
8	158	na
9	140	na
10	105	na
11	10	na
12	na	517

pH SCHEME FOR:
22CAL1 1-12

ID	Vol (µL) of 0.4 M HNO_3	Vol (µL) of 0.1 M NaOH
1	180	na
2	175	na
3	170	na
4	165	na
5	160	na
6	155	na
7	150	na
8	128	na
9	120	na
10	105	na
11	10	na
12	na	517

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Table 3: Mass after pH adjustment + equilibration ~~equilib~~ 6/19/06 MR

Sample ID	Mass (g) After pH Adjustment	Mass (g) After Equilibration
19CALW1-1	52.87443	52.85748
19CALW1-2	53.05690	53.03978
19CALW1-3	52.83497	52.81389
19CALW1-4	53.24922	53.23417
19CALW1-5	53.16392	53.14191
19CALW1-6	52.96621	52.94739
19CALW1-7	52.78657	52.77366
19CALW1-8	53.19244	53.17478
19CALW1-9	53.13052	53.11397
19CALW1-10	52.67272	52.65254
19CALW1-11	52.69138	52.67382
19CALW1-12	53.06541	53.05565
19CAL1-1	53.22140	53.20568
19CAL1-2	53.01754	53.00578
19CAL1-3	52.92316	52.90868
19CAL1-4	53.00920	52.99031
19CAL1-5	53.03259	53.01319
19CAL1-6	53.34562	53.32474
19CAL1-7	53.01554	52.99622
19CAL1-8	52.43215	52.41347
19CAL1-9	52.84571	52.81353
19CAL1-10	53.25619	53.23874
19CAL1-11	52.72929	52.71375
19CAL1-12	53.75924	53.74850
22CALW1-1	53.05305	53.03493
22CALW1-2	52.74355	52.72520
22CALW1-3	52.09534	52.07860
22CALW1-4	53.12976	53.11350
22CALW1-5	52.77414	52.76031
22CALW1-6	52.81946	52.80840
22CALW1-7	52.94315	52.92868
22CALW1-8	52.97140	52.95815
22CALW1-9	51.50~~61~~ 6/16/06 MR 73	51.48011
22CALW1-10	52.66959	52.65598
22CALW1-11	52.07543	52.06173
22CALW1-12	53.31270	53.30217
22CAL1-1	51.74307	51.73055
22CAL1-2	52.43665	52.42035
22CAL1-3	53.03051	53.01446
22CAL1-4	52.78033	52.76913
22CAL1-5	52.60481	52.59272
22CAL1-6	52.66373	52.64996
22CAL1-7	52.76025	52.74706

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Table 3: cont.

22CAL1-8	53.035~~8~~ 6/19/06 MR 38	53.02287
22CAL1-9	52.88829	52.86001
22CAL1-10	52.68012	52.66726
22CAL1-11	52.61712	52.60913
22CAL1-12	53.11868	53.10938 6/20/06 MR 49

Challenge Balance: Target – 20.0001g
Before: 20.00002 After: 19.99999 - after adding pH adjustment

Before: 19.99999 After: 20.00000 -after equilibration

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Addition of Neptunium Spike to 19CAL Series 1 and 22CAL Series 1 with and without Calcite Sorption Experimental Solutions

Personnel initially assigned to task: Marla Roberts

Objective: To prepare the experimental solutions by adding the neptunium spike.

Initial Entry: 800/14-15

Reagent: Np Spike # 61A-1 (369/100)

Procedure

Added 100μL (100μL eppendorf pipet) to each experimental solution and recorded the mass of the experimental solution on 800/28-29.

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Table 4: Mass after Np Spike

Sample ID	Mass (g) After Np Added
19CALW1-1	52.95742
19CALW1-2	53.13951
19CALW1-3	52.91353
19CALW1-4	53.33192
19CALW1-5	53.23724
19CALW1-6	53.04710
19CALW1-7	52.87342
19CALW1-8	53.27458
19CALW1-9	53.21383
19CALW1-10	52.75254
19CALW1-11	52.77399
19CALW1-12	53.15569
19CAL1-1	53.30540
19CAL1-2	53.10546
19CAL1-3	53.00830
19CAL1-4	53.089~~64~~ 74 6/20/06 MR
19CAL1-5	53.11276
19CAL1-6	53.42425
19CAL1-7	53.09570
19CAL1-8	52.51310
19CAL1-9	52.91313
19CAL1-10	53.33851
19CAL1-11	52.81339
19CAL1-12	53.84820
22CALW1-1	53.13450
22CALW1-2	52.82456
22CALW1-3	52.17810
22CALW1-4	53.21302
22CALW1-5	52.85973
22CALW1-6	52.90783
22CALW1-7	53.02787
22CALW1-8	53.05721
22CALW1-9	51.57955
22CALW1-10	52.75544
22CALW1-11	52.16118
22CALW1-12	53.40155
22CAL1-1	51.82971
22CAL1-2	52.51934
22CAL1-3	53.11382
22CAL1-4	52.86814
22CAL1-5	52.69221
22CAL1-6	52.74921
22CAL1-7	52.84639
22CAL1-8	53.12206

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Table 4: cont.

22CAL1-9	52.95916
22CAL1-10	52.76637
22CAL1-11	52.70823 6/20/06 MR 31
22CAL1-12	53.20861

Challenge Balance: Target – 20.0001g
Before: 20.00003 After: 20.00000

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Running of 19CAL ~~Series1~~ Series1 + 22CAL Series1 With and without 20 June 06 MR Calcite Sorption Experiment

Initial entry: 800/14-15

Each experimental tube was placed on activated gyrator loosely capped at ~11:30 am.

At ~ 4:45 pm caps were ~~tightend~~ tightened 20 June 06 MR for the night.

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21 June 2006 MR
PROJECT

Running of 19CALI Series + 22CALI Series w/ & w/o Calcite Sorption Exp.

Initial entry: 800/14-15

At 8:15am all exp. tubes were vortexed for ~30 seconds. Next all tubes were placed loosely capped in an activated gyrator.

At 4:30pm caps were tighten and all tubes placed on an activated gyrator.

22 June 2006 MR

Running of 19CALI Series + 22CALI Series w/ & w/o Calcite Sorption Experiment

Initial entry: 800/14-15

At 8:30am all exp. tubes were vortexed for ~30 seconds. Next all tubes were placed loosely capped in an activated gyrator.

At 4:15pm caps were tightened and all tubes placed on an activated gyrator.

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23 June 2006 MR
PROJECT

Running of 19CALI Series + 22CALI Series w/ and w/o Calcite Sorption Experiment.

Initial Entry: 800/14-15
At 8:00am all exp. tubes were vortexed for ~30 seconds. ~~At 2:30pm~~ Next, all tubes were placed loosely capped in an activated gyrator.

Tubes will remain loosely capped until 26 June 2006 (weekend).

26 June 2006 MR

Running of 19CALI Series + 22CALI Series w/ + w/o Calcite Sorption Experiment

Initial Entry: 800/14-15

Tubes were left loosely capped over weekend. All tubes capped and vortexed for ~30 seconds. at 8:30 am. Next tubes placed on activated gyrator.

At 4:30 pm. all caps tightened and all tubes placed on activated gyrator.

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End experiment

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Liquid Scintillation and pH Analyses of 19CAL Series 1 and 22CAL Series 1 with and without Calcite Sorption Experimental Solutions– Np-237 in one type of simulated groundwater (with Ca) over a pH range

Task initially assigned to: Marla Roberts

Objective: To determine the neptunium concentration and pH of experimental solutions and to use in calculations for determining the sorption coefficient (Kd) under specified conditions

Initial Entry: 800/14-15

Background: Repeat of previous experiment. For further information see 800/10

Sample Info: Four types of experiments were run. Experiments based on consolidated alluvium substrate with and without calcite from NC-EWDP-19PB and NC-EWDP-22PC using one simulated water (with calcium) based on 19PB shallow string groundwater.

Procedure:

LSA vials (size 7 mL) were labeled for experimental solutions, blank solution, and neptunium spikes solutions. Due to lack of space on the LSA caps, the sample IDs were changed. See 800/34 for legend of sample IDs. Experimental solutions were analyzed in duplicate and labeled to identify the sorption solid phase and series, the experimental solution number, and the a/b duplicate designator (example – 19CW1-1a and 19W-Np1b). One simulated water blank solution was analyzed and labeled as, Blank wCa with scientific notebook page reference. The neptunium spike was analyzed in duplicate and labeled Spike 61A1-13 and 61A1-14.

Each LSA vial (experimental solution, water blank, and neptunium spikes) had 0.5 mL (500μL eppendorf pipet) of 0.02 M HNO_3 added. The mass of all of the LSA vials with acid was recorded (See Table 5).

The experimental solutions were centrifuged for about 5 minutes at 9200 RPM prior to LSA aliquot transfer. The mass of the experimental solutions was recorded before removing the LSA aliquots (See Table 6). The tubes containing the experimental solutions were placed in the tared aluminum centrifuge holder.

For experimental solutions, 0.5 mL (500μL eppendorf pipet) of the experimental solution was transferred into the appropriate LSA vial. For the simulated water blank, 0.5 mL (500μL eppendorf pipet) of simulated water was added to the LSA vial. For the neptunium spike solutions, 0.1 mL (100μL eppendorf pipet) of the spike was added into each LSA vial. The mass of all of the LSA vials was recorded after the addition of the appropriate sample solution (See Table 5).

Next, the pH of the experimental solutions was taken. Fresh pH buffers of 4, 7 and 10 (60mL bottles with stir bars) were used to calibrate the pH meter (using stir plate). The temperature, calibration setpoints and slope were recorded. The acceptable range for the slope is 92-102% from page 5 of Orion Ross pH Electrode Instruction Manual, 2003.

Temp: 21 c Set Pts.: 4.01, 7.01, 10.05 Slope: 97.4

Stir bars were placed in each of the exp. tubes. The pH probe was inserted directly into the the tube. A stir plate was used when measuring the pH of the experimental solutions. The pH was recorded (Table 6). The pH meter was challenged with one of the calibration standards after all of the sample pHs were measured. The challenge solution type and measurement was recorded.

All LSA vials had 5 mL (Repipet bottle top dispenser) of LSA cocktail added. The LSA vials were tightly capped and rigorously shaken by hand.

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LSA Legend

Sample ID	LSA ID	Sample ID	LSA ID	Sample ID
Blank	Blank wCa	22CALW1-1	22CW1 1a	Spike 61A1-13
19CALW1-1	19CW1 1a		22CW1 1b	Spike 61A1-14
	19CW1 1b	22CALW1-2	22CW1 2a	
19CALW1-2	19CW1 2a		22CW1 2b	
	19CW1 2b	22CALW1-3	22CW1 3a	
19CALW1-3	19CW1 3a		22CW1 3b	
	19CW1 3b	22CALW1-4	22CW1 4a	
19CALW1-4	19CW1 4a		22CW1 4b	
	19CW1 4b	22CALW1-5	22CW1 5a	
19CALW1-5	19CW1 5a		22CW1 5b	
	19CW1 5b	22CALW1-6	22CW1 6a	
19CALW1-6	19CW1 6a		22CW1 6b	
	19CW1 6b	22CALW1-7	22CW1 7a	
19CALW1-7	19CW1 7a		22CW1 7b	
	19CW1 7b	22CALW1-8	22CW1 8a	
19CALW1-8	19CW1 8a		22CW1 8b	
	19CW1 8b	22CALW1-9	22CW1 9a	
19CALW1-9	19CW1 9a		22CW1 9b	
	19CW1 9b	22CALW1-10	22CW1 10a	
19CALW1-10	19CW1 10a		22CW1 10b	
	19CW1 10b	22CALW1-11	22CW1 11a	
19CALW1-11	19CW1 11a		22CW1 11b	
	19CW1 11b	22CALW1-12	22CW1 12a	
19CALW1-12	19CW1 12a		22CW1 12b	
	19CW1 12b	22CAL1-1	22C1 1a	
19CAL1-1	19C1 1a		22C1 1b	
	19C1 1b	22CAL1-2	22C1 2a	
19CAL1-2	19C1 2a		22C1 2b	
	19C1 2b	22CAL1-3	22C1 3a	
19CAL1-3	19C1 3a		22C1 3b	
	19C1 3b	22CAL1-4	22C1 4a	
19CAL1-4	19C1 4a		22C1 4b	
	19C1 4b	22CAL1-5	22C1 5a	
19CAL1-5	19C1 5a		22C1 5b	
	19C1 5b	22CAL1-6	22C1 6a	
19CAL1-6	19C1 6a		22C1 6b	
	19C1 6b	22CAL1-7	22C1 7a	
19CAL1-7	19C1 7a		22C1 7b	
	19C1 7b	22CAL1-8	22C1 8a	
19CAL1-8	19C1 8a		22C1 8b	
	19C1 8b	22CAL1-9	22C1 9a	
19CAL1-9	19C1 9a		22C1 9b	
	19C1 9b	22CAL1-10	22C1 10a	
19CAL1-10	19C1 10a		22C1 10b	
	19C1 10b	22CAL1-11	22C1 11a	
19CAL1-11	19C1 11a		22C1 11b	
	19C1 11b	22CAL1-12	22C1 12a	
19CAL1-12	19C1 12a		22C1 12b	
	19C1 12b			

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Table 5: Mass of LSA vial + acid, mass of vial, acid + sample

Sample ID	Mass (g) of LSA vial & acid	Mass (g) of LSA vial, acid & sample
Blank wCa	7.89451	8.39293
19CW1 1a	7.89411	8.39143
19CW1 1b	7.90061	8.39690
19CW1 2a	7.87789	8.37050
19CW1 2b	7.84860	8.34339
19CW1 3a	7.92778	8.41988
19CW1 3b	7.86223	8.35642
19CW1 4a	7.99024	8.48261
19CW1 4b	7.88643	8.38003
19CW1 5a	7.94299	8.43542
19CW1 5b	7.92609	8.42096
19CW1 6a	7.94996	8.44236
19CW1 6b	7.98309	8.47649
19CW1 7a	7.88950	8.38212
19CW1 7b	7.95360	8.44895
19CW1 8a	7.88639	8.37993
19CW1 8b	7.96874	8.46473
19CW1 9a	7.95913	8.45537
19CW1 9b	7.94319	8.44062
19CW1 10a	7.91234	8.40971
19CW1 10b	7.85424	8.35029
19CW1 11a	7.88083	8.37590
19CW1 11b	7.94448	8.44092
19CW1 12a	7.84730	8.34353
19CW1 12b	7.97162	8.46736
19C1 1a	7.83833	8.33625
19C1 1b	7.85079	8.34761
19C1 2a	7.85264	8.34711
19C1 2b	7.87033	8.36689
19C1 3a	7.91162	8.40583
19C1 3b	7.87049	8.36588
19C1 4a	7.90773	8.40171
19C1 4b	7.85852	8.35347
19C1 5a	7.88487	8.37873
19C1 5b	7.91003	8.40353
19C1 6a	7.92512	8.41806
19C1 6b	7.86396	8.35836
19C1 7a	7.80479	8.30170
19C1 7b	7.85244	8.34791
19C1 8a	7.84245	8.33601
19C1 8b	7.90900	8.40350
19C1 9a	7.89035	8.38549
19C1 9b	7.87961	8.37446

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Table 5: cont.

Sample ID	Mass (g) of LSA vial & acid	Mass (g) of LSA vial, acid & sample
19C1 10a	7.90150	8.39560
19C1 10b	7.90913	8.40348
19C1 11a	7.99821	8.49295
19C1 11b	7.96412	8.45944
19C1 12a	7.95124	8.44561
19C1 12b	7.91866	8.~~412~~ 41309 27 June MR
22CW1 1a	7.88798	8.38162
22CW1 1b	7.87876	8.37372
22CW1 2a	7.88549	8.37952
22CW1 2b	7.93391	8.43491
22CW1 3a	7.87745	8.37343
22CW1 3b	7.88547	8.38230
22CW1 4a	7.92213	8.41664
22CW1 4b	7.89100	8.38615
22CW1 5a	8.01814	8.51433
22CW1 5b	7.89232	8.38833
22CW1 6a	7.89546	8.39071
22CW1 6b	7.94669	8.44259
22CW1 7a	7.85816	8.35155
22CW1 7b	7.87986	8.37499
22CW1 8a	7.90645	8.40297
22CW1 8b	7.86596	8.36150
22CW1 9a	7.88202	8.37680
22CW1 9b	7.90297	8.39960
22CW1 10a	7.90193	8.39687
22CW1 10b	7.90715	8.~~39~~ 40171 6/27/06 MR
22CW1 11a	8.01232	8.50612
22CW1 11b	7.88863	8.38372
22CW1 12a	7.92418	8.41988
22CW1 12b	7.88743	8.38244
22C1 1a	7.91411	8.40896
22C1 1b	7.94059	8.43592
22C1 2a	7.82705	8.32204
22C1 2b	7.94206	8.43704
22C1 3a	7.89207	8.38631
22C1 3b	7.91018	8.40559
22C1 4a	7.88318	8.37928
22C1 4b	8.02508	8.52041
22C1 5a	7.94856	8.44343
22C1 5b	7.85793	8.35346
22C1 6a	7.87674	8.37286
22C1 6b	7.96511	8.46168
22C1 7a	7.86241	8.35857

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Table 5: cont.

Sample ID	Mass (g) of LSA vial & acid	Mass (g) of LSA vial, acid & sample
22C1 7b	7.91259	8.41021
22C1 8a	6/27/06 MR ~~7.86285~~ 7.93608	8.43131
22C1 8b	6/27/06 MR ~~7.88653~~ 7.96592	8.46309
22C1 9a	7.91934	8.41457
22C1 9b	7.97410	8.46966
22C1 10a	7.87526	8.37141
22C1 10b	7.91097	8.40743
22C1 11a	7.94884	8.44205
22C1 11b	7.87548	8.37183
22C1 12a	7.98576	8.48021
22C1 12b	7.90590	8.40057
Spike 61A1-13	7.91555	8.01499
Spike 61A1-14	7.89400	7.99414

Challenge Balance: Target – 20.0001g
Before: 19.99998 After: 20.00000

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DISCLOSED TO AND UNDERSTOOD BY PRINTED NAME DATE

27 June 2006 MR
BOOK NO. PROJECT

Table 6: Mass Before ~~LS~~ LSA, pH of Exp. Sol.

Sample ID	Mass (g) Before LSA	pH of Exp. Soln.
19CALW1-1	52.81238	4.52
19CALW1-2	52.83900	4.77
19CALW1-3	52.72992	4.88
19CALW1-4	53.16297	5.34
19CALW1-5	52.95323	6.31
19CALW1-6	52.87721	7.04
19CALW1-7	52.61156	7.37
19CALW1-8	53.12215	8.04
19CALW1-9	53.04162	8.15
19CALW1-10	52.60123	8.29
19CALW1-11	52.56164	8.63
19CALW1-12	52.88022	8.84
19CAL1-1	53.07494	7.13
19CAL1-2	52.85885	7.17
19CAL1-3	52.74789	7.56
19CAL1-4	52.88678	7.70
19CAL1-5	52.59846	7.83
19CAL1-6	53.20786	7.83
19CAL1-7	52.89082	7.85
19CAL1-8	52.33661	8.06
19CAL1-9	52.69322	8.20
19CAL1-10	53.13332	8.42
19CAL1-11	52.65113	8.60
19CAL1-12	53.67803	9.04
22CALW1-1	52.91118	4.17
22CALW1-2	52.55496	4.29
22CALW1-3	51.92458	4.33
22CALW1-4	53.01597	4.82
22CALW1-5	52.65578	5.36
22CALW1-6	52.52773	6.15
22CALW1-7	52.85 ~~188~~ 242 6/27/06 MR	6.89
22CALW1-8	52.85 ~~242~~ 185 6/27/06 MR	7.63
22CALW1-9	51.35079	7.69
22CALW1-10	52.55235	8.26
22CALW1-11	51.91027	8.75
22CALW1-12	53.24492	8.83
22CAL1-1	51.63099	7.85
22CAL1-2	52.33659	7.78
22CAL1-3	52.84915	7.99
22CAL1-4	52.64295	7.91
22CAL1-5	52.12800	8.10
22CAL1-6	52.56845	8.13
22CAL1-7	52.69370	8.16
22CAL1-8	52.90085	8.25

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Table 6: Cont.

22CAL1-9	52.74981	8.30
22CAL1-10	52.49993	8.31
22CAL1-11	52.55991	8.64
22CAL1-12	52.95776	9.19

Challenge Balance: Target – 20.0001g
Before: 19.99999 After: 20.00001

In process entry:
pH meter challenged with pH buffer 10. Measured at 10.05.

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Preparation of Cation and Anion QA Solutions for 19CAL Series 1 and 22CAL Series 1 with and without Calcite Sorption Experiment

Personnel Involved: Sandra Watson

Objective: To prepare QA solutions to include with 19CAL Series 1 and 22CAL Series 1 with and without Calcite cation and anion samples sent to Div 01 for analyses.

Reagents: Spex Certiprep Instrument Calibration Standard 3 (cat # CL-CAL-3, lot # 29-19AS)
Spex Certiprep IC Instrument Check Standard 2 (cat # ICMIX2-100, lot # 28-164AS)
Type 1 water (Barnstead/Thermolyne model D11901 sn1190010979691)

Supplies: Volumetric pipets
Volumetric flasks
HDPE bottles
Squirt bottle for water
Kimwipes

Procedure

Added 20 mL (volumetric pipet) of cation mix (Spex CL-CAL-3) into a 1000 mL volumetric flask and filled to mark with type 1 water and mixed thoroughly. Decanted into a 1 L HDPE bottle and labeled Cation Std, date, initials, and SN ref. The cation dilution factor is 50.

Added 10 mL (volumetric pipet) of anion mix (Spex ICMIX2-100) into a 500 mL volumetric flask and filled to mark with type 1 water and mixed thoroughly. Decanted into a 500 mL HDPE bottle and labeled Anion Std, date, initials, and SN. The anion dilution factor is 50.

Table of Target Conc (ppm) of QA standards for samples

Species	Conc (ppm) in Spex Standard	Dilution Factor	Target Conc (ppm) of QA Standard
K	1000	50	20
Ca	1000	50	20
Na	1000	50	20
Mg	1000	50	20
HPO4	600	50	12
Br	400	50	8
NO3	400	50	8
SO4	400	50	8
Cl	200	50	4
F	100	50	2

Sampling of 19CAL Series 1 and 22CAL Series 1 with and without Calcite Sorption Experimental Solutions for Div 01 Cation and Anion Analyses

Task initially assigned to: Marla Roberts and Sandra Watson

Objective:
To characterize 19CAL Series 1 and 22CAL Series 1 with and without Calcite Sorption Experimental Solutions water chemistry at the conclusion of the sorption experiments by analyses of cations and anions.

Initial Entry: 800/14-15

Samples and Reagents:
Experimental solutions: 19CALW1-1 to 12, 19CAL1-1 to 12 and 22CALW1-1 to 12, 22CAL1-1 to 12 (800/38-39).
QA solutions: cation and anion QA std (800/40)

Equipment:
100 mL pp beakers
Filters – Whatman #6874-2504, lot # 11026, 25mm dia and 0.45 μm pore size
10mL syringe, BD#
30mL pp bottles
60mL pp bottles

Note:
The cation and anion analyses samples were collected after the pH analyses was conducted (800/38)

Procedure:
A 10cc syringe was used to collect as much sample as possible from the centrifuge tube. Next a filter was attached to the end of the syringe. The sample was dispensed into a labeled 30mL pp bottle. The label contained a Div 01 ID, initials, and date. The filter was set aside in a contained location and the syringe was again inserted into the centrifuge tube and the experimental solution was withdrawn. The filter was again placed on the syringe and the sample was dispensed into the labeled pp bottle. The filter was then properly discarded with other rad. trash. This process was repeated for each of the experimental solutions.

The samples sent to Div 01 for anion analyses were created by splitting the cation sample. 30mL pp bottles were labeled and their mass recorded (800/45). Using an eppendorff pipet about 5mL of solution was added to the anion bottles. The anion bottles were re-weighed and the mass recorded. Approximately, 15mL of Type 1 water was transferred to the anion bottles. The bottles were re-weighed and the mass recorded. The dilution factor was calculated by weight for each sample.

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Two duplicate QA samples were included in this sample set. Aliquots of cation and anion QA stds (800/40) were decanted into four labeled 30mL pp bottles.

All 19CAL1 series (with and without calcite) experimental solutions were given the prefix "19C". "W" was added to the Div 01 ID to indicate experiments with calcite. The suffixes 1 to 12 were used for the 19CALW1 series (with calcite) exp solutions. The suffixes 1 to 12 were used again for the individual 19CAL1 exp solutions. The prefixes allow for easy and unique identification. All 22CAL1 series (with and without calcite) experimental solutions were given the prefix "22C". "W" was added to the Div 01 ID to indicate experiments with calcite. The suffixes 1 to 12 were used for the individual 22CALW1 series (with calcite) exp solutions. Suffixes 1 to 12 were repeated for 22CAL1 exp solutions.

All experimental solutions used the same water, 19PB-2 Simulated Groundwater with Calcium 742/41. However, this experiment exhausted all of the 19PB-2 Simulated Groundwater with Calcium. As a result more water was made (19PB-3 Simulated Groundwater with Calcium, 800/20). An aliquot of this water was also sent to Div 01 for analyses. The sample ID was 1922-1. In addition, sample IDs 1922-2 to 5 were used for the cation and anion QA samples respectively. The last letter of the Div 01 ID (either A or C) was used to indicate the sample was either for anion or cation analyses. The following is complete legend relating the GED IDs with the DIV 01 IDs.

In process entry:
all Cation Samples sent to Div 01 for analyses were ~~APH~~ 28 June 06 MR preserved with 70 ul of 1:1 Nitric acid (742/74)

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GED Sample ID	Div 01 Sample ID-Cations	Div 01 Sample ID-Anions
19CALW1-1	19CW-1C	19CW-1A
19CALW1-2	19CW-2C	19CW-2A
19CALW1-3	19CW-3C	19CW-3A
19CALW1-4	19CW-4C	19CW-4A
19CALW1-5	19CW-5C	19CW-5A
19CALW1-6	19CW-6C	19CW-6A
19CALW1-7	19CW-7C	19CW-7A
19CALW1-8	19CW-8C	19CW-8A
19CALW1-9	19CW-9C	19CW-9A
19CALW1-10	19CW-10C	19CW-10A
19CALW1-11	19CW-11C	19CW-11A
19CALW1-12	19CW-12C	19CW-12A
19CAL1-1	19C-1C	19C-1A
19CAL1-2	19C-2C	19C-2A
19CAL1-3	19C-3C	19C-3A
19CAL1-4	19C-4C	19C-4A
19CAL1-5	19C-5C	19C-5A
19CAL1-6	19C-6C	19C-6A
19CAL1-7	19C-7C	19C-7A
19CAL1-8	19C-8C	19C-8A
19CAL1-9	19C-9C	19C-9A
19CAL1-10	19C-10C	19C-10A
19CAL1-11	19C-11C	19C-11A
19CAL1-12	19C-12C	19C-12A
22CALW1-1	22CW-1C	22CW-1A
22CALW1-2	22CW-2C	22CW-2A
22CALW1-3	22CW-3C	22CW-3A
22CALW1-4	22CW-4C	22CW-4A
22CALW1-5	22CW-5C	22CW-5A
22CALW1-6	22CW-6C	22CW-6A
22CALW1-7	22CW-7C	22CW-7A
22CALW1-8	22CW-8C	22CW-8A
22CALW1-9	22CW-9C	22CW-9A
22CALW1-10	22CW-10C	22CW-10A
22CALW1-11	22CW-11C	22CW-11A
22CALW1-12	22CW-12C	22CW-12A
22CAL1-1	22C-1C	22C-1A
22CAL1-2	22C-2C	22C-2A
22CAL1-3	22C-3C	22C-3A
22CAL1-4	22C-4C	22C-4A
22CAL1-5	22C-5C	22C-5A
22CAL1-6	22C-6C	22C-6A
22CAL1-7	22C-7C	22C-7A
22CAL1-8	22C-8C	22C-8A
22CAL1-9	22C-9C	22C-9A
22CAL1-10	22C-10C	22C-10A
22CAL1-11	22C-11C	22C-11A

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22CAL1-12	22C-12C	22C-12A
19PB-3 Simulated Groundwater with Calcium	1922-1C	1922-1A
QA-cation1	1922-2C	na
QA-cation2	1922-3C	na
QA-anion1	na	1922-4A
QA-anion2	na	1922-5A

Balance Challenged - Target 20.0001g
Before: 20.00000 After: 20.00002

This challenge is for the following table 800/45.

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Div 01 Sample ID-Anions	Mass (g) Empty Bottle	Mass (g) bottle & exp. soln.	Mass (g) bottle, exp. soln. & Type 1 water
19CW-1A	8.23272	13.37588	28.52476
19CW-2A	8.22035	12.95265	27.88265
19CW-3A	8.19156	13.42641	28.71809
19CW-4A	8.19999	13.38281	28.63231
19CW-5A	8.25207	13.49421	28.73296
19CW-6A	8.13731	13.38449	28.57570
19CW-7A	8.13977	13.37596	28.48230
19CW-8A	8.17601	13.42957	28.57123
19CW-9A	8.20566	13.44744	28.68281
19CW-10A	8.24047	13.42328	28.60946
19CW-11A	8.19039	13.43645	28.59666
19CW-12A	8.17293	13.42178	28.61947
19C-1A	8.19147	13.49523	28.06749
19C-2A	8.23815	13.43643	28.06085
19C-3A	8.18804	13.40317	28.44796
19C-4A	8.15283	13.40412	27.99136
19C-5A	8.24016	13.47307	28.63682
19C-6A	8.24759	13.44120	28.67043
19C-7A	8.18041	13.41919	28.63588
19C-8A	8.19912	13.40029	28.64759
19C-9A	8.20365	13.35125	28.29402
19C-10A	8.24565	13.47164	28.66733
19C-11A	8.19438	13.42314	28.34895
19C-12A	8.17315	13.54177	28.85442
22CW-1A	8.15800	13.40365	28.04598
22CW-2A	8.16131	13.40093	28.71341
22CW-3A	8.19236	13.39004	28.23377
22CW-4A	8.19646	13.43673	28.35418
22CW-5A	8.19746	13.42473	27.85029
22CW-6A	8.23435	13.46024	28.27971
22CW-7A	8.24318	13.48791	28.67372
22CW-8A	8.23029	13.46977	28.20636
22CW-9A	8.14757	13.37476	28.68443
22CW-10A	8.23731	13.47722	28.78967
22CW-11A	8.18154	13.41796	28.74977
22CW-12A	8.19694	13.43110	28.48796

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Div 01 Sample ID-Anions	Mass (g) Empty Bottle	Mass (g) bottle & exp. soln.	Mass (g) bottle, exp. soln. & Type 1 water
22C-1A	8.14101	13.28988	28.53986
22C-2A	8.15336	13.38408	28.48560
22C-3A	8.25237	13.40130	28.55851
22C-4A	8.17088	13.31111	28.50137
22C-5A	8.25694	13.38069	28.54352
22C-6A	8.17999	13.30862	28.61616
22C-7A	8.16952	13.30346	28.49402
22C-8A	8.20877	13.35319	28.46726
22C-9A	8.22657	13.37060	28.62839
22C-10A	8.24540	13.38938	28.26072
22C-11A	8.24623	13.38357	27.71920
22C-12A	8.24802	13.38860	28.66969

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Delivery of 19CAL1 Series w/ and w/o Calcite and 22CAL1 Series w/ and w/o Calcite samples to Div 01 for Cation and Anion Analyses.

Initial Entry for Sorption Exp: 800/14

Samples: 12-19CALW1
12-19CAL1
12-22CALW1
12-22CAL1
2-19PB-3 Simulated Groundwater with Calcium.
4 QAs (2-cation + 2 anion)

Sample + QA Collection: 800/41

Sample legend: 800/43-44

QA target conc.: 800/40

Chain of custody on following pages:

29 June 2006 MR

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BOOK NO.

PROJECT

29 June 2006 MR

SAMPLE LIST/CHAIN OF CUSTODY

Southwest Research Institute®
Chemistry and Chemical Engineering Division
6220 Culebra Road
San Antonio, Texas 78238-5166

Shipper/Name/Address: Bradley Werling Bldg 57

Client: Div 20

Client Purchase Order/Other ID:

Site/Zone ID:

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

SwRI Contact: Mike Dammann

Analyses Requested

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Anions by IC										REMARKS
19CW-1A	6/28/06		W		1	✓										Nuclear Safety
19CW-2A						✓										related-use
19CW-3A						✓										appropriate
19CW-4A						✓										QA procedures
19CW-5A						✓										
19CW-6A						✓										
19CW-7A						✓										POC-Bradley
19CW-8A						✓										Werling, x65565
19CW-9A						✓										fax 5184
19CW-10A						✓										

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

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

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

Temp: 22.0°C Therm #: 027

Comments: Radioactive – Np 237 at 8.5×10^{-9} M or 1.4×10^{-4} µCi/mL SNI 800/41

Relinquished by (Print/Signature)	Date	Time
Marla Roberts Marla Roberts	6/29/06	
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time

SwRI Project#: 20.06002.01.242

Received by SwRI Lab: (Signature)

Date: 6/29/06 Time: 1045

Samples Disposed: Date: Time:

Samples Disposed by:

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

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SAMPLE LIST/CHAIN OF CUSTODY

Southwest Research Institute®
Chemistry and Chemical Engineering Division
6220 Culebra Road
San Antonio, Texas 78238-5166

Shipper/Name/Address: Bradley Werling Bldg 57

Client: Div 20

Client Purchase Order/Other ID:

Site/Zone ID:

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

SwRI Contact: Mike Dammann

Analyses Requested

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Anions by IC										REMARKS
19CW-11A	6/28/06		W		1	✓										Nuclear Safety
19CW-12A						✓										related-use
19C-1A						✓										appropriate
19C-2A						✓										QA procedures
19C-3A						✓										
19C-4A						✓										
19C-5A						✓										
19C-6A						✓										POC-Bradley
19C-7A						✓										Werling, x65565
19C-8A						✓										fax 5184

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

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

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

Temp: 22.0°C Therm #: 027

Comments: Radioactive – Np 237 at 8.5×10^{-9} M or 1.4×10^{-4} µCi/mL SNI 800/41

Relinquished by (Print/Signature)	Date	Time
Marla Roberts Marla Roberts	6/29/06	1045
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time

SwRI Project#: 20.06002.01.242

Received by SwRI Lab: (Signature)

Date: 6/29/06 Time: 1045

Samples Disposed: Date: Time:

Samples Disposed by:

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

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DISCLOSURE INVENTOR

SAMPLE LIST/CHAIN OF CUSTODY

Southwest Research Institute®
Chemistry and Chemical Engineering Division
6220 Culebra Road
San Antonio, Texas 78238-5166

Shipper Name/Address: Bradley Werling Bldg 57

Client: Div 20

Client Purchase Order/Other ID:

Site/Zone ID:

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

SwRI Contact: Mike Dammann

Analyses Requested

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Anions by IC	REMARKS
19C-9A	6/28/06		W		1	✓	Nuclear Safety
19C-10A						✓	Related-use
19C-11A						✓	appropriate
19C-12A						✓	QA procedures
22CW-1A						✓	
22CW-2A						✓	
22CW-3A						✓	POC-Bradley
22CW-4A						✓	Werling, x65565
22CW-5A						✓	fax 5784
22CW-6A						✓	

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

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

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

Temp: 22.0°C Therm #: 021

Comments: Radioactive – Np 237 8.5×10^{-7} M or 1.4×10^{-4} uCi/mL SN 800/41

Relinquished by (Print/Signature)	Date	Time
Marla Roberts Marla Roberts	6/29/06	1015
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time

SwRI Project#: 20.06002.01.242

Received by SwRI Lab: (Signature)

Date: 6/29/06 Time: 1015

Samples Disposed: Date / Time

Samples Disposed by:

BOOK NO. PROJECT

29 June 2006 MR

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Shipper Name/Address: Bradley Werling Bldg 57

Client: Div 20

Client Purchase Order/Other ID:

Site/Zone ID:

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

SwRI Contact: Mike Dammann

Analyses Requested

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Anions by IC	REMARKS
22CW-7A	6/28/06		W		1	✓	Nuclear Safety
22CW-8A						✓	related-use
22CW-9A						✓	appropriate
22CW-10A						✓	QA procedures
22CW-11A						✓	
22CW-12A						✓	
22C-1A						✓	
22C-2A						✓	POC-Bradley
22C-3A						✓	Werling
22C-4A						✓	x65565
							fax 5784

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

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

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

Temp: 22.0°C Therm #: 022

Comments: Radioactive – Np 237 8.5×10^{-7} M or 1.4×10^{-4} uCi/mL SN 800/41

Relinquished by (Print/Signature)	Date	Time
Marla Roberts Marla Roberts	6/29/06	1015
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time

SwRI Project#: 20.06002.01.242

Received by SwRI Lab: (Signature)

Date: 6/29/06 Time: 1015

Samples Disposed: Date / Time

Samples Disposed by:

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SAMPLE LIST/CHAIN OF CUSTODY

Southwest Research Institute®
Chemistry and Chemical Engineering Division
6220 Culebra Road
San Antonio, Texas 78238-5166

Shipper Name/Address: Bradley Werling Bldg 57

Client: Div 20

Client Purchase Order/Other ID:

Site/Zone ID:

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

SwRI Contact: Mike Dammann

Analyses Requested: Anions by IC

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Anions by IC
22C-5A	6/28/06		W		1	✓
22C-6A						✓
22C-7A						✓
22C-8A						✓
22C-9A						✓
22C-10A						✓
22C-11A						✓
22C-12A						✓
1922-1A						✓
1922-4A						✓

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

Nuclear Safety related-use appropriate QA procedures.

POC-Bradley Werling, X 65565 fax 5184

BOOK NO

PROJECT

29 June 2006 MR

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

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

Temp: 22.0°C Therm #: 027

Comments: Radioactive - Np237 at 8.5×10^{-7} M or 1.4×10^{-4} uCi/mL SN 800/41

Relinquished by (Print/Signature)	Date	Time
Marla Roberts Marla Roberts	6/29/06	1045
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time

SwRI Project#: 20.06002.01.242

Received by SwRI Lab: (Signature)

Date: 6/29/06 Time: 1045

Samples Disposed: Date: Time:

Samples Disposed by:

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

Page ____ of ____

SAMPLE LIST/CHAIN OF CUSTODY

Southwest Research Institute®
Chemistry and Chemical Engineering Division
6220 Culebra Road
San Antonio, Texas 78238-5166

Shipper Name/Address: Bradley Werling Bldg 20

Client: Div 20

Client Purchase Order/Other ID:

Site/Zone ID:

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

SwRI Contact: Mike Dammann

Analyses Requested: Anions by IC

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Anions by IC
1922-5A	6/28/06		W		1	✓

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

Nuclear Safety related-use appropriate QA procedures

POC-Bradley Werling, X 65565 fax 5184

BOOK NO

PROJECT

29 June 2006 MR

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

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

Temp: 22.0°C Therm #: 027

Comments: Radioactive - Np237 at 8.5×10^{-7} M or 1.4×10^{-4} uCi/mL SN 800/41

Relinquished by (Print/Signature)	Date	Time
Marla Roberts Marla Roberts	6/29/06	1045
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time

SwRI Project#: 20.06002.01.242

Received by SwRI Lab: (Signature)

Date: 6/29/06 Time: 1045

Samples Disposed: Date: Time:

Samples Disposed by:

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

Page ____ of ____

DISCOC | INVENT

SAMPLE LIST/CHAIN OF CUSTODY

Southwest Research Institute®
Chemistry and Chemical Engineering Division
6220 Culebra Road
San Antonio, Texas 78238-5166

Shipper Name/Address: Bradley Werling, Div 20, Bldg. 57

Client: Div 20

Client Purchase Order/Other ID:

Site/Zone ID:

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

SwRI Contact: Mike Dammann

Analyses Requested: Analysis of Major + Minor Elements by ICP

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Analysis of Major + Minor Elements by ICP
19CW-1C	6/28/06		W		1	✓
19CW-2C						✓
19CW-3C						✓
19CW-4C						✓
19CW-5C						✓
19CW-6C						✓
19CW-7C						✓
19CW-8C						✓
19CW-9C						✓
19CW-10C						✓

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

Nuclear Safety related - use appropriate QA procedures

POC - Bradley Werling x 65565 fax 5184

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

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

Temp: 22.0°C Therm #: 027

Comments: Radioactive - Np237 at 8.5×10^{-7} M or 1.4×10^{-4} µCi/mL SN 800/41

Relinquished by (Print/Signature)	Date	Time
Marla Roberts Marla Roberts	6/29/06	1015
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time

SwRI Project#: 20.06002.01.242

Received by SwRI Lab: (Signature)

Date: 6/29/06 Time: 1045

Samples Disposed: Date / Time

Samples Disposed by:

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

Page ____ of ____

29 June 2006 MR

SAMPLE LIST/CHAIN OF CUSTODY

Southwest Research Institute®
Chemistry and Chemical Engineering Division
6220 Culebra Road
San Antonio, Texas 78238-5166

Shipper Name/Address: Bradley Werling, Bldg. 57

Client: Div 20

Client Purchase Order/Other ID:

Site/Zone ID:

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

SwRI Contact: Mike Dammann

Analyses Requested: Analysis of Major + Minor Elements-ICP

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Analysis of Major + Minor Elements-ICP
19CW-11C	6/29/06		W		1	✓
19CW-12C						✓
19C-1C						✓
19C-2C						✓
19C-3C						✓
19C-4C						✓
19C-5C						✓
19C-6C						✓
19C-7C						✓
19C-8C						✓

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

Nuclear Safety ~~use appropriate~~ related - use appropriate QA procedures.

POC - Bradley Werling, x 65565 fax 5184

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

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

Temp: 22.0°C Therm #: 027

Comments: Radioactive - Np237 at 8.5×10^{-7} M or 1.4×10^{-4} µCi/mL SN 800/41

Relinquished by (Print/Signature)	Date	Time
Marla Roberts Marla Roberts	6/29/06	1015
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time

SwRI Project#: 20.06002.01.242

Received by SwRI Lab: (Signature)

Date: 6/29/06 Time: 1045

Samples Disposed: Date / Time

Samples Disposed by:

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

Page ____ of ____

29 June 2006 MR

DISC | INVE

Shipper Name/Address: Bradley Werling Bldg. 57

Client: Div 20

SAMPLE LIST/CHAIN OF CUSTODY

Southwest Research Institute®
Chemistry and Chemical Engineering Division
6220 Culebra Road
San Antonio, Texas 78238-5166

Client Purchase Order/Other ID:
Site/Zone ID:

Requested Turnaround:
- [x] 2 Weeks
- [ ] 3 Weeks
- [ ] Other:

SwRI Contact: Mike Dammann

Analyses Requested

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Analysis of Major + Minor Elements - ICP
19C - 9C	6/29/06		W		1	✓
19C - 10C						✓
19C - 11C						✓
19C - 12C						✓
22CW - 1C						✓
22CW - 2C						✓
22CW - 3C						✓
22CW - 4C						✓
22CW - 5C						✓
22CW - 6C						✓

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

Nuclear Safety related - use appropriate QA procedure

POC - Bradley Werling, x65565 fax 5184

29 June 2006 MR

BOOK NO.

PROJECT

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 Rinse
ES – Environmental Sample
FB – Field Blank
FD – Field Duplicate
MS – Matrix Spike
MSD – Matrix Spike Dup
TB – Trip Blank

Temp: 22.0°C Therm #: -27

Comments: Radioactive - Np237 at 8.5×10^{-7} M or 1.4×10^{-4} µCi/mL SN 800141

Relinquished by (Print/Signature)	Date	Time
Marla Roberts, Marla Roberts	6/29/06	1045
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time

SwRI Project#: 20.06002.01.242

Received by SwRI Lab: (Signature)

Date: 6/29/06 Time: 1045

Samples Disposed: Date / Time

Samples Disposed by:

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

Page ____ of ____

Shipper Name/Address: Bradley Werling Bldg 57

Client: Div 20

SAMPLE LIST/CHAIN OF CUSTODY

Southwest Research Institute®
Chemistry and Chemical Engineering Division
6220 Culebra Road
San Antonio, Texas 78238-5166

Client Purchase Order/Other ID:
Site/Zone ID:

Requested Turnaround:
- [x] 2 Weeks
- [ ] 3 Weeks
- [ ] Other:

SwRI Contact: Mike Dammann

Analyses Requested

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Analysis of Major + Minor Elements - ICP
22CW - 7C	6/29/06		W		1	✓
22CW - 8C						✓
22CW - 9C						✓
22CW - 10C						✓
22CW - 11C						✓
22CW - 12C						✓
22C - 1C						✓
22C - 2C						✓
22C - 3C						✓
22C - 4C						✓

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

Nuclear Safety related - use appropriate QA procedure

POC - Bradley Werling, x65565 fax 5184

29 June 2006 MR

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 Rinse
ES – Environmental Sample
FB – Field Blank
FD – Field Duplicate
MS – Matrix Spike
MSD – Matrix Spike Dup
TB – Trip Blank

Temp: 22.0°C Therm #: 627

Comments: Radioactive - Np237 at 8.5×10^{-7} M or 1.4×10^{-4} µCi/mL SN 800141

Relinquished by (Print/Signature)	Date	Time
Marla Roberts, Marla Roberts	6/29/06	1045
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time

SwRI Project#: 20.06002.01.242

Received by SwRI Lab: (Signature)

Date: 6/29/06 Time: 1045

Samples Disposed: Date / Time

Samples Disposed by:

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

Page ____ of ____

Shipper Name/Address: Bradley Werling Bldg 57

Client: Div 20

SAMPLE LIST/CHAIN OF CUSTODY

Southwest Research Institute®
Chemistry and Chemical Engineering Division
6220 Culebra Road
San Antonio, Texas 78238-5166

Client Purchase Order/Other ID:

Site/Zone ID:

Requested Turnaround:
- [x] 2 Weeks
- [ ] 3 Weeks
- [ ] Other:

SwRI Contact: Mike Dammann

Analyses Requested

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Analysis of Major + Minor Elements ICP
22C - 5C	6/28/06		W		1	✓
22C - 6C						✓
22C - 7C						✓
22C - 8C						✓
22C - 9C						✓
22C - 10C						✓
22C - 11C						✓
22C - 12C						✓
1922-1C						✓
1922-2C						✓

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

Nuclear Safety related - use appropriate QA procedure

POC - Bradley Werling, x 65565 fax 5184

29 June 2006 MR

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

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

Temp: 22.0°C Therm #: 027

Comments: Radioactive - Np 237 at 8.5x10⁻⁷ M or 1.4x10⁻⁴ uCi/ml SN 800141

Relinquished by (Print/Signature)	Date	Time
6/29/06 MR Maria Roberts Maria Roberts	6/29/06	1015
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time

SwRI Project#: 20.06002.01.242

Received by SwRI Lab: (Signature)

Date: 6/29/06 Time: 1045

Samples Disposed: Date / Time

Samples Disposed by:

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

Page ____ of ____

Shipper Name/Address: Bradley Werling Bldg 57

Client: Div 20

SAMPLE LIST/CHAIN OF CUSTODY

Southwest Research Institute®
Chemistry and Chemical Engineering Division
6220 Culebra Road
San Antonio, Texas 78238-5166

Client Purchase Order/Other ID:

Site/Zone ID:

Requested Turnaround:
- [x] 2 Weeks
- [ ] 3 Weeks
- [ ] Other:

SwRI Contact: Mike Dammann

Analyses Requested

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Analysis of Major + Minor Elements ICP
1922-3C	6/28/06		W		1	✓

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

Nuclear Safety related - use appropriate QA procedures

POC - Bradley Werling, x 65565 fax 5184

29 June 2006 MR

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

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

Temp: 22.0°C Therm #: 027

Comments: Radioactive - Np 237 at 8.5x10⁻⁷ M or 1.4x10⁻⁴ uCi/ml SN 800141

Relinquished by (Print/Signature)	Date	Time
Maria Roberts Maria Roberts	6/29/06	1015
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time

SwRI Project#: 20.06002.01.242

Received by SwRI Lab: (Signature)

Date: 6/29/06 Time: 1045

Samples Disposed: Date / Time

Samples Disposed by:

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

Page ____ of ____

BOOK NO. 30 June 2006 MR
PROJECT

Basalt Aliquot Removal for Div 18 XRD Analysis

Personnel involved: Marla Roberts

Objectives:
Remove aliquots from two different basalt samples for Div 18 XRD analyses.

Background: For background information on the basalt samples see 733/132.

Samples:
- Basalt (Flood) - Pullman, WA, Ward's Natural Science Cat. No. 47E1042 (733/132)
- NIST Standard Reference Material 688 Basalt Rock

Equipment:
- Mettler Toledo XP205DR (sn 1126461033)

Supplies:
- Weighing Paper
- Polystyrene vials
- Spatulas

Basic Outline Procedure:

The material from each sample will be individually placed on a new tared piece of weighing paper and the mass will be recorded. After the mass is recorded the material will be placed in a labeled polystyrene container. The label will contain a sample ID, SN, date and initials.

Sample ID	Div18 ID	Mass(g)
• Basalt (Flood) Pullman WA	BF1	5.11678
• Nist 688 Basalt Rock	BN1	5.05154

INVENTOR SIGNATURE PRINTED NAME DATE

DISCLOSED TO AND UNDERSTOOD BY PRINTED NAME DATE

BOOK NO. 5 July 2006 MR
PROJECT

Delivery of Basalt Standards to Div 18 for XRD Analyses.

Initial Entry: 800/60
~~Bar~~ 5 July 06 MR
Background Info.: 733/132

Samples: BN1 800/60
BF1 800/60

Samples delivered to Div 18 – Jim Spencer for XRD analyses.
No Chain of custody required.

5 July 2006 MR

INVENTOR SIGNATURE PRINTED NAME DATE

DISCLOSED TO AND UNDERSTOOD BY PRINTED NAME DATE

Liquid Scintillation Analyses Results for 19CAL Series 1 and 22CAL Series 1 with and without Calcite Experimental Solutions

Task initially assigned to Marla Roberts

Objective

To determine the amount of neptunium in the experimental solution at the end of the sorption experiments.

Initial Entry 800/14-15

LSA sample preparation 800/32-33

Sample Info

Blank (one sample from simulated water with calcium): w Ca 800/32
Neptunium spikes (two samples) – Spike 61A1-13 and Spike 61A1-14 (800/32)
Four experiments derived from 4 solids and 1 type of simulated water
19CALW series 1 (24 samples, with calcite) using simulated water with calcium
19CAL series 1 (24 samples, without calcite) using simulated water with calcium
22CALW series 1 (24 samples, with calcite) using simulated water with calcium
22CAL series 1 (24 samples, without calcite) using simulated water with calcium

Results

Printout of LSA analyses following:

3-27-07 BW

INVENTOR SIGNATURE PRINTED NAME DATE

DISCLOSED TO AND UNDERSTOOD BY PRINTED NAME DATE


```
7/3/06  12:59:16 PM        QuantaSmart (TM) - 1.31 - Serial# 405314        Page # 1
Protocol# 15 - Pa_Np_Exp_AB.lsa                                            User: Bertetti

Assay Definition-

Assay Description:

Assay Type: Alpha/Beta
Report Name: Np_Pa_Exp
Output Data Path: C:\Packard\Tricarb\Results\Bertetti\Pa_Np_Exp_AB
Raw Results Path: C:\Packard\Tricarb\Results\Bertetti\Pa_Np_Exp_AB\20060627_1521.results
Comma-Delimited File Name: C:\Packard\Tricarb\Results\Bertetti\Pa_Np_Exp_AB\Np_Pa_AB.042
Assay File Name: C:\Packard\TriCarb\Assays\Pa_Np_Exp_AB.lsa

Count Conditions-

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

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

In Use Discriminator: 143

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

Count Corrections-

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

Half Life-

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

IPA Block Data
Software Version IC: 2.11
Software Version EC: 1.31
Instrument Model: Tri-Carb 3100TR
Instrument Serial Number: 405314
3H Chi Square: 20.44     Date Processed: 6/27/06 3:21:31 PM
14C Chi Square: 24.45    Date Processed: 6/27/06 3:21:31 PM
3H E^2/B (1-18.6 keV): 271.81  Date Processed: 6/27/06 3:21:31 PM
14C E^2/B (4-156 keV): 526.40   Date Processed: 6/27/06 3:21:31 PM
3H Efficiency (0-18.6 keV): 65.17  Date Processed: 6/27/06 3:21:31 PM
14C Efficiency (0-156 keV): 96.71  Date Processed: 6/27/06 3:21:31 PM
IPA Background Date Processed: 6/27/06 3:21:31 PM
```

DISCLOSED TO AND UNDERSTOOD BY PRINTED NAME DATE

3H Background CPM (0-18.6 keV): 15.52 Date Processed: 6/27/06 3:21:31 PM
14C Background CPM (0-156 keV): 22.48 Date Processed: 6/27/06 3:21:31 PM
3H Calibration DPM: 285000
3H Reference Date: 10/29/99
14C Calibration DPM: 134100

Cycle 1 Results

S#	Count Time	CPMA	A:2S%	CPMB	B:2S%	CPMa	alpha2S%	SIS	
MESSAGES									
1	240.00	19.99	2.89	3.47	6.93	0.37	21.32	174.0	Blank w/Ca (800/32)
B									
Missing vial 2.									
3	79.72	3.12	39.18	0.89	59.31	125.07	2.01	164.0	19CW1-1a
4	80.67	4.28	28.93	1.48	37.21	123.60	2.01	254.9	19CW1-1b
5	80.46	3.38	36.19	1.70	32.94	123.92	2.01	326.8	" - 2a
6	80.49	4.81	26.01	2.02	28.40	123.88	2.01	279.5	" - 2b
7	80.31	3.14	38.86	1.60	34.78	124.15	2.01	348.9	" - 3a
8	81.27	3.37	36.17	1.54	35.79	122.68	2.01	326.3	" - 3b
9	82.86	3.70	32.82	1.66	33.24	120.33	2.01	281.3	" - 4a
10	82.95	3.76	32.32	1.80	31.00	120.20	2.01	318.8	" - 4b
11	87.36	3.78	31.57	1.74	31.25	114.13	2.01	335.6	" - 5a
12	84.70	4.07	29.76	2.18	26.16	117.70	2.01	340.7	" - 5b
13	81.82	3.99	30.74	2.14	26.89	121.85	2.01	352.8	" - 6a
14	82.80	3.83	31.81	1.84	30.53	120.41	2.01	339.8	" - 6b
15	84.75	4.22	28.75	2.33	24.73	117.66	2.01	372.3	" - 7a
16	81.58	4.69	26.50	2.18	26.49	122.21	2.01	313.0	" - 7b
17	83.80	6.41	19.69	2.45	23.79	118.97	2.01	261.6	" - 8a
18	83.34	4.67	26.37	2.38	24.47	119.64	2.01	325.5	" - 8b
19	84.74	4.17	29.12	2.04	27.58	117.64	2.01	326.4	" - 9a
20	86.05	6.00	20.70	2.75	21.41	115.84	2.01	305.4	" - 9b
21	84.94	4.84	25.32	2.35	24.51	117.38	2.01	299.3	" - 10a
22	86.44	6.75	18.57	2.51	23.00	115.33	2.01	248.2	" - 10b
23	82.89	7.14	17.94	2.72	21.93	120.28	2.01	262.3	" - 11a
24	81.95	6.04	20.96	2.61	22.81	121.66	2.01	307.7	" - 11b
25	85.61	6.75	18.64	3.02	19.91	116.44	2.01	300.9	" - 12a
26	85.12	7.24	17.53	2.91	20.53	117.11	2.01	294.9	" - 12b
Missing vial 27.									
28	81.08	5.39	23.34	2.29	25.50	122.97	2.01	267.3	19C1-1a
29	82.44	6.78	18.83	2.85	21.16	120.96	2.01	282.4	19C1-1b
30	83.95	6.61	19.13	3.08	19.72	118.75	2.01	314.5	" - 2a
31	82.40	6.32	20.07	2.93	20.72	121.07	2.01	289.2	" - 2b
32	82.89	6.52	19.48	3.08	19.83	120.29	2.01	314.6	" - 3a
33	84.89	6.31	19.88	2.92	20.52	117.43	2.01	305.4	" - 3b
34	84.38	6.00	20.84	2.62	22.43	118.16	2.01	272.2	" - 4a
35	83.81	7.17	17.80	3.13	19.49	118.97	2.01	264.6	" - 4b
36	83.71	8.41	15.46	3.29	18.73	119.13	2.01	267.3	" - 5a
37	84.87	7.64	16.73	3.38	18.25	117.46	2.01	294.1	" - 5b
38	86.70	7.95	16.02	3.47	17.73	114.99	2.01	280.4	" - 6a
39	82.98	7.66	16.85	3.61	17.51	120.14	2.01	328.7	" - 6b
40	84.86	7.68	16.66	3.56	17.53	117.49	2.01	306.5	" - 7a
41	84.96	8.07	15.93	3.83	16.54	117.35	2.01	307.5	" - 7b
42	83.65	8.88	14.74	3.92	16.35	119.19	2.01	291.8	" - 8a
43	83.92	9.25	14.20	3.92	16.33	118.79	2.01	297.2	" - 8b
44	84.25	9.26	14.17	3.48	17.90	118.33	2.01	261.2	" - 9a
45	85.03	9.78	13.46	3.73	16.88	117.24	2.01	272.4	" - 9b
46	85.63	9.02	14.40	4.64	14.24	116.41	2.01	339.6	" - 10a
47	84.75	10.92	12.26	4.19	15.45	117.67	2.01	271.0	" - 10b
48	85.12	9.82	13.41	3.70	16.98	117.13	2.01	266.4	" - 11a
49	83.50	10.44	12.81	4.51	14.71	119.41	2.01	280.3	" - 11b
50	88.64	10.73	12.22	4.81	13.64	112.45	2.01	301.3	" - 12a
51	87.65	12.27	10.95	5.27	12.82	113.72	2.01	299.9	" - 12b
Missing vial 52.									

53	81.93	10.37	12.99	4.09	15.98	121.71	2.01	278.2	22CW1-1a
54	80.28	10.31	13.17	4.34	15.39	124.20	2.01	292.7	22CW1-1b
55	80.71	11.30	12.15	5.12	13.58	123.53	2.01	297.6	" - 2a
56	79.12	11.43	12.12	4.56	14.93	126.04	2.01	279.4	" - 2b
57	78.98	10.74	12.80	5.17	13.61	126.25	2.01	313.5	" - 3a
58	78.59	11.05	12.52	4.63	14.81	126.88	2.01	275.2	" - 3b
59	80.36	10.72	12.72	4.60	14.74	124.07	2.01	292.6	" - 4a
60	79.68	11.22	12.28	4.84	14.23	125.14	2.01	293.0	" - 4b
61	81.05	11.65	11.82	5.23	13.34	123.01	2.01	309.5	" - 5a
62	80.03	13.19	10.70	5.53	12.88	124.60	2.01	285.2	" - 5b
63	81.12	11.72	11.75	4.99	13.81	122.91	2.01	300.5	" - 6a
64	81.21	11.97	11.54	4.73	14.35	122.77	2.01	265.0	" - 6b
65	83.42	12.95	10.68	5.50	12.70	119.52	2.01	272.6	" - 7a
66	82.96	12.99	10.67	5.69	12.41	120.22	2.01	297.1	" - 7b
67	83.93	10.99	12.24	4.75	14.10	118.79	2.01	273.6	" - 8a
68	85.29	12.29	11.06	4.86	13.78	116.88	2.01	274.2	" - 8b
69	82.45	13.03	10.68	5.23	13.24	120.92	2.01	267.4	" - 9a
70	82.24	13.03	10.69	5.17	13.38	121.29	2.01	271.8	" - 9b
71	85.32	12.08	11.22	4.64	14.25	116.86	2.01	263.6	" - 10a
72	84.24	11.80	11.50	5.13	13.31	118.37	2.01	294.0	" - 10b
73	81.90	12.98	10.74	5.87	12.21	121.73	2.01	297.5	" - 11a
74	81.48	13.69	10.30	5.39	13.01	122.36	2.01	286.4	" - 11b
75	100.17	11.22	11.20	4.24	14.26	99.46	2.01	262.7	" - 12a
76	100.57	11.26	11.15	4.36	13.94	99.08	2.01	274.7	" - 12b
Missing vial 77.									
78	81.53	13.83	10.21	5.40	13.00	122.30	2.01	269.0	22C1-1a
79	82.59	12.55	11.01	5.70	12.43	120.71	2.01	298.4	22C1-1b
80	86.17	15.01	9.32	6.35	11.28	115.68	2.01	295.1	" - 2a
81	85.18	13.81	10.03	5.83	12.06	117.04	2.01	282.9	" - 2b
82	85.81	14.23	9.76	6.02	11.75	116.20	2.01	292.5	" - 3a
83	85.90	14.18	9.78	5.65	12.29	116.06	2.01	286.6	" - 3b
84	84.09	14.51	9.68	6.19	11.62	118.55	2.01	278.6	" - 4a
85	86.08	15.10	9.28	6.81	10.74	115.80	2.01	298.8	" - 4b
86	83.34	14.71	9.61	5.75	12.30	119.62	2.01	269.0	" - 5a
87	83.36	15.79	9.07	6.83	10.88	119.62	2.01	297.8	" - 5b
88	85.54	14.56	9.59	6.14	11.59	116.54	2.01	284.1	" - 6a
89	84.49	15.24	9.28	6.17	11.62	118.00	2.01	283.4	" - 6b
90	84.67	15.57	9.11	6.56	11.11	117.74	2.01	280.0	" - 7a
91	85.64	15.76	8.98	6.53	11.09	116.40	2.01	287.9	" - 7b
92	87.64	14.76	9.39	6.47	11.05	113.74	2.01	300.0	" - 8a
93	87.69	15.27	9.12	6.07	11.57	113.67	2.01	270.8	" - 8b
94	86.80	15.73	8.94	6.78	10.74	114.85	2.01	290.4	" - 9a
95	87.04	16.36	8.65	5.99	11.72	114.55	2.01	275.5	" - 9b
96	84.14	16.29	8.81	5.84	12.11	118.49	2.01	239.6	" - 10a
97	85.95	17.52	8.23	7.04	10.50	115.98	2.01	268.5	" - 10b
98	86.57	17.10	8.36	6.96	10.55	115.15	2.01	275.4	" - 11a
99	84.04	17.38	8.36	7.71	9.96	118.64	2.01	302.3	" - 11b
100	133.33	12.07	9.43	4.96	11.24	74.64	2.01	285.6	" - 12a
101	132.18	12.48	9.19	4.84	11.49	75.29	2.01	265.3	" - 12b
Missing vial 102.									
103	1.32	1478.50	4.56	553.35	7.42	7655.69	1.99	272.8	Spike 61A1-13
104	1.28	1640.95	4.39	616.85	7.14	7833.23	2.00	274.7	Spike 61A1-14

3-27-07 BW

6/27/06 3:21:32 PM QuantaSmart (TM) - 1.31 - Serial# 405314 Page # 1
SNC Protocol

```
Calibration Information
Software Version IC: 2.11
Software Version EC: 1.31
Instrument Model: Tri-Carb 3100TR
Instrument Serial Number: 405314
3H Chi Square: 20.44     Date Processed: 6/27/06 3:21:31 PM
14C Chi Square: 24.45    Date Processed: 6/27/06 3:21:31 PM
3H E^2/B (1-18.6 keV): 271.81  Date Processed: 6/27/06 3:21:31 PM
14C E^2/B (4-156 keV): 526.40   Date Processed: 6/27/06 3:21:31 PM
3H Efficiency (0-18.6 keV): 65.17  Date Processed: 6/27/06 3:21:31 PM
14C Efficiency (0-156 keV): 96.71  Date Processed: 6/27/06 3:21:31 PM
IPA Background Date Processed: 6/27/06 3:21:31 PM
3H Background CPM (0-18.6 keV): 15.52  Date Processed: 6/27/06 3:21:31 PM
14C Background CPM (0-156 keV): 22.48  Date Processed: 6/27/06 3:21:31 PM
3H Calibration DPM: 285000
3H Reference Date: 10/29/99
14C Calibration DPM: 134100
```

7/3/06 2:36:06 PM QuantaSmart (TM) - 1.31 - Serial# 405314 Page # 1
SNC Protocol

```
Calibration Information
Software Version IC: 2.11
Software Version EC: 1.31
Instrument Model: Tri-Carb 3100TR
Instrument Serial Number: 405314
3H Chi Square: 23.10     Date Processed: 7/3/06 2:36:05 PM
14C Chi Square: 17.67    Date Processed: 7/3/06 2:36:05 PM
3H E^2/B (1-18.6 keV): 298.35  Date Processed: 7/3/06 2:36:05 PM
14C E^2/B (4-156 keV): 555.34   Date Processed: 7/3/06 2:36:05 PM
3H Efficiency (0-18.6 keV): 65.19  Date Processed: 7/3/06 2:36:05 PM
14C Efficiency (0-156 keV): 96.31  Date Processed: 7/3/06 2:36:05 PM
IPA Background Date Processed: 7/3/06 2:36:05 PM
3H Background CPM (0-18.6 keV): 14.45  Date Processed: 7/3/06 2:36:05 PM
14C Background CPM (0-156 keV): 21.62  Date Processed: 7/3/06 2:36:05 PM
3H Calibration DPM: 285000
3H Reference Date: 10/29/99
14C Calibration DPM: 134100
```

3-27-07 BW

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Evaluation of 19CAL Series 1 and 22CAL Series 1 With and Without Calcite Sorption Experiment Results

Initial Entry for Entire Experiment: 800/14-15

Samples: NC-EWDP-19PB-0305-Sonic Core Composite - 696/64-66
NC-EWDP-19PB-0305-Sonic Core Composite w/o Calcite-742/25
NC-EWDP-22PC-1005-Sonic Core Composite – 742/8
NC-EWDP-22Pc-1005-Sonic Core Composite w/o Calcite- 742/25

Water Used: 19PB-2 Simulated Groundwater with Calcium 742/41
^ in experiment 19CAL Series 1 + 22CAL Series 1 5 July 2006 MR

Np Spike Used: 61A1

Personnel Involved: Marla Roberts, Sandra Watson

Summary:

Inconsistent results between the spikes from previous experiments and the results of the LSA analyses (800/62-66) for the spikes used in 19CAL Series 1 and 22CAL Series 1 with and without calcite have lead to an evaluation of possible sources of error. Possible causes include, but are not limited to: too strong of an acid being used for LSA matrix, tainted Ultima Gold AB cocktail, equipment malfunction and/or tainted Np Spike.

The following pages contain tests run on various components of the LSA process to pinpoint the cause of the inconsistent Np Spike 61A1 results.

Page 68: Testing the Ultima Gold AB Cocktail-used two different containers of Ultima Gold AB Cocktail (labeled A & B), 500µL of 0.02 M HNO_3 (696/29-30) and 100µL of Np Spike 61A1-See 800/68 for sample IDs and masses.

3-27-07 BW

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BOOK NO.

5 July 2006 MR
PROJECT

Sample ID	Mass(g) of LSA vial & acid	Mass(g) of LSA vial, acid + sample
A-Spike 6/A1-15	7.87622	7.97597
A-Spike 6/A1-16	7.89389	7.99393
B-Spike 6/A1-17	7.99883	8.09911
B-Spike 6/A1-18	7.96200	8.06215

5 July 2006 MR

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BOOK NO.

6 July 2006 MR
PROJECT

Continuation of testing components of LSA process - testing acid.

Background + initial entry: 800/67

purpose: test influence of acid on LSA results.

Acid used: 0.02M HNO_3 (696/29-30) in 19CALI & 22CALI experiment. 6 July 06 MR

Procedure: 2 LSA vials labeled NoA Spike 19 & 20. These vials will have no acid added, 100 µL Spike 6/A1 and 5mL of Ultima Gold AB (labeled A) cocktail. Masses recorded 800/70.

Additional 2 LSA vials labeled WM Spike 21 & 22. These vials will have 250 µL Type1 water, 100 µL spike and 5 mL Ultima Gold AB (labeled A) cocktail. Masses recorded ~~800/70~~ 800/70 6 July 06 MR

6 July 2006 MR

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Sample ID	Mass(g) of empty vial	Mass(g) of vial + spike
NoA-Spike 6IA1-19	7.41451	7.51452
NoA-Spike 6IA1-20	7.39766	7.49766

Sample ID	Mass(g) of vial + water	Mass(g) of vial, water + spike
WM-Spike 6IA1-21	7.61870	7.71852
WM-Spike 6IA1-22	7.62133	7.72120

6 July 2006 MR

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Continuation of testing components of LSA process - testing spike.

Background + initial entry: 800/67

purpose: test spike 6IA for repeatability of results on LSA machine.

Procedure: 2 LSA vials labeled WM Spike 6IA3 + 4. These vials will have a water matrix of 250 uL of Type I water, and 100 uL of Spike 6IA and 5 mL of Ultima Gold AB (labeled A) added. Masses recorded 800/72.

6 July 2006 MR

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BOOK NO. 6 July 2006 MR PROJECT

Sample ID	Mass(g) vial & water	Mass(g) vial, water & spike
WM-Spike 61A-3	7.79755	7.89719
WM-Spike 61A-4	7.71514	7.81502

6 July 2006 MR

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BOOK NO. 6 July 2006 MR PROJECT

Continuation of testing components of LSA process - test LSA machine.

Background + Intial entry: 800/67

purpose: test LSA machine for repeatability of results for known Np-237 spike - 61A

6 July 2006 MR

Testing pH of Np-237 spike 61A1

Task initially assigned to: Marla Roberts
Objective: To determine the pH Np-237 spike 61A1
Background: See 800/67
Sample Info: Neptunium Spike # 61A-1 (369/100) - 60 ppm Np-237 at pH of 5.63
Conditions:
- $\sum Np = 200$ ppb
- equilibrium with lab $CO_2(g)$; $pCO_2 = 10^{-3.42}$
- solution volume = 30 ml
- mass of solid = 0.1 g
- M/V (g/L) = 3.33

8 Aug 06 MR

Procedure:

Empty centrifuge tube weighed and mass recorded (800/74). About 8 mL of 61A1 Np spike added. Tube with spike aliquot weighed and mass recorded (800/74).

Next, fresh pH buffers of 4, 7 and 10 (60mL bottles with stir bars) were used to calibrate the pH meter (using stir plate). The temperature, calibration setpoints and slope were recorded (800/74). The acceptable range for the slope is 92-102% from page 5 of Orion Ross pH Electrode Instruction Manual, 2003.

The pH of the spike aliquot was measured and recorded. The pH meter was challenged and the measurement recorded. See following page.

3-27-07 BUS

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BOOK NO.

6 July 2006
PROJECT

Sample ID	Mass(g) empty tube	Mass(g) tube + Spike
pH test Spike 6/A1	22.52313	30.71711

temp: 19.9°C

Set pts: 4.01, 7.01, 10.06

Slope: 97.9

pH of 6/A1 = 5.98

*challenge pH meter with pH buffer 7, measured: ~~5.98~~ 7.01
6 July 06 MR

7 July 2006

LSA results for test components of LSA process

initial entry: 800/~~67~~ 67
6 July 06 MR
Masses for components: 800/68-74

The following are the results of the LSA analyses for testing variables in the LSA process.

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BOOK NO.

7 July 2006 MR
PROJECT

7/6/06 7:01:34 PM QuantaSmart (TM) - 1.31 - Serial# 405314 Page # 1
Protocol# 15 - Pa_Np_Exp_AB.lsa User: Bertetti

Assay Definition-

Assay Description:

Assay Type: Alpha/Beta
Report Name: Np_Pa_Exp
Output Data Path: C:\Packard\Tricarb\Results\Bertetti\Pa_Np_Exp_AB
Raw Results Path: C:\Packard\Tricarb\Results\Bertetti\Pa_Np_Exp_AB\20060706_1531.results
Comma-Delimited File Name: C:\Packard\Tricarb\Results\Bertetti\Pa_Np_Exp_AB\Np_Pa_AB.047
Assay File Name: C:\Packard\TriCarb\Assays\Pa_Np_Exp_AB.lsa

Count Conditions-

Nuclide: NP/PA
Quench Indicator: SIS
External Std Terminator (sec): n/a
Pre-Count Delay (min): 0.00
Alpha/Beta Standards:
Low Energy: NP/PA
Count Time (min): 10.00
Count Mode: Normal
Assay Count Cycles: 1 Repeat Sample Count: 1
#Vials/Sample: 1 Calculate % Reference: Off

Background Subtract: Off
Low CPM Threshold: Off
2 Sigma % Terminator: Off

In Use Discriminator: 143

Regions	LL	UL
Beta A	0.0	400.0
Beta B	100.0	400.0
Alpha	100.0	400.0

Count Corrections-

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

Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time
Beta A				
Beta B				
Alpha				

IPA Block Data
Software Version IC: 2.11
Software Version EC: 1.31
Instrument Model: Tri-Carb 3100TR
Instrument Serial Number: 405314
3H Chi Square: 23.15 Date Processed: 7/6/06 2:01:14 PM
14C Chi Square: 14.58 Date Processed: 7/6/06 2:01:14 PM
3H E^2/B (1-18.6 keV): 292.16 Date Processed: 7/6/06 2:01:14 PM
14C E^2/B (4-156 keV): 587.41 Date Processed: 7/6/06 2:01:14 PM
3H Efficiency (0-18.6 keV): 64.90 Date Processed: 7/6/06 2:01:14 PM
14C Efficiency (0-156 keV): 96.76 Date Processed: 7/6/06 2:01:14 PM
IPA Background Date Processed: 7/6/06 2:01:14 PM

DISCLOSED TO AND UNDERSTOOD BY | PRINTED NAME | DATE

7/6/06 7:01:34 PM QuantaSmart (TM) - 1.31 - Serial# 405314 Page # 2

Protocol# 15 - Pa_Np_Exp_AB.lsa User: Bertetti

3H Background CPM (0-18.6 keV): 14.43 Date Processed: 7/6/06 2:01:14 PM
14C Background CPM (0-156 keV): 20.90 Date Processed: 7/6/06 2:01:14 PM
3H Calibration DPM: 285000
3H Reference Date: 10/29/99
14C Calibration DPM: 134100

Cycle 1 Results

S#	Count Time	CPMA	A:2S%	CPMB	B:2S%	CPMa	alpha2S%	SIS	
MESSAGES									
1	10.00	13646.70	0.54	4595.30	0.93	16770.70	0.49	258.1	WM-61A-3
2	10.00	13664.10	0.54	4475.60	0.95	16848.60	0.49	252.5	WM-61A-4
Missing vial 3.									
4	10.00	14771.40	0.52	6177.00	0.80	16056.90	0.50	293.6	61A-1
5	10.00	14272.50	0.53	5941.20	0.82	15601.20	0.51	292.9	61A-2
Missing vial 6.									
7	10.00	913.80	2.09	299.60	3.65	8036.40	0.71	271.5	NoA 61A1-19
8	10.00	830.30	2.19	283.70	3.75	8004.90	0.71	277.8	NoA 61A1-20
Missing vial 9.									
10	10.00	1096.60	1.91	430.20	3.05	7912.80	0.71	293.1	WM 61A1-21
11	10.00	1099.90	1.91	428.70	3.05	7943.20	0.71	291.0	WM 61A1-22
Missing vial 12.									
13	10.00	8115.20	0.70	3370.50	1.09	9098.00	0.66	293.5	61A1-9
14	10.00	8606.60	0.68	3612.40	1.05	9628.20	0.64	295.5	61A1-10
Missing vial 15.									
Missing vial 16.									
Missing vial 17.									
Missing vial 18.									
Missing vial 19.									
Missing vial 20.									
Missing vial 21.									
22	10.00	8115.90	0.70	3356.40	1.09	9087.00	0.66	293.0	61A1-11 (NpCS)
23	10.00	8507.30	0.69	3546.10	1.06	9466.80	0.65	294.2	61A1-12 (NpCS)
Missing vial 24.									
25	10.00	4368.20	0.96	1759.40	1.51	7793.60	0.72	283.5	61A1-11
26	10.00	4574.80	0.94	1833.70	1.48	8125.40	0.70	281.2	61A1-12
Missing vial 27.									
28	10.00	1983.60	1.42	774.00	2.27	7756.30	0.72	281.0	61A1-13
29	10.00	2071.80	1.39	802.30	2.23	7764.20	0.72	278.2	61A1-14
Missing vial 30.									
31	10.00	727.50	2.34	284.30	3.75	7659.60	0.72	278.1	A-61A1-15
32	10.00	722.70	2.35	256.20	3.95	7662.20	0.72	261.5	A-61A1-16
Missing vial 33.									
34	10.00	730.00	2.34	261.10	3.91	7688.10	0.72	262.9	B-61A1-17
35	10.00	728.60	2.34	261.20	3.91	7689.50	0.72	265.0	B-61A1-18

3-27-07 BW

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7/6/06 2:01:15 PM QuantaSmart (TM) - 1.31 - Serial# 405314 Page # 1

SNC Protocol

Calibration Information
Software Version IC: 2.11
Software Version EC: 1.31
Instrument Model: Tri-Carb 3100TR
Instrument Serial Number: 405314
3H Chi Square: 23.15 Date Processed: 7/6/06 2:01:14 PM
14C Chi Square: 14.58 Date Processed: 7/6/06 2:01:14 PM
3H E^2/B (1-18.6 keV): 292.16 Date Processed: 7/6/06 2:01:14 PM
14C E^2/B (4-156 keV): 587.41 Date Processed: 7/6/06 2:01:14 PM
3H Efficiency (0-18.6 keV): 64.90 Date Processed: 7/6/06 2:01:14 PM
14C Efficiency (0-156 keV): 96.76 Date Processed: 7/6/06 2:01:14 PM
IPA Background Date Processed: 7/6/06 2:01:14 PM
3H Background CPM (0-18.6 keV): 14.43 Date Processed: 7/6/06 2:01:14 PM
14C Background CPM (0-156 keV): 20.90 Date Processed: 7/6/06 2:01:14 PM
3H Calibration DPM: 285000
3H Reference Date: 10/29/99
14C Calibration DPM: 134100

7 July 2006 MR

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BOOK NO. PROJECT

Note: late entry to summarize results of LSA testing of Np spikes (800/067-077) [See 800/10]

26 MAR 2007

Multiple samples were withdrawn from spikes or standard solutions 61A and ~~61A-1~~ 61A1. Solutions 61A and 61A1 are similar except that 61A1 is a dilution of 61A. The dilution was a result of neutralizing a sample of 61A to a pH of approximately 5-6, using NaOH. The end result of the dilution/neutralization is a solution about ½ the concentration of the original 61A

The tests examined differing combinations of cocktails and acid additions to LSA vials in an attempt to identify the cause of varying concentrations – as measured by LSA – of spike 61A1. The final analysis showed that the 'anomalous' low measurements of 61A1 as having a concentration of ~50 ppm rather than the expected and previously measured 61 ppm were correct. At least the LSA was functioning properly and the acid matrix and cocktails were not the cause of the changes in spike 61A1.

Spike 61A1 was withdrawn from use and a new spike 61A2 was prepared in similar fashion to 61A1. Subsequent observation showed that the problems are due to precipitation of a solid Np phase within the neutralized spikes. Varying concentrations were due to the amount of 'mixing' performed by the experimenter prior to spiking expt. solns. Spikes 61A1 and 61A2 were not used pending acidification and spike 61A was used in following experimental work.

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BOOK NO. 11 July 2006 MR PROJECT

Evaluation of pH adjustments required for 19PB-0305-Sonic Core Composite with and without Calcite and NC-EWDP-22PC-1005-Sonic Core Composite with and without Calcite (0.2g of sediment)

Personnel initially assigned to task: Marla Roberts

Objective: Determine the amount of acid needed to add to experimental solution in order to reach a specific range of pH values using a larger amount of sediment for use in sorption experiments.

Previous Initial Entries of Importance: 742/45-46, 800/10 and 800/11-13

Sample info: NC-EWDP-19PB-0305-Sonic Core Composite - 696/64-66
NC-EWDP-19PB-0305-Sonic Core Composite w/o Calcite- 742/25
NC-EWDP-22PC-1005-Sonic Core Composite – 742/8
NC-EWDP-22Pc-1005-Sonic Core Composite w/o Calcite- 742/25

Solution info: 19PB-3 Simulated Groundwater with Calcium 800/20

Reagents: pH buffer 4 (Fisher SB98 lot # 041614)
pH buffer 7 (Fisher SB108 lot # 044065)
pH buffer 10 (Fisher SB 116 lot # 044060)
0.4 M HNO3 (696/195) for pH adjustment

Equipment: Orion meter 920A (sn 039518)
Thermo Orion combination electrode 8103BN (ID 3I)
New Brunswick Scientific Gyratory shaker model G33 (sn 290127990)
Mettler Toledo XP205DR (sn 1126461033)
Stir Plate

Supplies: Polycarbonate centrifuge tubes with caps (50 ml capacity)
Pipettes and tips
Stir bars

Procedure:

Four pc centrifuge tubes were labeled: 19PB2 W, 19PB2 WO, 22PC2 W and 22PC2 WO. Empty tubes were weighed and the masses recorded (800/81). Next, about 0.2g of sediment was added to each of the tubes according to: 19PB2 W = NC-EWDP-19PB-0305-Sonic Core Composite , 19PB2 WO = NC-EWDP-19PB-0305-Sonic Core Composite w/o Calcite, 22PC2 W = NC-EWDP-22PC-1005-Sonic Core Composite and 22PC2 WO = NC-EWDP-22Pc-1005-Sonic Core Composite w/o Calcite. Prior to sediment transfer, each sample container was rolled gently to avoid bias. Next, approximately 30 mL of solution was added. Each tube was weighed and the mass recorded (800/81). Using an eppendorff pipette 10 µL of 0.4 M nitric acid was added. The tube was weighed and the mass recorded. The tubes were uncapped and placed on an activated shaker and left to equilibrate for a few hours. The addition of acid was a step-wise process, in which the tube was weighed (and mass recorded), pH measured, acid was added, and left to equilibrate. The process repeated until the pH was ~ 7. This process used an increment of 50 µL of acid.

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The pH of the experimental solutions was taken. Fresh pH buffers of 4, 7 and 10 (60mL bottles with stir bars) were used to calibrate the pH meter (using stir plate). The temperature, calibration set points and slope were recorded. The acceptable range for the slope is 92-102% from page 5 of Orion Ross pH Electrode Instruction Manual, 2003. See 800/80-81.

In process:

① date: 11 July 2006 time: 4:00 pm
Set pts: 4.00, 7.02, 10.07 slope: 97.9 temp: 19.4

② date: 12 July 2006 time: 9:30 am
Set pts: 4.00, 7.02, 10.07 slope: 98.0 temp: 19.1°C

③ date: 12 July 2006 time: 3:30 pm
Set pts: 4.00, 7.01, 10.07 slope: 98.1 temp: 19.4°C

④ date: 13 July 2006 time: 9:30 am
Set pts: 4.00, 7.02, 10.07 slope: ~~97~~ 98.3 temp: 19.1°C

13 July 06 MR

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22PC-W	Initial Mass (g)	Mass (g) after Equilibrization	pH
Empty Tube	22.31656		
Tube & Sediment	22.52906		
Tube, Sediment & Solution	53.19012		
Tube, Sediment, Solution & 10 µL acid	53.20026	53.18598	7.70 ①
+ 50µL acid	53.23597	53.13688	7.47 ②
+ 50µL acid	53.18811	53.16417	4.43 ③
+ 50µL acid	53.21436	53.11962	3.33 ④
+ 50µL acid			
+ 50µL acid			
+ 50µL acid			
+ 50µL acid			
+ 50µL acid			

22PC-WO	Initial Mass (g)	Mass (g) after Equilibrization	pH
Empty Tube	22.12604		
Tube & Sediment	22.33994		
Tube, Sediment & Solution	52.85173		
Tube, Sediment, Solution & 10 µL acid	52.86192	52.84823	7.54 ①
+ 50µL acid	52.89815	52.79346	6.80 ②
+ 50µL acid	52.84146	52.80024	5.66 ③
+ 50µL acid	52.85343	52.77655	4.18 ④
+ 50µL acid			
+ 50µL acid			
+ 50µL acid			
+ 50µL acid			
+ 50µL acid			

19PB-W	Initial Mass (g)	Mass (g) after Equilibrization	pH
Empty Tube	22.51146		
Tube & Sediment	22.72381		
Tube, Sediment & Solution	53.24223		
Tube, Sediment, Solution & 10 µL acid	53.25089	53.23687	7.76 ①
+ 50µL acid	53.28760	53.18599	7.38 ②
~~53.23400~~ 12 July 06 MR + 50µL acid	53.20658	53.20658	5.87 ③
+ 50µL acid	53.25222	53.16042	3.60 ④
+ 50µL acid			
+ 50µL acid			
+ 50µL acid			
+ 50µL acid			
+ 50µL acid			

19PB-WO	Initial Mass (g)	Mass (g) after Equilibrization	pH
Empty Tube	22.39920		
Tube & Sediment	22.61245		
Tube, Sediment & Solution	53.10796		
Tube, Sediment, Solution & 10 µL acid	53.11812	53.10368	7.56 ①
+ 50µL acid	53.15375	53.04811	6.76 ②
+ 50µL acid	53.09965	53.06243	5.64 ③
+ 50µL acid	53.11312	53.01608	4.46 ④
+ 50µL acid			
+ 50µL acid			
+ 50µL acid			
+ 50µL acid			
+ 50µL acid			

DATE

DATE

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While evaluating the pH adjust scheme it was decided to continue to add incremental amounts of acid to push the pH below 7. This is different from the pH target stated in the initial entry on 800/79.

8 Aug 06 MR

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27 MAR 07 BAW

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END OF SCIENTIFIC NOTEBOOK 800

CONTINUED IN SCIENTIFIC NOTEBOOK ~~836~~ 811 BWS 3-27-07

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GEOSCIENCES AND ENGINEERING DIVISION

SCIENTIFIC NOTEBOOK REVIEW CHECKLIST RECORD

Scientific Notebook No. 800 Project Numbers: 20 06002. 01. 232

Accomplished

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

Any discrepancies must be resolved before notebook closeout.

==========

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

P. C. R. 7/2/2007

Manager's Signature Date

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

Form QAP-01 (03/2007)