



ON-SITE TECHNICAL SERVICES, INC

72 Railroad Avenue Wellsville, New York 14895

Phone: (585) 593-1824 Fax: (585) 593-7471

to tell May 1, 1,

February 12, 2014

Mr. Mark Domagala

NYSDEC – Region 8

Division of Solid and Hazardous Materials
6274 East Avon-Lima Road

Avon, New York 14414

Re: Hakes C & D Landfill Painted Post, New York - 4th Quarter 2013 Radiological Test Results

Dear Mark:

On behalf of Hakes C & D Landfill, the purpose of this letter is to present results of the fourth quarter 2013 leachate radiological testing. Leachate sampling and analysis for radiological testing is required as detailed in section 2.6.3 of the March 2012 Environmental Monitoring Plan (EMP). The initial radiological sampling of each landfill cell and combined leachate was completed in May 2012. Therefore, the sampling required in the fourth quarter 2013 includes only landfill cells which contain gas well waste. Currently the cells containing gas well waste includes Cells 5 and 6. Leachate samples were collected from Cells 5 and 6 on November 6, 2013 and sent to ALS Environmental in Rochester, New York. A laboratory results summary table that includes maximum detected concentrations (MDC), field sampling forms and the laboratory analytical report are attached.

Please feel free to call myself at 585-593-1824 or Joe Boyles at 585-466-7271 if you have any questions.

Sincerely,

Jonathan E. Brandes, P.G.

Senior Geologist

cc: Joe Boyles, Casella Waste Systems Inc.

Enclosures

Mark Amann, NYSDEC Richard Clarkson, NYSDEC

Timothy Rice, NYSDEC

		,

Table 1

Fourth Quarter 2013 Leachate Radiological Analytical Results Hakes C and D Landfill Painted Post, New York (pCi/L)

Parameter	Cell 5 Leachate 11/6/2013	Cell 6 Leachate 11/6/2013
Actinium-228	-1.515 ± 31.550 (44.23)	3.731 ± 23.437 (44.29)
Actinium-228, Dissolved	-5.263 ± 52.415 (43.25)	-6.774 ± 88.042 (50.24)
Bismuth-212	-13.743 ± 549.740 (182.3)	-38.698 ± 188.190 (163.9)
Bismuth-212, Dissolved	31.422 ± 63.942 (113.6)	-7.919 ± 316.740 (163.8)
Bismuth-214	186.460 ± 33.504 (19.71)	450.210 ± 63.878 (27.69)
Bismuth-214, Dissolved	50.799 ± 14.979 (15.3)	537.350 ± 70.694 (19.97)
Cesium-134	1.346 ± 23.514 (39.6)	-2.014 ± 35.919 (60.04)
Cesium-134, Dissolved	0.000 ± 13.128 (22.55)	1.349 ± 41.714 (69.61)
Cesium-137	-0.243 ± 5.802 (9.642)	0.271 ± 6.598 (11.92)
Cesium-137, Dissolved	-0.105 ± 7.143 (9.56)	-2.554 ± 13.479 (14.74)
Lead-212	13.493 ± 10.788 (17.79)	57.948 ± 18.576 (27.5)
Lead-212, Dissolved	2.371 ± 8.658 (15.87)	75.475 ± 22.154 (23.09)
Lead-214	188.830 ± 34.085 (21.45)	432.490 ± 59.577 (25.03)
Lead-214, Dissolved	49.889 ± 15.466 (20.4)	563.230 ± 72.309 (24.69)
Potassium-40	16.102 ± 67.685 (140.9)	59.864 ± 86.218 (159.3)
Potassium-40, Dissolved	45.325 ± 76.125 (146)	299.730 ± 96.482 (106.7)
Radium-226	180.910 ± 135.860 (193.4)	61.980 ± 161.570 (284.9)
Radium-226 (EPA 903.1)	2.57 ± 1.71 (0.774)	1.28 ± 1.47 (0.87)
Radium-226, Dissolved	40.459 ± 108.470 (201.6)	1.854 ± 186.260 (328)
Radium-226, Dissolved (EPA 903.1)	0.771 ± 0.945 (1.32)	1.24 ± 0.999 (1.24)
Radium-228	-1.515 ± 31.550 (44.23)	3.731 ± 23.437 (44.29)
Radium-228 (EPA 904.0)	2.29 ± 2.48 (4.47)	1.72 ± 1.30 (2.26)
Radium-228, Dissolved	-5.263 ± 52.415 (43.25)	-6.774 ± 88.042 (50.24)
Radium-228, Dissolved (EPA 904.0)	1.92 ± 0.795 (1.21)	2.71 ± 1.02 (1.5)
Thallium-208	-0.294 ± 7.841 (10.27)	1.912 ± 6.620 (11.87)
Thallium-208, Dissolved	-2.025 ± 20.895 (10.7)	-1.581 ± 16.329 (11.65)
Thorium-232	423.750 ± 3507.300 (6138)	-1637.200 ± 92402.000 (79
Thorium-232, Dissolved	267.070 ± 2983.200 (5328)	511.900 ± 4679.000 (8051)
Thorium-234	1.122 ± 196.560 (348.2)	-68.843 ± 1176.300 (439)
Thorium-234, Dissolved	-14.922 ± 218.470 (308.7)	-16.941 ± 355.100 (463.6)
Total Uranium	0.689 ± 0.672 (1.09)	0.866 ± 0.531 (0.773)
Total Uranium, Dissolved	1.17 ± 0.597 (0.8)	0.693 ± 0.216 (0.205)
Uranium-235	12.897 ± 40.224 (68.86)	-22.747 ± 79.996 (86.53)
Uranium-235, Dissolved	21.278 ± 35.176 (59.57)	-24.889 ± 93.288 (88.56)
Uranium-238	63.211 ± 109.740 (188.1)	38.315 ± 135.950 (233.3)
Uranium-238, Dissolved	98.808 ± 96.080 (160.1)	-41.734 ± 2030.000 (259.7

Note: Values in parentheses represent maximum detected concentration

Groundwater Suppression and Leachate Sampling Field Form On-Site Technical Services, Inc.

Project: Hakes C&D Landfill, Painted Post, New York	Date: _//-6-/
Sampling Location: <u>Cell-5</u> Sample ID: <u>Cell5-1113</u>	Arrival Time: 1122
Weather Conditions:	
Temp.5 ^ℓ / _° °F()Sunny ()Partly Cloudy (), Light Rain ()	Hvy. Rain () Snow
Temp <u>5い。</u> F() Sunny () Partly Cloudy X Cloudy (), Light Rain () Wind Conditions:	
Location Type	
() Groundwater Suppression 📈 Leachate () Secondary Leachate () Surface Water	er/Sediment () Res. Water
() Other	
Flow and Depth Information (as appropriate)	
Depth: <u>NA</u> Estimated Flow: <u>NA</u>	
Comments:	
	
Field Parameters (as appropriate)	
Meter: YSI 556 (sn: 05023742), Hach 2100P (sn: 124/ C	<u>) </u>
Field Parameters tested in: () Submerged Probe	
Note: ₹urbidity measured from a vial grab sample	
Time pH Conductivity Turbidity D.O. Tem	np. ORP
(us/cm) (ntu) (mg/L) (°C)	(mV)
7770 6765 3377 6577 704 767	-
Sample Information	
	e () Pond () Ditch
Sample Type: () Composite Sample Location: () Discharge Pipe Adjacent to MW-M	
, ''	
Sample Collection Equipment/Method: 5-6 AL Buck Sample Description (clarity\color): fansparent Black Sample Odor (Y) or (N) Explain: Am t.	Sample Time:
Sample Description (clarity\color): <u>ransparent Black</u> Sample Odor (Y) or (N) Explain: <u>/</u>	leachske oder
Am t.	
Other Observations/Comments:	
	
Analysis Degreeated:	of Containors (C)
Analysis Requested:Number Sampling Completion: Time 1208Date 1643SamplersNumber	of Containers; //
ramping completion time /// // Date // O/O Complete /- //	

Groundwater Suppression and Leachate Sampling Field Form On-Site Technical Services, Inc.

Project: Hakes C&D Landfill, Painted F	Date: 16-13								
Sampling Location: <u>Ce//-</u> <u>(</u>	npling Location: <u>Cell-6</u> Sample ID: <u>Cell6-1/13</u>								
	Weather Conditions:								
Temp. <u>5(e</u> ° F () Sunny V) Pa Wind Cond	artly Cloudy () Cloudy () Light Ritions: 5-10 mg Ly Cust	ain () Hvy. Rain () Snow							
	Location Type	·							
() Groundwater Suppression (Leac	haté () Secondary Leachate () Surfa	ace Water/Sediment()Res. Water							
(() Other								
Flow a	nd Depth Information (as appropria	ate)							
	Estimated Flow: MA								
Comments;									
· F	ield Parameters (as appropriate)								
	102374/w), Hach 2100P (sn: /	1141A							
Field Param Note: Tu	eters tested in: () Submerged Probe urbidity measured from a vial grab sar	.(X) Cup πple							
	uctivity Turbidity D.O. /cm) (ntu) (mg/L)	Temp. ORP (*C) (mV) //,52 -/09.7							
	Sample Information Rise								
Sample Type: (*) Grab () Con Location Description/Condition:	nposite Sample Location; (/) Discha	arge Pipe () Pond () Ditch							
Sample Collection Equipment/Method: 5 gar	& Bucket	Sample Time:							
Sample Description (clarity\color): <u>Fanspace</u>	ent Bkck Sample Odor (Y) or (N) E	Explain: Kenchark oder							
Other Observations/Comments:									
Analysis Requested:		Number of Containers: /O							
Sampling Completion: Time 1251 Date	: 116-13 Samplers KD4 E								



1565 Jefferson Rd., Bldg 300, Suite 360 Rochester, NY 14623 T:+1 585 288 5380 F:+1 585 288 8475 www.alsglobal.com

December 3, 2013

Mr. Joe Boyles Casella Waste Systems Hyland Facility 6653 Herdman Road Angelica, NY 14709

Re: Hakes C&D Landfill – Leachate Service Request # R1308385

Dear Mr. Boyles:

Enclosed is the analytical data report for the above referenced facility. A total of one sample was subcontracted to Pace Analytical for Radiological Testing.

This report consists of one (1) package: the sample data summary package. The summary package has been e-mailed to your attention and to On-Site. A hard copy of the summary package has also been mailed to On-Site. All data presented in this package has been reviewed prior to report submission. If you should have any questions or concerns, please contact me at (585) 288-5380.

Thank you for your continued use of our services.

Sincerely,

ALS Environmental

Janice M. Jaeger Project Chemist

enc.

cc: Mr. Jon Brandes
On-Site
72 Railroad Avenue
Wellsville, NY 14895

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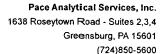
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Cooler Receipt and Preservation Check Form

Project/Client Folder Number	
Cooler received on 1/4/1 by: 60/1/2 COURIER: ALS UPS FEDEX VELOCITY CLIE	NT
1. Were custody seals on outside of cooler? (YES) NO	
2. Were custody papers properly filled out (ink, signed, etc.)? YES NO	
3. Did all bottles arrive in good condition (unbroken)? YES NO	
4. Did VOA viale, Alkalinity, or Sulfide have significant* air bubbles? YES NO N/A	
5. Were Ice or Ice packs present? YES NO	
6. Where did the bottles originate?	
7. Soil VOA samples received as: Bulk Jar Encore TerraCore Lab5035set N/A	•
8. Temperature of cooler(s) upon receipt: 5.1° 3.1° /.6° /.1° 20°	3./
Is the temperature within 0° - 6° C?: YN BN DN DN WN WN	D *
If No, Explain Below Date/Time Temperatures Taken: 11/7/13 09/9	
Thermometer ID: (RGUN#3 / IR GUN#4 Reading From: Femp Blank / Sample Bottle	
If out of Temperature, note packing/ice condition & Client Approval to Run Samples:	_
All Samples held in storage location P-con by O on 1/2/15 at 0926	
5035 samples placed in storage location by on at	
PC Secondary Review	
Cooler Breakdown: Date: 11/7/13 Time: 1617 by: JES	
 Were all bottle labels complete (i.e. analysis, preservation, etc.)? Did all bottle labels and tags agree with custody papers? NO NO	
 2. Did all bottle labels and tags agree with custody papers? 3. Were correct containers used for the tests indicated? YES NO 	
4. Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated	9
Explain any discrepancies:	A .
pH Reagent Lot Received Exp Sample ID Vol. Lot Added Final Yes = All	
YES NO Added PH samples OK	
YES NO Added pH samples OK	
YES NO Samples OK ≥12 NaOH ≥12 HNO3 U DDD2L(31C 10/14 No =	
YES NO	

PC Secondary Review:	
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December 03, 2013

Ms. Janice Jaeger ALS Environmental Columbia 1565 Jefferson Road Building 300 Rochester, NY 14623

RE: Project: R1308385

Pace Project No.: 30106949

Dear Ms. Jaeger:

Enclosed are the analytical results for sample(s) received by the laboratory on November 08, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carin a Ferris

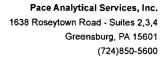
Carin Ferris

carin.ferris@pacelabs.com Project Manager

Enclosures



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CERTIFICATIONS

Project:

R1308385

Pace Project No.:

30106949

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4 Greensburg, PA 15601 ACLASS DOD-ELAP Accreditation #: ADE-1544

Alabama Certification #: 41590 Arizona Certification #: AZ0734

Arkansas Certification

California/TNI Certification #: 04222CA

Colorado Certification

Connecticut Certification #: PH-0694

Delaware Certification

Florida/TNI Certification #: E87683 Guarn/PADEP Certification

Hawaii/PADEP Certification Idaho Certification

Illinois/PADEP Certification

Indiana/PADEP Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: 90133

Louisiana/TNI Certification #: LA080002 Louisiana/TNI Certification #: 4086

Maine Certification #: PA0091

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification

Missouri Certification #: 235

Montana Certification #: Cert 0082

Nevada Certification
New Hampshire/TNI Certification #: 2976

New Jersey/TNI Certification #: PA 051

New Mexico Certification

New York/TNI Certification #: 10888 North Carolina Certification #: 42706

North Dakota Certification #: R-190 Oregon/TNI Certification #: PA200002

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

South Dakota Certification

Tennessee Certification #: TN2867 Texas/TNI Certification #: T104704188 Utah/TNI Certification #: ANTE

Vermont Dept. of Health: ID# VT-0282 Virgin Island/PADEP Certification Virginia/VELAP Certification #: 460198

Washington Certification #: C868

West Virginia Certification #: 143
Wisconsin/PADEP Certification

Wyoming Certification #: 8TMS-Q





SAMPLE SUMMARY

Project: R1308385 Pace Project No.: 30106949

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30106949001	R1308385-001	Water	11/06/13 11:40	11/08/13 09:55
30106949002	R1308385-002	Water	11/06/13 12:30	11/08/13 09:55
30106949003	R1308385-003	Water	11/06/13 11:40	11/08/13 09:55
30106949004	R1308385-004	Water	11/06/13 12:30	11/08/13 09:55

REPORT OF LABORATORY ANALYSIS

		** **********************************



SAMPLE ANALYTE COUNT

Project: R1308385
Pace Project No.: 30106949

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30106949001	R1308385-001	EPA 901.1m	MAH	15
		EPA 903.1	SLA	1
		EPA 904.0	MAW	1
		EPA 908.0	LAL	1
30106949002	R1308385-002	EPA 901.1m	MAH	15
		EPA 903.1	SLA	1
		EPA 904.0	MAW	1
		EPA 908.0	LAL	1
30106949003	R1308385-003	EPA 901.1m	MAH	15
		EPA 903.1	SLA	1
		EPA 904.0	MAW	1
		EPA 908.0	LAL	1
30106949004	R1308385-004	EPA 901.1m	MAH	15
		EPA 903.1	SLA	1
		EPA 904.0	MAW	1
		EPA 908.0	LAL	1

		et.





Project: R1308385 Pace Project No.: 30106949

Method: EPA 901.1m

Description: 901.1 Gamma Spec

Client: ALS Environmental Columbia

Date: December 03, 2013

General Information:

4 samples were analyzed for EPA 901.1m. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

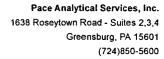
Additional Comments:

Sample Comments:

Dissolved fraction

- R1308385-003 (Lab ID: 30106949003)
- R1308385-004 (Lab ID: 30106949004)

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Project: Pace Project No.: R1308385

30106949

Method:

EPA 903.1

Description: 903.1 Radium 226 Client:

ALS Environmental Columbia

Date:

December 03, 2013

General Information:

2 samples were analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

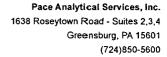
Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:





Project:

R1308385 30106949

Method:

Pace Project No.:

EPA 903.1

Description: 903.1 Radium 226, Dissolved
Client: ALS Environmental Columbia

Date: December 03, 2013

Date.

General Information:

2 samples were analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below.

Hold Time

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Sample Comments:

Dissolved fraction

- R1308385-003 (Lab ID: 30106949003)
- R1308385-004 (Lab ID: 30106949004)

		₹





Project: R1308385 Pace Project No.: 30106949

Method: EPA 904.0

Description: 904.0 Radium 228

Client: ALS Environmental Columbia

Date: December 03, 2013

General Information:

2 samples were analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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Project: Pace Project No.: R1308385 30106949

Method:

EPA 904.0

Client:

Description: 904.0 Radium 228, Dissolved ALS Environmental Columbia

Date:

December 03, 2013

General Information:

2 samples were analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

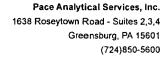
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Sample Comments:

Dissolved fraction

- R1308385-003 (Lab ID: 30106949003)
- •R1308385-004 (Lab ID: 30106949004)





Project: R1308385
Pace Project No.: 30106949

Method: EPA 908.0

Description: 908.0 Total Uranium

Client: ALS Environmental Columbia

Date: December 03, 2013

General Information:

4 samples were analyzed for EPA 908.0. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Sample Comments:

Dissolved fraction

- R1308385-003 (Lab ID: 30106949003)
- R1308385-004 (Lab ID: 30106949004)

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project:

R1308385

Pace Project No.: 30106949

Date: 12/03/2013 11:57 AM

Sample: R1308385-001 PWS:	Lab ID: 3010 Site ID:	6949001 Collected: 11/06/13 11:4 Sample Type:	0 Received:	11/08/13 09:55 N	fatrix: Water	
Parameters	Method	Act ± Unc (MDC)	Units	Analyzed	CAS No.	Qua
Actinium-228	EPA 901.1m	-1.515 ± 31.550 (44.230)	pCi/L	11/30/13 09:26	14331-83-0	
Bismuth-212	EPA 901.1m	-13.743 ± 549.740 (182.300)	pCi/L	11/30/13 09:26	14913-49-6	
Bismuth-214	EPA 901.1m	186.460 ± 33.504 (19.710)	pCi/L	11/30/13 09:26	14733-03-0	
Cesium-134	EPA 901.1m	1.346 ± 23.514 (39.600)	pCi/L	11/30/13 09:26	13967-70-9	
Cesium-137	EPA 901.1m	-0.243 ± 5.802 (9.642)	pCi/L	11/30/13 09:26	10045-97-3	
Lead-212	EPA 901.1m	13.493 ± 10.788 (17.790)	pCi/L	11/30/13 09:26	15092-94-1	
Lead-214	EPA 901.1m	188.830 ± 34.085 (21.450)	pCi/L	11/30/13 09:26	15067-28-4	
Potassium-40	EPA 901.1m	16.102 ± 67.685 (140.900)	pCi/L	11/30/13 09:26	13966-00-2	
Radium-226	EPA 901.1m	180.910 ± 135.860 (193.400)	pCi/L	11/30/13 09:26	13982-63-3	
Radium-228	EPA 901.1m	-1.515 ± 31.550 (44.230)	pCi/L	11/30/13 09:26	15262-20-1	
Thallium-208	EPA 901.1m	-0.294 ± 7.841 (10.270)	pCi/L	11/30/13 09:26	14913-50-9	
Thorium-232	EPA 901.1m	423.750 ± 3507.300 (6138.000)	pCi/L	11/30/13 09:26	7440-29-1	
Thorium-234	EPA 901.1m	1.122 ± 196.560 (348.200)	pCi/L	11/30/13 09:26	15065-10-8	
Uranium-235	EPA 901.1m	12.897 ± 40.224 (68.860)	pCi/L	11/30/13 09:26	15117-96-1	
Uranium-238	EPA 901.1m	63.211 ± 109.740 (188.100)	pCi/L	11/30/13 09:26		
	EPA 903.1	$2.57 \pm 1.71 (0.774)$	pCi/L	11/19/13 13:22	13982-63-3	
Radium-226				44/00/40 46:00	16262 20 4	
	EPA 904.0	2.29 ± 2.48 (4.47)	pCi/L	11/20/13 16:23	10202-20-1	
Radium-228 Total Uranium Sample: R1308385-002	EPA 908.0 Lab ID: 3010	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3	pCi/L	11/16/13 11:34		
Radium-228 Total Uranium Sample: R1308385-002 PWS:	EPA 908.0 Lab ID: 30106 Site ID:	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3 Sample Type:	pCi/L 80 Received:	11/16/13 11:34 11/08/13 09:55 M	7440-61-1 latrix: Water	
Radium-228 Total Uranium Sample: R1308385-002 PWS: Parameters	EPA 908.0 Lab ID: 30106 Site ID: Method	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3 Sample Type: Act ± Unc (MDC)	pCi/L Received: Units	11/16/13 11:34 11/08/13 09:55 M Analyzed	7440-61-1 Matrix: Water CAS No.	Qua
Radium-228 Total Uranium Sample: R1308385-002 PWS: Parameters Actinium-228	EPA 908.0 Lab ID: 30106 Site ID: Method EPA 901.1m	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3 Sample Type: Act ± Unc (MDC) 3.731 ± 23.437 (44.290)	pCi/L Received: Units pCi/L	11/16/13 11:34 11/08/13 09:55 M Analyzed 11/27/13 14:53	7440-61-1 Matrix: Water CAS No. 14331-83-0	Qua
Radium-228 Total Uranium Sample: R1308385-002 PWS: Parameters Actinium-228 Bismuth-212	EPA 908.0 Lab ID: 30106 Site ID: Method EPA 901.1m EPA 901.1m	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3 Sample Type: Act ± Unc (MDC) 3.731 ± 23.437 (44.290) -38.698 ± 188.190 (163.900)	pCi/L Received: Units pCi/L pCi/L	11/16/13 11:34 11/08/13 09:55 M Analyzed 11/27/13 14:53 11/27/13 14:53	7440-61-1 Matrix: Water CAS No. 14331-83-0 14913-49-6	Qua
Radium-228 Total Uranium Sample: R1308385-002 PWS: Parameters Actinium-228 Bismuth-212 Bismuth-214	EPA 908.0 Lab ID: 30106 Site ID: Method EPA 901.1m EPA 901.1m EPA 901.1m	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3 Sample Type: Act ± Unc (MDC) 3.731 ± 23.437 (44.290) -38.698 ± 188.190 (163.900) 450.210 ± 63.878 (27.690)	pCi/L Units pCi/L pCi/L pCi/L	11/16/13 11:34 11/08/13 09:55 M Analyzed 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53	7440-61-1 Matrix: Water CAS No. 14331-83-0 14913-49-6 14733-03-0	Qua
Radium-228 Total Uranium Sample: R1308385-002 PWS: Parameters Actinium-228 Bismuth-212 Bismuth-214 Cesium-134	EPA 908.0 Lab ID: 30106 Site ID: Method EPA 901.1m EPA 901.1m EPA 901.1m EPA 901.1m	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3	pCi/L Units PCi/L pCi/L pCi/L pCi/L	11/16/13 11:34 11/08/13 09:55 M Analyzed 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53	7440-61-1 Matrix: Water CAS No. 14331-83-0 14913-49-6 14733-03-0 13967-70-9	Qua
Radium-228 Total Uranium Sample: R1308385-002 PWS: Parameters Actinium-228 Bismuth-212 Bismuth-214 Cesium-134 Cesium-137	EPA 908.0 Lab ID: 30106 Site ID: Method EPA 901.1m EPA 901.1m EPA 901.1m EPA 901.1m EPA 901.1m EPA 901.1m	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3	pCi/L Units pCi/L pCi/L pCi/L pCi/L pCi/L pCi/L	11/16/13 11:34 11/08/13 09:55 M Analyzed 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53	7440-61-1 Tatrix: Water CAS No. 14331-83-0 14913-49-6 14733-03-0 13967-70-9 10045-97-3	Qua
Radium-228 Total Uranium Sample: R1308385-002 PWS: Parameters Actinium-228 Bismuth-212 Bismuth-214 Cesium-134 Cesium-137 Lead-212	EPA 908.0 Lab ID: 30106 Site ID: Method EPA 901.1m	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3	pCi/L Units PCi/L pCi/L pCi/L pCi/L pCi/L pCi/L pCi/L pCi/L	11/16/13 11:34 11/08/13 09:55 M Analyzed 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53	7440-61-1 Tatrix: Water CAS No. 14331-83-0 14913-49-6 14733-03-0 13967-70-9 10045-97-3 15092-94-1	Qua
Radium-228 Total Uranium Sample: R1308385-002 PWS: Parameters Actinium-228 Bismuth-212 Bismuth-214 Cesium-134 Cesium-137 Lead-212 Lead-214	EPA 908.0 Lab ID: 30106 Site ID: Method EPA 901.1m	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3	pCi/L Units pCi/L pCi/L pCi/L pCi/L pCi/L pCi/L pCi/L pCi/L pCi/L	11/16/13 11:34 11/08/13 09:55 M Analyzed 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53	7440-61-1 Tatrix: Water CAS No. 14331-83-0 14913-49-6 14733-03-0 13967-70-9 10045-97-3 15092-94-1 15067-28-4	Qua
Radium-228 Total Uranium Sample: R1308385-002 PWS: Parameters Actinium-228 Bismuth-212 Bismuth-214 Cesium-134 Cesium-137 Lead-212 Lead-214 Potassium-40	EPA 908.0 Lab ID: 30106 Site ID: Method EPA 901.1m	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3 Sample Type: Act ± Unc (MDC) 3.731 ± 23.437 (44.290) -38.698 ± 188.190 (163.900) 450.210 ± 63.878 (27.690) -2.014 ± 35.919 (60.040) 0.271 ± 6.598 (11.920) 57.948 ± 18.576 (27.500) 432.490 ± 59.577 (25.030) 59.864 ± 86.218 (159.300)	pCi/L Units pCi/L	11/16/13 11:34 11/08/13 09:55 M Analyzed 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53	7440-61-1 CAS No. 14331-83-0 14913-49-6 14733-03-0 13967-70-9 10045-97-3 15092-94-1 15067-28-4 13966-00-2	Qua
Radium-228 Total Uranium Sample: R1308385-002 PWS: Parameters Actinium-228 Bismuth-212 Bismuth-214 Cesium-134 Cesium-137 Lead-212 Lead-214 Potassium-40 Radium-226	EPA 908.0 Lab ID: 30106 Site ID: Method EPA 901.1m	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3 Sample Type: Act ± Unc (MDC) 3.731 ± 23.437 (44.290) -38.698 ± 188.190 (163.900) 450.210 ± 63.878 (27.690) -2.014 ± 35.919 (60.040) 0.271 ± 6.598 (11.920) 57.948 ± 18.576 (27.500) 432.490 ± 59.577 (25.030) 59.864 ± 86.218 (159.300) 61.980 ± 161.570 (284.900)	pCi/L Units pCi/L	11/16/13 11:34 11/08/13 09:55 M Analyzed 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53	7440-61-1 CAS No. 14331-83-0 14913-49-6 14733-03-0 13967-70-9 10045-97-3 15092-94-1 15067-28-4 13966-00-2 13982-63-3	Qua
Radium-228 Total Uranium Sample: R1308385-002 PWS: Parameters Actinium-228 Bismuth-212 Bismuth-214 Cesium-134 Cesium-137 Lead-212 Lead-214 Potassium-40 Radium-226 Radium-228	EPA 908.0 Lab ID: 30106 Site ID: Method EPA 901.1m	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3 Sample Type: Act ± Unc (MDC) 3.731 ± 23.437 (44.290) -38.698 ± 188.190 (163.900) 450.210 ± 63.878 (27.690) -2.014 ± 35.919 (60.040) 0.271 ± 6.598 (11.920) 57.948 ± 18.576 (27.500) 432.490 ± 59.577 (25.030) 59.864 ± 86.218 (159.300) 61.980 ± 161.570 (284.900) 3.731 ± 23.437 (44.290)	pCi/L Units pCi/L	11/16/13 11:34 11/08/13 09:55 M Analyzed 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53	7440-61-1 CAS No. 14331-83-0 14913-49-6 14733-03-0 13967-70-9 10045-97-3 15092-94-1 15067-28-4 13966-00-2 13982-63-3 15262-20-1	Qua
Radium-228 Total Uranium Sample: R1308385-002 PWS: Parameters Actinium-228 Bismuth-212 Bismuth-214 Cesium-134 Cesium-137 Lead-212 Lead-214 Potassium-40 Radium-226 Radium-228 Thallium-208	EPA 908.0 Lab ID: 30106 Site ID: Method EPA 901.1m	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3 Sample Type: Act ± Unc (MDC) 3.731 ± 23.437 (44.290) -38.698 ± 188.190 (163.900) 450.210 ± 63.878 (27.690) -2.014 ± 35.919 (60.040) 0.271 ± 6.598 (11.920) 57.948 ± 18.576 (27.500) 432.490 ± 59.577 (25.030) 59.864 ± 86.218 (159.300) 61.980 ± 161.570 (284.900)	pCi/L Units pCi/L	11/16/13 11:34 11/08/13 09:55 M Analyzed 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53	7440-61-1 CAS No. 14331-83-0 14913-49-6 14733-03-0 13967-70-9 10045-97-3 15092-94-1 15067-28-4 13966-00-2 13982-63-3 15262-20-1 14913-50-9	Qua
Radium-228 Total Uranium Sample: R1308385-002 PWS: Parameters Actinium-228 Bismuth-212 Bismuth-214 Cesium-134 Cesium-137 Lead-212 Lead-214 Potassium-40 Radium-226 Radium-228 Thallium-208	EPA 908.0 Lab ID: 30106 Site ID: Method EPA 901.1m	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3 Sample Type: Act ± Unc (MDC) 3.731 ± 23.437 (44.290) -38.698 ± 188.190 (163.900) 450.210 ± 63.878 (27.690) -2.014 ± 35.919 (60.040) 0.271 ± 6.598 (11.920) 57.948 ± 18.576 (27.500) 432.490 ± 59.577 (25.030) 59.864 ± 86.218 (159.300) 61.980 ± 161.570 (284.900) 3.731 ± 23.437 (44.290) 1.912 ± 6.620 (11.870)	pCi/L Units pCi/L	11/16/13 11:34 11/08/13 09:55 M Analyzed 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53	7440-61-1 CAS No. 14331-83-0 14913-49-6 14733-03-0 13967-70-9 10045-97-3 15092-94-1 15067-28-4 13966-00-2 13982-63-3 15262-20-1 14913-50-9	Qua
Radium-228 Total Uranium Sample: R1308385-002 PWS: Parameters Actinium-228 Bismuth-212 Bismuth-214 Cesium-134 Cesium-137 Lead-212 Lead-214 Potassium-40 Radium-226 Radium-228 Thallium-208 Thorium-232	EPA 908.0 Lab ID: 30100 Site ID: Method EPA 901.1m	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3 Sample Type: Act ± Unc (MDC) 3.731 ± 23.437 (44.290) -38.698 ± 188.190 (163.900) 450.210 ± 63.878 (27.690) -2.014 ± 35.919 (60.040) 0.271 ± 6.598 (11.920) 57.948 ± 18.576 (27.500) 432.490 ± 59.577 (25.030) 59.864 ± 86.218 (159.300) 61.980 ± 161.570 (284.900) 3.731 ± 23.437 (44.290) 1.912 ± 6.620 (11.870) -1637.200 ± 92402.000	pCi/L Units pCi/L	11/16/13 11:34 11/08/13 09:55 M Analyzed 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53	7440-61-1 Atrix: Water CAS No. 14331-83-0 14913-49-6 14733-03-0 13967-70-9 10045-97-3 15092-94-1 15067-28-4 13966-00-2 13982-63-3 15262-20-1 14913-50-9 7440-29-1	Qua
Radium-228 Total Uranium Sample: R1308385-002 PWS: Parameters Actinium-228 Bismuth-212 Bismuth-214 Cesium-134 Cesium-137 Lead-212 Lead-214 Potassium-40 Radium-226 Radium-226 Radium-228 Thorium-232	EPA 908.0 Lab ID: 30100 Site ID: Method EPA 901.1m	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3 Sample Type: Act ± Unc (MDC) 3.731 ± 23.437 (44.290) -38.698 ± 188.190 (163.900) 450.210 ± 63.878 (27.690) -2.014 ± 35.919 (60.040) 0.271 ± 6.598 (11.920) 57.948 ± 18.576 (27.500) 432.490 ± 59.577 (25.030) 59.864 ± 86.218 (159.300) 61.980 ± 161.570 (284.900) 3.731 ± 23.437 (44.290) 1.912 ± 6.620 (11.870) -1637.200 ± 92402.000 (7921.000) -68.843 ± 1176.300	PCi/L Units PCi/L	11/16/13 11:34 11/08/13 09:55 M Analyzed 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53	7440-61-1 Atrix: Water CAS No. 14331-83-0 14913-49-6 14733-03-0 13967-70-9 10045-97-3 15092-94-1 15067-28-4 13966-00-2 13982-63-3 15262-20-1 14913-50-9 7440-29-1 15065-10-8	Qua
Radium-228 Total Uranium Sample: R1308385-002 PWS: Parameters Actinium-228 Bismuth-212 Bismuth-214 Cesium-134 Cesium-137 Lead-212 Lead-214 Potassium-40 Radium-226 Radium-226 Radium-228 Thallium-208 Thorium-232 Thorium-234 Uranium-235	EPA 908.0 Lab ID: 30100 Site ID: Method EPA 901.1m	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3 Sample Type: Act ± Unc (MDC) 3.731 ± 23.437 (44.290) -38.698 ± 188.190 (163.900) 450.210 ± 63.878 (27.690) -2.014 ± 35.919 (60.040) 0.271 ± 6.598 (11.920) 57.948 ± 18.576 (27.500) 432.490 ± 59.577 (25.030) 59.864 ± 86.218 (159.300) 61.980 ± 161.570 (284.900) 3.731 ± 23.437 (44.290) 1.912 ± 6.620 (11.870) -1637.200 ± 92402.000 (7921.000) -68.843 ± 1176.300 (439.000)	pCi/L Units PCi/L	11/16/13 11:34 11/08/13 09:55 M Analyzed 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53	7440-61-1 Atrix: Water CAS No. 14331-83-0 14913-49-6 14733-03-0 13967-70-9 10045-97-3 15092-94-1 15067-28-4 13966-00-2 13982-63-3 15262-20-1 14913-50-9 7440-29-1 15065-10-8	Qua
Radium-228 Total Uranium Sample: R1308385-002 PWS: Parameters Actinium-228 Bismuth-212 Bismuth-214 Cesium-134 Cesium-137 Lead-212 Lead-214 Potassium-40 Radium-226 Radium-226 Radium-228 Thallium-208 Thorium-232 Thorium-234 Uranium-235 Uranium-238	EPA 908.0 Lab ID: 30100 Site ID: Method EPA 901.1m	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3 Sample Type: Act ± Unc (MDC) 3.731 ± 23.437 (44.290) -38.698 ± 188.190 (163.900) 450.210 ± 63.878 (27.690) -2.014 ± 35.919 (60.040) 0.271 ± 6.598 (11.920) 57.948 ± 18.576 (27.500) 432.490 ± 59.577 (25.030) 59.864 ± 86.218 (159.300) 61.980 ± 161.570 (284.900) 3.731 ± 23.437 (44.290) 1.912 ± 6.620 (11.870) -1637.200 ± 92402.000 (7921.000) -68.843 ± 1176.300 (439.000) -22.747 ± 79.996 (86.530)	pCi/L Units PCi/L	11/16/13 11:34 11/08/13 09:55 M Analyzed 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53	7440-61-1 Aatrix: Water CAS No. 14331-83-0 14913-49-6 14733-03-0 13967-70-9 10045-97-3 15092-94-1 15067-28-4 13966-00-2 13982-63-3 15262-20-1 14913-50-9 7440-29-1 15065-10-8	Qua
Radium-226 Radium-228 Total Uranium Sample: R1308385-002 PWS: Parameters Actinium-228 Bismuth-212 Bismuth-214 Cesium-134 Cesium-137 Lead-212 Lead-214 Potassium-40 Radium-226 Radium-228 Thallium-208 Thorium-232 Thorium-234 Uranium-235 Uranium-238 Radium-226 Radium-226 Radium-226 Radium-227	EPA 908.0 Lab ID: 30100 Site ID: Method EPA 901.1m	0.689 ± 0.672 (1.09) 6949002 Collected: 11/06/13 12:3 Sample Type: Act ± Unc (MDC) 3.731 ± 23.437 (44.290) -38.698 ± 188.190 (163.900) 450.210 ± 63.878 (27.690) -2.014 ± 35.919 (60.040) 0.271 ± 6.598 (11.920) 57.948 ± 18.576 (27.500) 432.490 ± 59.577 (25.030) 59.864 ± 86.218 (159.300) 61.980 ± 161.570 (284.900) 3.731 ± 23.437 (44.290) 1.912 ± 6.620 (11.870) -1637.200 ± 92402.000 (7921.000) -68.843 ± 1176.300 (439.000) -22.747 ± 79.996 (86.530) 38.315 ± 135.950 (233.300)	pCi/L Units PCi/L	11/16/13 11:34 11/08/13 09:55 M Analyzed 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53 11/27/13 14:53	7440-61-1 Aatrix: Water CAS No. 14331-83-0 14913-49-6 14733-03-0 13967-70-9 10045-97-3 15092-94-1 15067-28-4 13966-00-2 13982-63-3 15262-20-1 14913-50-9 7440-29-1 15065-10-8 15117-96-1 13982-63-3	Qua

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project:

R1308385

Pace Project No.:

30106949

Sample:	R1308385-003
PWS:	

Lab ID: 30106949003 Site ID:

Collected: 11/06/13 11:40

Sample Type:

Comments: • Dissolved fraction

Parameters	Method	Act ± Unc (MDC)	Units	Analyzed	CAS No.	Qual
Actinium-228	EPA 901.1m	-5.263 ± 52.415 (43.250)	pCi/L	12/02/13 10:36	14331-83-0	
Bismuth-212	EPA 901.1m	31.422 ± 63.942 (113.600)	pCi/L	12/02/13 10:36	14913-49-6	
Bismuth-214	EPA 901.1m	50.799 ± 14.979 (15.300)	pCi/L	12/02/13 10:36	14733-03-0	
Cesium-134	EPA 901.1m	0.000 ± 13.128 (22.550)	pCi/L	12/02/13 10:36	13967-70-9	
Cesium-137	EPA 901.1m	-0.105 ± 7.143 (9.560)	pCi/L	12/02/13 10:36	10045-97-3	
Lead-212	EPA 901.1m	2.371 ± 8.658 (15.870)	pCi/L	12/02/13 10:36	15092-94-1	
Lead-214	EPA 901.1m	49.889 ± 15.466 (20.400)	pCi/L	12/02/13 10:36	15067-28-4	
Potassium-40	EPA 901.1m	45.325 ± 76.125 (146.000)	pCi/L	12/02/13 10:36	13966-00-2	
Radium-226	EPA 901.1m	40.459 ± 108.470 (201.600)	pCi/L	12/02/13 10:36	13982-63-3	
Radium-228	EPA 901.1m	-5.263 ± 52.415 (43.250)	pCi/L	12/02/13 10:36	15262-20-1	
Thallium-208	EPA 901.1m	-2.025 ± 20.895 (10.700)	pCi/L	12/02/13 10:36	14913-50-9	
Thorium-232	EPA 901.1m	267.070 ± 2983.200 (5328.000)	pCi/L	12/02/13 10:36	7440-29-1	
Thorium-234	EPA 901.1m	-14.922 ± 218.470 (308.700)	pCi/L	12/02/13 10:36	15065-10-8	
Uranium-235	EPA 901.1m	21.278 ± 35.176 (59.570)	pCi/L	12/02/13 10:36	15117-96-1	
Uranium-238	EPA 901.1m	98.808 ± 96.080 (160.100)	pCi/L	12/02/13 10:36		
Radium-226, Dissolved	EPA 903.1	0.771 ± 0.945 (1.32)	pCi/L	11/15/13 13:38	13982-63-3	
Radium-228, Dissolved	EPA 904.0	1.92 ± 0.795 (1.21)	pCi/L	11/15/13 15:18	15262-20-1	
Total Uranium	EPA 908.0	1.17 ± 0.597 (0.800)	pCi/L	11/16/13 11:34	7440-61-1	

Sample: R1308385-004

Date: 12/03/2013 11:57 AM

Lab ID: 30106949004 Site ID:

Sample Type:

Collected: 11/06/13 12:30 Received: 11/08/13 09:55 Matrix: Water

Received: 11/08/13 09:55 Matrix: Water

PWS:

Comments: • Dissolved fraction

Parameters	Method	Act ± Unc (MDC)	Units	Analyzed	CAS No.	Qual
Actinium-228	EPA 901.1m	-6.774 ± 88.042 (50.240)	pCi/L	12/02/13 11:38	14331-83-0	
Bismuth-212	EPA 901.1m	-7.919 ± 316.740 (163.800)	pCi/L	12/02/13 11:38	14913-49-6	
Bismuth-214	EPA 901.1m	537.350 ± 70.694 (19.970)	pCi/L	12/02/13 11:38	14733-03-0	
Cesium-134	EPA 901.1m	1.349 ± 41.714 (69.610)	pCi/L	12/02/13 11:38	13967-70-9	
Cesium-137	EPA 901.1m	-2.554 ± 13.479 (14.740)	pCi/L	12/02/13 11:38	10045-97-3	
Lead-212	EPA 901.1m	75.475 ± 22.154 (23.090)	pCi/L	12/02/13 11:38	15092-94-1	
Lead-214	EPA 901.1m	563.230 ± 72.309 (24.690)	pCi/L	12/02/13 11:38	15067-28-4	
Potassium-40	EPA 901.1m	299.730 ± 96.482 (106.700)	pCi/L	12/02/13 11:38	13966-00-2	
Radium-226	EPA 901.1m	1.854 ± 186.260 (328.000)	pCi/L	12/02/13 11:38	13982-63-3	
Radium-228	EPA 901.1m	-6.774 ± 88.042 (50.240)	pCi/L	12/02/13 11:38	15262-20-1	
Thallium-208	EPA 901.1m	-1.581 ± 16.329 (11.650)	pCi/L	12/02/13 11:38	14913-50-9	
Thorium-232	EPA 901.1m	511.900 ± 4679.000 (8051.000)	pCi/L	12/02/13 11:38	7440-29-1	
Thorium-234	EPA 901.1m	-16.941 ± 355.100 (463.600)	pCi/L	12/02/13 11:38	15065-10-8	
Uranium-235	EPA 901.1m	-24.889 ± 93.288 (88.560)	pCi/L	12/02/13 11:38	15117-96-1	
Uranium-238	EPA 901.1m	-41.734 ± 2030.000 (259.700)	pCi/L	12/02/13 11:38		
Radium-226, Dissolved	EPA 903.1	1.24 ± 0.999 (1.24)	pCi/L	11/15/13 12:57	13982-63-3	
Radium-228, Dissolved	EPA 904.0	2.71 ± 1.02 (1.50)	pCi/L	11/15/13 16:32	15262-20-1	
Total Uranium	EPA 908.0	$0.693 \pm 0.216 (0.205)$	pCi/L	11/16/13 11:34	7440-61-1	

REPORT OF LABORATORY ANALYSIS

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Project:

R1308385

Pace Project No.:

30106949

QC Batch:

RADC/17708

Analysis Method:

EPA 903.1

QC Batch Method:

EPA 903.1

Analysis Description:

Matrix: Water

903.1 Radium-226, Dissolved

Associated Lab Samples:

oles: 30106949003, 30106949004

Act ± Unc (MDC)

METHOD BLANK: 655931

Associated Lab Samples:

30106949003, 30106949004

Units

Analyzed

Qualifiers

Parameter Radium-226, Dissolved

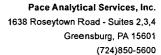
Date: 12/03/2013 11:57 AM

 -0.087 ± 0.395 (0.932)

pCi/L

11/15/13 12:46

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Project:

R1308385

Pace Project No.:

30106949

QC Batch:

RADC/17709

Analysis Method:

EPA 903.1

QC Batch Method:

EPA 903.1

Analysis Description:

Matrix: Water

903.1 Radium-226

Associated Lab Samples:

30106949001, 30106949002

METHOD BLANK: 655932

Associated Lab Samples:

Date: 12/03/2013 11:57 AM

30106949001, 30106949002

Parameter

Act ± Unc (MDC)

Units

pCi/L

Analyzed

Qualifiers

Radium-226

 -0.045 ± 0.233 (0.539)

11/19/13 13:22

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Project:

R1308385

Pace Project No.:

30106949

QC Batch:

RADC/17776

Analysis Method:

EPA 901.1m

QC Batch Method:

Analysis Description:

901.1 Gamma Spec

Associated Lab Samples:

EPA 901.1m

30106949001, 30106949002, 30106949003, 30106949004

METHOD BLANK: 657652

Associated Lab Samples:

Date: 12/03/2013 11:57 AM

30106949001, 30106949002, 30106949003, 30106949004

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Actinium-228	-0.012 ± 16.104 (33.830)	pCi/L	11/14/13 15:02	
Bismuth-212	-8.981 ± 2089.800 (130.500)	pCi/L	11/14/13 15:02	
Bismuth-214	54.548 ± 18.556 (19.710)	pCi/L	11/14/13 15:02	
Cesium-134	-2.729 ± 7.989 (11.090)	pCi/L	11/14/13 15:02	
Cesium-137	-2.459 ± 6.529 (11.330)	pCi/L	11/14/13 15:02	
Lead-212	$0.240 \pm 7.314 (14.130)$	pCi/L	11/14/13 15:02	
Lead-214	26.162 ± 12.572 (19.430)	pCi/L	11/14/13 15:02	
Potassium-40	-16.271 ± 84.402 (120.300)	pCi/L	11/14/13 15:02	
Radium-226	-30.461 ± 150.260 (182.200)	pCi/L	11/14/13 15:02	
Radium-228	-0.012 ± 16.104 (33.830)	pCi/L	11/14/13 15:02	
Thallium-208	$-3.649 \pm 48.852 (9.367)$	pCi/L	11/14/13 15:02	
Thorium-232	-1288.400 ± 51536.000 (4917.000)	pCi/L	11/14/13 15:02	
Thorium-234	-27.481 ± 233.900 (239.500)	pCi/L	11/14/13 15:02	
Uranium-235	0.788 ± 26.430 (49.130)	pCi/L	11/14/13 15:02	
Uranium-238	14.907 ± 76.930 (141.100)	pCi/L	11/14/13 15:02	

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Project:

R1308385

Pace Project No.:

30106949

QC Batch:

RADC/17710

Analysis Method:

EPA 904.0

QC Batch Method:

EPA 904.0

Analysis Description:

Matrix: Water

904.0 Radium 228, Dissolved

Associated Lab Samples:

ples: 30106949003, 30106949004

METHOD BLANK: 655933
Associated Lab Samples:

Parameter

30106949003, 30106949004

Act ± Unc (MDC)

Units

Analyzed

Qualifiers

Radium-228, Dissolved

Date: 12/03/2013 11:57 AM

 0.0800 ± 0.271 (0.580)

pCi/L

11/15/13 15:34

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Project:

R1308385

Pace Project No.:

30106949

QC Batch:

DADO4477

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RADC/17713

Analysis Method:

EPA 904.0

QC Batch Method:

EPA 904.0

Analysis Description:

904.0 Radium 228

Associated Lab Samples:

Matrix: Water

METHOD BLANK: 655936 Associated Lab Samples:

Date: 12/03/2013 11:57 AM

30106949001, 30106949002

30106949001, 30106949002

Parameter

Act ± Unc (MDC)

Units

pCi/L

Analyzed

Qualifiers

Radium-228

 0.253 ± 0.319 (0.676)

11/20/13 12:31





Project:

R1308385

Pace Project No.:

30106949

QC Batch:

RADC/17757

Analysis Method:

EPA 908.0

QC Batch Method:

EPA 908.0

Analysis Description:

908.0 Total Uranium

Associated Lab Samples:

30106949001, 30106949002, 30106949003, 30106949004

METHOD BLANK: 657449

Associated Lab Samples:

30106949001, 30106949002, 30106949003, 30106949004

Parameter

Act ± Unc (MDC)

Units

Analyzed

Qualifiers

Total Uranium

Date: 12/03/2013 11:57 AM

 $0.222 \pm 0.219 \quad (0.355)$

pCi/L

11/15/13 17:35

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QUALIFIERS

Project: R1308385 Pace Project No.: 30106949

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Date: 12/03/2013 11:57 AM

Unc - Uncertainty

(MDC) - Minimum Detectable Concentration

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

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ALS Environmental Chain of Custody 1565 Jefferson Rd, Building 300 • Rochester, NY 14623 • 585-288-5380 • FAX 585-288-8475

ALS Contact: Janice Jaeger

Project Number: Project Manager: Lab Code	R1308385 Janice Jaeger Sample ID	# of Cont.	Matrix	Samp Date	ile Time	Lab ID	Radium 226 903, 1	Radium 228 904.0	Gamma Spec	Wannom by 908.0	
R1308385-001	CELL5-1113	1	Water	11/6/13	1140	Pace PA	X	х	X	X c	01
R1308385-002	CELL6-1113	· in	Water	11/6/13	1230	Pace PA	X	X	X	X oc	2
R1308385-003	CELL5-1113 Dissolved	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Water	11/6/13	1140	Pace PA	X	X	X	χ α	5
R1308385-004	CELL6-1113 Dissolved	2	Water	11/6/13	1230	Pace PA	X	х	X	X	524

Special Instructions/Comments	Turnaround Requirements	Report Requirements	Invoice Information
a second along along and in lah	RUSH (Surcharges Apply)	I. Results Only	
DISSOlved samples reed in Cab filter	PLEASE CIRCLE WORK DAYS	II. Results + QC Summaries	PO#
filler	1 2 3 4 5	III. Results + QC and Calibration Summaries	R1308385
excel EDD	XSTANDARD	IV. Data Validation Report with Raw Data	
ana se	Requested FAX Date:	PQL/MDL/J <u>N</u>	Bill to
H - Test is On Hold P - Test is Authorized for Prep Only	Requested Report Date: 11/21/13	EDD Y	

Received By:

Airbill Number:

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Sample Condition Upon Receipt

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Face Analytical Client Name	: ALS		·	_ Project#_	3010449
Courier: DFFed Ex UPS USPS Clie	nt □Comn	nercial	☐ Pace Other	Optio	onal water than the
Tracking #: 55308488 3145			•		Due Date in Angle
Custody Seal on Cooler/Box Present:	🛛 no	Seals	s intact: yes	☐ no	
Packing Material: Bubble Wrap Bubble	Bags 🗾	None	Other		.€ 34′
Thermometer Used 5 6 7	Type of Ice	: Wa	Blue None		cooling process has begun
Cooler Temperature 2 0 2 1	Biological	Tissue	is Frozen: Yes No Comments:	Date and In contents;	PAC 11-8-13
Chain of Custody Present:	Ayes □No	□ _{N/A}	1.	K	
Chain of Custody Filled Out:	ZYes □No	□N/A	2.	<u> </u>	er a mar
Chain of Custody Relinquished:	ØYes □No	□N⁄A	3,	- Control of the Cont	- in the state of
Sampler Name & Signature on COC:	□Yes ZNo	□N⁄A	4.	*	
Samples Arrived within Hold Time:	ZYos □No	□n/a	5,		Company of the Compan
Short Hold Time Analysis (<72hr):	□Yes ZiNo	□n/a	6.		
Rush Turn Around Time Requested:	□Yes Zin o	□n/A	7.	The second secon	
Sufficient Volume:	ZYes_ ONo	DN/A	8		
Correct Containers Used:	ZYes □No	□n/a	9.	•	
Pace Containers Used:	□Yes ☑No	□n/a		· · · · · · · · · · · · · · · · · · ·	The Control of the Co
Containers Intact:	ZiYes □No	□n/a	10.	Advances and the second	H.,
Filtered volume received for Dissolved tests	□Yes ØNo	* HOW	11 PAC 118-13		# C
Sample Labels match COC:	DYes □No	□N/A	12.		
-Includes date/time/ID/Analysis Matrix	WT		3 6		#
All containers needing preservation have been checked.	ØYes □No	□n/a	13. Cell6 -1113	and Cells 1	
All containers needing preservation are found to be in compliance with EPA recommendation.	□Yes ØNo	□n/a	Added (Samples	to each both	120 11-8-13
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	□Yes ZÎNo		Initial when Completed	Lot # of added preservative	DL13-1051
Samples checked for dechlorination:	□Yes □No	IONIA	14.		Asido Philip
Headspace in VOA Vials (>6mm):	□Yes □No	ZNIA	15.		
Trip Blank Present:	□Yes DKio	□n/a	16.		
Trip Blank Custody Seals Present	□Yés □No	ZINA	:		
Pace Trip Blank Lot # (if purchased):	<u> </u>			- 15-26	
Client Notification/ Resolution:		`		Field Data Requi	red? Y / N .
Person Contacted:		_Date/	Time:		
Comments/ Resolution:				*	The second secon
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