

# **EXHIBIT E**



## ON-SITE TECHNICAL SERVICES, INC

72 Railroad Avenue  
Wellsville, New York 14895

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

September 6, 2013

Mr. Mark Domagala  
NYSDEC – Region 8  
Division of Solid and Hazardous Materials  
6274 East Avon-Lima Road  
Avon, New York 14414

RECEIVED  
SEP 10 2013  
Division of Materials Management  
NYSDEC - Region 8 Avon

Re: Hakes C & D Landfill Painted Post, New York – 2<sup>nd</sup> Quarter 2013 Leachate Radiological Test Results

Dear Mark:

On behalf of Hakes C & D Landfill, the purpose of this letter is to transmit the results of the second 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 second 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 May 15, 2013 and sent to ALS Environmental (formerly Columbia Analytical Services) in Rochester, New York. A laboratory results summary table, 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. (electronic copy)  
Carla Jordan, Casella Waste Systems Inc. (electronic copy)  
Mark Amann, NYSDEC (hard copy)  
Richard Clarkson, NYSDEC, Division of Material Management (hard copy)  
Timothy Rice, NYSDEC, Environmental Remediation (hard copy)

Attachments

Table 1

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

Parameter	Cell 5 Leachate 5/15/2013	Cell 6 Leachate 5/15/2013
Actinium-228	-10.7996 ± 245.7	-6.921 ± 73.925
Actinium-228, Dissolved	-1.558 ± 52.055	-4.078 ± 32.606
Bismuth-212	-1.199 ± 61.325	-0.63 ± 85.341
Bismuth-212, Dissolved	53.992 ± 147.880	1.482 ± 62.670
Bismuth-214	17.264 ± 32.231	166.5 ± 29.290
Bismuth-214, Dissolved	2878.9 ± 316.840	-6.882 ± 42.477
Cesium-134	-1.574 ± 5.240	2.351 ± 3.694
Cesium-134, Dissolved	2.646 ± 90.325	-1.779 ± 5.252
Cesium-137	0.875 ± 5.066	-2.479 ± 8.102
Cesium-137, Dissolved	-11.315 ± 15.998	-0.209 ± 20.920
Lead-212	-6.346 ± 211.120	26.725 ± 15.570
Lead-212, Dissolved	-88.256 ± 44.016	-6.801 ± 93.396
Lead-214	-3.963 ± 24.352	189.33 ± 28.610
Lead-214, Dissolved	2853.2 ± 314.060	8.682 ± 8.606
Potassium-40	97.208 ± 76.387	92.937 ± 83.848
Potassium-40, Dissolved	38.195 ± 120.260	185.06 ± 102.490
Radium-226	-9.006 ± 117.540	40.06 ± 122.330
Radium-226 (EPA 903.1)	2.12 ± 1.35	3.31 ± 1.70
Radium-226, Dissolved	-1.335 ± 343.750	29.396 ± 109.850
Radium-226, Dissolved (EPA 903.1)	1.03 ± 0.797	4.18 ± 1.81
Radium-228	-10.799 ± 245.760	-6.921 ± 73.925
Radium-228 (EPA 904.0)	2.37 ± 1.35	2.73 ± 1.45
Radium-228, Dissolved	-1.558 ± 52.055	-4.078 ± 32.606
Radium-228, Dissolved (EPA 904.0)	1.56 ± 0.608	1.87 ± 0.662
Thallium-208	-1.618 ± 15.179	-2.693 ± 46.305
Thallium-208, Dissolved	-3.223 ± 128.930	-0.741 ± 6.759
Thorium-232	461.14 ± 2681.000	349.91 ± 3328.000
Thorium-232, Dissolved	-2154 ± 51946.000	595.51 ± 2727.700
Thorium-234	-7.505 ± 175.730	1.299 ± 198.230
Thorium-234, Dissolved	-273.2 ± 1299.400	-54.779 ± 449.200
Total Uranium	1.04 ± 1.40	1.27 ± 1.33
Total Uranium, Dissolved	1.06 ± 1.50	1.34 ± 1.42
Uranium-235	-8.563 ± 137.160	-29.946 ± 59.449
Uranium-235, Dissolved	61.408 ± 111.980	8.328 ± 31.446
Uranium-238	43.862 ± 80.842	85.842 ± 95.919
Uranium-238, Dissolved	-80.062 ± 1270.300	54.16 ± 82.463

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

Project: Hakes C&D Landfill, Painted Post, New York

Date: 5-15-13

Sampling Location: Cell 5 Sample ID: Cell 5-0513 Arrival Time: 1141

**Weather Conditions:**

Temp. 62° F ( ) Sunny  Partly Cloudy ( ) Cloudy ( ) Light Rain ( ) Hvy. Rain ( ) Snow

Wind Conditions: 0-10 mph

**Location Type**

( ) Groundwater Suppression  Leachate ( ) Secondary Leachate ( ) Surface Water/Sediment ( ) Res. Water  
( ) Other \_\_\_\_\_

**Flow and Depth Information (as appropriate)**

Depth: NA Estimated Flow: \_\_\_\_\_

Comments: \_\_\_\_\_

**Field Parameters (as appropriate)**

Meter: YSI 556 (sn: 051237AW), Hach 2100P (sn: 13309)

Field Parameters tested in: ( ) Submerged Probe  Cup

Note: Turbidity measured from a vial grab sample

Time	pH	Conductivity (us/cm)	Turbidity (ntu)	D.O. (mg/L)	Temp. (°C)	ORP (mV)
<u>1200</u>	<u>6.78</u>	<u>5677</u>	<u>469.0</u>	<u>NA</u>	<u>19.88</u>	<u>-98.7</u>

**Sample Information**

Sample Type:  Grab ( ) Composite Sample Location:  Discharge Pipe ( ) Pond ( ) Ditch

Location Description/Condition: Cell 5 Discharge in 5 Gal Bucket From Hake Employee

Sample Collection Equipment/Method: 1 gal jug Sample Time: 1200

Sample Description (clarity/color): Black Lat Sample Odor (Y) or (N) Explain: leachate odor

Other Observations/Comments: \_\_\_\_\_

Analysis Requested: \_\_\_\_\_ Number of Containers: 8/10

Sampling Completion: Time 1219 Date 5-15-13 Samplers KJE

# Groundwater Suppression and Leachate Sampling Field Form

## On-Site Technical Services, Inc.

Project: Hakes C&D Landfill, Painted Post, New York

Date: 5-15-13

Sampling Location: Cell 6 Sample ID: Cell 6-053 Arrival Time: 1231

**Weather Conditions:**

Temp. 61° F ( ) Sunny  Partly Cloudy ( ) Cloudy ( ) Light Rain ( ) Hvy. Rain ( ) Snow

Wind Conditions: 0-15 mph w/ gusts to 30 mph

**Location Type**

( ) Groundwater Suppression  Leachate ( ) Secondary Leachate ( ) Surface Water/Sediment ( ) Res. Water  
( ) Other \_\_\_\_\_

**Flow and Depth Information (as appropriate)**

Depth: NA Estimated Flow: \_\_\_\_\_

Comments: \_\_\_\_\_

**Field Parameters (as appropriate)**

Meter: YSI 556 (sn: 05D2374AW), Hach 2100P (sn: 13309)

Field Parameters tested in: ( ) Submerged Probe  Cup

Note: Turbidity measured from a vial grab sample

Time	pH	Conductivity (us/cm)	Turbidity (ntu)	D.O. (mg/L)	Temp. (°C)	ORP (mV)
<u>1245</u>	<u>6.80</u>	<u>13320</u>	<u>32.9</u>	<u>NA</u>	<u>22.31</u>	<u>-224.9</u>

**Sample Information**

Sample Type:  Grab ( ) Composite Sample Location:  Discharge Pipe ( ) Pond ( ) Ditch

Location Description/Condition: Cell 6 Discharge Pipe collected by Hake employee  
5 GAL Bucket

Sample Collection Equipment/Method: 5 GAL jug Sample Time: 1245

Sample Description (clarity/color): Clear w/ Black tint Sample Odor:  (Y) or (N) Explain: leachate

Other Observations/Comments: \_\_\_\_\_

Analysis Requested: \_\_\_\_\_ Number of Containers: 10

Sampling Completion: Time 1306 Date 5-15-13 Samplers K D G



1565 Jefferson Rd., Bldg 300, Suite 360  
Rochester, NY 14623  
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F: +1 585 288 8475  
[www.alsglobal.com](http://www.alsglobal.com)

June 10, 2013

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

Re: Hakes C&D Landfill – Leachate  
Service Request # R1303467

Dear Mr. Boyles:

Enclosed is the analytical data report for the above referenced facility. A total of four samples were 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



Pace Analytical Services, Inc.  
1638 Roseytown Road - Suites 2,3,4  
Greensburg, PA 15601  
(724)850-5600

June 10, 2013

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

RE: Project: R1303467  
Pace Project No.: 3094549

Dear Ms. Jaeger:

Enclosed are the analytical results for sample(s) received by the laboratory on May 17, 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 Ferris

carin.ferris@pacelabs.com  
Project Manager

Enclosures



## REPORT OF LABORATORY ANALYSIS

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### CERTIFICATIONS

Project: R1303467  
Pace Project No.: 3094549

#### 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  
Guam/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

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### SAMPLE SUMMARY

Project: R1303467  
Pace Project No.: 3094549

Lab ID	Sample ID	Matrix	Date Collected	Date Received
3094549001	R1303467-001 CELL5-0513	Water	05/15/13 12:00	05/17/13 09:15
3094549002	R1303467-002 CELL5-0513 DISS	Water	05/15/13 12:00	05/17/13 09:15
3094549003	R1303467-003 CELL6-0513	Water	05/15/13 12:45	05/17/13 09:15
3094549004	R1303467-004 CELL6-0513 DISS	Water	05/15/13 12:45	05/17/13 09:15

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**SAMPLE ANALYTE COUNT**

Project: R1303467  
 Pace Project No.: 3094549

Lab ID	Sample ID	Method	Analysts	Analytes Reported
3094549001	R1303467-001 CELL5-0513	EPA 901.1m	AEH	15
		EPA 903.1	SLA	1
		EPA 904.0	MAW	1
		EPA 908.0	LAL	1
3094549002	R1303467-002 CELL5-0513 DISS	EPA 901.1m	AEH	15
		EPA 903.1	SLA	1
		EPA 904.0	MAW	1
		EPA 908.0	LAL	1
3094549003	R1303467-003 CELL6-0513	EPA 901.1m	AEH	15
		EPA 903.1	SLA	1
		EPA 904.0	MAW	1
		EPA 908.0	LAL	1
3094549004	R1303467-004 CELL6-0513 DISS	EPA 901.1m	AEH	15
		EPA 903.1	SLA	1
		EPA 904.0	MAW	1
		EPA 908.0	LAL	1

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## PROJECT NARRATIVE

Project: R1303467  
Pace Project No.: 3094549

---

**Method:** EPA 901.1m  
**Description:** 901.1 Gamma Spec  
**Client:** ALS Environmental Columbia  
**Date:** June 10, 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 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 NARRATIVE

Project: R1303467  
Pace Project No.: 3094549

---

**Method:** EPA 903.1  
**Description:** 903.1 Radium 226  
**Client:** ALS Environmental Columbia  
**Date:** June 10, 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 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 NARRATIVE

Project: R1303467  
Pace Project No.: 3094549

---

**Method:** EPA 903.1  
**Description:** 903.1 Radium 226, Dissolved  
**Client:** ALS Environmental Columbia  
**Date:** June 10, 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 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 NARRATIVE

Project: R1303467  
Pace Project No.: 3094549

---

**Method:** EPA 904.0  
**Description:** 904.0 Radium 228  
**Client:** ALS Environmental Columbia  
**Date:** June 10, 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 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:**

## REPORT OF LABORATORY ANALYSIS

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## PROJECT NARRATIVE

Project: R1303467  
Pace Project No.: 3094549

---

**Method:** EPA 904.0  
**Description:** 904.0 Radium 228, Dissolved  
**Client:** ALS Environmental Columbia  
**Date:** June 10, 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 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 NARRATIVE

Project: R1303467  
Pace Project No.: 3094549

---

**Method:** EPA 908.0  
**Description:** 908.0 Total Uranium  
**Client:** ALS Environmental Columbia  
**Date:** June 10, 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 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:**

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

## REPORT OF LABORATORY ANALYSIS

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**ANALYTICAL RESULTS**

Project: R1303467  
 Pace Project No.: 3094549

Sample: R1303467-001 CELL5-0513 Lab ID: 3094549001 Collected: 05/15/13 12:00 Received: 05/17/13 09:15 Matrix: Water  
 PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC)	Units	Analyzed	CAS No.	Qual
Actinium-228	EPA 901.1m	-10.799 ± 245.760 (42.220)	pCi/L	06/05/13 15:09	14331-83-0	
Bismuth-212	EPA 901.1m	-1.199 ± 61.325 (116.200)	pCi/L	06/05/13 15:09	14913-49-6	
Bismuth-214	EPA 901.1m	17.264 ± 32.231 (55.820)	pCi/L	06/05/13 15:09	14733-03-0	
Cesium-134	EPA 901.1m	-1.574 ± 5.240 (8.785)	pCi/L	06/05/13 15:09	13967-70-9	
Cesium-137	EPA 901.1m	0.875 ± 5.056 (9.306)	pCi/L	06/05/13 15:09	10045-97-3	
Lead-212	EPA 901.1m	-6.346 ± 211.120 (20.470)	pCi/L	06/05/13 15:09	15092-94-1	
Lead-214	EPA 901.1m	-3.963 ± 24.352 (18.670)	pCi/L	06/05/13 15:09	15067-28-4	
Potassium-40	EPA 901.1m	97.208 ± 76.387 (137.200)	pCi/L	06/05/13 15:09	13966-00-2	
Radium-226	EPA 901.1m	-9.006 ± 117.540 (195.300)	pCi/L	06/05/13 15:09	13982-63-3	
Radium-228	EPA 901.1m	-10.799 ± 245.760 (42.220)	pCi/L	06/05/13 15:09	15262-20-1	
Thallium-208	EPA 901.1m	-1.618 ± 15.179 (10.470)	pCi/L	06/05/13 15:09	14913-50-9	
Thorium-232	EPA 901.1m	461.140 ± 2681.000 (4811.000)	pCi/L	06/05/13 15:09	7440-29-1	
Thorium-234	EPA 901.1m	-7.505 ± 175.730 (282.000)	pCi/L	06/05/13 15:09	15065-10-8	
Uranium-235	EPA 901.1m	-8.563 ± 137.160 (55.650)	pCi/L	06/05/13 15:09	15117-96-1	
Uranium-238	EPA 901.1m	43.862 ± 80.842 (142.300)	pCi/L	06/05/13 15:09		
Radium-226	EPA 903.1	2.12 ± 1.35 (1.41)	pCi/L	05/31/13 14:00	13982-63-3	
Radium-228	EPA 904.0	2.37 ± 1.35 (2.24)	pCi/L	06/03/13 14:45	15262-20-1	
Total Uranium	EPA 908.0	1.04 ± 1.40 (2.35)	pCi/L	05/28/13 16:55	7440-61-1	

Sample: R1303467-002 CELL5-0513 Lab ID: 3094549002 Collected: 05/15/13 12:00 Received: 05/17/13 09:15 Matrix: Water  
 DISS PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC)	Units	Analyzed	CAS No.	Qual
Actinium-228	EPA 901.1m	-1.558 ± 52.055 (73.240)	pCi/L	06/05/13 16:11	14331-83-0	
Bismuth-212	EPA 901.1m	53.992 ± 147.880 (252.000)	pCi/L	06/05/13 16:11	14913-49-6	
Bismuth-214	EPA 901.1m	2878.900 ± 316.840 (96.150)	pCi/L	06/05/13 16:11	14733-03-0	
Cesium-134	EPA 901.1m	2.646 ± 90.325 (149.700)	pCi/L	06/05/13 16:11	13967-70-9	
Cesium-137	EPA 901.1m	-11.315 ± 15.998 (24.920)	pCi/L	06/05/13 16:11	10045-97-3	
Lead-212	EPA 901.1m	-88.256 ± 44.016 (60.840)	pCi/L	06/05/13 16:11	15092-94-1	
Lead-214	EPA 901.1m	2853.200 ± 314.060 (50.780)	pCi/L	06/05/13 16:11	15067-28-4	
Potassium-40	EPA 901.1m	38.195 ± 120.260 (220.600)	pCi/L	06/05/13 16:11	13966-00-2	
Radium-226	EPA 901.1m	-1.335 ± 343.750 (570.500)	pCi/L	06/05/13 16:11	13982-63-3	
Radium-228	EPA 901.1m	-1.558 ± 52.055 (73.240)	pCi/L	06/05/13 16:11	15262-20-1	
Thallium-208	EPA 901.1m	-3.223 ± 128.930 (21.480)	pCi/L	06/05/13 16:11	14913-50-9	
Thorium-232	EPA 901.1m	-2154.000 ± 51946.000 (13690.000)	pCi/L	06/05/13 16:11	7440-29-1	
Thorium-234	EPA 901.1m	-273.200 ± 1299.400 (906.600)	pCi/L	06/05/13 16:11	15065-10-8	
Uranium-235	EPA 901.1m	61.408 ± 111.980 (185.500)	pCi/L	06/05/13 16:11	15117-96-1	
Uranium-238	EPA 901.1m	-80.062 ± 1270.300 (396.500)	pCi/L	06/05/13 16:11		
Radium-226, Dissolved	EPA 903.1	1.03 ± 0.797 (0.899)	pCi/L	06/03/13 14:35	13982-63-3	
Radium-228, Dissolved	EPA 904.0	1.56 ± 0.608 (0.883)	pCi/L	06/06/13 17:58	15262-20-1	
Total Uranium	EPA 908.0	1.06 ± 1.50 (2.51)	pCi/L	05/28/13 17:01	7440-61-1	

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### ANALYTICAL RESULTS

Project: R1303467  
 Pace Project No.: 3094549

Sample: R1303467-003 CELL6-0513 Lab ID: 3094549003 Collected: 05/15/13 12:45 Received: 05/17/13 09:15 Matrix: Water  
 PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC)	Units	Analyzed	CAS No.	Qual
Actinium-228	EPA 901.1m	-6.921 ± 73.925 (44.630)	pCi/L	06/05/13 17:26	14331-83-0	
Bismuth-212	EPA 901.1m	-0.630 ± 85.341 (156.000)	pCi/L	06/05/13 17:26	14913-49-6	
Bismuth-214	EPA 901.1m	166.500 ± 29.290 (65.620)	pCi/L	06/05/13 17:26	14733-03-0	
Cesium-134	EPA 901.1m	2.351 ± 3.694 (6.246)	pCi/L	06/05/13 17:26	13967-70-9	
Cesium-137	EPA 901.1m	-2.479 ± 8.102 (10.910)	pCi/L	06/05/13 17:26	10045-97-3	
Lead-212	EPA 901.1m	26.725 ± 15.570 (20.000)	pCi/L	06/05/13 17:26	15092-94-1	
Lead-214	EPA 901.1m	189.330 ± 28.610 (18.960)	pCi/L	06/05/13 17:26	15067-28-4	
Potassium-40	EPA 901.1m	92.937 ± 83.848 (150.900)	pCi/L	06/05/13 17:26	13966-00-2	
Radium-226	EPA 901.1m	40.060 ± 122.330 (221.900)	pCi/L	06/05/13 17:26	13982-63-3	
Radium-228	EPA 901.1m	-6.921 ± 73.925 (44.630)	pCi/L	06/05/13 17:26	15262-20-1	
Thallium-208	EPA 901.1m	-2.693 ± 46.305 (9.482)	pCi/L	06/05/13 17:26	14913-50-9	
Thorium-232	EPA 901.1m	349.910 ± 3328.000 (5863.000)	pCi/L	06/05/13 17:26	7440-29-1	
Thorium-234	EPA 901.1m	1.299 ± 198.230 (351.500)	pCi/L	06/05/13 17:26	15065-10-8	
Uranium-235	EPA 901.1m	-29.946 ± 59.449 (69.960)	pCi/L	06/05/13 17:26	15117-96-1	
Uranium-238	EPA 901.1m	85.842 ± 95.919 (162.200)	pCi/L	06/05/13 17:26		
Radium-226	EPA 903.1	3.31 ± 1.70 (1.54)	pCi/L	05/31/13 14:35	13982-63-3	
Radium-228	EPA 904.0	2.73 ± 1.45 (2.38)	pCi/L	06/03/13 14:11	15262-20-1	
Total Uranium	EPA 908.0	1.27 ± 1.33 (2.17)	pCi/L	05/28/13 17:01	7440-61-1	

Sample: R1303467-004 CELL6-0513 Lab ID: 3094549004 Collected: 05/15/13 12:45 Received: 05/17/13 09:15 Matrix: Water  
 DISS PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC)	Units	Analyzed	CAS No.	Qual
Actinium-228	EPA 901.1m	-4.078 ± 32.606 (36.900)	pCi/L	06/05/13 18:29	14331-83-0	
Bismuth-212	EPA 901.1m	1.482 ± 62.670 (118.400)	pCi/L	06/05/13 18:29	14913-49-6	
Bismuth-214	EPA 901.1m	-6.882 ± 42.477 (77.290)	pCi/L	06/05/13 18:29	14733-03-0	
Cesium-134	EPA 901.1m	-1.779 ± 5.252 (8.806)	pCi/L	06/05/13 18:29	13967-70-9	
Cesium-137	EPA 901.1m	-0.209 ± 20.920 (9.432)	pCi/L	06/05/13 18:29	10045-97-3	
Lead-212	EPA 901.1m	-6.801 ± 93.396 (15.990)	pCi/L	06/05/13 18:29	15092-94-1	
Lead-214	EPA 901.1m	8.682 ± 8.606 (14.330)	pCi/L	06/05/13 18:29	15067-28-4	
Potassium-40	EPA 901.1m	185.060 ± 102.490 (161.500)	pCi/L	06/05/13 18:29	13966-00-2	
Radium-226	EPA 901.1m	29.396 ± 109.850 (203.700)	pCi/L	06/05/13 18:29	13982-63-3	
Radium-228	EPA 901.1m	-4.078 ± 32.606 (36.900)	pCi/L	06/05/13 18:29	15262-20-1	
Thallium-208	EPA 901.1m	-0.741 ± 6.759 (9.106)	pCi/L	06/05/13 18:29	14913-50-9	
Thorium-232	EPA 901.1m	595.510 ± 2727.700 (4870.000)	pCi/L	06/05/13 18:29	7440-29-1	
Thorium-234	EPA 901.1m	-54.779 ± 449.200 (289.800)	pCi/L	06/05/13 18:29	15065-10-8	
Uranium-235	EPA 901.1m	8.328 ± 31.446 (54.840)	pCi/L	06/05/13 18:29	15117-96-1	
Uranium-238	EPA 901.1m	54.160 ± 82.463 (143.600)	pCi/L	06/05/13 18:29		
Radium-226, Dissolved	EPA 903.1	4.18 ± 1.81 (0.514)	pCi/L	06/03/13 15:31	13982-63-3	
Radium-228, Dissolved	EPA 904.0	1.87 ± 0.662 (0.939)	pCi/L	06/06/13 17:58	15262-20-1	
Total Uranium	EPA 908.0	1.34 ± 1.42 (2.32)	pCi/L	05/28/13 17:01	7440-61-1	

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**QUALITY CONTROL DATA**

Project: R1303467  
 Pace Project No.: 3094549

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QC Batch: RADC/15872                      Analysis Method: EPA 901.1m  
 QC Batch Method: EPA 901.1m            Analysis Description: 901.1 Gamma Spec  
 Associated Lab Samples: 3094549001, 3094549002, 3094549003, 3094549004

---

METHOD BLANK: 583838                      Matrix: Water  
 Associated Lab Samples: 3094549001, 3094549002, 3094549003, 3094549004

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Actinium-228	-29.189 ± 1167.600 (98.520)	pCi/L	06/05/13 07:38	
Bismuth-212	47.226 ± 147.980 (264.900)	pCi/L	06/05/13 07:38	
Bismuth-214	10.742 ± 81.706 (152.400)	pCi/L	06/05/13 07:38	
Cesium-134	-0.092 ± 3.676 (23.910)	pCi/L	06/05/13 07:38	
Cesium-137	-1.166 ± 66.847 (24.230)	pCi/L	06/05/13 07:38	
Lead-212	5.985 ± 16.269 (30.490)	pCi/L	06/05/13 07:38	
Lead-214	27.527 ± 22.062 (33.090)	pCi/L	06/05/13 07:38	
Potassium-40	-127.710 ± 512.380 (319.400)	pCi/L	06/05/13 07:38	
Radium-226	154.900 ± 261.770 (382.600)	pCi/L	06/05/13 07:38	
Radium-228	-29.189 ± 1167.600 (98.520)	pCi/L	06/05/13 07:38	
Thallium-208	-7.306 ± 4864.600 (24.290)	pCi/L	06/05/13 07:38	
Thorium-232	247.530 ± 4082.800 (7937.000)	pCi/L	06/05/13 07:38	
Thorium-234	-51.737 ± 363.550 (487.100)	pCi/L	06/05/13 07:38	
Uranium-235	6.492 ± 44.060 (81.920)	pCi/L	06/05/13 07:38	
Uranium-238	118.760 ± 149.460 (265.300)	pCi/L	06/05/13 07:38	

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1638 Roseytown Road - Suites 2,3,4  
Greensburg, PA 15601  
(724)850-5600

### QUALITY CONTROL DATA

Project: R1303467  
Pace Project No.: 3094549

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QC Batch: RADC/15879                      Analysis Method: EPA 903.1  
QC Batch Method: EPA 903.1              Analysis Description: 903.1 Radium-226, Dissolved  
Associated Lab Samples: 3094549002, 3094549004

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METHOD BLANK: 584087                      Matrix: Water  
Associated Lab Samples: 3094549002, 3094549004

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Radium-226, Dissolved	0.163 ± 0.392 (0.756)	pCi/L	06/03/13 15:12	

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### QUALITY CONTROL DATA

Project: R1303467  
Pace Project No.: 3094549

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QC Batch: RADC/15880                      Analysis Method: EPA 904.0  
QC Batch Method: EPA 904.0              Analysis Description: 904.0 Radium 228, Dissolved  
Associated Lab Samples: 3094549002, 3094549004

---

METHOD BLANK: 584088                      Matrix: Water  
Associated Lab Samples: 3094549002, 3094549004

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Radium-228, Dissolved	0.361 ± 0.314 (0.629)	pCi/L	06/06/13 17:58	

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**QUALITY CONTROL DATA**

Project: R1303467  
 Pace Project No.: 3094549

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QC Batch: RADC/15882	Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0	Analysis Description: 904.0 Radium 228
Associated Lab Samples: 3094549001, 3094549003	

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METHOD BLANK: 584096	Matrix: Water
Associated Lab Samples: 3094549001, 3094549003	

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Radium-228	0.335 ± 0.301 (0.608)	pCi/L	06/03/13 12:04	

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### QUALITY CONTROL DATA

Project: R1303467  
Pace Project No.: 3094549

---

QC Batch: RADC/15864                      Analysis Method: EPA 903.1  
QC Batch Method: EPA 903.1              Analysis Description: 903.1 Radium-226  
Associated Lab Samples: 3094549001, 3094549003

---

METHOD BLANK: 583689                      Matrix: Water  
Associated Lab Samples: 3094549001, 3094549003

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Radium-226	-0.190 ± 0.329 (0.830)	pCi/L	05/31/13 12:45	

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**QUALITY CONTROL DATA**

Project: R1303467  
 Pace Project No.: 3094549

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QC Batch:	RADC/15907	Analysis Method:	EPA 908.0
QC Batch Method:	EPA 908.0	Analysis Description:	908.0 Total Uranium
Associated Lab Samples:	3094549001, 3094549002, 3094549003, 3094549004		

---

METHOD BLANK:	585242	Matrix:	Water
Associated Lab Samples:	3094549001, 3094549002, 3094549003, 3094549004		

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Total Uranium	-0.112 ± 0.183 (0.561)	pCi/L	05/29/13 06:09	

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## QUALIFIERS

Project: R1303467  
Pace Project No.: 3094549

### 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

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.

## REPORT OF LABORATORY ANALYSIS

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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: R1303467  
Project Manager: Janice Jaeger

Lab Code	Sample ID	# of Cont.	Matrix	Sample		Lab ID	Radium 226 903.1	Radium 228 904.0
				Date	Time			
R1303467-001	CELL5-0513	5	Water	5/15/13	1200	Pace PA	X	X
R1303467-002	CELL5-0513 Dissolved	5	Water	5/15/13	1200	Pace PA	X	X
R1303467-003	CELL6-0513	5	Water	5/15/13	1245	Pace PA	X	X
R1303467-004	CELL6-0513 Dissolved	5	Water	5/15/13	1245	Pace PA	X	X

gamma spec  
 901.1  
 uranium  
 908.0  
 X X 3094549 001  
 X X 002  
 X X 003  
 X X 004

<b>Special Instructions/Comments</b> Dissolved samples need to be filtered in-lab.	<b>Turnaround Requirements</b> <input type="checkbox"/> RUSH (Surcharges Apply) <b>PLEASE CIRCLE WORK DAYS</b> 1 2 3 4 5 <input checked="" type="checkbox"/> STANDARD Requested FAX Date: _____ Requested Report Date: <u>05/30/13</u>	<b>Report Requirements</b> <input type="checkbox"/> I. Results Only <input checked="" type="checkbox"/> II. Results + QC Summaries <input type="checkbox"/> III. Results + QC and Calibration Summaries <input type="checkbox"/> IV. Data Validation Report with Raw Data PQL/MDL/J <u>N</u> EDD <u>Y excel</u>	<b>Invoice Information</b> PO# R1303467 Bill to
---	--	---	--

Relinquished By: BJ Doyle 5/16/13 1630 Received By: [Signature] 5-17-13 0915 Airbill Number: \_\_\_\_\_

R1303467

X Ship To: Pace PA  
Pace Analytical Services  
1638 Roseytown Road  
Suites 2,3, & 4  
Greensburg, PA 15601

Instructions:

Ice \_\_\_\_\_

Dry Ice \_\_\_\_\_

No Ice X \_\_\_\_\_

Shipping:

Overnight X \_\_\_\_\_

2nd Day \_\_\_\_\_

Ground \_\_\_\_\_

PC AMS Date \_\_\_\_\_

SMO \_\_\_\_\_ Date \_\_\_\_\_

Bill to Client Account \_\_\_\_\_

Comments:

[Empty rectangular box for comments]



Sample Condition Upon Receipt

TAN

Client Name: ALS Project # 304549

Courier: [ ] Fed Ex [x] UPS [ ] USPS [ ] Client [ ] Commercial [ ] Pace Other
Tracking #: 1Z17W4380149309624 1Z17W4380149334838
Custody Seal on Cooler/Box Present: [ ] yes [x] no Seals intact: [ ] yes [ ] no

Optional
Proj. Due Date:
Proj. Name:

Packing Material: [x] Bubble Wrap [ ] Bubble Bags [ ] None [ ] Other

Thermometer Used 5 6 7 Type of Ice: [x] No Blue None [x] Samples on ice, cooling process has begun

Cooler Temperature NA Biological Tissue Is Frozen: Yes No
Temp should be above freezing to 6°C Comments:

Date and Initials of person examining contents: ALS-17-13

Table with 16 rows of checklist items including Chain of Custody, Sampler Name, Volume, and Containers. Includes handwritten notes like 'filtering' and 'Total samples dissolved samples need filtered and'. Includes a section for 'All containers needing preservation' with handwritten 'WA' and '13. 5-17-13 1030 6ML HVO3 to Total samples dissolved samples need filtered and'. Includes a section for 'exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)' with handwritten 'VFL' and 'DLB-0397'.

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: Date: 5/17/13

Project Number: 3041549  
 Client Name: ALS

Item No.	081	oil																	
Matrix Code	MW	↓																	
Glass Jar (120 / 250 / 500 / 1L)																			
Soil kit (2 SB, 1M, soil jar)																			
Chemistry (250 / 500 / 1L)																			
Organics (1L)																			
Nutrient (250 / 500 )																			
Phenolics (250 ml)																			
TOC (40 ml / 250 ml)																			
TOX (250 ml)																			
Total Metals																			
Dissolved Metals preserved Y N																			
O & G (1L)																			
TPH (1L)																			
VOA (40 ml 30 ml)																			
Cyanide (250 ml)																			
Sulfide (500 ml)																			
Bacteria (120 ml)																			
Wipes / swipe/ smear/ filter																			
Radchem Nalgene (125 / 250 / 500 / 1L)																			
Radchem Nalgene (1/2 gal. / 1 gal.L)																			
Cubtainer (500 ml / 4L)																			
Ziploc																			
Other																			
Other																			



### Quality Control Sample Performance Assessment

Test: Ra-228  
Analyst: MAW  
Date: 6/3/2013  
Worklist: 15882  
Matrix: DW

Analyst Must Manually Enter All Fields Highlighted in Yellow.

Method Blank Assessment	
MB Sample ID	584096
MB concentration:	0.335
MB Counting Uncertainty:	0.295
MB MDC:	0.608
MB Numerical Performance Indicator:	2.23
MB Status vs Numerical Indicator:	N/A
MB Status vs MDC:	Pass

Laboratory Control Sample Assessment	LCS/D (Y or N)?	Y
LCS15882	LCS15882	LCS15882
Count Date:	6/3/2013	6/3/2013
Spike I.D.:	12-019	12-019
Spike Concentration (pCi/mL):	36.492	36.492
Volume Used (mL):	0.10	0.10
Aliquot Volume (L, g, F):	0.800	0.800
Target Conc. (pCi/L, g, F):	4.562	4.562
Uncertainty (Calculated):	0.137	0.137
Result (pCi/L, g, F):	3.516	5.051
LCS/LCSD Counting Uncertainty (pCi/L, g, F):	0.535	0.650
Numerical Performance Indicator:	-3.71	1.44
Percent Recovery:	77.08%	110.73%
Status vs Numerical Indicator:	N/A	N/A
Status vs Recovery:	Pass	Pass

Sample Matrix Spike Control Assessment	
Sample Collection Date:	5/7/2013
Sample I.D.:	3094486001
Sample MS I.D.:	3094486001MS
Sample MSD I.D.:	
Spike I.D.:	12-019
MS/MSD Decay Corrected Spike Concentration (pCi/mL):	36.820
Spike Volume Used in MS (mL):	0.20
Spike Volume Used in MSD (mL):	
MS Aliquot (L, g, F):	0.800
MS Target Conc. (pCi/L, g, F):	9.205
MSD Aliquot (L, g, F):	
MSD Target Conc. (pCi/L, g, F):	
Spike uncertainty (calculated):	0.276
Sample Result:	1.352
Sample Result Counting Uncertainty (pCi/L, g, F):	0.445
Sample Matrix Spike Result:	12.137
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	1.282
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
MS Numerical Performance Indicator:	2.236
MSD Numerical Performance Indicator:	
MS Percent Recovery:	117.16%
MSD Percent Recovery:	
MS Status vs Numerical Indicator:	N/A
MSD Status vs Numerical Indicator:	
MS Status vs Recovery:	Pass
MSD Status vs Recovery:	

Duplicate Sample Assessment		Enter Duplicate sample IDs if other than LCS/LCSD in the space below.
Sample I.D.:	LCS15882	
Duplicate Sample I.D.:	LCS15882	
Sample Result (pCi/L, g, F):	3.516	
Sample Result Counting Uncertainty (pCi/L, g, F):	0.535	
Sample Duplicate Result (pCi/L, g, F):	5.051	
Sample Duplicate Result Counting Uncertainty (pCi/L, g, F):	0.650	
Are sample and/or duplicate results below MDC?	NO	
Duplicate Numerical Performance Indicator:	-3.573	
Duplicate RPD:	35.84%	
Duplicate Status vs Numerical Indicator:	N/A	
Duplicate Status vs RPD:	Pass	

Matrix Spike/Matrix Spike Duplicate Sample Assessment	
Sample I.D.:	
Sample MS I.D.:	
Sample MSD I.D.:	
Sample Matrix Spike Result:	
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
Duplicate Numerical Performance Indicator:	
MS/MSD Duplicate RPD:	
MS/MSD Duplicate Status vs Numerical Indicator:	
MS/MSD Duplicate Status vs RPD:	

# Evaluation of duplicate precision is not applicable if either the sample or duplicate results are below the MDC.

Comments:

*WBT 6-10-13*



### Quality Control Sample Performance Assessment

*Analyst Must Manually Enter All Fields Highlighted in Yellow.*

Test: Ra-228  
Analyst: MAW  
Date: 6/6/2013  
Worklist: 15880  
Matrix: DW

Method Blank Assessment		
MB Sample ID		584088
MB concentration:		0.361
M/B Counting Uncertainty:		0.307
MB MDC:		0.629
MB Numerical Performance Indicator:		2.31
MB Status vs Numerical Indicator:		N/A
MB Status vs. MDC:		Pass

Laboratory Control Sample Assessment		LCSD (Y or N)?	Y
		LCS15880	LCS15880
Count Date:		6/6/2013	6/6/2013
Spike I.D.:		12-019	12-019
Spike Concentration (pCi/mL):		36.453	36.453
Volume Used (mL):		0.10	0.10
Aliquot Volume (L, g, F):		0.800	0.800
Target Conc. (pCi/L, g, F):		4.557	4.557
Uncertainty (Calculated):		0.137	0.137
Result (pCi/L, g, F):		2.975	4.087
LCS/LCSD Counting Uncertainty (pCi/L, g, F):		0.509	0.508
Numerical Performance Indicator:		-5.88	-1.48
Percent Recovery:		65.30%	89.69%
Status vs Numerical Indicator:		N/A	N/A
Status vs Recovery:		Pass	Pass

Duplicate Sample Assessment		
Sample I.D.:	LCS15880	Enter Duplicate sample IDs if other than LCS/LCSD in the space below.
Duplicate Sample I.D.:	LCS15880	
Sample Result (pCi/L, g, F):	2.975	
Sample Result Counting Uncertainty (pCi/L, g, F):	0.509	
Sample Duplicate Result (pCi/L, g, F):	4.087	
Sample Duplicate Result Counting Uncertainty (pCi/L, g, F):	0.608	
Are sample and/or duplicate results below MDC?	NO	
Duplicate Numerical Performance Indicator:	-2.748	
Duplicate RPD:	31.47%	
Duplicate Status vs Numerical Indicator:	N/A	
Duplicate Status vs RPD:	Pass	

Sample Matrix Spike Control Assessment	
Sample Collection Date:	
Sample I.D.:	
Sample MS I.D.:	
Sample MSD I.D.:	
Spike I.D.:	
MS/MSD Decay Corrected Spike Concentration (pCi/mL):	
Spike Volume Used in MS (mL):	
Spike Volume Used in MSD (mL):	
MS Aliquot (L, g, F):	
MS Target Conc. (pCi/L, g, F):	
MSD Aliquot (L, g, F):	
MSD Target Conc. (pCi/L, g, F):	
Spike uncertainty (calculated):	
Sample Result:	
Sample Result Counting Uncertainty (pCi/L, g, F):	
Sample Matrix Spike Result:	
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
MS Numerical Performance Indicator:	
MSD Numerical Performance Indicator:	
MS Percent Recovery:	
MSD Percent Recovery:	
MS Status vs Numerical Indicator:	
MSD Status vs Numerical Indicator:	
MS Status vs Recovery:	
MSD Status vs Recovery:	

Matrix Spike/Matrix Spike Duplicate Sample Assessment	
Sample I.D.:	
Sample MS I.D.:	
Sample MSD I.D.:	
Sample Matrix Spike Result:	
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
Duplicate Numerical Performance Indicator:	
MS/MSD Duplicate RPD:	
MS/MSD Duplicate Status vs Numerical Indicator:	
MS/MSD Duplicate Status vs RPD:	

## Evaluation of duplicate precision is not applicable if either the sample or duplicate results are below the MDC.

Comments:



### Quality Control Sample Performance Assessment

Test: Ra-226  
Analyst: SLA  
Date: 5/29/2013  
Worklist: 15879  
Matrix: DW

**Analyst Must Manually Enter All Fields Highlighted in Yellow.**

Method Blank Assessment		
MB Sample ID	584087	
MB concentration:	0.163	
MB Counting Uncertainty:	0.391	
MB MDC:	0.756	
MB Numerical Performance Indicator:	4.09	
MB Status vs Numerical Indicator:	N/A	
MB Status vs. MDC:	Pass	

Laboratory Control Sample Assessment	LCSD (Y or N)?	Y
	LCS15879	LCSD15879
Count Date:	6/3/2013	6/3/2013
Spike I.D.:	13-004	13-004
Spike Concentration (pCi/mL):	55.754	55.754
Volume Used (mL):	0.10	0.10
Aliquot Volume (L, g, F):	0.500	0.500
Target Conc. (pCi/L, g, F):	11.151	11.151
Uncertainty (Calculated):	0.268	0.268
Result (pCi/L, g, F):	11.930	10.201
LCSD/LCSD Counting Uncertainty (pCi/L, g, F):	1.988	1.802
Numerical Performance Indicator:	0.76	-1.02
Percent Recovery:	106.89%	81.48%
Status vs Numerical Indicator:	N/A	N/A
Status vs Recovery:	Pass	Pass

Sample Matrix Spike Control Assessment	
Sample Collection Date:	
Sample I.D.	
Sample MS I.D.	
Sample MSD I.D.	
Spike I.D.:	
MS/MSD Decay Corrected Spike Concentration (pCi/mL):	
Spike Volume Used in MS (mL):	
Spike Volume Used in MSD (mL):	
MS Aliquot (L, g, F):	
MS Target Conc. (pCi/L, g, F):	
MSD Aliquot (L, g, F):	
MSD Target Conc. (pCi/L, g, F):	
Spike uncertainty (calculated):	
Sample Result:	
Sample Result Counting Uncertainty (pCi/L, g, F):	
Sample Matrix Spike Result:	
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
MS Numerical Performance Indicator:	
MSD Numerical Performance Indicator:	
MS Percent Recovery:	
MSD Percent Recovery:	
MS Status vs Numerical Indicator:	
MSD Status vs Numerical Indicator:	
MS Status vs Recovery:	
MSD Status vs Recovery:	

Duplicate Sample Assessment		
Sample I.D.:	LCS15879	Enter Duplicate sample IDs if other than LCS/LCSD in the space below.
Duplicate Sample I.D.	LCSD15879	
Sample Result (pCi/L, g, F):	11.930	
Sample Result Counting Uncertainty (pCi/L, g, F):	1.988	
Sample Duplicate Result (pCi/L, g, F):	10.201	
Sample Duplicate Result Counting Uncertainty (pCi/L, g, F):	1.802	
Are sample and/or duplicate results below MDC?	NO	
Duplicate Numerical Performance Indicator:	1.263	
Duplicate RPD:	15.83%	
Duplicate Status vs Numerical Indicator:	N/A	
Duplicate Status vs RPD:	Pass	

Matrix Spike/Matrix Spike Duplicate Sample Assessment	
Sample I.D.	
Sample MS I.D.	
Sample MSD I.D.	
Sample Matrix Spike Result:	
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
Duplicate Numerical Performance Indicator:	
MS/MSD Duplicate RPD:	
MS/MSD Duplicate Status vs Numerical Indicator:	
MS/MSD Duplicate Status vs RPD:	

## Evaluation of duplicate precision is not applicable if either the sample or duplicate results are below the MDC.

Comments:





## Quality Control Sample Performance Assessment

**Analyst Must Manually Enter All Fields Highlighted in Yellow.**

Test: Ra-226  
Analyst: SLA  
Date: 5/20/2013  
Worklist: 15864  
Matrix: DW

Method Blank Assessment		
MB Sample ID	583689	
MB concentration:	-0.190	
MB Counting Uncertainty:	0.328	
MB MDC:	0.830	
MB Numerical Performance Indicator:	-6.77	
MB Status vs Numerical Indicator:	N/A	
MB Status vs. MDC:	Pass	

Laboratory Control Sample Assessment	LCS (Y or N)?	Y
LCS15864	LCS15864	LCS15864
Count Date:	5/31/2013	5/31/2013
Spike I.D.:	13-004	13-004
Spike Concentration (pCi/mL):	55.754	55.754
Volume Used (mL):	0.10	0.10
Aliquot Volume (L, g, F):	0.500	0.500
Target Conc. (pCi/L, g, F):	11.151	11.151
Uncertainty (Calculated):	0.268	0.268
Result (pCi/L, g, F):	10.221	9.607
LCS/LCSD Counting Uncertainty (pCi/L, g, F):	1.604	1.512
Numerical Performance Indicator:	-1.12	-1.97
Percent Recovery:	91.66%	86.15%
Status vs Numerical Indicator:	N/A	N/A
Status vs Recovery:	Pass	Pass

Sample Matrix Spike Control Assessment	
Sample Collection Date:	5/8/2013
Sample I.D.	3094369001
Sample MS I.D.	3094369001MS
Sample MSD I.D.	
Spike I.D.:	13-004
MS/MSD Decay Corrected Spike Concentration (pCi/mL):	55.756
Spike Volume Used in MS (mL):	0.20
Spike Volume Used in MSD (mL):	
MS Aliquot (L, g, F):	0.500
MS Target Conc. (pCi/L, g, F):	22.302
MSD Aliquot (L, g, F):	
MSD Target Conc. (pCi/L, g, F):	
Spike uncertainty (calculated):	0.535
Sample Result:	-0.063
Sample Result Counting Uncertainty (pCi/L, g, F):	0.277
Sample Matrix Spike Result:	21.983
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	2.353
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
MS Numerical Performance Indicator:	-0.206
MSD Numerical Performance Indicator:	
MS Percent Recovery:	98.85%
MSD Percent Recovery:	
MS Status vs Numerical Indicator:	N/A
MSD Status vs Numerical Indicator:	
MS Status vs Recovery:	Pass
MSD Status vs Recovery:	

Duplicate Sample Assessment		
Sample I.D.:	LCS15864	Enter Duplicate sample IDs if other than LCS/LCSD in the space below.
Duplicate Sample I.D.:	LCS15864	
Sample Result (pCi/L, g, F):	10.221	
Sample Result Counting Uncertainty (pCi/L, g, F):	1.604	
Sample Duplicate Result (pCi/L, g, F):	9.607	
Sample Duplicate Result Counting Uncertainty (pCi/L, g, F):	1.512	
Are sample and/or duplicate results below MDC?	NO	
Duplicate Numerical Performance Indicator:	0.548	
Duplicate RPD:	6.19%	
Duplicate Status vs Numerical Indicator:	N/A	
Duplicate Status vs RPD:	Pass	

Matrix Spike/Matrix Spike Duplicate Sample Assessment	
Sample I.D.	
Sample MS I.D.	
Sample MSD I.D.	
Sample Matrix Spike Result:	
Matrix Spike Result Counting Uncertainty (pCi/L, g, F):	
Sample Matrix Spike Duplicate Result:	
Matrix Spike Duplicate Result Counting Uncertainty (pCi/L, g, F):	
Duplicate Numerical Performance Indicator:	
MS/MSD Duplicate RPD:	
MS/MSD Duplicate Status vs Numerical Indicator:	
MS/MSD Duplicate Status vs RPD:	

## Evaluation of duplicate precision is not applicable if either the sample or duplicate results are below the MDC.

Comments:

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### Gamma Spec Quality Control Sample Performance Assessment



Analyst: Wade  
Date: 6/6/2013  
Batch ID: 15872  
Matrix: Water

Geometry: 2 Liter  
Activity Units: pCi  
Aliquot Units: Liter

Method Blank Assessment					
Method Blank ID: 583836					
Analytes of Interest	MB Result	2 Sigma CSU	MB MDC	Numerical Indicator	MB Evaluation
Potassium-40	-127.710	512.380	319.400	0.489	Pass
Cesium-134	-0.092	3.676	23.910	0.049	Pass
Cesium-137	-1.166	66.847	24.230	0.034	Pass
Thallium-208	-7.306	4864.600	24.290	0.003	Pass
Lead-210	33.151	513.810	985.300	0.127	Pass
Bismuth-214	10.742	81.706	152.400	0.258	Pass
Lead-214	27.527	22.062	33.090	2.446	Pass
Radium-226	154.900	261.770	382.600	1.160	Pass
Actinium-228	-29.189	1167.600	88.520	0.049	Pass
Thorium-232	247.530	4082.800	7937.000	0.119	Pass
Uranium-235	6.492	44.080	81.920	0.289	Pass
Uranium-238	118.760	149.460	265.300	1.557	Pass
Radium-228	-29.189	1167.600	88.520	0.049	Pass
Bismuth-212	47.226	147.980	284.900	0.826	Pass
Lead-212	5.985	16.269	30.490	0.721	Pass
Thorium-234	-51.737	363.550	487.100	0.279	Pass

Duplicate Sample Precision Assessment							
Analytes of Interest	Sample Results	Sample 2 Sigma CSU	Sample ID:		Duplicate Sample ID:		
			Duplicate Results	Duplicate 2 Sigma CSU	Numerical Indicator	% RPD	Evaluation
Potassium-40					#DIV/0!	#DIV/0!	#DIV/0!
Cesium-134					#DIV/0!	#DIV/0!	#DIV/0!
Cesium-137					#DIV/0!	#DIV/0!	#DIV/0!
Thallium-208					#DIV/0!	#DIV/0!	#DIV/0!
Lead-210					#DIV/0!	#DIV/0!	#DIV/0!
Bismuth-214					#DIV/0!	#DIV/0!	#DIV/0!
Lead-214					#DIV/0!	#DIV/0!	#DIV/0!
Radium-226					#DIV/0!	#DIV/0!	#DIV/0!
Actinium-228					#DIV/0!	#DIV/0!	#DIV/0!
Thorium-232					#DIV/0!	#DIV/0!	#DIV/0!
Uranium-235					#DIV/0!	#DIV/0!	#DIV/0!
Uranium-238					#DIV/0!	#DIV/0!	#DIV/0!
Radium-228					#DIV/0!	#DIV/0!	#DIV/0!
Bismuth-212					#DIV/0!	#DIV/0!	#DIV/0!
Lead-212					#DIV/0!	#DIV/0!	#DIV/0!
Thorium-234					#DIV/0!	#DIV/0!	#DIV/0!

  

Duplicate LCS Precision Assessment							
Analyte	LCS Concentration	LCS 2 Sigma CSU	LCSD Concentration	LCSD 2 Sigma CSU	Numerical Indicator	Percent RPD	Precision Evaluation
Americium-241	488.000	88.435	508.400	90.259	-0.320	4.1%	Pass
Cobalt-60	87.125	22.505	73.071	15.383	1.010	17.5%	Pass
Cesium-137	69.199	20.995	127.460	24.383	-2.331	35.3%	Evaluate

Laboratory Control Sample Assessment				
	Analyte	Americium-241	Cobalt-60	Cesium-137
Count Date		6/4/2013	8/4/2013	6/4/2013
Reference ID		11-029Am	11-029Co	11-029Cs
Reference Concentration		532.232	81.574	91.271
Reference Uncertainty		0.058	0.059	0.059
LCS Concentration		488	87.125	89.199
LCS 2 Sigma CSU		88.435	22.505	20.995
Numerical Indicator		1.00	-0.48	0.19
Percent Recovery		91.7%	106.8%	97.7%
LCS Evaluation		Pass	Pass	Pass

Laboratory Control Sample Duplicate Assessment				
	Analyte	Americium-241	Cobalt-60	Cesium-137
Count Date		6/5/2013	6/5/2013	6/5/2013
Reference ID		11-029Am	11-029Co	11-029Cs
Reference Concentration		532.232	81.574	91.271
Reference Uncertainty		0.059	0.059	0.059
LCSD Concentration		508.4	73.071	127.46
LCSD 2 Sigma CSU		90.259	15.383	24.383
Numerical Indicator		0.52	1.08	-2.91
Percent Recovery		95.5%	89.8%	139.6%
LCSD Evaluation		Pass	Pass	Evaluate

Evaluation: If the sample or Duplicate sample activity is below the associated MDC, the %RPD evaluation is not applicable and the sample duplicate precision criteria is acceptable.

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Quality Control Sample Performance Assessment



Analyte: LAL  
Date: 5/29/2013  
Worklist: 15907  
Matrix: DW  
Method: EPA 908.D  
SOP: PGR-R-006  
MB Sample ID: 565242

Method Blank Assessment						
Analyte	Activity	1.96 Sig Unc.	MDC	Critical Value	Flag	Assessment
Total Uranium	-0.1120	0.1820	0.5610	0.18300		

Laboratory Control Sample Assessment						
	LCS	LCSD	LCS	LCSD	LCS	LCSD
Analyte:	Total Uranium					
Count Date:	5/29/13 6:09	5/29/13 6:09				
Spike I.D.:	11-041U	11-041U				
Spike Concentration (pCi/L):	95.724	95.724				
Volume Used (mL):	0.100	0.100				
Aliquot Volume (L, g, F):	0.400	0.400				
Target Conc. (pCi/L, g, F):	23.931	23.931				
1.96 Sigma Uncertainty (Calculated):	0.844	0.844				
Result (pCi/L, g, F):	21.629	19.708				
1.96 Sigma Unc:	1.689	1.551				
% Recovery:	90.38%	76.17%				
Assessment:	Pass	Pass				
Upper % Recovery Limits:	465.00%	725.00%				
Lower % Recovery Limits:	75.00%	75.00%				

Duplicate Sample Assessment						
LCS/LCSD Y or N?	Y					
Analyte:	Total Uranium					
Sample I.D.:	LCS15907					
Duplicate Sample I.D.:	LCSD15907					
Sample Result (pCi/L, g, F):	21.8290					
1.96 Sigma Unc:	1.6800					
Sample Duplicate Result (pCi/L, g, F):	18.7080					
Duplicate Sample 1.96 Sigma Unc:	1.5510					
Either results below MDC?	N					
Relative Percent Difference:	14.48%					
Assessment:	Pass					
% RPD Limit:	25.00%					

Sample Matrix Spike Control Assessment		
Analyte:	Total Uranium	
Sample Collection Date:	5/20/2013	
Sample I.D.:	92158603001	
Sample MS I.D.:	82158603001MS	
Sample MSD I.D.:		
Spike I.D.:	11-041U	
MS/MSD Decay Corrected Spike Conc. (pCi/L):	95.724	
Spike Volume Used in MS (mL):	0.20	
Spike Volume Used in MSD (mL):		
MS Aliquot (L, g, F):	0.4000	
MS Target Conc. (pCi/L, g, F):	47.862	
MSD Aliquot (L, g, F):		
MSD Target Conc. (pCi/L, g, F):		
MS Spike uncertainty (Calculated):	1.689	
MSD Spike uncertainty (Calculated):		
Sample Result:	0.453	
Sample 1.96 Sigma Unc.:	0.173	
Sample Matrix Spike Result:	41.205	
Sample MS 1.96 Sigma Unc.:	2.372	
Sample Matrix Spike Duplicate Result:		
Sample MSD 1.96 Sigma Unc.:		
MS % Recovery:	85.14%	
MSD % Recovery:		
MS Assessment:	Pass	
MSD Assessment:		
MS/MSD Upper % Recovery Limit:	125.00%	
MS/MSD Lower % Recovery Limit:	75.00%	
Matrix Spike/Matrix Spike Duplicate Sample Assessment		
Analyte:		
Sample I.D.:		
Sample MS I.D.:		
Sample MSD I.D.:		
Sample Matrix Spike Result:		
Sample Matrix Spike 1.96 Sigma Unc.:		
Sample Matrix Spike Duplicate Result:		
Sample Matrix Spike Duplicate 1.96 Sigma Unc.:		
MS/MSD Relative Percent Difference:		
MS/MSD RPD Assessment:		
% RPD Limit:		

Evaluation of duplicate precision is not applicable if either the sample or duplicate results are below the MDC.

Comments:

MBT 6.10.13