

Wellsville, New York 14895

June 11, 2013

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 2012 Leachate Radiological Test Results

Phone: (585) 593-1824

Fax: (585) 593-7471

Dear Mark:

On behalf of Hakes C & D Landfill, the purpose of this letter is to transmit the results of the fourth quarter 2012 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 2012 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 between November 14 and December 4, 2012 and sent to ALS Environmental (formerly Columbia Analytical Services) in Rochester, New York. The field sampling forms and the laboratory analytical reports 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.

Carla Jordan, Casella Waste Systems Inc.

Mark Amann, NYSDEC

Attachments

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

| Project: Hakes C&D Landfill, Painted | Post, New York | Date: 1/-/4-/2 |
|--|--|-----------------------------------|
| Sampling Location: <u>Ce/15</u> | Sample ID: <u>Ce//5</u> -/// | Arrival Time: 1221 |
| | Weather Conditions: | |
| Temp.38°F()Sunny()F Wind Con | Partly Cloudy () Light ditions: | Rain () Hvy. Rain () Snow |
| () Groundwater Suppression () Lea | Location Type chate () Secondary Leachate () Si | urface Water/Sediment()Res. Water |
| | () Other | |
| Flow | and Depth Information (as approp | oriate) |
| | VAEstimated Flow: | |
| Comments: | | |
| Meter: YSI 556 (sn: ○ Field Para Note: ⁻ Time pH Con | Field Parameters (as appropriate) (SEDS//AP), Hach 2100P (sn: meters tested in: () Submerged Pro Furbidity measured from a vial grab s ductivity Turbidity D.O. (ss/cm) (ntu) (mg/L) | 13309 be (x) Cup |
| | Sample Information | |
| Sample Type: () Grab () Co Location Description/Condition: | omposite Sample Location: (1) Disc | |
| Sample Collection Equipment/Method: 50 Sample Description (clarity\color): Foa my | SAL Bucker Black Sample Odor (Y) or (N | Sample Time: 230 |
| Other Observations/Comments: | | |
| Analysis Requested: Radionuclid | / | Number of Containers: |
| Analysis Requested: <u>Kadionuch</u> Da Sampling Completion: Time <u>244</u> Da | te////-/2 Samplers & Dic | _number of Containers: _(_/) |
| 12-412 121 | | |

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

| Project: Hakes C&D Landfill, Painted Post, New York | Date: 12-12 |
|---|------------------------|
| Sampling Location: Cell 6 Sample ID: Cell 6-12.12 Arri | val Time: 10/6 |
| Weather Conditions: | |
| Temp. 58° F (Sunny () Partly Cloudy () Cloudy () Light Rain () Hv | y. Rain ()Snow |
| Wind Conditions: 0-10mph | |
| | |
| Location Type | |
| () Groundwater Suppression (≼) Leachate () Secondary Leachate () Surface Water/Se | ediment () Res. Water |
| () Other | |
| Flow and Depth Information (as appropriate) | |
| Depth:Estimated Flow: | |
| Comments: | |
| Field Parameters (as appropriate) | |
| Meter: YSI 556 (sn: 06E2S/1AP), Hach 2100P (sn: /3309 | , |
| | |
| Field Parameters tested in: () Submerged Probe () Cup Note: Turbidity measured from a vial grab sample | |
| Time pH Conductivity Turbidity D.O. Temp. | ORP |
| 1100 6.94 (us/cm) (ntu) (mg/L) (°C) | +216 |
| | - |
| Sample Information | |
| Sample Type: (x) Grab () Composite Sample Location: () Discharge Pipe () | Pond () Ditch |
| Location Description/Condition: North must Discharge pipe right | tat Control |
| Sample Collection Equipment/Method: \$56s4 Bucker Sam | ple Time: _//00 |
| Sample Description (clarity\color): Lea & W/R/Ac/c/lieSample Odor (Y) or (N) Explain: Lea | whole oder |
| | |
| Other Observations/Comments: | |
| | |
| Padlanial da | 0 |
| Analysis Requested: Radio Nuclide Number of C | ontainers: |
| Sampling Completion: Time 120 p Date 124-12 Samplers 12 04 E | |



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

Re: Hakes C&D Landfill – Leachate Service Request # R1207900

Dear Mr. Boyles:

Enclosed is the analytical data report for the above referenced facility. A total of two 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,

COLUMBIA ANALYTICAL SERVICES

Janice M. Jaeger Project Chemist

enc.

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



ADDRESS 1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623

PHONE +1 585 288 5380 FAX+1 585 288 8475

Columbia Analytical Services, Inc.

Part of the ALS Group A Campbell Brothers Limited Company



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R1207900 5
Casella Waste Systems
Hakes CSD Landfill - Leachate



Other Comments:

Cooler Receipt and Preservation Check Form

| YES NO | (- | | , | | | | | | | _ | 1 |
|--|----------------------------------|---|---|--|--|--|------------------------------------|-------------|--------------------------|--|---------------|
| 1. Were custody seals on outside of cooler? 2. Were custody papers properly filled out (ink, signed, etc.)? 3. Did all bottles arrive-in-good condition (unbroken)? 4. Did VOA viale, Atkalinity, or Sulfide have significant* air bubbles? YES NO N/A 5. Were Ice or Ice packs present? 6. Where did the bottles originate? 7. Soil VOA samples received as: 8. Temperature of cooler(s) upon receipt: 7. Soil VOA samples received as: 8. Temperature of cooler(s) upon receipt: 7. Is the temperature within 0° - 6° C?: 8. Temperature within 0° - 6° C?: 8. Temperature of cooler(s) upon receipt: 7. Soil VOA samples received as: 8. Temperature of cooler(s) upon receipt: 7. Soil VOA samples received as: 8. Temperature of cooler(s) upon receipt: 7. Soil VOA samples received as: 8. Temperature of cooler(s) upon receipt: 7. Soil VOA samples received as: 8. Temperature of cooler(s) upon receipt: 7. Soil VOA samples received as: 8. Temperature of cooler(s) upon receipt: 7. Soil VOA samples received as: 8. Temperature of cooler(s) upon receipt: 7. Soil VOA samples received as: 8. Temperature of cooler(s) upon receipt: 7. Soil VOA samples bottle labels cooler(s) upon receipt: 7. Soil VOA sample Bottle Bottle Bottle Bottle Bottle Temperatures Taken: 7. Soil VOA sample Bottle Bottle Bottle Bottle Bottle Bottle Temperatures Taken: 7. Soil VOA samples Pooler Temperatures Taken: 7. Soil VOA samples Pooler Temperatures Taken: 7. Soil VOA samples Pooler Temperatures Taken: 7. Soil VOA samples Pooler Temperatures Taken: 7. Soil VOA samples Pooler Temperatures Taken: 7. Soil VOA samples Pooler Temperatures Taken: 8. Temperature of cooler(s) upon receipt: 8. Temperature of c | Projec | t/Client(| ase | lla | Thepes LF | F | older Numl | ber | 7900 | gun | inf |
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| Thermometer ID: RGLN#3 / IR GUN#4 Reading From: Temp Blank / Sample Bottle If out of Temperature, note packing/ice condition & Client Approval to Run Samples: All Samples held in storage location | 2. 3. 4. 5. 6. 7. | Were cust Did all bo Did VOA Were Ice Where did Soil VOA | ody j ttles vials or Ico the sam | paper arrive Alk pace pace pottle ples | es properly filled en good condition salinity, or Sulfide ks present? es originate? received as: | out (ink on (unbr e have s Bu | oken)? ignificant* ulk Jar E | air bubble | YES xs? YES ALS/RO | NO NO NO NO Ç, CLI | ENT |
| All Samples held in storage location Respect Reagent Reagent Reagent Respect Residual For TCN Respect Residual For TCN Residual For TCN Residual For TCN Residual For TCN Respect Residual For TCN Respect Residual For TCN Respect Respect Respect Respect Respect Respect Residual For TCN Respect | If No, Exp | lain | Belo | Date/Time | Temper | ratures Tak | en: | 1/15/12 | 1300 | |
| All Samples held in storage location 7-002 by 00 on 11/5/12 at 1255 at 1255 samples placed in storage location by on on 11/5/12 at 1255 1. Were all bottle labels complete (i.e. analysis, preservation, etc.)? 2. Did all bottle labels and tags agree with custody papers? 3. Were correct containers used for the tests indicated? 4. Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated N/A Explain any discrepancies: PH Reagent YES NO Lot Received Exp Sample ID Vol. Added PH samples OK. 2. HNO3 2. H28O4 4. NaHSO4 4. NaHSO4 6. No = Samples 8. Samples were pressrved at lab as listed NO = Samples 8. Samples were pressrved at lab as listed No = Samples 8. Samples were pressrved at lab as listed No = Samples 8. Samples were pressrved at lab as listed No = Samples 8. Samples were pressrved at lab as listed No = Samples were pressrved at lab as listed No = Samples were pressrved at lab as listed No = Samples were pressrved at lab as listed No = Samples were pressrved at lab as listed No = Samples were pressrved at lab as listed No = Samples were pressrved at lab as listed No = Samples were pressrved at lab as listed No = Samples were pressrved at lab as listed No = Samples were pressrved at lab as listed | | | | | | | | | | _ | ole Bottle |
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| Cooler Breakdown: Date: 11/15/17 Time: /636 by: SFS NO 1. Were all bottle labels complete (i.e. analysis, preservation, etc.)? YES NO 2. Did all bottle labels and tags agree with custody papers? YES NO 3. Were correct containers used for the tests indicated? YES NO 4. Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated N/A Explain any discrepancies: pH Reagent YES NO Lot Received Exp Sample ID Vol. Added Final Added PH Samples OK 2 HNO3 NO = Samples OK 4 NaHSO4 No = Samples Were Phenol Add Scorbic acid Or sodium sulfite (522) NaON If present, contact PM to add ascorbic acid Or sodium sulfite (522) *Not to be tested before analysis – pH Adjust: Time: /636 by: SFS NO ES NO Tedlar® Bags Inflated N/A Lot Added Final PH Samples OK No = Samples Were Preserved at lab as listed PM OK to Adjust: *Not to be tested before analysis – pH Lot Received by VOAs or GenChem on a separate worksheet | | | | | | X-0 | | <u> </u> | | | 255 |
| Cooler Breakdown: Date: 1/15/17 Time: 1/63/L by: Williams 1. Were all bottle labels complete (i.e. analysis, preservation, etc.)? YES NO 2. Did all bottle labels and tags agree with custody papers? YES NO 3. Were correct containers used for the tests indicated? YES NO 4. Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated WA Explain any discrepancies: PH Reagent YES NO Lot Received Exp Sample ID Vol. Added Final pH samples OK 2 HNO3 NO = Samples 4 NaHSO4 NaHSO4 Residual For TCN If present, contact PM to add ascorbic acid Or sodium sulfite (522) NaOH If present, contact PM to add ascorbic acid Or sodium sulfite (522) *Not to be tested before analysis – pH Adjust: Tan Aceta Who is a separate worksheet | | | | | | 5/12 | <u>oy</u> | | <u> </u> | _ <u>aı</u> | |
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| NaOH NaOH NaOH No = Samples OK No = Samples OK No = Samples ok NaHSO ₄ NaHSO ₄ Residual For TCN Phenol add ascorbic acid or and 522 NaoS ₂ O ₃ Tan Aceta HCl * * * | pH | | | _ | Lot Received | Exp | Sample ID | · I | Lot Added | Final | Yes = All |
| HNO ₃ H ₂ SO ₄ NaHSO ₄ Residual For TCN Phenol add ascorbic acid Or sodium sulfite (522) Na ₂ S ₂ O ₃ *Not to be tested before analysis − pH tested and recorded by VOAs or GenChem on a separate worksheet No = Samples were preserved at lab as listed lab as listed **Not to be tested before analysis − pH tested and recorded by VOAs or GenChem on a separate worksheet | ≥12 | NaOH | YES | NO | | - | | Added | | pH | samples OK |
| Samples Were Preserved at If present, contact PM to add ascorbic acid Or sodium sulfite (522) Na ₂ S ₂ O ₃ Zn Aceta HCl * * | ⊴ | <u></u> | | | | | | | | | No= |
| NaHSO ₄ Were Preserved at lab as listed Phenol add ascorbic acid Or sodium sulfite (522) PM OK to Na ₂ S ₂ O ₃ - | ⊴ | | <u> </u> | | - | - | <u> </u> | | · · | | |
| Residual For TCN Phenol add ascorbic acid Or sodium sulfite (522) Na ₂ S ₂ O ₃ **Not to be tested before analysis – pH tested and recorded by VOAs or GenChem on a separate worksheet **Not to be tested before analysis – pH tested and recorded by VOAs or GenChem on a separate worksheet | <4 | | | | | 1 | | | | | |
| Na ₂ S ₂ O ₃ *Not to be tested before analysis – pH Adjust: Zn Aceta tested and recorded by VOAs or GenChem on a separate worksheet | Residual Chlorine (-) | For TCN Phenol | | | add ascorbic acid | | | | | | lab as listed |
| Zn Aceta tested and recorded by VOAs or GenChem on a separate worksheet | ` , | | - | - | | Ì | | | | | |
| HCl T T | i | Zn Aceta | - | - | | | 1 | - | | Chem | |
| Bottle lot numbers: OPIO-IZ-ZKK | i | HCl | * | * | | | on a separa | ate workshe | et | | |
| | Bottle lot : | numbers: C | MO | Z-7 | ZKK | | | | | | |

PC Secondary Review: ______*significant air bubbles: VOA > 5-6 mm : WC > 1 in. diameter P:\INTRANET\QAQC\Forms Controlled\Cooler Receipt r6.doc 11/6/12





December 05, 2012

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

RE: Project: R1207900

Pace Project No.: 3082118

Dear Ms. Jaeger:

Enclosed are the analytical results for sample(s) received by the laboratory on November 16, 2012. 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





CERTIFICATIONS

Project:

R1207900

Pace Project No.: 3082118

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

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

Virgin Island/PADEP Certification

Virginia Certification #: 00112

Virginia/VELAP Certification #: 460198

Washington Certification #: C868

West Virginia Certification #: 143 Wisconsin/PADEP Certification





SAMPLE SUMMARY

Project: R1207900
Pace Project No.: 3082118

| Lab ID | Sample !D | Matrix | Date Collected | Date Received |
|------------|--------------------------------|--------|----------------|----------------|
| 3082118001 | R1207900-001 CELL5-1112 | Water | 11/14/12 12:30 | 11/16/12 09:30 |
| 3082118002 | R1207900-002 CELL5-1112 Dissol | Water | 11/14/12 12:30 | 11/16/12 09:30 |





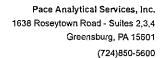
SAMPLE ANALYTE COUNT

Project:

R1207900

Pace Project No.: 3082118

| Lab ID | Sample ID | Method | Analysts | Analytes Reported |
|------------|--------------------------------|-----------|----------|----------------------|
| 3082118001 | R1207900-001 CELL5-1112 | EPA 903.1 | SLA | 1 |
| | | EPA 904.0 | MAW | 1 |
| 3082118002 | R1207900-002 CELL5-1112 Dissol | EPA 903.1 | SLA | 1 |
| | | EPA 904.0 | MAW | 1 |





Project:
Pace Project No.:

R1207900 3082118

EPA 903.1

Description: 903.1 Radium 226

Client:

Method:

ALS Environmental Columbia

Date:

December 05, 2012

General Information:

1 sample was 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.



PROJECT NARRATIVE

Project:

R1207900

Pace Project No.: 3082118

Method:

EPA 903.1

Client:

Description: 903.1 Radium 226, Dissolved ALS Environmental Columbia

Date:

December 05, 2012

General Information:

1 sample was 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:

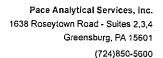
All analytes were below the report limit in the method blank with any exceptions noted below.

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.





Project: Pace Project No.:

R1207900 3082118

Method:

EPA 904.0

Description: 904.0 Radium 228

Client:

ALS Environmental Columbia

Date:

December 05, 2012

General Information:

1 sample was 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 with any exceptions noted below.

Laboratory Control Spike:

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

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





Project:

Pace Project No.:

R1207900 3082118

Method:

EPA 904.0

Description: 904.0 Radium 228, Dissolved Client: ALS Environmental Columbia

Date:

December 05, 2012

General Information:

1 sample was 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:

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





ANALYTICAL RESULTS

Project:

R1207900

Pace Project No.: 3082118

Sample: R1207900-001 CELL5-1112

Lab ID: 3082118001

Collected: 11/14/12 12:30 Received: 11/16/12 09:30 Matrix: Water

PWS:

PWS:

Site ID:

Sample Type:

| Parameters | Method | Act ± Unc (MDC) | Units | Analyzed | CAS No. | Qual |
|------------|-----------|---------------------|-------|----------------|------------|------|
| Radium-226 | EPA 903.1 | 0.733 ± 1.76 (3.40) | pCi/L | 11/27/12 13:45 | 13982-63-3 | |
| Radium-228 | EPA 904.0 | 1.09 ± 0.638 (1.07) | pCi/L | 11/26/12 14:17 | 15262-20-1 | |

Sample: R1207900-002 CELL5-1112

Lab ID: 3082118002

Collected: 11/14/12 12:30 Received: 11/16/12 09:30 Matrix: Water

Dissol

Date: 12/05/2012 02:35 PM

Site ID:

Sample Type:

| Parameters | Method | Act ± Unc (MDC) | Units | Analyzed | CAS No. | Qual |
|--|------------------------|--|----------------|----------------------------------|---------|------|
| Radium-226, Dissolved Radium-228, Dissolved | EPA 903.1 EPA 904.0 | 0.877 ± 0.746 (0.904) 0.939 ± 0.545 (0.907) | pCi/L pCi/L | 12/04/12 13:52 12/04/12 14:52 | | |



QUALITY CONTROL DATA

Project:

R1207900

Pace Project No.:

3082118

QC Batch:

RADC/13868

Analysis Method:

EPA 903.1

QC Batch Method:

EPA 903.1

Analysis Description:

903.1 Radium-226

Associated Lab Samples:

METHOD BLANK: 514122

Matrix: Water

Associated Lab Samples:

3082118001

3082118001

Parameter

Act ± Unc (MDC)

Units

Analyzed

Qualifiers

Radium-226

-0.114 ± 0.388 (0.858)

pCi/L

11/27/12 12:41



QUALITY CONTROL DATA

Project:

R1207900

Pace Project No.:

3082118

QC Batch:

RADC/13869

Analysis Method:

EPA 903.1

QC Batch Method:

EPA 903.1

Analysis Description:

903.1 Radium-226, Dissolved

Associated Lab Samples:

METHOD BLANK: 514123

Matrix: Water

Associated Lab Samples:

3082118002

3082118002

Parameter

Act ± Unc (MDC)

Units

Analyzed

Qualifiers

Radium-226, Dissolved

-0.150 ± 0.343 (0.807)

pCi/L

12/04/12 13:38



QUALITY CONTROL DATA

Project:

R1207900

Pace Project No.:

3082118

QC Batch:

RADC/13870

Analysis Method:

EPA 904.0

QC Batch Method:

EPA 904.0

Analysis Description:

904.0 Radium 228

METHOD BLANK: 514124

Matrix: Water

Associated Lab Samples:

Associated Lab Samples:

3082118001

3082118001

Parameter

Act ± Unc (MDC)

Units

Analyzed

Qualifiers

Radium-228

0.724 ± 0.412 (0.745)

pCi/L

11/26/12 11:51



QUALITY CONTROL DATA

Project: Pace Project No.:

R1207900 3082118

QC Batch:

RADC/13981

Analysis Method:

EPA 904.0

QC Batch Method:

EPA 904.0

Analysis Description:

904.0 Radium 228, Dissolved

Associated Lab Samples:

3082118002

Matrix: Water

METHOD BLANK: 517189 Associated Lab Samples:

3082118002

Parameter

Act ± Unc (MDC)

Units

Analyzed

Qualifiers

Radium-228, Dissolved

0.336 ± 0.290 (0.581)

pCi/L

12/04/12 14:52



QUALIFIERS

Project: R1207900 Pace Project No.: 3082118

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: 12/05/2012 02:35 PM

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.

ALS Environmental Chain of Custody 1565 Jefferson Rd, Building 300 - Rochester, NY 14623 - 385-288-5380 - FAX 585-288-8475

ALS Contact: Janice Jaeger

Project Number: R1207900

| Project Manager: | Janice Jaeger | | | Sampte | | Radiun 226 903 I | Radium 228 904.0 | |
|------------------|----------------------|------------|--------|---------------|---------|---------------------|---------------------|---------|
| Lab Code | Sample ID | # of Cont. | Matrix | Date Time | Lab ID | i | | |
| R1207900-001 | CELL5-1112 | 7 | Water | 11/14/12 1230 | Pace PA | | | 3082118 |
| R1207900-002 | CELL5-1112 Dissolved | | Water | 11/14/12 1230 | Pace PA | | | 002 |

| Special Instructions/Comments | Turnaround Requirements | Report Requirements | Invoice Information | 1 |
|--|--------------------------------|---|---------------------|----|
| | RUSH (Surcharges Apply) | I. Results Only | | |
| | PLEASE CIRCLE WORK DAYS | II. Results + QC Summaries | PO# | |
| | 1 2 3 4 5 | III. Results + QC and Calibration Summaries | R1207900 | |
| | STANDARD | IV. Data Validation Report with Raw Data | | |
| | Requested FAX Date: | PQL/MDL/J <u>N</u> | Bill to | 1 |
| | Requested Report Date:11/29/12 | EDD <u>Y</u> | | - |
| Relinquished By: Wml 11/15/17 Received By: | Simulto Brugo | I // I/2 Airbill Number: | |] |
| <u> </u> | | 0936 | Pa | ge |

Sample Condition Upon Receipt

| Courier: | - |
|--|-------------|
| Tracking #: 12 17W 4380 4917 8350 Custody Seal on Cooler/Box Present: yes no no no no no no no n | <u></u> |
| Packing Material: Bubble Wrap Bubble Bags None Other Thermometer Used 5 6 7 Type of Ice: Wet Blue None Date and Initials of persop examining contents: Smb III 19 12 Cooler Temperature No Comments: Chain of Custody Present: Dres No No No No No No No No No No No No No | |
| Thermometer Used 5 6 7 Type of Ice: Wet Blue None Samples on ice, cooling process has begun Cooler Temperature Temp should be above freezing to 6°C Chain of Custody Present: Chain of Custody Filled Out: Chain of Custody Relinquished: Samples Arrived within Hold Time: Short Hold Time Analysis (<72hr): Rush Turn Around Time Requested: Type of Ice: Wet Blue None Samples on ice, cooling process has begun and some sequences of sequences and sequences of sequences o | <u> </u> |
| Cooler Temperature Temp should be above freezing to 6°C Chain of Custody Present: Chain of Custody Filled Out: Chain of Custody Relinquished: Sampler Name & Signature on COC: Samples Arrived within Hold Time: Short Hold Time Analysis (<72hr): Rush Turn Around Time Requested: Date and Initials of persop examining contents: Comments: Comments: Comments: Comments: Comments: Date and Initials of persop examining contents: Smc II 19 1 1 1 1 1 1 1 1 1 | |
| Cooler Temperature Temp should be above freezing to 6°C Chain of Custody Present: Chain of Custody Filled Out: Chain of Custody Relinquished: Chain of Custody Relinquished: Sampler Name & Signature on COC: Samples Arrived within Hold Time: Short Hold Time Analysis (<72hr): Rush Turn Around Time Requested: Discrete Shoo DN/A 8. Signograf Tissue is Prozen: Yes No Contents: Sm6 III 19 1/2 Comments: Comments: Comments: Comments: Comments: Short 1. Comments: Comments | |
| Chain of Custody Present: Chain of Custody Filled Out: Chain of Custody Filled Out: Chain of Custody Relinquished: Chain of Custody Filled Out: | |
| Chain of Custody Filled Out: Chein of Custody Relinquished: Sampler Name & Signature on COC: Samples Arrived within Hold Time: Short Hold Time Analysis (<72hr): Rush Turn Around Time Requested: Sufficient Volume: Chein of Custody Filled Out: Chein of Custody Filled Ou | |
| Chain of Custody Relinquished: Sampler Name & Signature on COC: Samples Arrived within Hold Time: Short Hold Time Analysis (<72hr): Rush Turn Around Time Requested: Sufficient Volume: Sufficient Volume: Sufficient Signature on COC: Sufficient Signature Signature on COC: Sufficient Signature Signa | |
| Sampler Name & Signature on COC: Samples Arrived within Hold Time: Short Hold Time Analysis (<72hr): Pyes No NA 5. Short Hold Time Analysis (<72hr): Pyes No NA 6. Rush Turn Around Time Requested: Pyes No NA 7. Sufficient Volume: Pyes No NA 8. | |
| Samples Arrived within Hold Time: | |
| Short Hold Time Analysis (<72hr): | |
| Rush Turn Around Time Requested: Yes | |
| Sufficient Volume: ØÝes □no □n/A 8. | |
| | |
| Correct Containors Head: Type TNo TNA 9 | |
| Correct Containers Osed. | |
| -Pace Containers Used: □Yes □rio □N/A | |
| Containers Intact: Lyes DNo DN/A 10. | |
| Filtered volume received for Dissolved tests | |
| Sample Labels match COC: | |
| Includes date/time/ID/Analysis Matrix&T | |
| All containers needing preservation have been checked. Stes DNA 13.6 mls to 001 16/12@1400 | |
| All containers needing preservation are found to be in compliance with EPA recommendation. | |
| Initial when Completed SYN | |
| Samples checked for dechlorination: | |
| Headspace in VOA Vials (>6mm): □Yes □No □N/ 15. | |
| Trip Blank Present: | |
| Trip Blank Custody Seals Present □Yés □No □MATA | |
| Pace Trip Blank Lot # (ii purchased): | |
| Client Notification/ Resolution: Field Data Required? Y / N | |
| Person Contacted: Date/Time: | |
| Comments/ Resolution: | |
| | |
| | |
| | |
| | |
| Project Manager Review: Character English Date: 1/19112 | |

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

Project Number: _ Client Name:

0000 Item No. Matrix Code 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 O & G (1L) TPH (1L) VOA (40 ml 30 ml) Cyanide (250 ml) Suifide (500 ml) Bacteria (120 ml) Wipes / swipe/ smear/ filter Radchem Nalgene (125 / 250 / 500 / 1L) Radchem Naigene (1/2 gal. / 1 gal.L) Cubitalner (500 ml / 4L) Ziploc Other Other

SCURF Back (C016-4 15May2012).xls



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

Re: Hakes C&D Landfill – Leachate Service Request # R1208316

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,

COLUMBIA ANALYTICAL SERVICES dba ALS Environmental

Janice M. Jaeger Project Chemist

enc.

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



ADDRESS 1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623

PHONE +1 585 288 5380 | FAX+1 585 288 8475

Columbia Analytical Services, Inc.

Part of the ALS Group | A Campbell Brothers Limited Company



CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM 489

1565 Jefferson Road, Building 300, Suite 360 • Rochester, NY 14623 | +1 585 288 5380 +1 585 288 8475 (fax) PAGE ANALYSIS REQUESTED (Include Method Number and Container Preservative) **PRESERVATIVE** Preservative Key 0. NONE NUMBER OF CONTAINERS 1. HCL 2. HNO₃ 3. H₂SO₄ 4. NaOH 5. Zn. Acetate 6. MeOH 7. NaHSO4 8. Other Sampler's Printed Name REMARKS/ ALTERNATE DESCRIPTION FOR OFFICE USE **SAMPLING CLIENT SAMPLE ID** ONLY LAB ID DATE TIME MATRIX SPECIAL INSTRUCTIONS/COMMENTS TURNAROUND REQUIREMENTS REPORT REQUIREMENTS INVOICE INFORMATION Metals RUSH (SURCHARGES APPLY) I. Results Only PO# II. Results + QC Summaries ... _ 1 day ----- 2 day ----- 3 day (LCS, DUP, MS/MSD as required) _ 4 day _____5 day BILL TO: III. Results + QC and Calibration Summaries REQUESTED REPORT DATE . IV. Data Validation Report See QAPP Edata STATE WHERE SAMPLES WERE COLLECTED RELINQUISHED BY RELINQUISHED BY RECEIVED BY RELINQUISHED Signature Signature Signature Signature Signature Printed Name Printed Name Printed Name Printed Name Printed Name Firm Firm/2/5/12 Date/Time Date/Time Date/Time Date/Time Date/Time



Cooler Receipt and Preservation Check Form

| Project/ | Client_ <i>Ca</i> | scila | 4- Ho | ikes LF | F | older Numbe | r <i>R</i> / | 2-8316 | · | |
|----------------------------------|--|---|--|--|-----------------------------------|--|---|-----------------|----------------|--|
| Cooler r | eceived o | n | 2/5/1 | z by: sh | _COUF | RIER: ALS | UPS | (FEDEX) | VELO | CITY CLIENT |
| 2. 3. 1 4. 1 5. 3. 6. 7. 5 | Were cust Did all bot Did VOA Weredce Where did Soil VOA | ody parties a vials or Ico the language the | papers arrive , Alka e pacl pottles ples re | on outside of coos properly filled of in good conditionalinity, or Sulfide as present? so originate? eccived as: er(s) upon receip | out (ink, on (unbre have si | oken)? ignificant* a | | YES ALS/RO | NO NO NO C, CL | -7CoC not felinguista NA IENT 35set N/A |
| I I | s the temp | eratı olain | ire wi Belov | thin 0° - 6° C?: W Date/Time | (Ý Temper | N Y atures Taker | N 1: 17/5 | 112/1382 A N | ΥN | YN |
| | | | | GUN#3 / KR G | | | | | / Samp | ole Bottle |
| If out of | Tempera | iture | , note | e packing/ice co | ndition | &Client A | proval | to Run San | nples | |
| | | | | location | R-00 | | / (| n 12/5/12 | | 56 |
| | | | | age location | | by | | n | at | |
| | | | | MJ 9/5 | 10 | | *************************************** | | | |
| 1. W 2. D 3. W | Vere all bo oid all bott Vere corre ir Sample | ottle I le lal ct co s: (| abels cels au ntaine Casset | complete (i.e. ar nd tags agree with ers used for the te tes / Tubes Intac | ialysis, h custo ests indi | dy papers? icated? | , etc.)? | by: | NO NO NO | flated (N/A) |
| | Reagent | | | Lot Received | Exp | Sample ID | Vol. | Lot Added | Final | Yes = All |
| ≥12 | NaOH | YES | NO | | | | Added | | pH | samples OK |
| | HNO ₃ | | | | | | | | | No = |
| | H₂SO₄ | | | | | | | | | Samples |
| | NaHSO ₄ | | | | | | <u> </u> | | | were |
| Residual Chlorine (-) | For TCN Phenol and 522 | | | If present, contact add ascorbic acid Or sodium sulfite (| | 91 | | | | preserved at lab as listed PM OK to |
| <u> </u> | $Na_2S_2O_3$ | | - | | | | | re analysis – p | | Adjust: |
| <u> </u> | Zn Aceta | - | - | | | tested and recorded by VOAs or GenChem on a separate worksheet | | | | |
| | HCI | * | * | | | | | | | |
| Bottle lot nu Other Comn | | | · | | | - | _ | | ···· | |

| PC Secondary Review: | *significant air bubbles: VOA > 5-6 mm : WC >1 in. diameter |
|--|---|
| P:\INTRANET\OAOC\Forms Controlled\Cooler Receipt r6.do | nc 11/6/12 |





December 28, 2012

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

RE: Project: R1208316

Pace Project No.: 3083317

Dear Ms. Jaeger:

Enclosed are the analytical results for sample(s) received by the laboratory on December 06, 2012. 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,

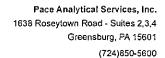
Carin a. Ferris

Carin Ferris

carin.ferris@pacelabs.com Project Manager

Enclosures







CERTIFICATIONS

Project:

R1208316

Pace Project No.: 3083317

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

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
Virgin Island/PADEP Certification
Virgin Certification #: 00113

Virginia Certification #: 00112 Virginia/VELAP Certification #: 460198 Washington Certification #: C868

West Virginia Certification #: 143 Wisconsin/PADEP Certification

Wyoming Certification #: 8TMS-Q





SAMPLE SUMMARY

Project:

R1208316

Pace Project No.: 3083317

| Lab ID | Sample ID | Matrix | Date Collected | Date Received |
|------------|--------------------------------|--------|----------------|----------------|
| 3083317001 | R1208316-001 Cell6-1212 | Water | 12/04/12 11:00 | 12/06/12 10:30 |
| 3083317002 | R1208316-002 Cell6-1212 Dissol | Water | 12/04/12 11:00 | 12/06/12 10:30 |
| 3083317003 | R1208316-003 Cell5-1212 | Water | 12/04/12 12:20 | 12/06/12 10:30 |
| 3083317004 | R1208316-004 Cell5-1212 Dissol | Water | 12/04/12 12:20 | 12/06/12 10:30 |





SAMPLE ANALYTE COUNT

Project:

R1208316

Pace Project No.: 3083317

| Lab ID | Sample ID | Method | Analysts | Analytes Reported |
|------------|--------------------------------|------------|----------|----------------------|
| 3083317001 | R1208316-001 Cell6-1212 | EPA 901,1m | AEH | 15 |
| | | EPA 903.1 | SLA | 1 |
| | | EPA 904.0 | MAW | 1 |
| | | EPA 908.0 | MBT | 1 |
| 3083317002 | R1208316-002 Cell6-1212 Dissol | EPA 901.1m | AEH | 15 |
| | | EPA 903.1 | SLA | 1 |
| | | EPA 904.0 | MAW | 1 |
| | | EPA 908.0 | MBT | 1 |
| 3083317003 | R1208316-003 Cell5-1212 | EPA 901.1m | AEH | 15 |
| | | EPA 908.0 | MBT | 1 |
| 3083317004 | R1208316-004 Cell5-1212 Dissol | EPA 901.1m | AEH | 15 |
| | | EPA 908.0 | MBT | 1 |



PROJECT NARRATIVE

Project:

R1208316

Pace Project No.:

3083317

Method:

EPA 901.1m

Description: 901.1 Gamma Spec

Client:

ALS Environmental Columbia

Date:

December 28, 2012

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.





Project: Pace Project No.: R1208316 3083317

Method:

EPA 903.1

Description: 903.1 Radium 226

Client:

ALS Environmental Columbia

Date:

December 28, 2012

General Information:

1 sample was 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:

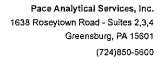
All analytes were below the report limit in the method blank with any exceptions noted below.

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.





Project: Pace Project No.:

R1208316 3083317

Method:

EPA 903.1

Description: 903.1 Radium 226, Dissolved Client:

ALS Environmental Columbia

Date:

December 28, 2012

General Information:

1 sample was 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:

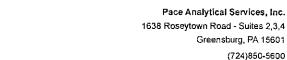
All analytes were below the report limit in the method blank with any exceptions noted below.

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.





Project:

R1208316 3083317

Pace Project No.:

EPA 904.0

Method: Descripti Client:

Description: 904.0 Radium 228

Date:

ALS Environmental Columbia December 28, 2012

General Information:

1 sample was 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





PROJECT NARRATIVE

Project: R1208316 Pace Project No.: 3083317

Method: EPA 904.0

Description: 904.0 Radium 228, Dissolved **Client:** ALS Environmental Columbia

Date: December 28, 2012

General Information:

1 sample was 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:



PROJECT NARRATIVE

Project:

R1208316

Pace Project No.: 3083317

EPA 908.0

Method: Description

Description: 908.0 Total Uranium

Client:

ALS Environmental Columbia

Date:

December 28, 2012

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.



ANALYTICAL RESULTS

Project: R1208316 Pace Project No.: 3083317

Total Uranium

| Sample: R1208316-001 Cell6-1212 PWS: | 2 Lab ID: 3083317 Site ID: | 001 Collected: 12/04/12 11:00 Sample Type: | Received: | 12/06/12 10:30 | Matrix: Water | |
|---|-------------------------------|---|-----------|----------------|---------------|------|
| Parameters | Method | Act ± Unc (MDC) | Units | Analyzed | CAS No. | Qual |
| Actinium-228 | EPA 901.1m | 9.20 ± 16.6 (29.7) | pCi/L | 12/19/12 11:39 | 14331-83-0 | |
| Bismuth-212 | EPA 901.1m | 22.0 ± 58.4 (104) | pCi/L | 12/19/12 11:39 | 14913-49-6 | |
| Bismuth-214 | EPA 901.1m | -23.9 ± 144 (65.7) | pCi/L | 12/19/12 11:39 | 14733-03-0 | |
| Cesium-134 | EPA 901.1m | -1.28 ± 4.12 (7.24) | pCi/L | 12/19/12 11:39 | 13967-70-9 | |
| Cesium-137 | EPA 901.1m | -0.943 ± 6.21 (7.73) | pCi/L | 12/19/12 11:39 | 10045-97-3 | |
| Lead-212 | EPA 901.1m | -1.83 ± 19.3 (14.4) | pCi/L | 12/19/12 11:39 | 15092-94-1 | |
| Lead-214 | EPA 901.1m | 3.52 ± 10.2 (19.0) | pCi/L | 12/19/12 11:39 | 15067-28-4 | |
| Potassium-40 | EPA 901.1m | 254 ± 92.1 (119) | pCi/L | 12/19/12 11:39 | 13966-00-2 | |
| Radium-226 | EPA 901.1m | -2.36 ± 94.2 (185) | pCi/L | 12/19/12 11:39 | 13982-63-3 | |
| Radium-228 | EPA 901.1m | 9.20 ± 16.6 (29.7) | pCi/L | 12/19/12 11:39 | 15262-20-1 | |
| Thallium-208 | EPA 901.1m | -2.61 ± 129 (9.28) | pCi/L | 12/19/12 11:39 | 14913-50-9 | |
| Thorium-232 | EPA 901.1m | 9.20 ± 16.6 (29.7) | pCi/L | 12/19/12 11:39 | 7440-29-1 | |
| Thorium-234 | EPA 901.1m | 277 ± 759 (1299) | pCi/L | 12/19/12 11:39 | 15065-10-8 | |
| Uranium-235 | EPA 901.1m | 0.502 ± 31.1 (56.2) | pCi/L | 12/19/12 11:39 | 15117-96-1 | |
| Uranium-238 | EPA 901.1m | 0.382 ± 85.1 (158) | pCi/L | 12/19/12 11:39 | 1 | |
| Radium-226 | EPA 903.1 | 5.60 ± 2.66 (0.842) | pCi/L | 12/17/12 13:28 | 13982-63-3 | |
| Radium-228 | EPA 904.0 | 5.84 ± 2.51 (3.86) | pCi/L | 12/14/12 15:05 | 15262-20-1 | |
| Total Uranium | EPA 908.0 | 0.0671 ± 0.140 (0.246) | pCì/L | 12/17/12 14:32 | 7440-61-1 | |

Sample: R1208316-002 Cell6-1212 Lab ID: 3083317002 Collected: 12/04/12 11:00 Received: 12/06/12 10:30 Matrix: Water Dissol

PWS: Site ID:

Sample Type: Parameters Method Act ± Unc (MDC) Units Analyzed CAS No. Qual EPA 901.1m 6.35 ± 14.4 (26.8) Actinium-228 pCi/L 12/19/12 12:34 14331-83-0 EPA 901.1m Bismuth-212 15.9 ± 48.9 (89.4) pCi/L 12/19/12 12:34 14913-49-6 Bismuth-214 EPA 901.1m -8.78 ± 118 (64.6) pCi/L 12/19/12 12:34 14733-03-0 EPA 901.1m -1.22 ± 4.93 (8.63) pCi/L 12/19/12 12:34 13967-70-9 Cesium-134 Cesium-137 EPA 901.1m 1.80 ± 3.67 (6.42) pCi/L 12/19/12 12:34 10045-97-3 Lead-212 EPA 901.1m -4.41 ± 233 (14.4) pCi/L 12/19/12 12:34 15092-94-1 Lead-214 EPA 901.1m 8.53 ± 9.80 (17.5) pCi/L 12/19/12 12:34 15067-28-4 12/19/12 12:34 13966-00-2 EPA 901.1m 67.4 ± 69.7 (121) pCi/L Potassium-40 EPA 901.1m 12/19/12 12:34 13982-63-3 Radium-226 37.7 ± 79.4 (136) pCi/L EPA 901.1m 6.35 ± 14.4 (26.8) pCi/L 12/19/12 12:34 15262-20-1 Radium-228 EPA 901.1m Thallium-208 0.980 ± 4.22 (8.12) pCi/L 12/19/12 12:34 14913-50-9 EPA 901.1m 12/19/12 12:34 7440-29-1 Thorium-232 6.35 ± 14.4 (26.8) pCi/L EPA 901.1m 247 ± 667 (1146) pCi/L 12/19/12 12:34 15065-10-8 Thorium-234 Uranium-235 EPA 901.1m -2.73 ± 307 (54.3) pCi/L 12/19/12 12:34 15117-96-1 EPA 901.1m Uranium-238 -30.0 ± 129 (192) pCi/L 12/19/12 12:34 5.74 ± 1.66 (0.950) EPA 903.1 12/20/12 13:17 13982-63-3 Radium-226, Dissolved pCi/L EPA 904.0 12/14/12 15:01 15262-20-1 Radium-228, Dissolved 3.87 ± 0.991 (1.03) pCi/L

REPORT OF LABORATORY ANALYSIS Date: 12/28/2012 02:06 PM

EPA 908.0

12/17/12 14:32 7440-61-1

0.178 ± 0.154 (0.245)

pCi/L



ANALYTICAL RESULTS

Project:

R1208316

Pace Project No.: 3083317

| Sample: R1208316-003 Cell5 PWS: | -1212 Lab ID: 3083 Site ID: | 317003 Collected: 12/04/12 Sample Type: | 12:20 Received: | 12/06/12 10:30 Matrix: V | Vater |
|---------------------------------------|--------------------------------|--|-----------------|-------------------------------|---------------|
| Parameters | Method | Act ± Unc (MDC) | Units | Analyzed CAS | No. Qual |
| Actinium-228 | EPA 901.1m | -5.74 ± 648 (20.5) | pCi/L | 12/19/12 13:08 14331 | -83-0 |
| Bismuth-212 | EPA 901.1m | 19.5 ± 44.3 (77.3) | pCi/L | 12/19/12 13:08 14913 | -49-6 |
| Bismuth-214 | EPA 901.1m | 87.6 ± 18.4 (43.5) | pCi/L | 12/19/12 13:08 14733 | -03-0 |
| Cesium-134 | EPA 901.1m | -2.09 ± 5.50 (9.28) | pCi/L | 12/19/12 13:08 13967 | - 70-9 |
| Cesium-137 | EPA 901.1m | -0.205 ± 8.22 (9.03) | pCi/L | 12/19/12 13:08 10045 | |
| Lead-212 | EPA 901.1m | -7.24 ± 43.3 (16.1) | pCi/L | 12/19/12 13:08 15092 | -94-1 |
| Lead-214 | EPA 901.1m | 76.8 ± 15.4 (13.9) | pCi/L | 12/19/12 13:08 15067 | -28-4 |
| Potassium-40 | EPA 901.1m | 94.6 ± 50.6 (81.0) | pCi/L | 12/19/ 12 13:08 13966 | -00 -2 |
| Radium-226 | EPA 901.1m | 4.34 ± 88.5 (153) | pCi/L | 12/19/12 13:08 13982 | -63-3 |
| Radium-228 | EPA 901.1m | -5.74 ± 648 (20.5) | pCi/L | 12/19/12 13:08 15262 | -20-1 |
| Thallium-208 | EPA 901.1m | -2.03 ± 22.9 (7.08) | pCi/L | 12/19/12 13:08 14913 | -50-9 |
| Thorium-232 | EPA 901,1m | -5.74 ± 648 (20.5) | pCi/L | 12/19/12 13:08 7440-2 | 19-1 |
| Thorium-234 | EPA 901.1m | 18.7 ± 1037 (1759) | pCi/L | 12/19/12 13:08 15065 | |
| Uranium-235 | EPA 901.1m | -7.47 ± 91.0 (52.3) | pCi/L | 12/19/12 13:08 15117- | |
| Uranium-238 | EPA 901.1m | 26.0 ± 90.4 (156) | pCi/L | 12/19/12 13:08 | |
| Total Uranium | EPA 908.0 | 0.133 ± 0.164 (0.272) | pCi/L | 12/17/12 13:59 7440-6 | :1-1 |
| Sample: R1208316-004 Cell5- Dissol | | | 2:20 Received: | 12/06/12 10:30 Matrix: W | later . |
| PWS: | Site ID: | Sample Type: | | | |
| Parameters | Method | Act ± Unc (MDC) | Units | Analyzed CAS | No. Qual |
| Actinium-228 | EPA 901.1m | 1.48 ± 10.5 (20.3) | pCi/L | 12/19/12 18:30 14331- | 83-0 |
| Bismuth-212 | EPA 901.1m | -6.22 ± 249 (105) | pCi/L | 12/19/12 18:30 14913- | 49-6 |
| 3ismuth-214 | EPA 901.1m | 24.2 ± 8.80 (47.9) | pCi/L | 12/19/12 18:30 14733- | 03-0 |
| Cesium-134 | EPA 901.1m | -0.672 ± 3.45 (6.00) | pCi/L | 12/19/12 18:30 13967- | 70-9 |
| Cesium-137 | EPA 901.1m | -0.209 ± 8.368 (5.46) | pCi/L | 12/19/12 18:30 10045- | 97-3 |
| _ead-212 | EPA 901.1m | 2.31 ± 6.50 (11.6) | pCi/L | 12/19/12 18:30 15092- | 94-1 |
| _ead-214 | EPA 901.1m | 33.5 ± 15.9 (16.0) | pCi/L | 12/19/12 18:30 15067- | 28-4 |
| Potassium-40 | EPA 901.1m | 111 ± 48.3 (64.1) | pCi/ L | 12/19/12 18:30 13966- | |
| Radium-226 | EPA 901.1m | -7.11 ± 231 (176) | oCi/L | 12/19/1 2 18:30 13982- | 63-3 |
| Radium-228 | EPA 901.1m | 1.48 ± 10.5 (20.3) | pCi/L | 12/19/12 18:30 15262- | |
| Fhallium-208 | EPA 901.1m | -0.065 ± 3.70 (6.76) | pCi/L | 12/19/12 18:30 14913- | |
| Thorium-232 | EPA 901,1m | 1.48 ± 10.5 (20.3) | pCi/L | 12/19/12 18:30 7440-2 | |
| Thorium-234 | EPA 901.1m | 334 ± 631 (1056) | pCi/L | 12/19/12 18:30 15065- | |
| | EDA 001 1m | 4.07 + 00.4 (54.4) | -0:0 | 40/40/40 40:00 45447 | |

Uranium-235

Uranium-238

Total Uranium

EPA 901.1m

EPA 901.1m

EPA 908.0

1.27 ± 29.4 (51.4)

-5.15 ± 375 (170)

0.0564 ± 0.190 (0.330)

pCi/L

pCi/L

pCi/L

12/19/12 18:30 15117-96-1

12/17/12 13:59 7440-61-1

12/19/12 18:30





QUALITY CONTROL DATA

Project:

R1208316

Pace Project No.:

3083317

QC Batch:

RADC/14077

Analysis Method:

EPA 901.1m

QC Batch Method:

EPA 901.1m

Analysis Description:

901.1 Gamma Spec

Associated Lab Samples:

3083317001, 3083317002, 3083317003, 3083317004

METHOD BLANK: 521954

Matrix: Water

Associated Lab Samples:

3083317001, 3083317002, 3083317003, 3083317004

| Parameter | Act ± Unc (MDC) | Units | Analyzed | Qualifiers |
|--------------|----------------------|-------|----------------|------------|
| Actinium-228 | -5.99 ± 240 (24.1) | pCi/L | 12/19/12 15:51 | |
| Bismuth-212 | -5.33 ± 526 (69.7) | pCi/L | 12/19/12 15:51 | |
| Bismuth-214 | -17.5 ± 12216 (48.8) | pCi/L | 12/19/12 15:51 | |
| Cesium-134 | -2.05 ± 4.28 (7.21) | pCi/L | 12/19/12 15:51 | |
| Cesium-137 | 0.932 ± 2.92 (5.16) | pCi/L | 12/19/12 15:51 | |
| Lead-212 | -0.817 ± 8.77 (11.5) | pCi/L | 12/19/12 15:51 | |
| Lead-214 | -6.77 ± 31.4 (12.7) | pCi/L | 12/19/12 15:51 | |
| Potassium-40 | -28.5 ± 106 (74.8) | pCi/L | 12/19/12 15:51 | |
| Radium-226 | 60.1 ± 67.5 (110) | pCi/L | 12/19/12 15:51 | |
| Radium-228 | -5.99 ± 240 (24.1) | pCi/L | 12/19/12 15:51 | |
| Thallium-208 | -1.12 ± 7.71 (6.53) | pCi/L | 12/19/12 15:51 | |
| Thorium-232 | -5.99 ± 240 (24.1) | pCi/L | 12/19/12 15:51 | |
| Thorium-234 | 830 ± 385 (503) | pCi/L | 12/19/12 15:51 | |
| Uranium-235 | -12.1 ± 43.9 (40.1) | pCi/L | 12/19/12 15:51 | |
| Uranium-238 | -3.03 ± 121 (156) | pCi/L | 12/19/12 15:51 | |



QUALITY CONTROL DATA

Project:

R1208316

Pace Project No.:

3083317

QC Batch:

RADC/14083

11/100

Analysis Method:

EPA 903.1

QC Batch Method:

EPA 903.1

Analysis Description:

903.1 Radium-226, Dissolved

Associated Lab Samples:

METHOD BLANK: 522036

Matrix: Water

Associated Lab Samples:

3083317002

3083317002

Parameter

Act ± Unc (MDC)

Units

Analyzed

Qualifiers

Radium-226, Dissolved

-0.053 ± 0.373 (0.793)

pCi/L

12/20/12 13:28



QUALITY CONTROL DATA

Project:

R1208316

Pace Project No.:

3083317

QC Batch:

RADC/14084

Analysis Method:

EPA 904.0

QC Batch Method:

EPA 904.0

Analysis Description:

904.0 Radium 228, Dissolved

Associated Lab Samples:

3083317002

METHOD BLANK: 522037

Matrix: Water

Associated Lab Samples:

3083317002

Parameter

Act ± Unc (MDC)

Units

Analyzed

Qualifiers

Radium-228, Dissolved

 $0.332 \pm 0.300 \quad (0.608)$

pCi/L

12/14/12 15:02



QUALITY CONTROL DATA

Project:

R1208316

Pace Project No.:

3083317

QC Batch:

RADC/14085

Analysis Method:

EPA 903.1

QC Batch Method:

EPA 903.1

Analysis Description:

903.1 Radium-226

Associated Lab Samples:

METHOD BLANK: 522038

Matrix: Water

Associated Lab Samples:

3083317001

3083317001

Parameter

Act ± Unc (MDC)

Units

Analyzed

Qualifiers

Radium-226

 $-0.050 \pm 0.495 \quad (0.943)$

pCi/L

12/17/12 13:12



QUALITY CONTROL DATA

Project:

R1208316

Pace Project No.:

3083317

QC Batch:

RADC/14087

Analysis Method:

EPA 904.0

QC Batch Method:

EPA 904.0

Analysis Description:

904.0 Radium 228

Associated Lab Samples:

oles: 3083317001

METHOD BLANK: 522040

14**∩**

Matrix: Water

Associated Lab Samples:

3083317001

Parameter

Act ± Unc (MDC)

Units

Analyzed

Qualifiers

Radium-228

0.497 ± 0.402 (0.799)

pCi/L

12/14/12 12:15



QUALITY CONTROL DATA

Project:

R1208316

Pace Project No.:

3083317

QC Batch:

RADC/14117

Analysis Method:

EPA 908.0

QC Batch Method:

EPA 908.0

Analysis Description:

908.0 Total Uranium

Associated Lab Samples:

3083317001, 3083317002, 3083317003, 3083317004

METHOD BLANK: 523388 Associated Lab Samples:

Matrix: Water

3083317001, 3083317002, 3083317003, 3083317004

Parameter

Act ± Unc (MDC)

Units

Analyzed

Qualifiers

Total Uranium

-0.00818 ± 0.142 (0.267)

pCi/L

12/17/12 14:32



QUALIFIERS

Project: R1208316
Pace Project No.: 3083317

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: 12/28/2012 02:06 PM

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.

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: R1208316 Project Manager: Janice Jaeger

Special Instructions/Comments

Sample Lab Code Sample ID # of Cont. Matrix Date Time Lab ID R1208316-001 Cell6-1212 Water 12/4/12 1100 Pace R1208316-002 Cell6-1212 Dissolved Water 12/4/12 1100 ACZ-R1208316-003 Cell5-1212 Water 12/4/12 1220 ACZ -R1208316-004 Cell5-1212 Dissolved Water 12/4/12 1220 ACZ-

001

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003

Report Requirements Invoice Information __ I. Results Only II. Results + QC Summaries PO# III. Results + QC and Calibration Summaries R1208316 IV. Data Validation Report with Raw Data

Bill to

July July 12/5/12 6 Received By: ABuna

Turnaround Requirements

RUSH (Surcharges Apply)

1 2 3 4 5

PLEASE CIRCLE WORK DAYS

Requested FAX Date:

Requested Report Date: 12/19/12

XSTANDARD

PQL/MDL/J

EDD

Airbill Number;

N<u>Y</u>

Sample Condition Upon Receipt

| Face Analytical Client Nam | e: ALS | Project # <u>2053317</u> |
|--|------------------|---|
| Courier: Fed Ex ZUPS USPS CI Tracking #: 1211 W 438134196531 Custody Seal on Cooler/Box Present: Ye | निम | Proj. Due Date: Proj. Name: |
| Packing Material: Bubble Wrap Bubb | ie Bags 🛮 None | Other |
| Thermometer Used 5 6 7 | Type of Ice (We) | Blue None Samples on ice, cooling process has begun |
| Cooler Temperature NI | | Date and Initials of person examining |
| Temp should be above freezing to 6°C | | contents: SmB 12/G/11 |
| Chain of Custody Present: | ,⊠Yes □No □N/A | 1. |
| Chain of Custody Filled Out: | ØYos □No □N/A | 2. |
| Chain of Custody Relinquished: | Øyes □No □N/A | 3. |
| Sampler Name & Signature on COC: | □Yes ØNo □N/A | 4. |
| Samples Arrived within Hold Time: | ਈYos □No □N/A | 5. |
| Short Hold Time Analysis (<72hr): | □Yes 戸ॉNo □N/A | 6. |
| Rush Turn Around Time Requested: | □Yes ੴho □nia | 7. |
| Sufficient Volume: | ⊠Ýes □no □n/A | 8. |
| Correct Containers Used: | ŒYes □No □N/A | 9. |
| -Pace Containers Used: | □Yes ☑Ño □N/A | · |
| Containers Intact: | ďyes □no □n/a | 10. |
| Filtered volume received for Dissolved tests | □Yos (ĀNo □N/A | 11. |
| Sample Labels match COC: | ≝Yes □No □N/A | 12. |
| -Includes date/time/ID/Analysis Matrix: \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\ | | |
| All containers needing preservation have been checked. | Dros □no □n/a | 13. 21mples 002,004 are unpreserved for dissipre |
| All containers needing preservation are found to be in compliance with EPA recommendation. | LITES LINO LINA | 13/10/12@1530 |
| exceptions: VOA, collform, TOC, O&G, WI-DRO (water) | | completed STNS preservative ISFID-0313-3 |
| Samples checked for dechlorination: | □Yes □No CANA | 14. |
| Headspace in VOA Vials (>6mm): | □Yes □No ŒN/A | 15. |
| Trip Blank Present: | □Yes □No DANA | 16. |
| Trip Blank Custody Seals Present | □Yes □No ØN/A | |
| Pace Trip Blank Lot # (if purchased): | <u>-</u> | |
| Client Notification/ Resolution: | | Field Data Required? Y / N |
| Person Contacted: | Date/Ti | me: |
| Comments/ Resolution: | | |
| | | · |
| | | |
| | | |
| , posterior de la constitución d | | |
| - CY | | 121212 |
| Project Manager Review: | <u> </u> | Date: Date: |

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

Project Number: ________Client Name:______

| | | | | | | | | | | |
|------------|---|---|------|------|---|-----|-----|-----|-----|--|
| | | | | | | NOO | 500 | COS | 001 | ltem No. |
| | | | | | | | - | | \$ | Matrix Code |
| | | | | | | | | | | 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 |
| | | | | | | | | | | O & G (1L) |
| ** | | | | | | | | | | TPH (1L) |
| | | | , | | | | | | | VOA (40 ml 30 ml) |
| **** | | | | | | | | | | Cyanide (250 ml) |
| - <u>-</u> | | | | | | | | | | Sulfide (500 mt) |
| | | | | | | | | | | Bacteria (120 ml) |
| | | | | | | | | | | Wipes / swipe/ smear/ filter |
| | | | | | | N | 13 | 4 | H | Radchem Nalgene (125 / 250 / 500 V 1L) |
| | | | | | | | | | | Radchem Nalgene (1/2 gal. / 1 gal.L) |
| | | | | | | | | | | Cubitainer (500 ml / 4L) |
| | | | | | | | | | | Ziplac |
| - | | | | | - | | | | | Olher |
| | | | | | | | | | | Other |

SCURF Back (C016-4 15May2012).xls