Exhibit C

February 28, 2019

Ms. Yasmin Guevara
New York State Department of Environmental Conservation - Region 8
Division of Solid and Hazardous Materials
6274 East Avon-Lima Road
Avon, New York 14414

RE: Hakes C&D, Campbell N.Y.
Hakes C&D Landfill Permit No. 8-4630-00010/00001-0
2018 4th Quarter Leachate Radionuclide Monitoring Results

Dear Ms. Guevara:

Enclosed please find a copy of the radionuclide sampling and analysis report for leachate and leachate tank sediment sampling conducted during the fourth quarter 2018. This report is being submitted as required by the facility Environmental Monitoring Plan. Should you have any questions or require clarification of the enclosed data, please do not hesitate to contact me at 603-545-7125 or at russell.anderson@casella.com.

Sincerely,

CASELLA WASTE SERVICES

Russell Anderson
Manager of Compliance

cc: Larry Shilling, Casella (electronic)
Jonathan Brandes, On-Site Technical Services (electronic)
Richard Clarkson, NYSDEC (electronic)
Timothy Rice, NYSDEC (electronic)
Greg MacLean, NYSDEC (electronic)
Daniel Maeso, NYSDEC (electronic)

Enclosures

4376 Manning Ridge Road, Painted Post, NY 14870
Phone: 607.937.6044 Fax: 607.937.6089

ON-SITE TECHNICAL SERVICES, INC
72 Railroad Avenue
Wellsville, New York 14895
Phone: (585) 593-1824
Fax: (585) 593-7471

February 27, 2019

Mr. Russell Anderson
Casella Waste Systems, Inc.
4376 Manning Ridge Road
Campbell, New York 14870

Re: Hakes C & D Landfill Campbell, New York – 4th Quarter 2018 Radionuclide Test Results

Dear Russell:

The purpose of this letter is to present results of the leachate and leachate tank sediment radiological sampling conducted at the Hakes C & D Landfill during the fourth quarter 2018 with historic results for comparison. Leachate sampling and analysis for radionuclides is required as detailed in section 2.6.3 of the April 2015 Environmental Monitoring Plan (EMP) with approved NYSDEC revisions. On September 11, 2018, NYSDEC approved discontinuing leachate sample analysis by method EPA 901.1, as is consistent with revised solid waste regulations.

The initial Hakes leachate radiological sampling and analysis of each landfill cell and combined leachate was completed in May 2012. Therefore, the sampling required in the fourth quarter 2018 includes only landfill cells which have received gas well waste. Currently, the cells containing gas well waste includes cells 3 through 8. Leachate from cell 7 drains through cell 4 and cell 8A leachate flows through cell 3. Therefore, fourth quarter 2018 leachate samples were collected from cells 3, 4, 5, 6 and 8B. Samples were collected by On-Site on November 8, 2018 and analyzed by ALS Environmental (ALS) located in Fort Collins, Colorado. ALS Fort Collins is a New York State accredited laboratory. Attached Table 1 displays the current and historic leachate field parameter data and radionuclide results from leachate sampling conducted during 2017 and 2018, which encompasses the last five samplings.

Additionally the annual leachate tank sediment sample was collected on December 20, 2018 as part of annual leachate tank cleaning. Attached Table 2 presents the leachate tank sediment radionuclide results from 2014 through 2018, which includes the last five samplings.

Also enclosed are the fourth quarter 2018 field sampling forms and laboratory analytical reports.

If you have any questions regarding the information in this submittal, please call me at 585-593-1824.

Sincerely,

Jonathan E. Brandes, P.G.

Senior Geologist

Enclosures

Table 1

Leachate Radionuclide Results 2017-2018 (Last 5 Samplings)
Hakes C and D Landfill
Campbell, New York

Parameter	Cell 3 Leachate 6/6/2017	Cell 3 Leachate 11/17/2017	Cell 3 Leachate 2/27/2018	Cell 3 Leachate 6/26/2018	Cell 3 Leachate 11/8/2018
Field Parameters					
Field pH (std. units)	6.78	6.91	6.69	6.87	6.81
ORP (mV)	-323.8	-151.7	30.6	33.7	-138.7
Specific Conductivity (us/cm)	9085	7443	6191	7430	6443
Temperature (deg. C)	21.7	16.8	17	26.9	13.9
Turbidity (NTU)	69.2	140	20.6	48.4	76.6
Radionuclide Act + Unc (MDC) pCi/L					
Radium-226, Dissolved (EPA 903.1)	1.75 ± 1.10 (0.473)	2.69 ± 0.78 (0.22)	1.37 ± 0.46 (0.23)	1.18 ± 0.56 (0.44)	1 ± 1.3 (2)
Radium-226, Total (EPA 903.1)	2.85 ± 1.53 (0.552)	2.8 ± 0.78 (0.17)	2.67 ± 0.77 (0.18)	1.39 ± 0.57 (0.36)	1.2 ± 1.1 (1.3)
Radium-228, Dissolved (EPA 904.0)	3.25 ± 0.960 (1.15)	1.83 ± 0.57 (0.62)	1.11 ± 0.44 (0.65)	1.9 ± 0.68 (0.92)	2.1 ± 1.5 (2.9)
Radium-228, Total (EPA 904.0)	3.9 ± 1.30 (1.88)	2.02 ± 0.63 (0.71)	0.75 ± 0.37 (0.65)	4.2 ± 1.1 (0.8)	2.3 ± 1.5 (2.9)
Total Uranium, Dissolved (ASTM D5174-97)	0.00359 ± 0.156 (0.385)				
Total Uranium, Dissolved (EPA 908.0)					< (0.0992)
Total Uranium, Dissolved (HASL-300)		0.29 ± 0.19 (0.22)	0.35 ± 0.16 (0.12)	0.27 ± 0.14 (0.14)	
Total Uranium, Total (ASTM D5174-97)	0.00251 ± 0.127 (0.385)				
Total Uranium, Total (EPA 908.0)					< (0.0657)
Total Uranium, Total (HASL-300)		0.31 ± 0.15 (0.15)	0.37 ± 0.15 (0.12)	0.35 ± 0.15 (0.12)	

Notes:
Act + Unc (MDC) = Activity ± Uncertainty (Minimum Detectable Concentration)
pCi/L = picocuries per liter
Dissolved - Indicates sample filtered with 0.45 micron filter prior to analysis.
Each of EPA 903.1, EPA 904.0, EPA 908.0, ASTM D5174-97, HASL-300 are laboratory analysis methods.

Table 1

Leachate Radionuclide Results 2017-2018 (Last 5 Samplings)
Hakes C and D Landfill
Campbell, New York

Parameter	Cell 4 Leachate 6/6/2017	Cell 4 Leachate 11/17/2017	Cell 4 Leachate 2/27/2018	Cell 4 Leachate 6/26/2018	Cell 4 Leachate 11/8/2018
Field Parameters					
Field pH (std. units)	6.83	7.14	6.86	7.08	7.1
ORP (mV)	2.8	-213.7	11.6	-136.4	-204.8
Specific Conductivity (us/cm)	6304	6889	6379	7893	6219
Temperature (deg. C)	19.7	16.6	18.3	26.4	13
Turbidity (NTU)	14.7	42.1	76.1	87	61
Radionuclide Act + Unc (MDC) pCi/L					
Radium-226, Dissolved (EPA 903.1)	2.57 ± 1.30 (0.436)	1.59 ± 0.51 (0.24)	1.36 ± 0.44 (0.11)	2.54 ± 0.95 (0.36)	2.3 ± 1.4 (1.5)
Radium-226, Total (EPA 903.1)	2.58 ± 1.51 (1.79)	2.53 ± 0.72 (0.21)	2.16 ± 0.64 (0.21)	2.57 ± 0.91 (0.45)	2.4 ± 1.4 (1.4)
Radium-228, Dissolved (EPA 904.0)	3.88 ± 0.957 (0.821)	2.48 ± 0.71 (0.63)	0.71 ± 0.37 (0.64)	2.14 ± 0.73 (0.92)	1.7 ± 1.5 (3.1)
Radium-228, Total (EPA 904.0)	2.72 ± 0.892 (1.26)	2.22 ± 0.68 (0.74)	1.7 ± 0.56 (0.71)	2.32 ± 0.76 (0.9)	3.9 ± 2.1 (3.8)
Total Uranium, Dissolved (ASTM D5174-97)	0.000711 ± 0.033 (0.385)				
Total Uranium, Dissolved (EPA 908.0)					0.899 ± 0.243 (0.12)
Total Uranium, Dissolved (HASL-300)		0.48 ± 0.18 (0.1)	1.15 ± 0.28 (0.11)	0.73 ± 0.21 (0.11)	
Total Uranium, Total (ASTM D5174-97)	0.000764 ± 0.029 (0.385)				
Total Uranium, Total (EPA 908.0)					0.86 ± 0.2744 (0.116)
Total Uranium, Total (HASL-300)		0.56 ± 0.19 (0.1)	1.14 ± 0.35 (0.18)	0.84 ± 0.25 (0.13)	

Notes:
Act + Unc (MDC) = Activity ± Uncertainty (Minimum Detectable Concentration)
pCi/L = picocuries per liter
Dissolved - Indicates sample filtered with 0.45 micron filter prior to analysis.
Each of EPA 903.1, EPA 904.0, EPA 908.0, ASTM D5174-97, HASL-300 are laboratory analysis methods.

Table 1

Leachate Radionuclide Results 2017-2018 (Last 5 Samplings)
Hakes C and D Landfill
Campbell, New York

Parameter	Cell 5 Leachate 6/6/2017	Cell 5 Leachate 11/17/2017	Cell 5 Leachate 6/26/2018	Cell 5 Leachate 11/8/2018
Field Parameters				
Field pH (std. units)	6.79	6.88	6.88	6.81
ORP (mV)	-205.9	-102.1	-85.2	-142.7
Specific Conductivity (us/cm)	6221	6278	8030	7890
Temperature (deg. C)	21.9	16.2	28.4	13.2
Turbidity (NTU)	64.3	41.6	78.8	79.3
Radionuclide Act + Unc (MDC) pCi/L				
Radium-226, Dissolved (EPA 903.1)	0.898 ± 0.933 (1.39)	1.07 ± 0.36 (0.16)	0 ± 0.17 (0.25)	0 ± 0.72 (1.59)
Radium-226, Total (EPA 903.1)	1.35 ± 1.30 (1.87)	1.07 ± 0.36 (0.19)	0.39 ± 0.33 (0.46)	0 ± 0.75 (1.43)
Radium-228, Dissolved (EPA 904.0)	2.42 ± 0.699 (0.785)	1.85 ± 0.57 (0.61)	0.69 ± 0.46 (0.89)	0.3 ± 1.6 (3.5)
Radium-228, Total (EPA 904.0)	1.32 ± 0.846 (1.64)	1.07 ± 0.46 (0.75)	0.97 ± 0.49 (0.86)	2.9 ± 1.9 (3.5)
Total Uranium, Dissolved (ASTM D5174-97)	0.000797 ± 0.036 (0.385)			
Total Uranium, Dissolved (EPA 908.0)				< (0.075)
Total Uranium, Dissolved (HASL-300)		0.75 ± 0.2 (0.1)	0.51 ± 0.19 (0.13)	
Total Uranium, Total (ASTM D5174-97)	0.000733 ± 0.034 (0.385)			
Total Uranium, Total (EPA 908.0)				< (0.0897)
Total Uranium, Total (HASL-300)		0.82 ± 0.26 (0.15)	0.52 ± 0.18 (0.13)	

Notes:
Act + Unc (MDC) = Activity ± Uncertainty (Minimum Detectable Concentration)
pCi/L = picocuries per liter
Dissolved - Indicates sample filtered with 0.45 micron filter prior to analysis.
Each of EPA 903.1, EPA 904.0, EPA 908.0, ASTM D5174-97, HASL-300 are laboratory analysis methods.

Table 1

Leachate Radionuclide Results 2017-2018 (Last 5 Samplings)
Hakes C and D Landfill
Campbell, New York

Parameter	Cell 6 Leachate 6/6/2017	Cell 6 Leachate 11/17/2017	Cell 6 Leachate 6/26/2018	Cell 6 Leachate 11/8/2018
Field Parameters				
Field pH (std. units)	6.84	6.97	6.99	7.03
ORP (mV)	-291.7	-239.1	-305.9	-196
Specific Conductivity (us/cm)	12178	10151	11169	7566
Temperature (deg. C)	24.6	19.2	29.7	14.8
Turbidity (NTU)	67.4	107	26.3	35.9
Radionuclide Act + Unc (MDC) pCi/L				
Radium-226, Dissolved (EPA 903.1)	2.34 ± 1.21 (1.01)	2.77 ± 0.78 (0.19)	2.4 ± 1.2 (1.1)	1.5 ± 1.4 (2.2)
Radium-226, Total (EPA 903.1)	2.75 ± 1.80 (1.84)	1.81 ± 0.53 (0.12)	2.11 ± 0.75 (0.3)	2.6 ± 1.4 (1)
Radium-228, Dissolved (EPA 904.0)	2.07 ± 0.649 (0.807)	3.1 ± 0.84 (0.62)	2.28 ± 0.72 (0.82)	1.9 ± 1.6 (3.2)
Radium-228, Total (EPA 904.0)	2.4 ± 1.04 (1.77)	1.18 ± 0.46 (0.7)	2.64 ± 0.83 (0.9)	4.7 ± 1.9 (3.1)
Total Uranium, Dissolved (ASTM D5174-97)	0.00105 ± 0.047 (0.385)			
Total Uranium, Dissolved (EPA 908.0)				0.418 ± 0.158 (0.0902)
Total Uranium, Dissolved (HASL-300)		0.32 ± 0.13 (0.09)	0.63 ± 0.19 (0.1)	
Total Uranium, Total (ASTM D5174-97)	0.00112 ± 0.039 (0.385)			
Total Uranium, Total (EPA 908.0)				< (0.0809)
Total Uranium, Total (HASL-300)		0.25 ± 0.19 (0.23)	0.67 ± 0.2 (0.12)	

Notes:
Act + Unc (MDC) = Activity ± Uncertainty (Minimum Detectable Concentration)
pCi/L = picocuries per liter
Dissolved - Indicates sample filtered with 0.45 micron filter prior to analysis.
Each of EPA 903.1, EPA 904.0, EPA 908.0, ASTM D5174-97, HASL-300 are laboratory analysis methods.

Table 1

Leachate Radionuclide Results 2017-2018 (Last 5 Samplings)
Hakes C and D Landfill
Campbell, New York

Parameter	Cell 8 Leachate 6/6/2017	Cell 8 Leachate 11/17/2017	Cell 8 Leachate 2/27/2018	Cell 8 Leachate 6/26/2018	Cell 8 Leachate 11/8/2018
Field Parameters					
Field pH (std. units)	6.74	6.62	6.47	6.62	6.51
ORP (mV)	-257.4	-13.5	10	-208.4	-95.7
Specific Conductivity (us/cm)	5306	2286	1577	3300	3718
Temperature (deg. C)	22	14	16	28.2	15.6
Turbidity (NTU)	38.4	140	111	> 1000	> 1000
Radionuclide Act + Unc (MDC) pCi/L					
Radium-226, Dissolved (EPA 903.1)	1.51 ± 1.00 (0.455)	0.88 ± 0.31 (0.16)	0.59 ± 0.27 (0.23)	0.16 ± 0.3 (0.52)	1.1 ± 1.4 (2.2)
Radium-226, Total (EPA 903.1)	2.43 ± 2.24 (1.32)	1.38 ± 0.45 (0.18)	0.89 ± 0.34 (0.2)	2.4 ± 0.83 (0.35)	0.28 ± 0.88 (1.67)
Radium-228, Dissolved (EPA 904.0)	1.65 ± 0.611 (0.89)	1.38 ± 0.51 (0.72)	0.96 ± 0.4 (0.63)	1.68 ± 0.62 (0.87)	2.5 ± 1.6 (3)
Radium-228, Total (EPA 904.0)	1.77 ± 1.34 (2.7)	1.46 ± 0.54 (0.79)	0.7 ± 0.38 (0.68)	1.71 ± 0.62 (0.85)	0.7 ± 1.3 (2.8)
Total Uranium, Dissolved (ASTM D5174-97)	0.000911 ± 0.047 (0.385)				
Total Uranium, Dissolved (EPA 908.0)					< (0.0523)
Total Uranium, Dissolved (HASL-300)		0.59 ± 0.21 (0.16)	0.5 ± 0.2 (0.15)	4.22 ± 0.66 (0.11)	
Total Uranium, Total (ASTM D5174-97)	0.000866 ± 0.046 (0.385)				
Total Uranium, Total (EPA 908.0)					< (0.0914)
Total Uranium, Total (HASL-300)		0.65 ± 0.18 (0.12)	0.52 ± 0.16 (0.06)	7.8 ± 1 (0.2)	

Notes:
Act + Unc (MDC) = Activity ± Uncertainty (Minimum Detectable Concentration)
pCi/L = picocuries per liter
Dissolved - Indicates sample filtered with 0.45 micron filter prior to analysis.
Each of EPA 903.1, EPA 904.0, EPA 908.0, ASTM D5174-97, HASL-300 are laboratory analysis methods.

Table 2

Leachate Tank Sediment Radionuclide Analyitcal Results 2014 Through 2018
Hakes C and D Landfill
Painted Post, New York

Radionuclide Act + Unc (MDC) pCi/g	Leachate Tank Sediment 10/22/2014	Leachate Tank Sediment 9/24/2015	Leachate Tank Sediment 8/24/2016	Leachate Tank Sediment 8/25/2017	Leachate Tank Sediment 12/20/2018
Radium-226 (EPA 901.1)	2.118 ± 0.468 (0.323)	1.817 ± 0.337 (0.269)	1.773 ± 0.370 (0.227)	1.883 ± 0.372 (0.326)	
Radium-226, Dissolved (EPA 903.1)					0.48 ± 0.21 (0.19)
Radium-228, Total (EPA 901.1)	1.839 ± 0.584 (0.997)	2.208 ± 0.473 (0.35)	2.454 ± 0.539 (0.342)	2.153 ± 0.527 (0.452)	2.08 ± 0.85 (1.55)
Total Uranium, Total (EPA 908.0)					2.33 ± 0.521 (0.191)
Uranium-234 (HSL-300)	0.076 ± 0.193 (0.443)	0.656 ± 0.202 (0.107)	1 ± 0.234 (0.084)	1.05 ± 0.294 (0.089)	
Uranium-235 (HSL-300)	-0.011 ± 0.161 (0.224)	0.035 ± 0.056 (0.103)	0.047 ± 0.050 (0.073)	0.02 ± 0.070 (0.053)	
Uranium-238 (HSL-300)	0.243 ± 0.211 (0.314)	0.578 ± 0.187 (0.099)	0.962 ± 0.226 (0.056)	0.787 ± 0.246 (0.089)	

Notes:
Act + Unc (MDC) = Activity ± Uncertainty (Minimum Detectable Concentration)
pCi/g = picocuries per gram
EPA 901.1, EPA 903.1, EPA 908.0 and HSL-300 are laboratory analysis methods.

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

Project: Hakes C&D Landfill, Campbell, New York **Date:** 11-8-18

Sampling Location: Cell-3 **Sample ID:** Cell3-1118 **Arrival Time:** 0851

Weather Conditions:

Temp. 41 ° F ( ) Sunny ( ) Partly Cloudy (X) Cloudy ( ) Light Rain ( ) Hvy. Rain ( ) Snow

Wind Conditions: 0-10mph

Location Type

( ) Groundwater Suppression (X) Leachate ( ) Secondary Leachate ( ) Surface Water/Sediment ( ) Res. Water

( ) Other _____

Flow and Depth Information (as appropriate)

Depth: NA Estimated Flow: NA

Comments: Hakes Employee Filled Ded Bucket

Field Parameters (as appropriate)

Meter: YSI (sn: 17D108273), Hach 2100P (sn: 12410)

Field Parameters tested in: ( ) Submerged Probe (X) Cup

Note: Turbidity measured from a vial grab sample

Time	pH	Conductivity (us/cm)	Turbidity (ntu)	D.O. (mg/L)	Temp. (°C)	ORP (mV)
0910	6.81	6413	7616	NA	13.9	-138.7

Sample Information

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

Location Description/Condition: Cell 3 Riser pipe

Sample Collection Equipment/Method: Ded Bucket Sample Time: 0910

Sample Description (clarity\color): lightly Cloudy Sample Odor (Y) or (N) Explain: leachate odor

light Amber tint

Other Observations/Comments: _____

Analysis Requested: RAD Number of Containers: 8

Sampling Completion: Time 0919 Date 11-8-18 Samplers K Dye

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

Project: Hakes C&D Landfill, Campbell, New York **Date:** 11-8-18

Sampling Location: Cell-4 **Sample ID:** Cell4-1118 **Arrival Time:** 0921

Weather Conditions:

Temp. 41 ° F ( ) Sunny ( ) Partly Cloudy (X) Cloudy ( ) Light Rain ( ) Hvy. Rain ( ) Snow

Wind Conditions: 0-10 mph

Location Type

( ) Groundwater Suppression (X) Leachate ( ) Secondary Leachate ( ) Surface Water/Sediment ( ) Res. Water

( ) Other _____

Flow and Depth Information (as appropriate)

Depth: NA Estimated Flow: NA

Comments: Hakes Employee Filled Ded 5 gal Bucket

Field Parameters (as appropriate)

Meter: YSI (sn: 17D108273), Hach 2100P (sn: 12410)

Field Parameters tested in: ( ) Submerged Probe (X) Cup

Note: Turbidity measured from a vial grab sample

Time	pH	Conductivity (us/cm)	Turbidity (ntu)	D.O. (mg/L)	Temp. (°C)	ORP (mV)
0930	7.10	6219	61.0	NA	13.0	-204.8

Sample Information

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

Location Description/Condition: Cell 4 Riser pipe

Sample Collection Equipment/Method: Ded 5 gal Bucket Sample Time: 0930

Sample Description (clarity\color): Slightly Cloudy light Amber tint Sample Odor (Y) or (N) Explain: leachate odor

Other Observations/Comments: _____

Analysis Requested: RAD Number of Containers: 8

Sampling Completion: Time 0944 Date 11-8-18 Samplers K Dye

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

Project: Hakes C&D Landfill, Campbell, New York **Date:** 11-8-18

Sampling Location: Cell-5 **Sample ID:** Cell5-1118 **Arrival Time:** 0948

Weather Conditions:

Temp. 41 ° F ( ) Sunny ( ) Partly Cloudy (X) Cloudy ( ) Light Rain ( ) Hvy. Rain ( ) Snow

Wind Conditions: 0-5mph

Location Type

( ) Groundwater Suppression (X) Leachate ( ) Secondary Leachate ( ) Surface Water/Sediment ( ) Res. Water

( ) Other _____

Flow and Depth Information (as appropriate)

Depth: NA Estimated Flow: NA

Comments: Hakes Employee Filled Ded 5 gal Bucket

Field Parameters (as appropriate)

Meter: YSI (sn: 17010827 3), Hach 2100P (sn: 12410)

Field Parameters tested in: ( ) Submerged Probe (X) Cup

Note: Turbidity measured from a vial grab sample

Time	pH	Conductivity (us/cm)	Turbidity (ntu)	D.O. (mg/L)	Temp. (°C)	ORP (mV)
1000	6.81	7890	79.3	NA	13.2	-142.7

Sample Information

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

Location Description/Condition: Cell 5 Riser pipe

Sample Collection Equipment/Method: Ded 5 gal Bucket Sample Time: 1000

Sample Description (clarity\color): lightly Cloudy with Med Gray/Black tint Sample Odor (Y) or (N) Explain: leachate odor

Other Observations/Comments: _____

Analysis Requested: RAD Number of Containers: 8

Sampling Completion: Time 1018 Date 11-8-18 Samplers K Dyle

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

Project: Hakes C&D Landfill, Campbell, New York **Date:** 11-8-18

Sampling Location: Cell-6 **Sample ID:** Cell6-1118 **Arrival Time:** 1026

Weather Conditions:

Temp. 41° F ( ) Sunny ( ) Partly Cloudy (X) Cloudy ( ) Light Rain ( ) Hvy. Rain ( ) Snow

Wind Conditions: 0-10 mph

Location Type

( ) Groundwater Suppression (X) Leachate ( ) Secondary Leachate ( ) Surface Water/Sediment ( ) Res. Water

( ) Other _____

Flow and Depth Information (as appropriate)

Depth: NA Estimated Flow: NA

Comments: Hakes Employee Filled Ded 5gal Bucket

Field Parameters (as appropriate)

Meter: YSI (sn: 17D108273), Hach 2100P (sn: 12410)

Field Parameters tested in: ( ) Submerged Probe (X) Cup

Note: Turbidity measured from a vial grab sample

Time	pH	Conductivity (us/cm)	Turbidity (ntu)	D.O. (mg/L)	Temp. (°C)	ORP (mV)
1040	7.03	7566	35.9	NA	14.8	-196.0

Sample Information

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

Location Description/Condition: Cell 6 Riser piper

Sample Collection Equipment/Method: Ded 5gal Bucket Sample Time: 1040

Sample Description (clarity\color): Slightly Cloudy Med Black tint Sample Odor (Y) or (N) Explain: leachate odor

Other Observations/Comments: _____

Analysis Requested: RAD Number of Containers: 8

Sampling Completion: Time 1103 Date 11-8-18 Samplers K Dye

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

Project: Hakes C&D Landfill, Campbell, New York **Date:** 11-8-18

Sampling Location: Cell-8B **Sample ID:** Cell8B-1118 **Arrival Time:** _____

Weather Conditions:

Temp. 41 ° F ( ) Sunny ( ) Partly Cloudy (X) Cloudy ( ) Light Rain ( ) Hvy. Rain ( ) Snow

Wind Conditions: 0-5mph

Location Type

( ) Groundwater Suppression (X) Leachate ( ) Secondary Leachate ( ) Surface Water/Sediment ( ) Res. Water

( ) Other _____

Flow and Depth Information (as appropriate)

Depth: NA Estimated Flow: _____

Comments: Buckets Filled by Hakes Employee

Field Parameters (as appropriate)

Meter: YSI (sn: 17D108273), Hach 2100P (sn: 12410)

Field Parameters tested in: ( ) Submerged Probe (X) Cup

Note: Turbidity measured from a vial grab sample

Time	pH	Conductivity (us/cm)	Turbidity (ntu)	D.O. (mg/L)	Temp. (°C)	ORP (mV)
0815	6.51	3218	74.0	NA	15.6	-95.7
		DI	>1000			

Sample Information

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

Location Description/Condition: Cell 8 Riser pipe

Sample Collection Equipment/Method: Direct Grab Sample Time: 0815

Sample Description (clarity\color): Lightly cloudy Sample Odor (Y) or (N) Explain: leachate odor

light Gray tint → Black

Other Observations/Comments: ~~As~~ After the 1st couple of Bottles the Sample got Black

Analysis Requested: RAD Number of Containers: 8

Sampling Completion: Time 0834 Date 11-8-18 Samplers K Dye

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

Project: Hakes C&D Landfill, Campbell, New York **Date:** 12-20-18

Sampling Location: North leachate Tank **Sample ID:** North Tank SED-1218 **Arrival Time:** 1300

Weather Conditions:

Temp. 42 ° F ( ) Sunny ( ) Partly Cloudy ( ) Cloudy ( ) Light Rain ( ) Hvy. Rain ( ) Snow

Wind Conditions: O -

Location Type

( ) Groundwater Suppression ( ) Leachate ( ) Secondary Leachate (X) Surface Water/Sediment ( ) Res. Water

( ) Other _____

Flow and Depth Information (as appropriate)

Depth: _____ Estimated Flow: NA

Comments: _____

Field Parameters (as appropriate)

Meter: YSI (sn: _____), Hach 2100P (sn: _____)

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)
1340						

Sample Information

Sample Type: (X) Grab ( ) Composite Sample Location: ( ) Discharge Pipe ( ) Pond (X) ~~Ditch~~ North Tank

Location Description/Condition: North leachate Tank

Sample Collection Equipment/Method: 2 L Dipper Sample Time: 1340

Sample Description (clarity\color): Wet Black Consistency of yogart Sample Odor (Y) or (N) Explain: leachate odor

Other Observations/Comments: _____

Analysis Requested: RAD Number of Containers: 2

Sampling Completion: Time 1353 Date 12-20-18 Samplers K Dye - J. Brandes

January 24, 2019 Service Request No:R1810912

Russell Anderson
Casella Waste Systems - Hakes Billing
4 Chenell Drive Suite 200
Concord, NH 03301

Laboratory Results for: Hakes C&D Landfill - Leachate RAD.

Dear Russell,

Enclosed are the results of the sample(s) submitted to our laboratory November 08, 2018
For your reference, these analyses have been assigned our service request number **R1810912.**

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAP standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and ALS Environmental is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report. The measurement uncertainty of the results included in this report is within that expected when using the prescribed method(s) for analysis of these samples, and represented by Laboratory Control Sample control limits. Any events, such as QC failures, which may add to the uncertainty are explained in the report narrative.

Please contact me if you have any questions. My extension is 7472. You may also contact me via email at Janice.Jaeger@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janice Jaeger
Project Manager

CC: Jon Brandes

ADDRESS 1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
PHONE +1 585 288 5380 | FAX +1 585 288 8475
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Client: Casella Waste Systems (Hampden ME)
Project: Hakes C&D Landfill - Leachate RAD.
Sample Matrix: Water

Service Request: R1810912
Date Received: 11/08/2018

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables, including results of QC samples analyzed from this delivery group. Analytical procedures performed by the lab are validated in accordance with NELAC standards. Any parameters that are not included in the lab's NELAC accreditation are identified on a "Non-Certified Analytes" report in the Miscellaneous Forms Section of this report. Individual analytical results requiring further explanation are flagged with qualifiers and/or discussed below. The flags are explained in the Report Qualifiers and Definitions page in the Miscellaneous Forms section of this report.

Sample Receipt:

Ten water samples were received for analysis at ALS Environmental on 11/08/2018. Any discrepancies noted upon initial sample inspection are noted on the cooler receipt and preservation form included in this data package. The samples were received in good condition and consistent with the accompanying chain of custody form. Samples are refrigerated at 0 to 6°C upon receipt at the lab except for aqueous samples designated for metals analyses, which are stored at room temperature. If any samples were received for the analysis of pH, chlorine residual, sulfite, dissolved oxygen, or ferrous iron, the samples were analyzed past their holding time expiration since these analyses are required to be analyzed within 15 minutes of sampling.
The sample extract(s) required cleanup with TBA (Tetrabutylammonium sulfate) to reduce analytical interference from sulfur. Endrin aldehyde is degraded by TBA cleanup, resulting in low LCS recoveries, and a likely low bias in the associated samples.

Subcontracted Analytical Parameters:

One or more samples were subcontracted to another laboratory for testing. The certified analytical report from the subcontractor has been included in its entirety at the end of this report and includes the name and address of the subcontracted laboratory.

Approved by _____ Date 01/24/2019

Sample Receipt Information

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Client: Casella Waste Systems (Hampden ME) **Service Request:**R1810912
Project: Hakes C&D Landfill - Leachate RAD.

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
R1810912-001	Cell8B-1118	11/8/2018	0815
R1810912-002	Cell8B-1118 Diss	11/8/2018	0815
R1810912-003	Cell3-1118	11/8/2018	0910
R1810912-004	Cell3-1118 Diss	11/8/2018	0910
R1810912-005	Cell4-1118	11/8/2018	0930
R1810912-006	Cell4-1118 Diss	11/8/2018	0930
R1810912-007	Cell5-1118	11/8/2018	1000
R1810912-008	Cell5-1118 Diss	11/8/2018	1000
R1810912-009	Cell6-1118	11/8/2018	1040
R1810912-010	Cell6-1118 Diss	11/8/2018	1040

ALS-Environmental
1565 Jefferson Rd, Bldg 300, Suite 360
Rochester, NY 14623
585.288.5380

CHAIN of CUSTODY

Page ___ of ___

Client: **Casella/On-Site**
4376 Manning Ridge Road
Campbell, NY 14870

Project: **Hakes C&D Landfill - Leachate RAD.**

Method of Shipment

Project Manager: **Lance Stevens/Jon Brandes**

Telephone No.: 585-593-1824

Email: jonb@on-sitehs.com

Special Detection Limit/Reporting

PDF to Lance and On-Site, and EDD to On-Site.

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Water	Air	Other	Prsv.: Yes	No	Sampling Date	Sampling Time	Total: [redacted], Ra-226 (903.1), Ra-228 (904.0) (HNO3).	Total: Uranium (HASL-300) (HNO3)	Dissolved: [redacted], Ra-226 (903.1), Ra-228 (904.0)	Dissolved: Uranium (HASL-300)
Cell8B-1118		8		X			X	X	11-8-18	0815	X	X	X	X	X	X
Cell3-1118		8		X			X	X	11-8-18	0910	X	X	X	X	X	X
Cell4-1118		8		X			X	X	11-8-18	0930	X	X	X	X	X	X
Cell5-1118		8		X			X	X	11-8-18	1000	X	X	X	X	X	X
Cell6-1118		8		X			X	X	11-8-18	1040	X	X	X	X	X	X
Note: Dissolved analysis requires lab filtering																

REMARKS

Sample Received Intact: Yes No

Temperature received: Ice No ice

	Date	Time		Date	Time
Relinq. by sampler (Sign & Print Name) Kevin Dye	11-8-18	1410	Received by (Sign & Print Name) Scott R. Watson		
Relinquished by	11-8-18	1600	Received by		
Relinquished by			Received by		
Relinquished by			Received by laboratory HLS	11/8/16	1600

Lab Work No.

R1810912 5
Casella Waste Systems - Hakes Billing
Hakes C&D Landfill - Leachate RAD.

Cooler Receipt and Preservation Check Form

R1810912 5
Casella Waste Systems - Hakes Billing
Hakes C&D Landfill - Leachate RAD.

Project/Client Casella Folder Number

Cooler received on 11/8/18 by: dh

COURIER: ALS UPS FEDEX VELOCITY ~~CLIENT~~

1	Were **Custody seals** on outside of cooler?	Y ~~N~~	5a	**Perchlorate** samples have required headspace?	Y N (NA)
2	**Custody papers** properly completed (ink, signed)?	(Y) N	5b	Did VOA vials, Alk,or Sulfide have sig* **bubbles**?	(Y) N NA
3	Did all bottles arrive in good **condition** (unbroken)?	(Y) N	6	Where did the bottles originate?	ALS/ROC CLIENT
4	Circle: **Wet Ice** **Dry Ice** **Gel packs** present?	(Y) N	7	Soil VOA received as:	Bulk Encore 5035set ~~NA~~

8. Temperature Readings Date: 11/8/18 Time: 1635 ID: IR#7 IR#10 From: Temp Blank ~~Sample Bottle~~

Observed Temp (°C)	4.7c	9.4c	10.6c	7.4c	4.6c	4.4	10.9c	2.7
Correction Factor (°C)	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
Corrected Temp (°C)	4.7	9.4	10.6	7.4	4.6	4.4	10.9	2.7
Temp from:Type of bottle								
Within 0-6°C?	(Y) N	Y (N)	Y (N)	Y (N)	(Y) N	(Y) N	Y (N)	(Y) N
If <0°C, were samples frozen?	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

If out of Temperature, note packing/ice condition: _____ Ice melted Poorly Packed (described below) ~~Same Day Rule~~

&Client Approval to Run Samples: _____ Standing Approval Client aware at drop-off Client notified by: _____

All samples held in storage location: R-007 by dh on 11/8/18 at 1635
5035 samples placed in storage location: _____ by _____ on _____ at _____

Cooler Breakdown/Preservation Check**: Date: 11/10/18 Time: 0810 by: dh

9.	Were all bottle labels complete (*i.e.* analysis, preservation, etc.)?	~~YES~~	NO
10.	Did all bottle labels and tags agree with custody papers?	~~YES~~	NO
11.	Were correct containers used for the tests indicated?	~~YES~~	NO
12.	Were 5035 vials acceptable (no extra labels, not leaking)?	YES	NO ~~N/A~~
13.	Air Samples: Cassettes / Tubes Intact with MS? Canisters Pressurized		Tedlar® Bags Inflated ~~N/A~~

pH	Lot of test paper	Reagent	Preserved? Yes	Preserved? No	Lot Received	Exp	Sample ID Adjusted	Vol. Added	Lot Added	Final pH
≥12		NaOH								
≤2		HNO_3			B280C0	8/19				
≤2		H_2SO_4								
<4		$NaHSO_4$								
5-9		For 608pest			No=Notify for 3day					
Residual Chlorine (-)		For CN, Phenol, 625, 608pest, 522			If +, contact PM to add $Na_2S_2O_3$ (625, 608, CN), ascorbic (phenol).					
		$Na_2S_2O_3$								
		ZnAcetate	-	-			**VOAs and 1664 Not to be tested before analysis. Otherwise, all bottles of all samples with chemical preservatives are checked (not just representatives).			
		HCl	**	**						

Bottle lot numbers: 070218-ZAB2

Explain all Discrepancies/ Other Comments:
4 Svials for LCS-1118

CLRES	BULK
DO	FLDT
HPROD	HGFB
HTR	LL3541
PH	~~SUB~~
SO3	MARRS
ALS	REV

Labels secondary reviewed by: dh

PC Secondary Review: _____

*significant air bubbles: VOA > 5-6 mm : WC >1 in. diameter

Miscellaneous Forms

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

REPORT QUALIFIERS AND DEFINITIONS

U	Analyte was analyzed for but not detected. The sample quantitation limit has been corrected for dilution and for percent moisture, unless otherwise noted in the case narrative.
J	Estimated value due to either being a Tentatively Identified Compound (TIC) or that the concentration is between the MRL and the MDL. Concentrations are not verified within the linear range of the calibration. For DoD: concentration >40% difference between two GC columns (pesticides/Arclors).
B	Analyte was also detected in the associated method blank at a concentration that may have contributed to the sample result.
E	Inorganics- Concentration is estimated due to the serial dilution was outside control limits.
E	Organics- Concentration has exceeded the calibration range for that specific analysis.
D	Concentration is a result of a dilution, typically a secondary analysis of the sample due to exceeding the calibration range or that a surrogate has been diluted out of the sample and cannot be assessed.
*	Indicates that a quality control parameter has exceeded laboratory limits. Under the "Notes" column of the Form I, this qualifier denotes analysis was performed out of Holding Time.
H	Analysis was performed out of hold time for tests that have an "immediate" hold time criteria.
#	Spike was diluted out.
+	Correlation coefficient for MSA is <0.995.
N	Inorganics- Matrix spike recovery was outside laboratory limits.
N	Organics- Presumptive evidence of a compound (reported as a TIC) based on the MS library search.
S	Concentration has been determined using Method of Standard Additions (MSA).
W	Post-Digestion Spike recovery is outside control limits and the sample absorbance is <50% of the spike absorbance.
P	Concentration >40% difference between the two GC columns.
C	Confirmed by GC/MS
Q	DoD reports: indicates a pesticide/Aroclor is not confirmed (≥100% Difference between two GC columns).
X	See Case Narrative for discussion.
MRL LOQ	Method Reporting Limit. Also known as: Limit of Quantitation (LOQ) The lowest concentration at which the method analyte may be reliably quantified under the method conditions.
MDL	Method Detection Limit. A statistical value derived from a study designed to provide the lowest concentration that will be detected 99% of the time. Values between the MDL and MRL are estimated (see J qualifier).
LOD	Limit of Detection. A value at or above the MDL which has been verified to be detectable.
ND	Non-Detect. Analyte was not detected at the concentration listed. Same as U qualifier.

Rochester Lab ID # for State Certifications[1]

Connecticut ID # PH0556	Maine ID #NY0032	Pennsylvania ID# 68-786
Delaware Approved	New Hampshire ID # 2941	Rhode Island ID # 158
DoD ELAP #65817	New York ID # 10145	Virginia #460167
Florida ID # E87674	North Carolina #676	

[1] Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state or agency requirements. The test results meet requirements of the current NELAP/TNI standards or state or agency requirements, where applicable, except as noted in the case narrative. Since not all analyte/method/matrix combinations are offered for state/NELAC accreditation, this report may contain results which are not accredited. For a specific list of accredited analytes, contact the laboratory or go to https://www.alsglobal.com/locations/americas/north-america/usa/new-york/rochester-environmental

ALS Laboratory Group

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

The preparation methods associated with this report are found in these tables unless discussed in the case narrative.

Water/Liquid Matrix

Analytical Method	Preparation Method
200.7	200.2
200.8	200.2
6010C	3005A/3010A
6020A	ILM05.3
9014 Cyanide Reactivity	SW846 Ch7, 7.3.4.2
9034 Sulfide Reactivity	SW846 Ch7, 7.3.4.2
9034 Sulfide Acid Soluble	9030B
9056A Bomb (Halogens)	5050A
9066 Manual Distillation	9065
SM 4500-CN-E Residual Cyanide	SM 4500-CN-G
SM 4500-CN-E WAD Cyanide	SM 4500-CN-I

Solid/Soil/Non-Aqueous Matrix

Analytical Method	Preparation Method
6010C	3050B
6020A	3050B
6010C TCLP (1311) extract	3005A/3010A
6010 SPLP (1312) extract	3005A/3010A
7196A	3060A
7199	3060A
9056A Halogens/Halides	5050
300.0 Anions/ 350.1/ 353.2/ SM 2320B/ SM 5210B/ 9056A Anions	DI extraction

For analytical methods not listed, the preparation method is the same as the analytical method reference.

Subcontracted Analytical Parameters

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Monday, December 31, 2018

Janice Jaeger
ALS Environmental
1565 Jefferson Rd., Bldg 300
Rochester, NY 14623

Re: ALS Workorder: 1811487
Project Name:
Project Number: R1810912

Dear Ms. Jaeger:

Ten water samples were received from ALS Environmental, on 11/28/2018. The samples were scheduled for the following analyses:

Radium-226
Radium-228

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Jeff R. Kujawa
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Alaska (AK)	CO01099
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Louisiana (LA)	05057
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1811487

Radium-228:
The samples were analyzed for the presence of ^{228}Ra by low background gas flow proportional counting of ^{228}Ac, which is the ingrown progeny of ^{228}Ra, according to EPA method 904.0. 1811487-2, -4, -6, -8, and -10 were filtered and preserved prior to analysis.

All acceptance criteria were met.

Radium-226:
The samples were prepared and analyzed according to EPA method 903.1. Samples 1811487-2, -4, -6, -8, and -10 were filtered and preserved prior to analysis.

All acceptance criteria were met.

ADDRESS 225 Commerce Drive, Fort Collins Colorado 80524 USA | PHONE +1 970 490 1511 | FAX +1 970 490 1522
ALS GROUP USA, CORP. Part of the ALS Group An ALS Limited Company

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1811487
Client Name: ALS Environmental
Client Project Name:
Client Project Number: R1810912
Client PO Number: R1810912

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
Cell8B-1118	1811487-1		WATER	08-Nov-18	8:15
Cell8B-1118 Diss	1811487-2		WATER	08-Nov-18	8:15
Cell3-1118	1811487-3		WATER	08-Nov-18	9:10
Cell3-1118 Diss	1811487-4		WATER	08-Nov-18	9:10
Cell4-1118	1811487-5		WATER	08-Nov-18	9:30
Cell4-1118 Diss	1811487-6		WATER	08-Nov-18	9:30
Cell5-1118	1811487-7		WATER	08-Nov-18	10:00
Cell5-1118 Diss	1811487-8		WATER	08-Nov-18	10:00
Cell6-1118	1811487-9		WATER	08-Nov-18	10:40
Cell6-1118 Diss	1811487-10		WATER	08-Nov-18	10:40

ALS Environmental Chain of Custody

1565 Jefferson Rd, Building 300 • Rochester, NY 14623 • 585-288-5380 • FAX 585-288-8475

ALS Contact:	Janice Jaeger

1811487

Project Number: R1810912
Project Manager: Janice Jaeger
QAP: LAB QAP

Lab Code	Sample ID		# of Cont.	Matrix	Sample Date	Sample Time	Lab ID	Radium 226 903.1	Radium 228 904.0
~~R1810912-001~~	Cell8B-1118	1		Water	11/8/18	0815	Fort Collins ALS	X	X
~~R1810912-002~~	Cell8B-1118 Diss	2		Water	11/8/18	0815	Fort Collins ALS	X	X
~~R1810912-003~~	Cell3-1118	3		Water	11/8/18	0910	Fort Collins ALS	X	X
~~R1810912-004~~	Cell3-1118 Diss	4		Water	11/8/18	0910	Fort Collins ALS	X	X
~~R1810912-005~~	Cell4-1118	5		Water	11/8/18	0930	Fort Collins ALS	X	X
~~R1810912-006~~	Cell4-1118 Diss	6		Water	11/8/18	0930	Fort Collins ALS	X	X
~~R1810912-007~~	Cell5-1118	7		Water	11/8/18	1000	Fort Collins ALS	X	X
~~R1810912-008~~	Cell5-1118 Diss	8		Water	11/8/18	1000	Fort Collins ALS	X	X
~~R1810912-009~~	Cell6-1118	9		Water	11/8/18	1040	Fort Collins ALS	X	X
~~R1810912-010~~	Cell6-1118 Diss	10		Water	11/8/18	1040	Fort Collins ALS	X	X

Folder Comments:
Report Total Uanium only - none of the isotopes

need in lab filter for dissolved

Special Instructions/Comments	Turnaround Requirements	Report Requirements	Invoice Information
Std EDD NPDES H - Test is On Hold P - Test is Authorized for Prep Only	____RUSH (Surcharges Apply) **PLEASE CIRCLE WORK DAYS** 1 2 3 4 5 X STANDARD Requested FAX Date: _____ Requested Report Date: 12/04/18	___ I. Results Only X II. Results + QC Summaries ___ III. Results + QC and Calibration Summaries ___ IV. Data Validation Report with Raw Data PQL/MDL/J N EDD Y	PO# 58R1810912 Bill to

Relinquished By: 11/20/18/1435 Received By: KELI-JEAN SMITH 11.21.18 1035 Airbill Number:

ALS Environmental Chain of Custody

1565 Jefferson Rd, Building 300 • Rochester, NY 14623 • 585-288-5380 • FAX 585-288-8475

ALS Contact: Janice Jaeger

1811487

Project Number: R1810912
Project Manager: Janice Jaeger
QAP: LAB QAP

Special Instructions/Comments	Turnaround Requirements	Report Requirements	Invoice Information
NPDES H - Test is On Hold P - Test is Authorized for Prep Only	____**RUSH** (Surcharges Apply) **PLEASE CIRCLE WORK DAYS** 1 2 3 4 5. ____ **STANDARD** Requested FAX Date: _____ Requested Report Date: 12/04/18	____ I. Results Only ____ II. Results + QC Summaries ____ III. Results + QC and Calibration Summaries ____ IV. Data Validation Report with Raw Data PQL/MDL/J N EDD Y	PO# 58R1810912 Bill to

Relinquished By: _____ Received By: KELI-JEAN SMITH Airbill Number: _____

11.2.18 1035

ALS Environmental Chain of Custody

1565 Jefferson Rd, Building 300 • Rochester, NY 14623 • 585-288-5380 • FAX 585-288-8475

ALS Contact: Janice Jaeger

1811487

Project Number: R1810912
Project Manager: Janice Jaeger
QAP: LAB QAP

Lab Code	Sample ID	# of Cont.	Matrix	Sample Date	Sample Time	Lab ID	Radium 226 903.1	Radium 228 904.0
~~R1810912-001~~	~~Cell8B-1118~~		Water	11/8/18	0815	Fort Collins ALS	X	X
~~R1810912-002~~	Cell8B-1118 Diss		Water	11/8/18	0815	Fort Collins ALS	X	X
~~R1810912-003~~	~~Cell3-1118~~		Water	11/8/18	0910	Fort Collins ALS	X	X
~~R1810912-004~~	Cell3-1118 Diss		Water	11/8/18	0910	Fort Collins ALS	X	X
~~R1810912-005~~	~~Cell4-1118~~		Water	11/8/18	0930	Fort Collins ALS	X	X
~~R1810912-006~~	Cell4-1118 Diss		Water	11/8/18	0930	Fort Collins ALS	X	X
~~R1810912-007~~	~~Cell5-1118~~		Water	11/8/18	1000	Fort Collins ALS	X	X
~~R1810912-008~~	Cell5-1118 Diss		Water	11/8/18	1000	Fort Collins ALS	X	X
~~R1810912-009~~	~~Cell6-1118~~		Water	11/8/18	1040	Fort Collins ALS	X	X
R1810912-010	Cell6-1118 Diss		Water	11/8/18	1040	Fort Collins ALS	X	X

10 of 25

Folder Comments:
Report Total Uanium only - none of the isotopes

Special Instructions/Comments	Turnaround Requirements	Report Requirements	Invoice Information
NPDES H - Test is On Hold P - Test is Authorized for Prep Only	____RUSH (Surcharges Apply) PLEASE CIRCLE WORK DAYS 1 2 3 4 5 ____STANDARD Requested FAX Date: _____ Requested Report Date: 12/04/18	___ I. Results Only ___ II. Results + QC Summaries ___ III. Results + QC and Calibration Summaries ___ IV. Data Validation Report with Raw Data PQL/MDL/J N EDD Y	PO# 58R1810912 Bill to

Relinquished By: Kenny Cooper 11-26-18 Received By: KELI-JEAN SMITH 11.28.18 0950 Airbill Number: _____

7 of 25

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS NY Workorder No: 1811487

Project Manager: JRL Initials: JR Date: 11.28.18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	YES	NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES	NO
3.	Are custody seals on **sample** containers intact?	NONE	YES	NO
4.	Is there a COC (chain-of-custody) present?		YES	NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	NO
6.	Are short-hold samples present?		YES	NO
7.	Are all samples within holding times for the requested analyses?		YES	NO
8.	Were all sample containers received intact? (not broken or leaking)		YES	NO
9.	Is there sufficient sample for the requested analyses?		YES	NO
10.	Are all samples in the proper containers for the requested analyses?		YES	NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	NO
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES	NO
14.	Were the samples shipped on ice?		YES	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	YES	NO

Cooler #:	1	2	3					
Temperature (°C):	AmB	AmB	AmB					
No. of custody seals on cooler:	1	1	1					
DOT Survey/ Acceptance Information — External µR/hr reading:	9	10	10					
Background µR/hr reading:	11							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

5) Sample 6 only has 2 bottles present. All other samples have 3 bottles each.

11) Sample # / initial pH (JR 11.28.18)

1 / 3
3 / 6
5 / 6
7 / 6
9 / 6

attempted to bring to acceptable pH but with addition of acid sample reacted by foaming violently - stopped per JRL.

All client bottle ID's vs ALS lab ID's double-checked by: [illegible]

If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: [signature] 11-29-18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

1811487

SHIP: STANDARD OVER

ORIGIN ID:ONHA (585) 672-7464
SMO
ALS ENVIRONMENTAL
1565 JEFFERSON RD
BLDG 300 SUITE 360
ROCHESTER, NY 14623
UNITED STATES US

SHIP DATE: 20NOV18
ACTWGT: 50.65 LB
CAD: 0342584/CAFE3211

BILL THIRD PARTY

TO SAMPLE RECEIVING
ALS LABS – FT. COLLINS
225 COMMERCE DRIVE

FORT COLLINS CO 80524
(970) 490-1511
INV:
PO:
REF:
DEPT:

9-1
AMB

551C3/C382/104C

FedEx Express

1 of 2
TRK# 0201 4150 9193 6302
MASTER

WED – 21 NOV 3:00P
STANDARD OVERNIGHT

XH FTCA

80524
CO-US DEN

J181118060501ev

SHIP: STANDARD OVER

ORIGIN ID:ONHA (585) 672-7464
SMO
ALS ENVIRONMENTAL
1565 JEFFERSON RD
BLDG 300 SUITE 360
ROCHESTER, NY 14623
UNITED STATES US

SHIP DATE: 20NOV18
ACTWGT: 11.80 LB
CAD: 0342[illegible]

BILL THIRD PARTY

Fedex

TO SAMPLE RECEIVING
ALS LABS – FT. COLLINS
225 COMMERCE DRIVE

FORT COLLINS CO 80524
(970) 490-1511
INV:
PO:
REF:
DEPT:

10-1
AMB

551C3/C382/104C

FedEx Express

2 of 2
MPS# 0263 4150 9193 6313
Mstr# 4150 9193 6302

WED – 21 NOV 3:00P
STANDARD OVERNIGHT

0201

XH FTCA

80524
CO-US DEN

J181118060501ev

1811487

ORIGIN ID:RKWA (865) 934-0382
SAMPLE RECEIVING
TELEDYNE BROWN ENGINEERING
2508 QUALITY LANE

KNOXVILLE, TN 37931
UNITED STATES US

SHIP DATE: 26NOV18
ACTWGT: 44.20 LB
CAD: 2882248/INET4040

BILL SENDER

TO ALS

225 COMMERS DRIVE

FORT COLLINS CO 80524
(585) 288-5380 REF 967554812
INV:
PO: DEPT:

10-1
AMB

FedEx Express

WED - 28 NOV 4:30P
** 2DAY **

TRK# 0201 7738 0323 3091

8052
CO-US DE

TI FTCA

ORIGIN ID:RKWA (865) 934-0382
SAMPLE RECEIVING
TELEDYNE BROWN ENGINEERING
2508 QUALITY LANE

KNOXVILLE, TN 37931
UNITED STATES US

SHIP DATE: 26NOV1
ACTWGT: 3.00 LB
CAD: 2882248/INET40

BILL SENDER

TO ALS

225 COMMERCE DR

FORT COLLINS CO 80524
(585) 288-5380 REF: 967555 4812
INV:
PO DEPT:

FedEx Express

THU - 29 NOV 3:00P
STANDARD OVERNIGHT

TRK# 0201 7738 2342 6774

80524
CO-US DEN

NA FTCA

Sample bottle 3

10-0
AMB

Client:	ALS Environmental	**Date:**	*31-Dec-18*
Project:	R1810912	**Work Order:**	1811487
Sample ID:	Cell8B-1118	**Lab ID:**	1811487-1
Legal Location:		**Matrix:**	WATER
Collection Date:	11/8/2018 08:15	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **12/3/2018**	PrepBy: **JXH**
Ra-226	0.28 (+/- 0.88)	U,M	1.67	pCi/l	NA	12/11/2018 11:09
Carr: BARIUM	*94.2*		*40-110*	*%REC*	DL = NA	12/11/2018 11:09
Radium-228 Analysis by GFPC		**SOP 724**			Prep Date: **12/6/2018**	PrepBy: **MLB**
Ra-228	0.7 (+/- 1.3)	Y1,U,M	2.8	pCi/l	NA	12/17/2018 11:22
Carr: BARIUM	*104*	Y1	*40-110*	*%REC*	DL = NA	12/17/2018 11:22

Client:	ALS Environmental	**Date:**	*31-Dec-18*
Project:	R1810912	**Work Order:**	1811487
Sample ID:	Cell8B-1118 Diss	**Lab ID:**	1811487-2
Legal Location:		**Matrix:**	WATER
Collection Date:	11/8/2018 08:15	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Dissolved Radium-226 by Radon Emanation - Method 903.		**SOP 783**		Prep Date: **12/3/2018**	PrepBy: **JXH**	
Ra-226	1.1 (+/- 1.4)	U,M	2.2	pCi/l	NA	12/11/2018 11:09
Carr: BARIUM	*89.1*		*40-110*	*%REC*	DL = NA	12/11/2018 11:09
Dissolved Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **12/21/2018**	PrepBy: **MLB**	
Ra-228	2.5 (+/- 1.6)	U,M	3	pCi/l	NA	12/28/2018 11:22
Carr: BARIUM	*85.2*		*40-110*	*%REC*	DL = NA	12/28/2018 11:22

Client:	ALS Environmental	**Date:**	*31-Dec-18*
Project:	R1810912	**Work Order:**	1811487
Sample ID:	Cell3-1118	**Lab ID:**	1811487-3
Legal Location:		**Matrix:**	WATER
Collection Date:	11/8/2018 09:10	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **12/3/2018**		PrepBy: **JXH**
Ra-226	1.2 (+/- 1.1)	U,M	1.3	pCi/l	NA	12/11/2018 11:09
Carr: BARIUM	*91.8*		*40-110*	*%REC*	DL = NA	12/11/2018 11:09
Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **12/6/2018**		PrepBy: **MLB**
Ra-228	2.3 (+/- 1.5)	U,M	2.9	pCi/l	NA	12/17/2018 11:22
Carr: BARIUM	*95.3*		*40-110*	*%REC*	DL = NA	12/17/2018 11:22

Client:	ALS Environmental	**Date:**	*31-Dec-18*
Project:	R1810912	**Work Order:**	1811487
Sample ID:	Cell3-1118 Diss	**Lab ID:**	1811487-4
Legal Location:		**Matrix:**	WATER
Collection Date:	11/8/2018 09:10	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Dissolved Radium-226 by Radon Emanation - Method 903.		**SOP 783**		Prep Date: **12/3/2018**	PrepBy: **JXH**	
Ra-226	1 (+/- 1.3)	U,M	2	pCi/l	NA	12/11/2018 11:09
Carr: BARIUM	*91.8*		*40-110*	*%REC*	DL = NA	12/11/2018 11:09
Dissolved Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **12/21/2018**	PrepBy: **MLB**	
Ra-228	2.1 (+/- 1.5)	U,M	2.9	pCi/l	NA	12/28/2018 11:22
Carr: BARIUM	*87.6*		*40-110*	*%REC*	DL = NA	12/28/2018 11:22

Client:	ALS Environmental	**Date:**	*31-Dec-18*
Project:	R1810912	**Work Order:**	1811487
Sample ID:	Cell4-1118	**Lab ID:**	1811487-5
Legal Location:		**Matrix:**	WATER
Collection Date:	11/8/2018 09:30	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **12/3/2018**	PrepBy: **JXH**
Ra-226	**2.4 (+/- 1.4)**	M3	**1.4**	**pCi/l**	NA	12/11/2018 11:09
Carr: BARIUM	*92.9*		*40-110*	*%REC*	DL = NA	12/11/2018 11:09
Radium-228 Analysis by GFPC		**SOP 724**			Prep Date: **12/6/2018**	PrepBy: **MLB**
Ra-228	**3.9 (+/- 2.1)**	M3	**3.8**	**pCi/l**	NA	12/17/2018 11:22
Carr: BARIUM	*82.2*		*40-110*	*%REC*	DL = NA	12/17/2018 11:22

Client:	ALS Environmental	**Date:**	*31-Dec-18*
Project:	R1810912	**Work Order:**	1811487
Sample ID:	Cell4-1118 Diss	**Lab ID:**	1811487-6
Legal Location:		**Matrix:**	WATER
Collection Date:	11/8/2018 09:30	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Dissolved Radium-226 by Radon Emanation - Method 903.		**SOP 783**			Prep Date: **12/3/2018**	PrepBy: **JXH**
Ra-226	**2.3 (+/- 1.4)**	M3	**1.5**	**pCi/l**	NA	12/11/2018 11:09
Carr: BARIUM	*90.9*		*40-110*	*%REC*	DL = NA	12/11/2018 11:09
Dissolved Radium-228 Analysis by GFPC		**SOP 724**			Prep Date: **12/21/2018**	PrepBy: **MLB**
Ra-228	1.7 (+/- 1.5)	U,M	3.1	pCi/l	NA	12/28/2018 11:22
Carr: BARIUM	*83.9*		*40-110*	*%REC*	DL = NA	12/28/2018 11:22

Client:	ALS Environmental	**Date:**	*31-Dec-18*
Project:	R1810912	**Work Order:**	1811487
Sample ID:	Cell5-1118	**Lab ID:**	1811487-7
Legal Location:		**Matrix:**	WATER
Collection Date:	11/8/2018 10:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **12/3/2018**		PrepBy: **JXH**
Ra-226	0 (+/- 0.75)	U,M	1.43	pCi/l	NA	12/11/2018 11:09
Carr: BARIUM	*90*		*40-110*	*%REC*	DL = NA	12/11/2018 11:09
Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **12/6/2018**		PrepBy: **MLB**
Ra-228	2.9 (+/- 1.9)	U,M	3.5	pCi/l	NA	12/17/2018 11:22
Carr: BARIUM	*83.5*		*40-110*	*%REC*	DL = NA	12/17/2018 11:22

Client:	ALS Environmental	**Date:**	*31-Dec-18*
Project:	R1810912	**Work Order:**	1811487
Sample ID:	Cell5-1118 Diss	**Lab ID:**	1811487-8
Legal Location:		**Matrix:**	WATER
Collection Date:	11/8/2018 10:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Dissolved Radium-226 by Radon Emanation - Method 903.		**SOP 783**		Prep Date: **12/3/2018**	PrepBy: **JXH**	
Ra-226	0 (+/- 0.72)	U,M	1.59	pCi/l	NA	12/11/2018 11:09
Carr: BARIUM	*91.1*		*40-110*	*%REC*	DL = NA	12/11/2018 11:09
Dissolved Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **12/21/2018**	PrepBy: **MLB**	
Ra-228	0.3 (+/- 1.6)	U,M	3.5	pCi/l	NA	12/28/2018 11:22
Carr: BARIUM	*76.2*		*40-110*	*%REC*	DL = NA	12/28/2018 11:22

Client:	ALS Environmental	**Date:**	*31-Dec-18*
Project:	R1810912	**Work Order:**	1811487
Sample ID:	Cell6-1118	**Lab ID:**	1811487-9
Legal Location:		**Matrix:**	WATER
Collection Date:	11/8/2018 10:40	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1			**SOP 783**		Prep Date: **12/3/2018**	PrepBy: **JXH**
Ra-226	**2.6 (+/- 1.4)**		**1**	**pCi/l**	NA	12/11/2018 11:40
Carr: BARIUM	*93.8*		*40-110*	*%REC*	DL = NA	12/11/2018 11:40
Radium-228 Analysis by GFPC			**SOP 724**		Prep Date: **12/6/2018**	PrepBy: **MLB**
Ra-228	**4.7 (+/- 1.9)**	M3	**3.1**	**pCi/l**	NA	12/17/2018 11:22
Carr: BARIUM	*80.9*		*40-110*	*%REC*	DL = NA	12/17/2018 11:22

Client:	ALS Environmental	**Date:**	*31-Dec-18*
Project:	R1810912	**Work Order:**	1811487
Sample ID:	Cell6-1118 Diss	**Lab ID:**	1811487-10
Legal Location:		**Matrix:**	WATER
Collection Date:	11/8/2018 10:40	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Dissolved Radium-226 by Radon Emanation - Method 903.		**SOP 783**		Prep Date: **12/3/2018**	PrepBy: **JXH**	
Ra-226	1.5 (+/- 1.4)	U,M	2.2	pCi/l	NA	12/11/2018 11:40
Carr: BARIUM	*92.8*		*40-110*	*%REC*	DL = NA	12/11/2018 11:40
Dissolved Radium-228 Analysis by GFPC		**SOP 724**		Prep Date: **12/21/2018**	PrepBy: **MLB**	
Ra-228	1.9 (+/- 1.6)	U,M	3.2	pCi/l	NA	12/28/2018 11:22
Carr: BARIUM	*87.9*		*40-110*	*%REC*	DL = NA	12/28/2018 11:22

Client:	ALS Environmental	**Date:**	*31-Dec-18*
Project:	R1810912	**Work Order:**	1811487
Sample ID:	Cell6-1118 Diss	**Lab ID:**	1811487-10
Legal Location:		**Matrix:**	WATER
Collection Date:	11/8/2018 10:40	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

Batch ID: **RE181201-1-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE181201-1** Units: **pCi/l** Analysis Date: **12/11/2018 11:40**

Client ID: Run ID: **RE181201-1A** Prep Date: **12/3/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	57 (+/- 14)	0	47.87		118	67-120					P
Carr: BARIUM	15090		16210		93.1	40-110					

LCSD Sample ID: **RE181201-1** Units: **pCi/l** Analysis Date: **12/18/2018 12:15**

Client ID: Run ID: **RE181201-1A** Prep Date: **12/3/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	43 (+/- 11)	0	47.87		89.3	67-120		57	0.8	2.1	P
Carr: BARIUM	15550		16210		95.9	40-110		15090			

MB Sample ID: **RE181201-1** Units: **pCi/l** Analysis Date: **12/11/2018 11:40**

Client ID: Run ID: **RE181201-1A** Prep Date: **12/3/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.28 (+/- 0.23)	0.3									U
Carr: BARIUM	15260		16210		94.2	40-110					

The following samples were analyzed in this batch:

1811487-1	1811487-2	1811487-3
1811487-4	1811487-5	1811487-6
1811487-7	1811487-8	1811487-9
1811487-10		

QC BATCH REPORT

Batch ID: **RA181206-1-1** Instrument ID **LB4100-C** Method: **Radium-228 Analysis by GFPC**

LCS Sample ID: **RA181206-1** Units: **pCi/l** Analysis Date: **12/17/2018 11:13**
Client ID: Run ID: **RA181206-1A** Prep Date: **12/6/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-228	8.3 (+/- 2.3)	1.4	8.567		97	70-130					P,M3
Carr: BARIUM	28410		30410		93.4	40-110					

LCSD Sample ID: **RA181206-1** Units: **pCi/l** Analysis Date: **12/17/2018 11:13**
Client ID: Run ID: **RA181206-1A** Prep Date: **12/6/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-228	9.5 (+/- 2.6)	1.5	8.567		111	70-130		8.3	0.3	2.1	P,M3
Carr: BARIUM	28890		30410		95	40-110		28410			

MB Sample ID: **RA181206-1** Units: **pCi/l** Analysis Date: **12/17/2018 11:22**
Client ID: Run ID: **RA181206-1A** Prep Date: **12/6/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-228	0.49 (+/- 0.33)	0.63									U
Carr: BARIUM	29170		30410		95.9	40-110					

The following samples were analyzed in this batch:

1811487-1	1811487-3	1811487-5
1811487-7	1811487-9	

QC BATCH REPORT

Batch ID: **RA181221-1-1** Instrument ID **LB4100-A** Method: **Radium-228 Analysis by GFPC**

DUP Sample ID: **1812137-4** Units: **pCi/l** Analysis Date: **12/28/2018 11:39**
Client ID: **BPSI-TT-MW303I2-20181207** Run ID: **RA181221-1A** Prep Date: **12/21/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-228	0.66 (+/- 0.47)	0.91						0.4	0.4	2.1	U
Carr: BARIUM	28710		33400		86	40-110		28540			

LCS Sample ID: **RA181221-1** Units: **pCi/l** Analysis Date: **12/28/2018 11:30**
Client ID: Run ID: **RA181221-1A** Prep Date: **12/21/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-228	8.8 (+/- 2.5)	1.7	8.536		103	70-130					P,M3
Carr: BARIUM	29480		33390		88.3	40-110					

MB Sample ID: **RA181221-1** Units: **pCi/l** Analysis Date: **12/28/2018 11:39**
Client ID: Run ID: **RA181221-1A** Prep Date: **12/21/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-228	0.33 (+/- 0.42)	0.89									U
Carr: BARIUM	28690		33390		85.9	40-110					

The following samples were analyzed in this batch:

1811487-2	1812137-4	1811487-4
1811487-6	1811487-8	1811487-10

TELEDYNE
BROWN ENGINEERING, INC.
A Teledyne Technologies Company
2508 Quality Lane
Knoxville, TN 37931-3133
865-690-6819

Janice Jaeger
ALS Global - Rochester Laboratory
1565 Jefferson road
Bldg 300, Suite 360
Rochester, NY 14623

Report of Analysis/Certificate of Conformance

01/23/2019

LIMS #:	L80225
Project ID#:	AL003-3EREG-18
Received:	11/20/2018
Delivery Date:	12/18/2018
P.O.#:	R1810912
Release #:	
SDG#:	

This is to certify that Teledyne Brown Engineering - Environmental Services located at 2508 Quality Lane, Knoxville, Tennessee, 37931, has analyzed, tested and documented samples, as received by the laboratory, as specified in the applicable purchase order.

This also certifies that requirements of applicable codes, standards and specifications have been fully met and that any quality assurance documentation which verified conformance to the purchase order is on file and may be examined upon request.

I hereby certify that the above statements are true and correct.

Keith Jeter
Operations Manager

Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
CELL8B-1118 - TOTAL	L80225-1	
CELL8B-1118 - DISS	L80225-2	
CELL3-1118 - TOTAL	L80225-3	
CELL3-1118 - DISS	L80225-4	
CELL4-1118 - TOTAL	L80225-5	
CELL4-1118 - DISS	L80225-6	
CELL5-1118 - TOTAL	L80225-7	
CELL5-1118 - DISS	L80225-8	

TELEDYNE
BROWN ENGINEERING, INC.
A Teledyne Technologies Company
2508 Quality Lane
Knoxville, TN 37931-3133
865-690-6819

Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
CELL6-1118 - TOTAL	L80225-9	
CELL6-1118 - DISS	L80225-10	

Method Reference Numbers

Matrix	Analysis	Method Reference
WO	U-235 (AS)	EPA 908.0 Mod.
WO	U-238 (AS)	EPA 908.0 Mod.
WO	U-234 (AS)	EPA 908.0 Mod.

Report of Analysis

01/23/19 10:43

TELEDYNE BROWN ENGINEERING, INC.
A Teledyne Technologies Company

L80225

ALS Global - Rochester Laboratory

AL003-3EREG-18

Sample ID: **CELL8B-1118 - TOTAL** (WO)
Station:
Description:
LIMS Number: L80225-1

Collect Start: 11/08/2018 08:15
Collect Stop:
Receive Date: 11/20/2018

Matrix: Water
Volume:
% Moisture:

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
TOTAL-U	032-89	<		**9.14E-02**	pCi/L					12/12/18	0		U
U-233/234 (AS)	2001	<		**2.81E-02**	pCi/l		200	ml		12/12/18	60000	sec	U
U-235 (AS)	2001	<		**9.14E-02**	pCi/l		200	ml		12/12/18	60000	sec	U
U-238 (AS)	2001	<		**5.23E-02**	pCi/l		200	ml		12/12/18	60000	sec	U

Comment:

Sample ID: **CELL8B-1118 - DISS** (WO)
Station:
Description:
LIMS Number: L80225-2

Collect Start: 11/08/2018 08:15
Collect Stop:
Receive Date: 11/20/2018

Matrix: Water
Volume:
% Moisture:

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
TOTAL-U	032-89	<		**5.23E-02**	pCi/L					12/13/18	0		U
U-233/234 (AS)	2001	<		**2.34E-02**	pCi/l		200	ml		12/13/18	86400	sec	U
U-235 (AS)	2001	<		**2.89E-02**	pCi/l		200	ml		12/13/18	86400	sec	U
U-238 (AS)	2001	<		**5.23E-02**	pCi/l		200	ml		12/13/18	86400	sec	U

Comment:

Flag Values
U = Compound/Analyte not detected (< MDC) or less than 3 sigma
\+ = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
High = Activity concentration exceeds customer reporting value
Spec = MDC exceeds customer technical specification
L = Low recovery
H = High recovery

Bolded text indicates reportable value.

No = Peak not identified in gamma spectrum
Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

TBE-ROA002

TELEDYNE
BROWN ENGINEERING, INC.
A Teledyne Technologies Company
2508 Quality Lane
Knoxville, TN 37931-3133
865-690-6819

Janice Jaeger
ALS Global - Rochester Laboratory
1565 Jefferson road
Bldg 300, Suite 360
Rochester, NY 14623

Report of Analysis/Certificate of Conformance

01/23/2019

LIMS #:	L80225
Project ID#:	AL003-3EREG-18
Received:	11/20/2018
Delivery Date:	12/18/2018
P.O.#:	R1810912
Release #:	
SDG#:	

This is to certify that Teledyne Brown Engineering - Environmental Services located at 2508 Quality Lane, Knoxville, Tennessee, 37931, has analyzed, tested and documented samples, as received by the laboratory, as specified in the applicable purchase order.

This also certifies that requirements of applicable codes, standards and specifications have been fully met and that any quality assurance documentation which verified conformance to the purchase order is on file and may be examined upon request.

I hereby certify that the above statements are true and correct.

Keith Jeter
Operations Manager

Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
CELL8B-1118 - TOTAL	L80225-1	
CELL8B-1118 - DISS	L80225-2	
CELL3-1118 - TOTAL	L80225-3	
CELL3-1118 - DISS	L80225-4	
CELL4-1118 - TOTAL	L80225-5	
CELL4-1118 - DISS	L80225-6	
CELL5-1118 - TOTAL	L80225-7	
CELL5-1118 - DISS	L80225-8	

TELEDYNE
BROWN ENGINEERING, INC.
A Teledyne Technologies Company
2508 Quality Lane
Knoxville, TN 37931-3133
865-690-6819

Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
CELL6-1118 - TOTAL	L80225-9	
CELL6-1118 - DISS	L80225-10	

Method Reference Numbers

Matrix	Analysis	Method Reference
WO	U-235 (AS)	EPA 908.0 Mod.
WO	U-238 (AS)	EPA 908.0 Mod.
WO	U-234 (AS)	EPA 908.0 Mod.

Report of Analysis

01/23/19 10:43

TELEDYNE BROWN ENGINEERING, INC.
A Teledyne Technologies Company

L80225

ALS Global - Rochester Laboratory

AL003-3EREG-18

Sample ID: **CELL8B-1118 - TOTAL** | Collect Start: 11/08/2018 08:15 | Matrix: Water (WO)
Station: | Collect Stop: | Volume:
Description: | Receive Date: 11/20/2018 | % Moisture:
LIMS Number: L80225-1

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
TOTAL-U	032-89	<		**9.14E-02**	pCi/L					12/12/18	0		U
U-233/234 (AS)	2001	<		**2.81E-02**	pCi/l		200	ml		12/12/18	60000	sec	U
U-235 (AS)	2001	<		**9.14E-02**	pCi/l		200	ml		12/12/18	60000	sec	U
U-238 (AS)	2001	<		**5.23E-02**	pCi/l		200	ml		12/12/18	60000	sec	U

Comment:

Sample ID: **CELL8B-1118 - DISS** | Collect Start: 11/08/2018 08:15 | Matrix: Water (WO)
Station: | Collect Stop: | Volume:
Description: | Receive Date: 11/20/2018 | % Moisture:
LIMS Number: L80225-2

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
TOTAL-U	032-89	<		**5.23E-02**	pCi/L					12/13/18	0		U
U-233/234 (AS)	2001	<		**2.34E-02**	pCi/l		200	ml		12/13/18	86400	sec	U
U-235 (AS)	2001	<		**2.89E-02**	pCi/l		200	ml		12/13/18	86400	sec	U
U-238 (AS)	2001	<		**5.23E-02**	pCi/l		200	ml		12/13/18	86400	sec	U

Comment:

43 of 46

Flag Values
U = Compound/Analyte not detected (< MDC) or less than 3 sigma
\+ = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
High = Activity concentration exceeds customer reporting value
Spec = MDC exceeds customer technical specification
L = Low recovery
H = High recovery

Bolded text indicates reportable value.

No = Peak not identified in gamma spectrum
Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Report of Analysis

01/23/19 10:43

TELEDYNE BROWN ENGINEERING, INC.
A Teledyne Technologies Company

L80225

ALS Global - Rochester Laboratory

AL003-3EREG-18

Janice Jaeger

Sample ID: **CELL3-1118 - TOTAL** Collect Start: 11/08/2018 09:10 Matrix: Water (WO)
Station: Collect Stop: Volume:
Description: Receive Date: 11/20/2018 % Moisture:
LIMS Number: L80225-3

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
TOTAL-U	032-89	<		**6.57E-02**	pCi/L					12/12/18	0		U
U-233/234 (AS)	2001	<		**4.65E-02**	pCi/l		200	ml		12/12/18	60000	sec	U
U-235 (AS)	2001	<		**3.09E-02**	pCi/l		200	ml		12/12/18	60000	sec	U
U-238 (AS)	2001	<		**6.57E-02**	pCi/l		200	ml		12/12/18	60000	sec	U

Comment:

Sample ID: **CELL3-1118 - DISS** Collect Start: 11/08/2018 09:10 Matrix: Water (WO)
Station: Collect Stop: Volume:
Description: Receive Date: 11/20/2018 % Moisture:
LIMS Number: L80225-4

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
TOTAL-U	032-89	<		**9.92E-02**	pCi/L					12/12/18	0		U
U-233/234 (AS)	2001	<		**8.03E-02**	pCi/l		200	ml		12/12/18	60000	sec	U
U-235 (AS)	2001	<		**9.92E-02**	pCi/l		200	ml		12/12/18	60000	sec	U
U-238 (AS)	2001	<		**9.83E-02**	pCi/l		200	ml		12/12/18	60000	sec	U

Comment:

44 of 88

Flag Values
U = Compound/Analyte not detected (< MDC) or less than 3 sigma
\+ = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
High = Activity concentration exceeds customer reporting value
Spec = MDC exceeds customer technical specification
L = Low recovery
H = High recovery

Bolded text indicates reportable value.

No = Peak not identified in gamma spectrum
Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

TBE-ROA002

Report of Analysis

01/23/19 10:43

TELEDYNE BROWN ENGINEERING, INC.
A Teledyne Technologies Company

L80225

ALS Global - Rochester Laboratory

AL003-3EREG-18

Janice Jaeger

Sample ID: **CELL4-1118 - TOTAL** (WO)
Station:
Description:
LIMS Number: L80225-5

Collect Start: 11/08/2018 09:30
Collect Stop:
Receive Date: 11/20/2018

Matrix: Water
Volume:
% Moisture:

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values			
TOTAL-U	032-89	**8.60E-01**	2.74E-01		pCi/L					01/10/19	0		+			
U-233/234 (AS)	2001	**4.18E-01**	1.96E-01		pCi/l	R1	.2	1		01/10/19	60000	sec	+			
U-235 (AS)	2001	<		**1.16E-01**	pCi/l	R1	.2	1		01/10/19	60000	sec	U	Spec		
U-238 (AS)	2001	**4.42E-01**	1.92E-01		pCi/l	R1	.2	1		01/10/19	60000	sec	+			

Comment:

Sample ID: **CELL4-1118 - DISS** (WO)
Station:
Description:
LIMS Number: L80225-6

Collect Start: 11/08/2018 09:30
Collect Stop:
Receive Date: 11/20/2018

Matrix: Water
Volume:
% Moisture:

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values			
TOTAL-U	032-89	**8.99E-01**	2.43E-01		pCi/L					01/10/19	0		+			
U-233/234 (AS)	2001	**5.82E-01**	1.95E-01		pCi/l	R1				01/10/19	60000	sec	+			
U-235 (AS)	2001	<		**8.86E-02**	pCi/l	R1				01/10/19	60000	sec	U			
U-238 (AS)	2001	**3.17E-01**	1.45E-01		pCi/l	R1				01/10/19	60000	sec	+			

Comment:

45 of 59

Flag Values
U = Compound/Analyte not detected (< MDC) or less than 3 sigma
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U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
High = Activity concentration exceeds customer reporting value
Spec = MDC exceeds customer technical specification
L = Low recovery
H = High recovery

Bolded text indicates reportable value.

No = Peak not identified in gamma spectrum
Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

TBE-ROA002

Report of Analysis

01/23/19 10:43

TELEDYNE BROWN ENGINEERING, INC.
A Teledyne Technologies Company

L80225

ALS Global - Rochester Laboratory

AL003-3EREG-18

Janice Jaeger

Sample ID: **CELL5-1118 - TOTAL** (WO)
Station:
Description:
LIMS Number: L80225-7

Collect Start: 11/08/2018 10:00
Collect Stop:
Receive Date: 11/20/2018

Matrix: Water
Volume:
% Moisture:

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values			
TOTAL-U	032-89	<		**8.97E-02**	pCi/L					12/13/18	0		U			
U-233/234 (AS)	2001	<		**2.30E-02**	pCi/l		200	ml		12/13/18	86400	sec	U			
U-235 (AS)	2001	<		**8.97E-02**	pCi/l		200	ml		12/13/18	86400	sec	U			
U-238 (AS)	2001	<		**2.30E-02**	pCi/l		200	ml		12/13/18	86400	sec	U			

Comment:

Sample ID: **CELL5-1118 - DISS** (WO)
Station:
Description:
LIMS Number: L80225-8

Collect Start: 11/08/2018 10:00
Collect Stop:
Receive Date: 11/20/2018

Matrix: Water
Volume:
% Moisture:

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values			
TOTAL-U	032-89	<		**7.50E-02**	pCi/L					12/12/18	0		U			
U-233/234 (AS)	2001	<		**7.50E-02**	pCi/l		200	ml		12/12/18	60000	sec	U			
U-235 (AS)	2001	<		**3.52E-02**	pCi/l		200	ml		12/12/18	60000	sec	U			
U-238 (AS)	2001	<		**7.50E-02**	pCi/l		200	ml		12/12/18	60000	sec	U			

Comment:

46 of 58

Flag Values
U = Compound/Analyte not detected (< MDC) or less than 3 sigma
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Spec = MDC exceeds customer technical specification
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H = High recovery

Bolded text indicates reportable value.

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Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

TBE-ROA002

Report of Analysis

01/23/19 10:43

TELEDYNE BROWN ENGINEERING, INC.
A Teledyne Technologies Company

L80225

ALS Global - Rochester Laboratory

AL003-3EREG-18

Janice Jaeger

Sample ID: **CELL6-1118 - TOTAL** (WO)
Station:
Description:
LIMS Number: L80225-9

Collect Start: 11/08/2018 10:40
Collect Stop:
Receive Date: 11/20/2018

Matrix: Water
Volume:
% Moisture:

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
TOTAL-U	032-89	<		**8.09E-02**	pCi/L					01/10/19	0		U
U-233/234 (AS)	2001	<		**6.61E-02**	pCi/l	R1				01/10/19	60000	sec	U
U-235 (AS)	2001	<		**3.10E-02**	pCi/l	R1				01/10/19	60000	sec	U
U-238 (AS)	2001	<		**8.09E-02**	pCi/l	R1				01/10/19	60000	sec	U

Comment:

Sample ID: **CELL6-1118 - DISS** (WO)
Station:
Description:
LIMS Number: L80225-10

Collect Start: 11/08/2018 10:40
Collect Stop:
Receive Date: 11/20/2018

Matrix: Water
Volume:
% Moisture:

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
TOTAL-U	032-89	**4.18E-01**	1.58E-01		pCi/L					01/10/19	0		+
U-233/234 (AS)	2001	**2.45E-01**	1.19E-01		pCi/l	R1				01/10/19	60000	sec	+
U-235 (AS)	2001	<		**9.02E-02**	pCi/l	R1				01/10/19	60000	sec	U
U-238 (AS)	2001	**1.73E-01**	1.04E-01		pCi/l	R1				01/10/19	60000	sec	+

Comment:

47 of 55

Flag Values
U = Compound/Analyte not detected (< MDC) or less than 3 sigma
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U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
High = Activity concentration exceeds customer reporting value
Spec = MDC exceeds customer technical specification
L = Low recovery
H = High recovery

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MDC - Minimum Detectable Concentration

TBE-ROA002

QC Summary Report for L80225

AL003-3EREG-18

01/23/2019 09:41

TELEDYNE BROWN ENGINEERING
Everywhereyoulook™

U-238

Method Blank Summary

TBE Sample ID	Radionuclide	Matrix	Count Date/Time	Blank Result	Units	Qualifier	P/F
WG29626-1	U-238 (AS)	WO	12/04/2018 16:06	< 1.345E-02	pCi/Total	U	P

LCS Sample Summary

TBE Sample ID	Radionuclide	Matrix	Count Date/Time	Spike Value	LCS Result	Units	Spike Recovery	Range	Qualifier	P/F
WG29626-2	U-238 (AS)	WO	12/04/2018 16:06	6.04E+00	4.537E+00	pCi/Total	75.1	70-130	+	P

Spike ID: **238U-091808**
Spike Conc: **6.04E+00**
Spike Vol: **1.00E+00**

LCSD Sample Summary

TBE Sample ID	Radionuclide	Matrix	Count Date/Time	Spike Value	LCSD Result	LCSD Recovery	Units	RPD	Range	Qualifier	P/F
WG29626-3	U-238 (AS)	WO	12/04/2018 16:06	6.04E+00	4.867E+00	80.6	pCi/Total	7.1	<30	+	P

WG29626-2

Spike ID: **238U-091808**
Spike Conc: **6.04E+00**
Spike Vol: **1.00E+00**

+	Positive Result
U	Compound/analyte was analyzed, peak not identified and/or not detected above MDC
*	< 5 times the MDC are not evaluated
**	Nuclide not detected
***	Spiking level < 5 times activity
P	Pass
F	Fail
NE	Not evaluated

QC Summary Report for L80225

AL003-3EREG-18

01/23/2019 09:41

TELEDYNE BROWN ENGINEERING
Everywhereyoulook™

U-238

U-238

Associated Samples for WG29626

Sample #	Client ID
L80225-1	CELL8B-1118 - TOTAL
L80225-2	CELL8B-1118 - DISS
L80225-3	CELL3-1118 - TOTAL
L80225-4	CELL3-1118 - DISS
L80225-7	CELL5-1118 - TOTAL
L80225-8	CELL5-1118 - DISS

+	Positive Result
U	Compound/analyte was analyzed, peak not identified and/or not detected above MDC
*	< 5 times the MDC are not evaluated
**	Nuclide not detected
***	Spiking level < 5 times activity
P	Pass
F	Fail
NE	Not evaluated

ALS Environmental Chain of Custody

1565 Jefferson Rd, Building 300 • Rochester, NY 14623 • 585-288-5380 • FAX 585-288-8475

ALS Contact: Janice Jaeger

L80225

Project Number: R1810912
Project Manager: Janice Jaeger
QAP: LAB QAP

Lab Code	Sample ID	# of Cont.	Matrix	Sample Date	Sample Time	Lab ID	Nat U 908.0
~~R1810912-001~~	Cell8B-1118		Water	11/8/18	0815	TeledyneBrownEng	X
~~R1810912-002~~	Cell8B-1118 Diss		Water	11/8/18	0815	TeledyneBrownEng	X
~~R1810912-003~~	Cell3-1118		Water	11/8/18	0910	TeledyneBrownEng	X
~~R1810912-004~~	Cell3-1118 Diss		Water	11/8/18	0910	TeledyneBrownEng	X
~~R1810912-005~~	Cell4-1118		Water	11/8/18	0930	TeledyneBrownEng	X
~~R1810912-006~~	Cell4-1118 Diss		Water	11/8/18	0930	TeledyneBrownEng	X
~~R1810912-007~~	Cell5-1118		Water	11/8/18	1000	TeledyneBrownEng	X
~~R1810912-008~~	Cell5-1118 Diss		Water	11/8/18	1000	TeledyneBrownEng	X
~~R1810912-009~~	Cell6-1118		Water	11/8/18	1040	TeledyneBrownEng	X
~~R1810912-010~~	Cell6-1118 Diss		Water	11/8/18	1040	TeledyneBrownEng	X

Folder Comments:
Report Total Uanium only - none of the isotopes need in lab filter for dissolved.

Special Instructions/Comments
excel EDD

NPDES

H - Test is On Hold P - Test is Authorized for Prep Only

Turnaround Requirements
____ **RUSH** (Surcharges Apply)
PLEASE CIRCLE WORK DAYS
1 2 3 4 5
__X__ **STANDARD**
Requested FAX Date: _____
Requested Report Date: 12/04/18

Report Requirements
____ I. Results Only
__X__ II. Results + QC Summaries
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
PQL/MDL/J N
EDD Y

Invoice Information
PO# 58R1810912
Bill to

Relinquished By: [signature] 11/20/18/1435 Received By: _____ Airbill Number: _____

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: R1810912
Project Manager: Janice Jaeger
QAP: LAB QAP

Special Instructions/Comments	Turnaround Requirements	Report Requirements	Invoice Information
NPDES H - Test is On Hold P - Test is Authorized for Prep Only	_____**RUSH** (Surcharges Apply) **PLEASE CIRCLE WORK DAYS** 1 2 3 4 5 ____ **STANDARD** Requested FAX Date: _____ Requested Report Date: 12/04/18	____ I. Results Only ____ II. Results + QC Summaries ____ III. Results + QC and Calibration Summaries ____ IV. Data Validation Report with Raw Data PQL/MDL/J N EDD Y	PO# 58R1810912 Bill to

Relinquished By: _____ Received By: _____ Airbill Number: _____

R1810912

Ship To: TeledyneBrownEng Inc
Teledyne Brown Engineering, Incorporated
Attn: Sample Receiving
2508 Quality Lane
Knoxville, TN 37931

PC JMJ Date 11/16/18

SMO _____ Date _____

Instructions:

Ice _____

Dry Ice _____

No Ice _____

Shipping:

Overnight _____

2nd Day _____

Ground _____

Bill to Client Account _____

Comments:

11/28/18 16:19

SR #: SR59602

Client: ALS GLOBAL

Teledyne Brown Engineering
Sample Receipt Verification/Variance Report

Project #: AL003-3EREG-18

LIMS #L80225

Initiated By: RCHARLES
Init Date: 11/28/18 Receive Date: 11/28/18

Notification of Variance

Person Notified: Contacted By:

Notify Date:

Notify Method:

Notify Comment:

Client Response

Person Responding:

Response Date:

Response Method:

Response Comment

	Criteria	Yes	No	NA	Comment
1	Shipping container custody seals present and intact.			NA	
2	Sample container custody seals present and intact.			NA	
3	Sample containers received in good condition.	Y			
4	Chain of custody received with samples.	Y			
5	All samples listed on chain of custody received.	Y			
6	Sample container labels present and legible.	Y			
7	Information on container labels correspond with chain of custody.	Y			
8	Sample(s) properly preserved.	Y			
9	Sample(s) appropriate container(s).	Y			
For Hazardous Materials Only:					
10	Other. (Describe)			NA	
11	Paperwork shows TBE and shippers name, address and phone number.			NA	
12	Paperwork shows sample quantity information.			NA	

Work Order: **L80225** Customer: **ALS GLOBAL**

Analysis: **U-234** Project: **AL003-3EREG-18**

Sample ID / Client ID	Run #	Analysis	Reference Date/Time	Volume/ Aliquot	Scavenge Date/Time	Milking Date/Time	Mount Weight	Recovery	Count Date/Time	Detector ID	Total Counts	Sample dt	Bkg Counts	Bkg dt	Decay & Eff. Ingrowth Factor	Analy
L80225-1		U-234 (AS)		200 ml			0	51.92	12-12-18 16:02	51	1	60000 S	0	172800 S	.2279	KMM
CELL8B-1118 - TOTAL																
Activity: 1.90E-02		Error: 3.81E-02	MDC: **2.81E-02**	pCi/l			L80225-1		U-233/234 (AS)							
L80225-2		U-234 (AS)		200 ml			0	45.13	12-13-18 16:33	59	1	86400 S	0	172800 S	.2186	KMM
CELL8B-1118 - DISS																
Activity: 1.59E-02		Error: 3.18E-02	MDC: **2.34E-02**	pCi/l			L80225-2		U-233/234 (AS)							
L80225-3		U-234 (AS)		200 ml			0	57.94	12-12-18 16:02	55	1	60000 S	1.01	172800 S	.2297	KMM
CELL3-1118 - TOTAL																
Activity: 1.11E-02		Error: 3.58E-02	MDC: **4.65E-02**	pCi/l			L80225-3		U-233/234 (AS)							
L80225-4		U-234 (AS)		200 ml			0	48.21	12-12-18 16:02	56	2	60000 S	1.99	172800 S	.2261	KMM
CELL3-1118 - DISS																
Activity: 2.70E-02		Error: 6.19E-02	MDC: **8.03E-02**	pCi/l			L80225-4		U-233/234 (AS)							
L80225-5	R1	U-234 (AS)		.2 l			0	58.53	01-10-19 15:46	63	28	60000 S	9.99	172800 S	.2261	
CELL4-1118 - TOTAL																
Activity: **4.18E-01**		Error: 1.96E-01	MDC: 1.48E-01	pCi/l			**L80225-5**		**U-233/234 (AS)**							
L80225-6	R1	U-234 (AS)					0	87.19	01-10-19 15:46	64	53	60000 S	8.99	172800 S	.2212	
CELL4-1118 - DISS																
Activity: **5.82E-01**		Error: 1.95E-01	MDC: 9.62E-02	pCi/l			**L80225-6**		**U-233/234 (AS)**							
L80225-7		U-234 (AS)		200 ml			0	46.03	12-13-18 16:34	60	0	86400 S	0	172800 S	.2183	KMM
CELL5-1118 - TOTAL																
Activity: .00E+00		Error: .00E+00	MDC: **2.30E-02**	pCi/l			L80225-7		U-233/234 (AS)							

Work Order: **L80225**

U-234

Customer: **ALS GLOBAL**

AL003-3EREG-18

L80225-7	U-234 (AS)				0	46.03	12-13-18 16:34	60	0	86400 S	0	172800 S	.2183	KMM
CELL5-1118 - TOTAL		200 ml												
L80225-8	U-234 (AS)				0	51.77	12-12-18 16:03	62	2	60000 S	.99	86400 S	.2252	KMM
CELL5-1118 - DISS		200 ml												
Activity: 2.52E-02	Error: 6.10E-02	MDC: **7.50E-02**	pCi/l		L80225-8		U-233/234 (AS)							
L80225-9	R1 U-234 (AS)				0	62.98	01-10-19 15:47	65	10	60000 S	1.99	172800 S	.2102	
CELL6-1118 - TOTAL														
Activity: 1.58E-01	Error: 1.12E-01	MDC: **6.61E-02**	pCi/l		L80225-9		U-233/234 (AS)							
L80225-10	R1 U-234 (AS)				0	90.32	01-10-19 15:47	66	22	60000 S	4	172800 S	.2098	
CELL6-1118 - DISS														
Activity: **2.45E-01**	Error: 1.19E-01	MDC: 6.53E-02	pCi/l		**L80225-10**		**U-233/234 (AS)**							

TBE-RDS03

Work Order: **L80225** Customer: **ALS GLOBAL**

Analysis: **U-235** Project: **AL003-3EREG-18**

Sample ID / Client ID	Run #	Analysis	Reference Date/Time	Volume/ Aliquot	Scavenge Date/Time	Milking Date/Time	Mount Weight	Recovery	Count Date/Time	Detector ID	Total Counts	Sample dt	Bkg Counts	Bkg dt	Decay & Eff. Ingrowth Factor	Analy
L80225-1		U-235 (AS)		200 ml			0	51.92	12-12-18 16:02	51	.69	60000 S	1.99	172800 S	.2279	KMM
CELL8B-1118 - TOTAL		Activity: .00E+00 Error: .00E+00 MDC: **9.14E-02** pCi/l					L80225-1		U-235 (AS)							
L80225-2		U-235 (AS)		200 ml			0	45.13	12-13-18 16:33	59	0	86400 S	0	172800 S	.2186	KMM
CELL8B-1118 - DISS		Activity: .00E+00 Error: .00E+00 MDC: **2.89E-02** pCi/l					L80225-2		U-235 (AS)							
L80225-3		U-235 (AS)		200 ml			0	57.94	12-12-18 16:02	55	0	60000 S	0	172800 S	.2297	KMM
CELL3-1118 - TOTAL		Activity: .00E+00 Error: .00E+00 MDC: **3.09E-02** pCi/l					L80225-3		U-235 (AS)							
L80225-4		U-235 (AS)		200 ml			0	48.21	12-12-18 16:02	56	0	60000 S	1.99	172800 S	.2261	KMM
CELL3-1118 - DISS		Activity: -1.77E-02 Error: 2.51E-02 MDC: **9.92E-02** pCi/l					L80225-4		U-235 (AS)							
L80225-5	R1	U-235 (AS)		.2 l			0	58.53	01-10-19 15:46	63	1	60000 S	4	172800 S	.2261	
CELL4-1118 - TOTAL		Activity: -8.18E-03 Error: 5.13E-02 MDC: **1.16E-01** pCi/l					L80225-5		U-235 (AS)							
L80225-6	R1	U-235 (AS)					0	87.19	01-10-19 15:46	64	0	60000 S	5.01	172800 S	.2212	
CELL4-1118 - DISS		Activity: -2.51E-02 Error: 2.28E-02 MDC: **8.86E-02** pCi/l					L80225-6		U-235 (AS)							
L80225-7		U-235 (AS)		200 ml			0	46.03	12-13-18 16:34	60	0	86400 S	2	172800 S	.2183	KMM
CELL5-1118 - TOTAL		Activity: -1.92E-02 Error: 2.74E-02 MDC: **8.97E-02** pCi/l					L80225-7		U-235 (AS)							
L80225-8		U-235 (AS)		200 ml			0	51.77	12-12-18 16:03	62	0	60000 S	0	86400 S	.2252	KMM
CELL5-1118 - DISS																

TBE-RDS03

Work Order: **L80225**
U-235

Customer: **ALS GLOBAL**
AL003-3EREG-18

L80225-8	U-235 (AS)				0	51.77	12-12-18 16:03	62	0	60000 S	0	86400 S	.2252	KMM
		200 ml												
CELL5-1118 - DISS														
Activity: .00E+00	Error: .00E+00	MDC: **3.52E-02**	pCi/l	L80225-8	U-235 (AS)									
L80225-9	R1 U-235 (AS)				0	62.98	01-10-19 15:47	65	2	60000 S	0	172800 S	.2102	
CELL6-1118 - TOTAL														
Activity: 4.21E-02	Error: 5.99E-02	MDC: **3.10E-02**	pCi/l	L80225-9	U-235 (AS)									
L80225-10	R1 U-235 (AS)				0	90.32	01-10-19 15:47	66	0	60000 S	5.01	172800 S	.2098	
CELL6-1118 - DISS														
Activity: -2.55E-02	Error: 2.32E-02	MDC: **9.02E-02**	pCi/l	L80225-10	U-235 (AS)									

Work Order: **L80225** Customer: **ALS GLOBAL**

Analysis: **U-238** Project: **AL003-3EREG-18**

Sample ID / Client ID	Run #	Analysis	Reference Date/Time	Volume/ Aliquot	Scavenge Date/Time	Milking Date/Time	Mount Weight	Recovery	Count Date/Time	Detector ID	Total Counts	Sample dt	Bkg Counts	Bkg dt	Decay & Eff. Ingrowth Factor	Analy
L80225-1		U-238 (AS)		200 ml			0	51.92	12-12-18 16:02	51	1.35	60000 S	1.01	172800 S	.2279	KMM
CELL8B-1118 - TOTAL																
Activity: 1.90E-02	Error: 3.81E-02	MDC: **5.23E-02**	pCi/l		L80225-1		U-238 (AS)									
L80225-2		U-238 (AS)		200 ml			0	45.13	12-13-18 16:33	59	0	86400 S	1	172800 S	.2186	KMM
CELL8B-1118 - DISS																
Activity: -7.93E-03	Error: 1.59E-02	MDC: **5.23E-02**	pCi/l		L80225-2		U-238 (AS)									
L80225-3		U-238 (AS)		200 ml			0	57.94	12-12-18 16:02	55	0	60000 S	1.99	172800 S	.2297	KMM
CELL3-1118 - TOTAL																
Activity: -1.18E-02	Error: 1.67E-02	MDC: **6.57E-02**	pCi/l		L80225-3		U-238 (AS)									
L80225-4		U-238 (AS)		200 ml			0	48.21	12-12-18 16:02	56	2	60000 S	3	172800 S	.2261	KMM
CELL3-1118 - DISS																
Activity: 1.98E-02	Error: 6.35E-02	MDC: **9.83E-02**	pCi/l		L80225-4		U-238 (AS)									
L80225-5	R1	U-238 (AS)		.2 l			0	58.53	01-10-19 15:46	63	27	60000 S	3	172800 S	.2261	
CELL4-1118 - TOTAL																
Activity: **4.42E-01**	Error: 1.92E-01	MDC: 8.10E-02	pCi/l		**L80225-5**		**U-238 (AS)**									
L80225-6	R1	U-238 (AS)					0	87.19	01-10-19 15:46	64	32	60000 S	14	172800 S	.2212	
CELL4-1118 - DISS																
Activity: **3.17E-01**	Error: 1.45E-01	MDC: 1.20E-01	pCi/l		**L80225-6**		**U-238 (AS)**									
L80225-7		U-238 (AS)		200 ml			0	46.03	12-13-18 16:34	60	3	86400 S	0	172800 S	.2183	KMM
CELL5-1118 - TOTAL																
Activity: 4.67E-02	Error: 5.45E-02	MDC: **2.30E-02**	pCi/l		L80225-7		U-238 (AS)									
L80225-8		U-238 (AS)		200 ml			0	51.77	12-12-18 16:03	62	.69	60000 S	.99	86400 S	.2252	KMM
CELL5-1118 - DISS																

TBE-RDS03

Work Order: **L80225**
U-238

Customer: **ALS GLOBAL**
AL003-3EREG-18

L80225-8	U-238 (AS)					0	51.77	12-12-18 16:03	62	.69	60000 S	.99	86400 S	.2252	KMM
CELL5-1118 - DISS		200 ml													
Activity: .00E+00	Error: .00E+00	MDC: **7.50E-02**	pCi/l	L80225-8	U-238 (AS)										
L80225-9	R1 U-238 (AS)					0	62.98	01-10-19 15:47	65	4	60000 S	3	172800 S	.2102	
CELL6-1118 - TOTAL															
Activity: 5.03E-02	Error: 7.15E-02	MDC: **8.09E-02**	pCi/l	L80225-9	U-238 (AS)										
L80225-10	R1 U-238 (AS)					0	90.32	01-10-19 15:47	66	17	60000 S	7	172800 S	.2098	
CELL6-1118 - DISS															
Activity: **1.73E-01**	Error: 1.04E-01	MDC: 8.64E-02	pCi/l	**L80225-10**	**U-238 (AS)**										

February 04, 2019 Service Request No:R1812382

Russell Anderson
Casella Waste Systems - Hakes Billing
4 Chenell Drive Suite 200
Concord, NH 03301

Laboratory Results for: Hakes C&D Landfill - Tank SED RAD

Dear Russell,

Enclosed are the results of the sample(s) submitted to our laboratory December 21, 2018
For your reference, these analyses have been assigned our service request number **R1812382.**

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAP standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and ALS Environmental is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report. The measurement uncertainty of the results included in this report is within that expected when using the prescribed method(s) for analysis of these samples, and represented by Laboratory Control Sample control limits. Any events, such as QC failures, which may add to the uncertainty are explained in the report narrative.

Please contact me if you have any questions. My extension is 7472. You may also contact me via email at Janice.Jaeger@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janice Jaeger
Project Manager

CC: Jon Brandes

ADDRESS 1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
PHONE +1 585 288 5380 | FAX +1 585 288 8475
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

ALS Environmental

Client: Casella Waste Systems (Hampden ME)
Project: Hakes C&D Landfill - Tank SED RAD
Sample Matrix: Soil

Service Request: R1812382
Date Received: 12/21/2018

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier IV, validation deliverables including all summary forms and associated raw data. Analytical procedures performed by the lab are validated in accordance with NELAC standards. Any parameters that are not included in the lab's NELAC accreditation are identified on a "Non-Certified Analytes" report in the Miscellaneous Forms Section of this report. Individual analytical results requiring further explanation are flagged with qualifiers and/or discussed below. The flags are explained in the Report Qualifiers and Definitions page in the Miscellaneous Forms section of this report.

Sample Receipt:

One soil sample was received for analysis at ALS Environmental on 12/21/2018. Any discrepancies noted upon initial sample inspection are noted on the cooler receipt and preservation form included in this data package. The sample was received in good condition and consistent with the accompanying chain of custody form. Samples are refrigerated at 0 to 6°C upon receipt at the lab except for aqueous samples designated for metals analyses, which are stored at room temperature. If any sample was received for the analysis of pH, chlorine residual, sulfite, dissolved oxygen, or ferrous iron, the samples were analyzed past their holding time expiration since these analyses are required to be analyzed within 15 minutes of sampling.

Subcontracted Analytical Parameters:

One or more samples were subcontracted to another laboratory for testing. The certified analytical report from the subcontractor has been included in its entirety at the end of this report and includes the name and address of the subcontracted laboratory.

Approved by _____ Date 02/04/2019

Sample Receipt Information

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

CHAIN of CUSTODY

Page 1 of 1

ALS-Environmental
1565 Jefferson Rd, Bldg 300, Suite 360
Rochester, NY 14623
585.288.5380

Client: **Casella/On-Site**
4376 Manning Ridge Road
Painted Post, NY 14870

Project Manager: **Russ Anderson/Jon Brandes**

Project: **Hakes C&D Landfill - Tank SED RAD**

Telephone No.: 585-593-1824

Email: jonb@on-sitehs.com

Method of Shipment: FED EX

Special Detection Limit/Reporting

PDF to Lance and On-Site, and EDD to On-Site.

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Matrix: Water	Matrix: Air	Matrix: Other	Prsv.: Yes	Prsv.: No	Sampling Date	Sampling Time	Ra-226 (903.1), Ra-228 (904.0)	Total: Uranium (908.0)
North Tank SED-1218		2	X					X	12-20-18	1340	X	X

REMARKS: Rad 226 & 228 by 901.1 as per Jon Brandes email

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name)	Date	Time	Received by (Sign & Print Name)	Date	Time
Kevin Dye / Kevin Dye	12-20-18	1415	Gregory O. Esmerian	ALS 12-21-18	10:50
Relinquished by	Date	Time	Received by		
Relinquished by	Date	Time	Received by		
Relinquished by	Date	Time	Received by laboratory	Date	Time

Lab Work No.

R1812382 5
Casella Waste Systems - Hakes Billing
Hakes C&D Landfill - Tank SED RAD

Cooler Receipt and Preservation Check Form

R1812382 5
Casella Waste Systems - Hakes Billing
Hakes C&D Landfill - Tank SED RAD

Project/Client Casella Folder Number

Cooler received on 12-21-18 by: HZ

COURIER: ALS UPS (FEDEX) VELOCITY CLIENT

1	Were **Custody seals** on outside of cooler?	(Y)	N
2	**Custody papers** properly completed (ink, signed)?	(Y)	N
3	Did all bottles arrive in good **condition** (unbroken)?	(Y)	N
4	Circle: **Wet Ice Dry Ice Gel packs** present?	(Y)	(N)

5a	**Perchlorate** samples have required headspace?	Y	N	(NA)
5b	Did VOA vials, Alk,or Sulfide have sig* **bubbles**?	Y	N	(NA)
6	Where did the bottles originate?	(ALS/ROC)	CLIENT	
7	Soil VOA received as: Bulk Encore 5035set			(NA)

8. Temperature Readings Date: 12-21-18 Time: 11:03 ID: IR#7 ~~IR#10~~ From: Temp Blank (Sample Bottle)

Observed Temp (°C)	14.4						
Correction Factor (°C)	0						
Corrected Temp (°C)	14.4						
Temp from:Type of bottle							
Within 0-6°C?	Y (N)	Y N	Y N	Y N	Y N	Y N	Y N
If <0°C, were samples frozen?	Y N	Y N	Y N	Y N	Y N	Y N	Y N

If out of Temperature, note packing/ice condition: _____ Ice melted Poorly Packed (described below) Same Day Rule

&Client Approval to Run Samples: _____ Standing Approval Client aware at drop-off Client notified by: _____

All samples held in storage location: R002 by HZ on 12-21-18 at 11:05
5035 samples placed in storage location: _____ by _____ on _____ at _____

Cooler Breakdown/Preservation Check**: Date: 12/21/18 Time: 1905 by: AW

9. Were all bottle labels complete (*i.e.* analysis, preservation, etc.)? (YES) NO
10. Did all bottle labels and tags agree with custody papers? (YES) NO
11. Were correct containers used for the tests indicated? (YES) NO
12. Were 5035 vials acceptable (no extra labels, not leaking)? YES NO (N/A)
13. Air Samples: Cassettes / Tubes Intact with MS? Canisters Pressurized Tedlar® Bags Inflated (N/A)

pH	Lot of test paper	Reagent	Preserved? Yes	Preserved? No	Lot Received	Exp	Sample ID Adjusted	Vol. Added	Lot Added	Final pH
≥12		NaOH								
≤2		HNO_3								
≤2		H_2SO_4								
<4		$NaHSO_4$								
5-9		For 608pest			No=Notify for 3day					
Residual Chlorine (-)		For CN, Phenol, 625, 608pest, 522			If +, contact PM to add $Na_2S_2O_3$ (625, 608, CN), ascorbic (phenol).					
		$Na_2S_2O_3$								
		ZnAcetate	-	-			**VOAs and 1664 Not to be tested before analysis. Otherwise, all bottles of all samples with chemical preservatives are checked (not just representatives).			
		HCl	**	**						

Bottle lot numbers: 080717-1TW

Explain all Discrepancies/ Other Comments:

CLRES	BULK
DO	FLDT
HPROD	HGFB
HTR	LL3541
PH	SUB
SO3	MARRS
ALS	REV

Labels secondary reviewed by: AW

PC Secondary Review: _____ 12/26/18 *significant air bubbles: VOA > 5-6 mm : WC >1 in. diameter

Miscellaneous Forms

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

REPORT QUALIFIERS AND DEFINITIONS

U	Analyte was analyzed for but not detected. The sample quantitation limit has been corrected for dilution and for percent moisture, unless otherwise noted in the case narrative.
J	Estimated value due to either being a Tentatively Identified Compound (TIC) or that the concentration is between the MRL and the MDL. Concentrations are not verified within the linear range of the calibration. For DoD: concentration >40% difference between two GC columns (pesticides/Arclors).
B	Analyte was also detected in the associated method blank at a concentration that may have contributed to the sample result.
E	Inorganics- Concentration is estimated due to the serial dilution was outside control limits.
E	Organics- Concentration has exceeded the calibration range for that specific analysis.
D	Concentration is a result of a dilution, typically a secondary analysis of the sample due to exceeding the calibration range or that a surrogate has been diluted out of the sample and cannot be assessed.
*	Indicates that a quality control parameter has exceeded laboratory limits. Under the "Notes" column of the Form I, this qualifier denotes analysis was performed out of Holding Time.
H	Analysis was performed out of hold time for tests that have an "immediate" hold time criteria.
#	Spike was diluted out.
+	Correlation coefficient for MSA is <0.995.
N	Inorganics- Matrix spike recovery was outside laboratory limits.
N	Organics- Presumptive evidence of a compound (reported as a TIC) based on the MS library search.
S	Concentration has been determined using Method of Standard Additions (MSA).
W	Post-Digestion Spike recovery is outside control limits and the sample absorbance is <50% of the spike absorbance.
P	Concentration >40% difference between the two GC columns.
C	Confirmed by GC/MS
Q	DoD reports: indicates a pesticide/Aroclor is not confirmed (≥100% Difference between two GC columns).
X	See Case Narrative for discussion.
MRL LOQ	Method Reporting Limit. Also known as: Limit of Quantitation (LOQ) The lowest concentration at which the method analyte may be reliably quantified under the method conditions.
MDL	Method Detection Limit. A statistical value derived from a study designed to provide the lowest concentration that will be detected 99% of the time. Values between the MDL and MRL are estimated (see J qualifier).
LOD	Limit of Detection. A value at or above the MDL which has been verified to be detectable.
ND	Non-Detect. Analyte was not detected at the concentration listed. Same as U qualifier.

Rochester Lab ID # for State Certifications[1]

Connecticut ID # PH0556	Maine ID #NY0032	Pennsylvania ID# 68-786
Delaware Approved	New Hampshire ID # 2941	Rhode Island ID # 158
DoD ELAP #65817	New York ID # 10145	Virginia #460167
Florida ID # E87674	North Carolina #676	

[1] Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state or agency requirements. The test results meet requirements of the current NELAP/TNI standards or state or agency requirements, where applicable, except as noted in the case narrative. Since not all analyte/method/matrix combinations are offered for state/NELAC accreditation, this report may contain results which are not accredited. For a specific list of accredited analytes, contact the laboratory or go to https://www.alsglobal.com/locations/americas/north-america/usa/new-york/rochester-environmental

ALS Laboratory Group

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

The preparation methods associated with this report are found in these tables unless discussed in the case narrative.

Water/Liquid Matrix

Analytical Method	Preparation Method
200.7	200.2
200.8	200.2
6010C	3005A/3010A
6020A	ILM05.3
9014 Cyanide Reactivity	SW846 Ch7, 7.3.4.2
9034 Sulfide Reactivity	SW846 Ch7, 7.3.4.2
9034 Sulfide Acid Soluble	9030B
9056A Bomb (Halogens)	5050A
9066 Manual Distillation	9065
SM 4500-CN-E Residual Cyanide	SM 4500-CN-G
SM 4500-CN-E WAD Cyanide	SM 4500-CN-I

Solid/Soil/Non-Aqueous Matrix

Analytical Method	Preparation Method
6010C	3050B
6020A	3050B
6010C TCLP (1311) extract	3005A/3010A
6010 SPLP (1312) extract	3005A/3010A
7196A	3060A
7199	3060A
9056A Halogens/Halides	5050
300.0 Anions/ 350.1/ 353.2/ SM 2320B/ SM 5210B/ 9056A Anions	DI extraction

For analytical methods not listed, the preparation method is the same as the analytical method reference.

Subcontracted Analytical Parameters

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Wednesday, January 23, 2019

Janice Jaeger
ALS Environmental
1565 Jefferson Rd., Bldg 300
Rochester, NY 14623

Re: ALS Workorder: 1812379
Project Name:
Project Number: R1812382

Dear Ms. Jaeger:

One soil sample was received from ALS Environmental, on 12/28/2018. The sample was scheduled for the following analyses:

Gamma Spectroscopy
Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Jeff R. Kujawa
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Alaska (AK)	CO01099
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Louisiana (LA)	05057
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1812379

Gamma Spectroscopy:
The sample was analyzed for the presence of gamma emitting radionuclides according to EPA method 901.1.

The Co-60 recovery in the associated laboratory control sample GS190108-1LCS is above the upper control limit of 115% at 116%. Results are submitted with project manager approval.

Activity concentrations above the calculated MDC are reported in some instances where minimum nuclide identification criteria are not met. Such tentative identifications result when the software attempts to calculate net activity concentrations for analytes where either one or both of the following criteria are not satisfied: the 'diagnostic' peak for a nuclide must be identified above the critical level, or the minimum library peak abundance must be attained. Nuclides not meeting these requirements have been flagged with a "TI" qualifier.

In cases where there are no peaks found in the peak search routine, the software performs a net quantification. This indicates that nuclides are not detected or supported at any level above the reported MDC. Consequently, these nuclides are flagged with an "NQ" qualifier on the final reports. Please refer to the Technical Bulletin Addendum at the end of this report.

All remaining acceptance criteria were met.

Radium-226:
The sample was prepared and analyzed according to EPA method 903.1.

All acceptance criteria were met.

ADDRESS 225 Commerce Drive, Fort Collins Colorado 80524 USA | PHONE +1 970 490 1511 | FAX +1 970 490 1522
ALS GROUP USA, CORP. Part of the ALS Group An ALS Limited Company

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1812379
Client Name: ALS Environmental
Client Project Name:
Client Project Number: R1812382
Client PO Number: R1812382

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
North Tank Sed-1218	1812379-1		SOIL	20-Dec-18	13:40

ALS Environmental Chain of Custody

1565 Jefferson Rd, Building 300 • Rochester, NY 14623 • 585-288-5380 • FAX 585-288-8475

ALS Contact: Janice Jaeger

1812379

Project Number: R1812382
Project Manager: Janice Jaeger
QAP: LAB QAP

Lab Code	Sample ID	# of Cont.	Matrix	Sample Date	Sample Time	Lab ID	Gamma Spec 901.1
~~R1812382-001~~	North Tank Sed-1218	1	Soil	12/20/18	1340	Fort Collins ALS	X

Folder Comments:
Gamma Spec list - Rad 226 & 228

Page 33 of 52

Special Instructions/Comments
standard EDD

NPDES

H - Test is On Hold P - Test is Authorized for Prep Only

Turnaround Requirements
____**RUSH** (Surcharges Apply)
PLEASE CIRCLE WORK DAYS
1 2 3 4 5
X **STANDARD**
Requested FAX Date: _____
Requested Report Date: 01/04/19

Report Requirements
___ I. Results Only
X II. Results + QC Summaries
___ III. Results + QC and Calibration Summaries
___ IV. Data Validation Report with Raw Data
PQL/MDL/J N
EDD Y

Invoice Information
PO# 58R1812382
Bill to

Relinquished By: 12/27/18/ 1252 Received By: KELI-JEAN SMITH 12.28.18 0920 Airbill Number:

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS NY Workorder No: 1812379

Project Manager: JRL Initials: JG Date: 12.28.18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	YES	NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES	NO
3.	Are custody seals on **sample** containers intact?	NONE	YES	NO
4.	Is there a COC (chain-of-custody) present?		YES	NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	NO
6.	Are short-hold samples present?		YES	NO
7.	Are all samples within holding times for the requested analyses?		YES	NO
8.	Were all sample containers received intact? (not broken or leaking)		YES	NO
9.	Is there sufficient sample for the requested analyses?		YES	NO
10.	Are all samples in the proper containers for the requested analyses?		YES	NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	NO
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES	NO
14.	Were the samples shipped on ice?		YES	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	YES	NO

Cooler #:	1							
Temperature (°C):	9.6							
No. of custody seals on cooler:	1							
DOT Survey/ Acceptance Information — External µR/hr reading:	10							
Background µR/hr reading:	10							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

All client bottle ID's vs ALS lab ID's double-checked by: JG

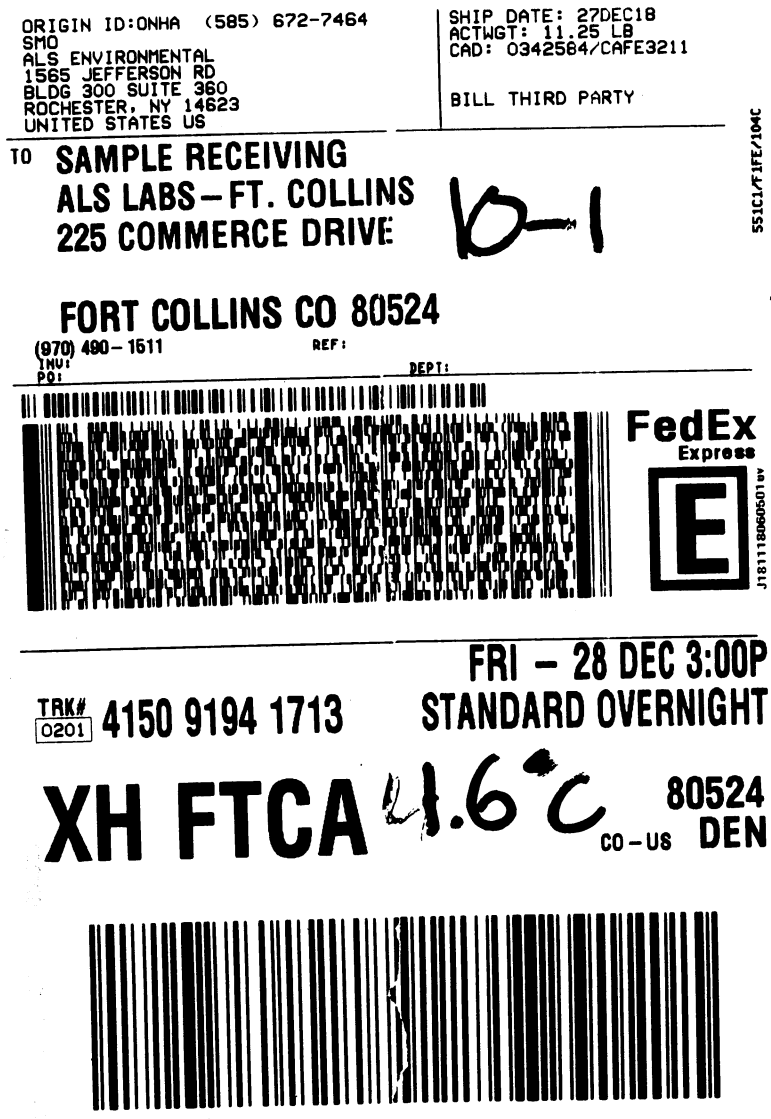
If applicable, was the client contacted? **YES / NO** NA Contact: _____ Date/Time: _____

Project Manager Signature / Date: 12.28.18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton SN 2372220101-0002

1812379


ORIGIN ID:ONHA (585) 672-7464
SMO
ALS ENVIRONMENTAL
1565 JEFFERSON RD
BLDG 300 SUITE 360
ROCHESTER, NY 14623
UNITED STATES US
SHIP DATE: 27DEC18
ACTWGT: 11.25 LB
CAD: 0342584/CAFE3211
BILL THIRD PARTY
TO SAMPLE RECEIVING
ALS LABS-FT. COLLINS
225 COMMERCE DRIVE
FORT COLLINS CO 80524
(970) 490-1511
REF:
INV:
PO:
DEPT:
551C1/FIFE/104C
FedEx
Express
J181111806050 1av
FRI - 28 DEC 3:00P
STANDARD OVERNIGHT
TRK# 0201 4150 9194 1713
XH FTCA
4.6°C
CO-US
80524
DEN

Client:	ALS Environmental	**Date:**	*25-Jan-19*
Project:	R1812382	**Work Order:**	1812379
Sample ID:	North Tank Sed-1218	**Lab ID:**	1812379-1
Legal Location:		**Matrix:**	SOIL
Collection Date:	12/20/2018 13:40	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Gamma Spectroscopy Results			**SOP 713**		Prep Date: **1/8/2019**	PrepBy: **MRL**
Ra-228	**2.08 (+/- 0.85)**	G	**1.55**	**pCi/g**	NA	1/9/2019 07:57
Dissolved Radium-226 by Radon Emanation - Method 903.			**SOP 783**		Prep Date: **1/10/2019**	PrepBy: **JXH**
Ra-226	**0.48 (+/- 0.21)**		**0.19**	**pCi/g**	NA	1/21/2019 12:18

Client:	ALS Environmental	**Date:**	*25-Jan-19*
Project:	R1812382	**Work Order:**	1812379
Sample ID:	North Tank Sed-1218	**Lab ID:**	1812379-1
Legal Location:		**Matrix:**	SOIL
Collection Date:	12/20/2018 13:40	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

G - Sample density differs by more than 15% of LCS density.

D - DER is greater than Control Limit

M - Requested MDC not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE190110-1-2** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE190110-1** Units: **pCi/g** Analysis Date: **1/21/2019 12:58**
Client ID: Run ID: **RE190110-1A** Prep Date: **1/10/2019** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	17.7 (+/- 3.3)	0.1	23.93		73.8	57-126					P

MB Sample ID: **RE190110-1** Units: **pCi/g** Analysis Date: **1/21/2019 12:58**
Client ID: Run ID: **RE190110-1A** Prep Date: **1/10/2019** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	-0.051 (+/- 0.09)	0.223									U

The following samples were analyzed in this batch: 1812379-1

Client: ALS Environmental
Work Order: 1812379
Project: R1812382

QC BATCH REPORT

Batch ID: **GS190108-1-1** Instrument ID **GAMMA** Method: **Gamma Spectroscopy Results**

DUP Sample ID: **1812379-1** Units: **pCi/g** Analysis Date: **1/9/2019 08:32**
Client ID: **North Tank Sed-1218** Run ID: **GS190108-1A** Prep Date: **1/8/2019** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-228	1.8 (+/- 1)	1.2						2.08	0.2		G,TI

LCS Sample ID: **GS190108-1** Units: **pCi/g** Analysis Date: **1/9/2019 09:07**
Client ID: Run ID: **GS190108-1A** Prep Date: **1/8/2019** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Am-241	1060 (+/- 130)	20	1010		105	85-115					P
Co-60	460 (+/- 54)	1	397.7		116	85-115					H
Cs-137	398 (+/- 47)	2	382		104	85-115					P,M3

MB Sample ID: **GS190108-1** Units: **pCi/g** Analysis Date: **1/9/2019 08:32**
Client ID: Run ID: **GS190108-1A** Prep Date: **1/8/2019** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-228	0.04 (+/- 0.36)	0.69									U

The following samples were analyzed in this batch: 1812379-1

TECHNICAL BULLETIN ADDENDUM

The library used for analysis defines the gamma emission(s) to be used for analysis of each nuclide. If multiple gamma emissions are used for quantification, then a 'NET' quantification emission (or peak) must be defined in the library. This designation provides for the calculation of nuclide activity concentrations and detection limits in the case of non-presence of the nuclide. When the nuclide is not present, or the software is unable to resolve a peak at the library defined 'NET' energy, the software evaluates the 'NET' region of interest ('NET' peak energy +/- 2 keV) by performing a summation of the net counts above the background level. This 'NET' quantification can result in net negative, zero, or positive activity results, and is highly dependent on the spectral distribution in the region of interest of the 'NET' peak. In cases where only the 'NET' peak is found, and the software performs a net quantification, the nuclide result will be flagged with an 'NQ' qualifier on the final reports. This indicates that the nuclide is not detected or supported at any level above the reported MDC. Results are submitted without further qualification.

All nuclides specified in the library of analysis for gamma spectroscopy are evaluated for positive OR tentative identification on the following criteria:

- The individual abundances for the gamma emissions specified for each nuclide are summed to obtain a total nuclide abundance.
- From the total nuclide abundance, a positive identification criterion is set as 75% of this total nuclide abundance.
- For all nuclide peaks that are not net quantified, those peak abundances are summed. The total non-net quantified peak sum is compared to the calculated 75% abundance criterion. If this sum is greater than the 75% criterion, the nuclide is considered to be positively identified at the reported concentration. If the sum is less than the 75% criterion, the nuclide is tentatively identified at the reported concentration. These results will be flagged with a 'TI' qualifier on the final reports to indicate that the 75% abundance criterion was not met.

TELEDYNE
BROWN ENGINEERING, INC.
A Teledyne Technologies Company
2508 Quality Lane
Knoxville, TN 37931-3133
865-690-6819

Janice Jaeger
ALS Global - Rochester Laboratory
1565 Jefferson road
Bldg 300, Suite 360
Rochester, NY 14623

Report of Analysis/Certificate of Conformance

02/01/2019

LIMS #:	L80615
Project ID#:	AL003-3EREG-18
Received:	12/28/2018
Delivery Date:	01/25/2019
P.O.#:	R1812382
Release #:	
SDG#:	

This is to certify that Teledyne Brown Engineering - Environmental Services located at 2508 Quality Lane, Knoxville, Tennessee, 37931, has analyzed, tested and documented samples, as received by the laboratory, as specified in the applicable purchase order.

This also certifies that requirements of applicable codes, standards and specifications have been fully met and that any quality assurance documentation which verified conformance to the purchase order is on file and may be examined upon request.

I hereby certify that the above statements are true and correct.

Keith Jeter
Operations Manager

Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
NORTH TANK SED-1218	L80615-1	

Method Reference Numbers

Matrix	Analysis	Method Reference
S	U-238 (AS)	EPA 908.0 Mod.
S	U-234 (AS)	EPA 908.0 Mod.
S	U-235 (AS)	EPA 908.0 Mod.

TELEDYNE
BROWN ENGINEERING, INC.
A Teledyne Technologies Company
2508 Quality Lane
Knoxville, TN 37931-3133
865-690-6819

Report of Analysis

02/01/19 13:28

TELEDYNE BROWN ENGINEERING, INC.
A Teledyne Technologies Company

L80615

ALS Global - Rochester Laboratory

AL003-3EREG-18

Sample ID: **NORTH TANK SED-1218** (S)
Station:
Description:
LIMS Number: L80615-1

Collect Start: 12/20/2018 13:40
Collect Stop:
Receive Date: 12/28/2018

Matrix: Soil
Volume:
% Moisture: 73.6

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values			
TOTAL-U	032-89	**2.33E+00**	5.21E-01		pCi/g					01/10/19	60000	sec	+			
U-233/234 (AS)	2001	**9.36E-01**	3.25E-01		pCi/g		.205	g dry		01/10/19	60000	sec	+			
U-235 (AS)	2001	<		**3.52E-02**	pCi/g		.205	g dry		01/10/19	60000	sec	U			
U-238 (AS)	2001	**1.35E+00**	4.02E-01		pCi/g		.205	g dry		01/10/19	60000	sec	+			

Comment:

Flag Values
U = Compound/Analyte not detected (< MDC) or less than 3 sigma
\+ = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
High = Activity concentration exceeds customer reporting value
Spec = MDC exceeds customer technical specification
L = Low recovery
H = High recovery

Bolded text indicates reportable value.

No = Peak not identified in gamma spectrum
Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

TBE-ROA002

QC Summary Report for L80615

AL003-3EREG-18

02/01/2019 13:57

TELEDYNE BROWN ENGINEERING
Everywhereyoulook™

U-238

Method Blank Summary

TBE Sample ID	Radionuclide	Matrix	Count Date/Time	Blank Result	Units	Qualifier	P/F
WG29927-1	U-238 (AS)	WO	01/10/2019 15:43	< 4.123E-02	pCi/Total	U	P

LCS Sample Summary

TBE Sample ID	Radionuclide	Matrix	Count Date/Time	Spike Value	LCS Result	Units	Spike Recovery	Range	Qualifier	P/F
WG29927-2	U-238 (AS)	WO	01/10/2019 15:43	6.04E+00	4.972E+00	pCi/Total	82.3	70-130	+	P

Spike ID: **238U-091808**
Spike Conc: **6.04E+00**
Spike Vol: **1.00E+00**

LCSD Sample Summary

TBE Sample ID	Radionuclide	Matrix	Count Date/Time	Spike Value	LCSD Result	LCSD Recovery	Units	RPD	Range	Qualifier	P/F
WG29927-3	U-238 (AS)	WO	01/10/2019 15:43	6.04E+00	4.823E+00	79.9	pCi/Total	3.0	<30	+	P

WG29927-2

Spike ID: **238U-091808**
Spike Conc: **6.04E+00**
Spike Vol: **1.00E+00**

U-238

Associated Samples for WG29927

Sample #	Client ID
L80615-1	NORTH TANK SED-1218

+	Positive Result
U	Compound/analyte was analyzed, peak not identified and/or not detected above MDC
*	< 5 times the MDC are not evaluated
**	Nuclide not detected
***	Spiking level < 5 times activity
P	Pass
F	Fail
NE	Not evaluated

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: R1812382
Project Manager: Janice Jaeger
QAP: LAB QAP

L801615

Lab Code	Sample ID	# of Cont.	Matrix	Sample Date	Sample Time	Lab ID	Nat U 908.0
~~R1812382-001~~	North Tank Sed-1218	1	Soil	12/20/18	1340	TeledyneBrownEng	X

Folder Comments:
~~Gamma Spec list - Rad 226 & 228~~

28033

Special Instructions/Comments

excel EDD

NPDES report as total Uranium

H - Test is On Hold P - Test is Authorized for Prep Only

Turnaround Requirements

____**RUSH** (Surcharges Apply)

PLEASE CIRCLE WORK DAYS
1 2 3 4 5

__X__**STANDARD**

Requested FAX Date: _____

Requested Report Date: 01/04/19

Report Requirements

____ I. Results Only

__X__ II. Results + QC Summaries

____ III. Results + QC and Calibration Summaries

____ IV. Data Validation Report with Raw Data

PQL/MDL/J N
EDD Y

Invoice Information

PO# 58R1812382

Bill to

Relinquished By: [signature] 12/27/18/1252

Received By: Kenny Cooper 12-28-18

Airbill Number: _____

R1812382

Ship To: TeledyneBrownEng Inc
Teledyne Brown Engineering, Incorporated
Attn: Sample Receiving
2508 Quality Lane
Knoxville, TN 37931

PC _____ Date 12/26/12
SMO _____ Date _____

Instructions:

Ice _____
Dry Ice _____
No Ice _____

Shipping:

Overnight _____
2nd Day _____
Ground _____

Bill to Client Account _____

Comments:

12/28/18 16:33

SR #: SR59980

Client: ALS GLOBAL

Teledyne Brown Engineering
Sample Receipt Verification/Variance Report

Project #: AL003-3EREG-18

LIMS #L80615

Initiated By: KNOXLAB
Init Date: 12/28/18 Receive Date: 12/28/18

Notification of Variance

Person Notified: Contacted By:

Notify Date:

Notify Method:

Notify Comment:

Client Response

Person Responding:

Response Date:

Response Method:

Response Comment

	Criteria	Yes	No	NA	Comment
1	Shipping container custody seals present and intact.			NA	
2	Sample container custody seals present and intact.			NA	
3	Sample containers received in good condition.	Y			
4	Chain of custody received with samples.	Y			
5	All samples listed on chain of custody received.	Y			
6	Sample container labels present and legible.	Y			
7	Information on container labels correspond with chain of custody.	Y			
8	Sample(s) properly preserved.	Y			
9	Sample(s) appropriate container(s).	Y			
For Hazardous Materials Only:					
10	Other. (Describe)			NA	
11	Paperwork shows TBE and shippers name, address and phone number.			NA	
12	Paperwork shows sample quantity information.			NA	

Raw Data Sheet (rawdata)

02/01/19 13:57

TBE-RDS03

Work Order: **L80615**
Analysis: **U-234**

Customer: **ALS GLOBAL**
Project: **AL003-3EREG-18**

Sample ID / Client ID	Run #	Analysis	Reference Date/Time	Volume/ Aliquot	Scavenge Date/Time	Milking Date/Time	Mount Weight	Recovery	Count Date/Time	Detector ID	Total Counts	Sample dt	Bkg Counts	Bkg dt	Eff.	Decay & Ingrowth Factor	Analy
L80615-1		U-234 (AS)					0	60.71	01-10-19 15:45	71	53	60000 S	12.99	172800 S	.1876		KMM
NORTH TANK SED-1218				.205 g dry													

Activity: **9.36E-01** Error: 3.25E-01 MDC: 1.91E-01 pCi/g **L80615-1** **U-233/234 (AS)**

Raw Data Sheet (rawdata)

02/01/19 13:57

TBE-RDS03

Work Order: **L80615**
Analysis: **U-235**

Customer: **ALS GLOBAL**
Project: **AL003-3EREG-18**

Sample ID / Client ID	Run #	Analysis	Reference Date/Time	Volume/ Aliquot	Scavenge Date/Time	Milking Date/Time	Mount Weight	Recovery	Count Date/Time	Detector ID	Total Counts	Sample dt	Bkg Counts	Bkg dt	Decay & Eff. Ingrowth Factor	Analy
L80615-1		U-235 (AS)					0	60.71	01-10-19 15:45	71	2	60000 S	0	172800 S	.1876	KMM
NORTH TANK SED-1218				.205 g dry												

Activity: 4.77E-02 Error: 6.79E-02 MDC: **3.52E-02** pCi/g L80615-1 U-235 (AS)

Raw Data Sheet (rawdata)

02/01/19 13:57

Work Order: **L80615** Customer: **ALS GLOBAL**

Analysis: **U-238** Project: **AL003-3EREG-18**

Sample ID / Client ID	Run #	Analysis	Reference Date/Time	Volume/ Aliquot	Scavenge Date/Time	Milking Date/Time	Mount Weight	Recovery	Count Date/Time	Detector ID	Total Counts	Sample dt	Bkg Counts	Bkg dt	Decay & Eff. Ingrowth Factor	Analy
L80615-1		U-238 (AS)					0	60.71	01-10-19	71	73	60000	8.99	172800	.1876	KMM
				.205					15:45			S		S		
NORTH TANK SED-1218				g dry												

Activity: **1.35E+00** Error: 4.02E-01 MDC: 1.59E-01 pCi/g **L80615-1** **U-238 (AS)**