Gravatt, Dan

From: Paul Rosasco <paulrosasco@emsidenver.com>
Sent: Thursday, August 14, 2014 1:39 PM
To: jschu@usgs.gov
Cc: Gravatt, Dan; 'Warren, Victoria'
Subject: RE: Outfall 008
Attachments: Bridgeton Landfill RadChem thru 2nd Q 2014.pdf

John and Dan,

We have researched information regarding the questions John raised in his August 5th e-mail and provide the following information. Victoria could certainly provide more detail since I know that this is something they have reviewed with MSD, MDNR and EPA several times over the last year.

To your first question, the samples in the data that EPA references are all representative of the actual leachate at the time the samples were taken (Outfall 008 is the current outfall for direct discharge to MSD, Outfall 006 is the former outfall and Treat Comingled MSD is treated leachate taken from a tank prior to truck loading).

To your second question, since the reaction began in late 2010 there have been significant changes that could affect the leachate radiologic data.

1. The leachate characteristics have changed. The rapid rate of waste decomposition resulted in orders-of-magnitude increases in BOD, solids, metals and organics. Given the situation, increases in radioactivity-producing constituents would be expected. An example is the increases in Gross Beta and Gross Gamma that were attributed to Potassium 40, which would be expected with the rapid breakdown of organic wastes.

2. Where the leachate is collected in the landfill has changed. Deep collection from some leachate collection sumps (what you may be calling the "old risers") continues, but installation of leachate extraction wells from shallow points has been greatly increased. This was necessary to manage the increased volume in liquid from the accelerated waste decomposition. 2012 and especially 2013 saw significant variability in the how leachate was removed from different zones vertically and horizontally in the landfill. The situation was extremely dynamic as new extraction points were added, other points discontinued, or stopped temporarily and then reactivated. This situation, as you might expect, contributed to marked leachate variability and we are not surprised to see this variability in the radiologic data.

3. Our laboratory has changed. In mid-2013 the facility changed the radiological testing from Test America to Eberline, which has increased confidence in the recent data overall. The matrix presents a challenge for radiologic analysis and we felt that a lab that specialized in radiologic data was needed. Eberline has provided us with additional analysis to help compensate for matrix interference and to help understand the chemical sources of some of the higher activity.

So while we can't pinpoint with certainty what caused the spikes during the turbulent events of 2012/2013, total radium levels generally seem to be returning to consistently lower levels over the past four quarters. Attached is a table that includes the most recent data.

To your third question, we are not aware of any samples having ever been obtained from any of the individual leachate risers.

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We are also providing a table of the leachate radiological data for your consideration.

Please let us know if there is any other assistance we can provide.

From: Schumacher, John [mailto:jschu@usgs.gov]
Sent: Tuesday, August 05, 2014 5:37 AM
To: Paul Rosasco
Cc: Gravatt, Dan
Subject: Outfall 008

Paul,

I received some radionuclide data for outfall 008 which I presume is leachate. The dates I have are 6/18/2013, 9/13/2013, and 12/30/2013. The sample types are "DO" and DUP" I assume the "DO" is the actual sample and "DUP" is a duplicate.

Q1- Is there additional data for this site that goes back several more years? I'd be very interested in data before the "smoldering event".

Q2- Can you confirm exactly what this site is?

Q3- Have there ever been rad samples collected from the individual leachate risers and might you have that data?

Thanks in advance, I know you busy.

Cheers,

john

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Table 1
Bridgeton Landfill Radiological Chemistry

					Parameter	Gross Gamma as Cesium 137	Gross Alpha (radiation)	Gross Beta (radiation)	Gross Gamma	Radium 226	Radium 228	Uranium	Uranium 234	Uranium 235
					Total or Dissolved	NA	NA	NA	NA	NA	NA	Total	NA	NA
Location	Date	lab_name_code	Sample Type	Data Status	lab_sdg									
Tank 2	5/29/2014	Eberline	DO	Validated	14-05138		101 +/- 83.9 pCi/l	441 +/- 169 pCi/l	509 +/- 92.7 pCi/l	-0.00971 +/- 0.0296 pCi/l	0.621 +/- 0.475 pCi/l	-0.216 +/- 0.00887 pCi/l		
Tank 2	5/29/2014	Eberline	DUP	Validated	14-05138		-19.1 +/- 59.2 pCi/l	700 +/- 196 pCi/l	436 +/- 86.5 pCi/l	0.0330 +/- 0.0627 pCi/l	0.462 +/- 0.419 pCi/l	-0.652 +/- 0.0266 pCi/l		
Batch 320-MSD	3/18/2014	Eberline	DO	Validated	14-03120	--	33.6 +/- 34.7 pCi/l	303 +/- 75.9 pCi/l	507 +/- 78.5 pCi/l	-1.93 +/- 2.33 pCi/l	2.26 +/- 1.07 pCi/l	2.21 +/- 1.50 ug/l	2.53 +/- 1.01 pCi/l	0.980 +/- 0.682 pCi/l
Batch 320-MSD	3/18/2014	Eberline	DUP	Validated	14-03120	--	-27.8 +/- 42.2 pCi/l	275 +/- 76.5 pCi/l	479 +/- 76.9 pCi/l	-0.0138 +/- 1.46 pCi/l	1.20 +/- 1.01 pCi/l	2.95 +/- 1.74 ug/l	1.87 +/- 0.869 pCi/l	0.288 +/- 0.373 pCi/l
Outfall008	12/30/2013	Eberline	DO	Validated	14-01006	-1.20 +/- 1.93 pCi/l	56.2 +/- 68.7 pCi/l	349 +/- 161 pCi/l	578 +/- 91.3 pCi/l	0.346 +/- 0.529 pCi/l	0.491 +/- 1.08 pCi/l	12.73 +/- 4.86 ug/l	4.91 +/- 1.82 pCi/l	1.02 +/- 0.906 pCi/l
Outfall008	12/30/2013	Eberline	DUP	Validated	14-01006	-1.09 +/- 2.34 pCi/l	9.11 +/- 53.6 pCi/l	180 +/- 141 pCi/l	536 +/- 91.1 pCi/l	0.464 +/- 0.598 pCi/l	1.30 +/- 1.04 pCi/l	19.86 +/- 6.22 ug/l	5.50 +/- 1.90 pCi/l	1.10 +/- 0.959 pCi/l
Outfall008	9/13/2013	Eberline	DO	Validated	13-09091	--	216 +/- 106 BQX pCi/l	819 +/- 169 pCi/l	589 +/- 79.2 BQX pCi/l	0.142 +/- 0.240 pCi/l	2.09 +/- 1.33 pCi/l	7.79 +/- 3.43 ug/l	1.82 +/- 0.990 pCi/l	0.943 +/- 0.821 pCi/l
Outfall008	9/13/2013	Eberline	DUP	Validated	13-09091	--	87.1 +/- 121 BQX pCi/l	879 +/- 182 pCi/l	634 +/- 84.8 BQX pCi/l	0.634 +/- 0.496 pCi/l	0.987 +/- 1.25 pCi/l	6.88 +/- 3.45 ug/l	3.10 +/- 1.38 pCi/l	0.735 +/- 0.809 pCi/l
Outfall008	9/13/2013	Eberline	DO	Validated	13-10138	--	--	--	--	--	--	--	--	--
Outfall008	9/13/2013	Eberline	DUP	Validated	13-10138	--	--	--	--	--	--	--	--	--
Outfall008	9/13/2013	Heritage	DO	Validated	65229	--	--	--	--	--	--	--	--	--
Outfall008	6/18/2013	Eberline	DO	Validated	13-06059	1.54 +/- 1.67 pCi/l	46.6 +/- 57.1 pCi/l	429 +/- 102 pCi/l	--	0.0752 +/- 0.163 pCi/l	2.64 +/- 0.904 pCi/l	--	0.955 +/- 0.532 pCi/l	0.0549 +/- 0.168 pCi/l
Outfall008	6/18/2013	Eberline	DUP	Validated	13-06059	0.00207 +/- 1.83 pCi/l	27.8 +/- 47.3 pCi/l	452 +/- 104 pCi/l	--	0.0867 +/- 0.166 pCi/l	0.289 +/- 0.596 pCi/l	--	1.09 +/- 0.547 pCi/l	0.0113 +/- 0.158 pCi/l
Outfall008	6/18/2013	Heritage	DO	Validated	64835	--	--	--	--	--	--	2.08 ug/l	--	--
Treat Commingled MSD	4/25/2013	PDC	DO	Validated	3043568	--	--	--	--	--	--	--	--	--
Treat Commingled MSD	4/5/2013	Eberline	DO	Validated	1306015	6.62 +/- 8.36 pCi/l	-28.9 +/- 56.7 pCi/l	1860 +/- 290 BQX pCi/l	--	--	11.0 +/- 5.79 pCi/l	--	--	--
Treat Commingled MSD	4/5/2013	Eberline	DUP	Validated	1306015	4.51 +/- 6.40 pCi/l	-14.0 +/- 58.2 pCi/l	408 +/- 104 BQX pCi/l	--	--	6.99 +/- 6.33 pCi/l	--	--	--
Treat Commingled MSD	4/5/2013	PDC	DO	Validated	3041134	--	--	--	--	--	--	--	--	--
Treat Commingled MSD	4/5/2013	TestAmerica	DO	Validated	160-2039-1	< 20.0 U pCi/l	3.71 +/- 57.3 UG pCi/l	--	--	11.4 +/- 2.24 pCi/l	5.36 +/- 3.98 UG pCi/l	< 100 ug/l	--	--
LCH_Outfall008	12/13/2012	TestAmerica	DO	Validated	160-1108-1	< 20 U pCi/l	< 3 UG pCi/l	379 +/- 80.4 pCi/l	--	14.0 +/- 3.19 pCi/l	9.69 +/- 3.81 pCi/l	< 20 ug/l	--	--
Outfall008	12/13/2012	Heritage	DO	Validated	64037	--	--	--	--	--	--	--	--	--
Outfall008	9/19/2012	Heritage	DO	Validated	63614	--	--	--	--	--	--	--	--	--
Outfall008	9/19/2012	TestAmerica	DO	Validated	F2I190459	0.5 +/- 5.6 U pCi/l	6 +/- 78 U pCi/l	331 +/- 74 pCi/l	--	13.1 +/- 2.7 pCi/l	7.3 +/- 2.7 pCi/l	< 2.0 ug/l	--	--
Outfall008	5/15/2012	Heritage	DO	Validated	63070	--	--	--	--	--	--	BDL	--	--
Outfall008	5/15/2012	TestAmerica	DO	Validated	F2E150442	-1.4 +/- 6.6 U pCi/l	29 +/- 30 U pCi/l	160 +/- 33 pCi/l	--	8.6 +/- 2.6 pCi/l	3.7 +/- 3.3 U pCi/l	--	--	--
Outfall008	5/15/2012	TestAmerica	DUP	Validated	F2E150442	1.9 +/- 5.3 U pCi/l	--	--	--	13.4 +/- 3.1 pCi/l	6.2 +/- 2.8 pCi/l	--	--	--
Outfall008	3/6/2012	TestAmerica	DO	Validated	F2C080411	-0.5 +/- 7.3 U pCi/l	38 +/- 30 U pCi/l	183 +/- 33 pCi/l	--	9.0 +/- 3.8 pCi/l	7.0 +/- 4.9 U pCi/l	< 4.0 ug/l	--	--
Outfall008	3/6/2012	TestAmerica	DUP	Validated	F2C080411	0 +/- 4.5 U pCi/l	28 +/- 34 U pCi/l	170 +/- 32 pCi/l	--	10.8 +/- 3.9 pCi/l	8.9 +/- 5.1 pCi/l	--	--	--
Outfall008	11/29/2011	Heritage	DO	Validated	62465	--	--	--	--	--	--	--	--	--
Outfall008	11/29/2011	TestAmerica	DO	Validated	F1K290445	-1.1 +/- 6.8 U pCi/l	21 +/- 15 pCi/l	72 +/- 14 pCi/l	--	5.16 +/- 0.77 pCi/l	1.13 +/- 0.51 pCi/l	< 5.0 ug/l	--	--
Outfall008	8/18/2011	Heritage	DO	Validated	61987	--	--	--	--	--	--	--	--	--
Outfall008	8/18/2011	TestAmerica	DO	Validated	F1H180440	-0.3 +/- 6.2 U pCi/l	31 +/- 19 pCi/l	59 +/- 12 pCi/l	--	3.3 +/- 1.0 pCi/l	2.5 +/- 1.1 pCi/l	< 1.0 ug/l	--	--
Outfall008	5/11/2011	Heritage	DO	Validated	61541	--	--	--	--	--	--	--	--	--
Outfall008	5/11/2011	TestAmerica	DO	Validated	F1E110517	-2.5 +/- 8.4 U pCi/l	8 +/- 18 U pCi/l	47 +/- 11 pCi/l	--	3.22 +/- 0.38 pCi/l	2.04 +/- 0.43 pCi/l	< 1.0 ug/l	--	--
Outfall008	3/16/2011	Heritage	DO	Validated	61273	--	--	--	--	--	--	--	--	--
Outfall008	3/16/2011	TestAmerica	DO	Validated	F1C160545	0.3 +/- 6.0 U pCi/l	3 +/- 13 U pCi/l	84 +/- 14 pCi/l	--	4.6 +/- 1.1 pCi/l	1.8 +/- 1.4 U pCi/l	16.8 +/- 2.3 ug/l	--	--
Outfall008	11/17/2010	Heritage	DO	Validated	60800	--	--	--	--	--	--	--	--	--
Outfall008	11/17/2010	TestAmerica	DO	Validated	F0K170562	2.6 +/- 7.0 U pCi/l	15 +/- 10 pCi/l	48.2 +/- 9.7 pCi/l	--	4.31 +/- 0.76 pCi/l	1.02 +/- 0.47 pCi/l	13.9 +/- 1.9 U ug/l	--	--
Outfall008	9/8/2010	Heritage	DO	Validated	60486	--	--	--	--	--	--	--	--	--
Outfall008	9/8/2010	TestAmerica	DO	Validated	F0I080494	0.6 +/- 7.9 U pCi/l	9 +/- 13 U pCi/l	58 +/- 13 pCi/l	--	2.81 +/- 0.50 pCi/l	1.46 +/- 0.68 pCi/l	16.0 +/- 2.2 ug/l	--	--
Outfall008	5/25/2010	Heritage	DO	Validated	60022	--	--	--	--	--	--	--	--	--
Outfall008	5/25/2010	TestAmerica	DO	Validated	F0E250568	0.757 +/- 5.5 U pCi/l	5.21 +/- 2.0 U pCi/l	114 +/- 9.0 pCi/l	--	3.24 +/- 0.34 pCi/l	2.18 +/- 0.26 pCi/l	0.705 +/- 0.041 ug/l	--	--
Outfall008	5/25/2010	TestAmerica	DUP	Validated	F0E250568	6.81 +/- 5.3 U pCi/l	1.25 +/- 1.2 U pCi/l	109 +/- 8.5 pCi/l	--	3.35 +/- 0.36 pCi/l	2.23 +/- 0.25 pCi/l	0.909 +/- 0.051 ug/l	--	--
Outfall008	2/25/2010	Heritage	DO	Validated	59650	--	--	--	--	--	--	--	--	--
Outfall008	2/25/2010	TestAmerica	DO	Validated	F0B250518	3.5 +/- 8.4 U pCi/l	10 +/- 10 U pCi/l	56.3 +/- 9.4 pCi/l	--	3.60 +/- 0.53 pCi/l	1.26 +/- 0.46 pCi/l	9.8 +/- 1.3 ug/l	--	--
Outfall008	11/4/2009	Heritage	DO	Validated	59175	--	--	--	--	--	--	--	--	--
Outfall008	11/4/2009	TestAmerica	DO	Validated	F9K040546	-0.06 +/- 5.8 U pCi/l	8 +/- 10 U pCi/l	73 +/- 13 pCi/l	--	3.71 +/- 0.50 pCi/l	1.24 +/- 0.53 pCi/l	3.03 +/- 0.37 U ug/l	--	--
Outfall008	8/6/2009	Heritage	DO	Validated	58742	--	--	--	--	--	--	--	--	--
Outfall008	8/6/2009	TestAmerica	DO	Validated	F9H060204	-0.7 +/- 9.2 U pCi/l	18 +/- 10 pCi/l	50.8 +/- 9.7 pCi/l	--	3.51 +/- 0.42 pCi/l	1.59 +/- 0.37 pCi/l	2.57 +/- 0.40 U ug/l	--	--
Outfall008	8/6/2009	TestAmerica	DUP	Validated	F9H060204	1 +/- 8.6 U pCi/l	9 +/- 12 U pCi/l	58 +/- 11 U pCi/l	--	--	--	--	--	--
Outfall008	5/7/2009	Heritage	DO	Validated	58370	--	--	--	--	--	--	--	--	--
Outfall008	5/7/2009	TestAmerica	DO	Validated	F9E080107	0 +/- 9.4 U pCi/l	11.0 +/- 9.9 U pCi/l	68 +/- 11 pCi/l	--	4.28 +/- 0.58 pCi/l	1.36 +/- 0.34 pCi/l	6.09 +/- 0.83 ug/l	--	--
Outfall008	2/12/2009	Heritage	DO	Validated	58064	--	--	--	--	--	--	--	--	--
Outfall008	2/12/2009	TestAmerica	DO	Validated	F9B120270	0.1 +/- 5.9 U pCi/l	-4.4 +/- 8.2 U pCi/l	73 +/- 13 pCi/l	--	4.24 +/- 0.58 pCi/l	1.61 +/- 0.43 pCi/l	-0.96 +/- 0.19 U ug/l	--	--

Table 1
Bridgeton Radiological Chemistry

					Parameter	Gross Gamma as Cesium 137	Gross Alpha (radiation)	Gross Beta (radiation)	Gross Gamma	Radium 226	Radium 228	Uranium	Uranium 234	Uranium 235
					Total or Dissolved	NA	NA	NA	NA	NA	NA	Total	NA	NA
Location	Date	lab_name_code	Sample Type	Data Status	lab_sdg									
Outfall008	11/4/2008	Heritage	DO	Validated	57674	--	--	--	--	--	--	--	--	--
Outfall008	11/4/2008	TestAmerica	DO	Validated	F8K050146	0.8 +/- 7.0 U pCi/l	20 +/- 12 pCi/l	66 +/- 11 pCi/l	--	4.19 +/- 0.54 pCi/l	1.80 +/- 0.39 pCi/l	7.09 +/- 0.88 U ug/l	--	--
Outfall008	11/4/2008	TestAmerica	DUP	Validated	F8K050146	0.4 +/- 7.5 U pCi/l	11 +/- 11 U pCi/l	66 +/- 11 pCi/l	--	--	--	--	--	--
Outfall008	7/16/2008	Heritage	DO	Validated	57153	--	--	--	--	--	--	--	--	--
Outfall008	7/16/2008	TestAmerica	DO	Validated	F8G160271	-0.07 +/- 7.8 U pCi/l	7.3 +/- 7.8 U pCi/l	46.4 +/- 8.3 pCi/l	--	3.29 +/- 0.46 pCi/l	1.44 +/- 0.36 pCi/l	--	--	--
Outfall008	7/16/2008	TestAmerica	DUP	Validated	F8G160271	-1.1 +/- 8.6 U pCi/l	3.2 +/- 7.0 U pCi/l	49.0 +/- 8.0 pCi/l	--	--	--	--	--	--
Outfall008	5/6/2008	Heritage	DO	Validated	56732	--	--	--	--	--	--	--	--	--
Outfall008	5/6/2008	TestAmerica	DO	Validated	F8E060240	0.5 +/- 6.7 U pCi/l	-0.2 +/- 7.7 U pCi/l	83 +/- 15 pCi/l	--	4.98 +/- 0.60 pCi/l	2.01 +/- 0.41 pCi/l	0.542 +/- 0.089 U ug/l	--	--
Outfall008	5/6/2008	TestAmerica	DUP	Validated	F8E060240	-0.7 +/- 8.0 U pCi/l	2 +/- 11 U pCi/l	88 +/- 16 pCi/l	--	--	--	--	--	--
Outfall008	3/13/2008	Heritage	DO	Validated	65044	--	--	--	--	--	--	--	--	--
Outfall008	3/13/2008	TestAmerica	DO	Validated	F8C130342	0.3 +/- 8.4 U pCi/l	20 +/- 16 U pCi/l	70 +/- 13 pCi/l	--	5.10 +/- 0.81 pCi/l	1.66 +/- 0.74 pCi/l	0.687 +/- 0.093 U ug/l	--	--
Outfall008	3/13/2008	TestAmerica	DUP	Validated	F8C130342	1.6 +/- 8.2 U pCi/l	--	--	--	--	--	--	--	--
Outfall008	11/29/2007	Heritage	DO	Validated	56024	--	--	--	--	--	--	--	--	--
Outfall008	11/29/2007	TestAmerica	DO	Validated	F7K290239	1 +/- 9.1 U pCi/l	11.0 +/- 9.97 U pCi/l	71 +/- 16 pCi/l	--	3.94 +/- 0.68 pCi/l	2.00 +/- 0.68 pCi/l	1.07 +/- 0.18 U ug/l	--	--
Outfall008	11/29/2007	TestAmerica	DUP	Validated	F7K290239	4.1 +/- 6.0 U pCi/l	--	--	--	--	--	--	--	--
Outfall006	8/21/2007	Heritage	DO	Validated	55695	--	--	--	--	--	--	--	--	--
Outfall006	8/20/2007	TestAmerica	DO	Validated	F7H220163	2.8 +/- 8.9 U pCi/l	12 +/- 12 U pCi/l	71 +/- 14 pCi/l	--	4.66 +/- 0.80 pCi/l	1.3 +/- 1.1 U pCi/l	-20.0 +/- 2.6 U* ug/l	--	--
Outfall006	8/20/2007	TestAmerica	DUP	Validated	F7H220163	-1.3 +/- 9.5 U pCi/l	--	--	--	--	--	--	--	--
Outfall006	5/22/2007	Heritage	DO	Validated	55411.1	--	--	--	--	--	--	--	--	--
Outfall006	5/22/2007	TestAmerica	DO	Validated	F7E220283	-2.1 +/- 7.8 U pCi/l	24 +/- 13 pCi/l	78 +/- 14 pCi/l	--	5.62 +/- 0.81 pCi/l	1.73 +/- 0.74 pCi/l	-0.514 +/- 0.086 U ug/l	--	--
Outfall006	5/21/2007	TestAmerica	DO	Validated	F7E220283	1.9 +/- 7.4 U pCi/l	18 +/- 13 U pCi/l	68 +/- 13 U pCi/l	--	4.34 +/- 0.64 pCi/l	1.40 +/- 0.54 pCi/l	-0.48 +/- 0.10 U ug/l	--	--
Outfall006	5/21/2007	TestAmerica	DUP	Validated	F7E220283	--	11 +/- 12 U pCi/l	63 +/- 12 pCi/l	--	--	--	--	--	--
Outfall006	3/8/2007	Heritage	DO	Validated	5400	--	--	--	--	--	--	--	--	--
Outfall006	3/8/2007	TestAmerica	DO	Validated	F7C080312	7.2 +/- 8.0 U pCi/l	14 +/- 17 U pCi/l	88 +/- 16 pCi/l	--	6.26 +/- 0.88 pCi/l	2.12 +/- 0.59 pCi/l	0.424 +/- 0.065 U ug/l	--	--
Outfall006	3/8/2007	TestAmerica	DUP	Validated	F7C080312	-9.3 +/- 8.7 U pCi/l	--	--	--	--	--	--	--	--
Outfall006	12/21/2006	Heritage	DO	Validated	5182	--	--	--	--	--	--	--	--	--
Outfall006	12/21/2006	TestAmerica	DO	Validated	F6L210233	-3 +/- 10 U pCi/l	15 +/- 15 U pCi/l	81 +/- 17 pCi/l	--	4.42 +/- 0.72 pCi/l	3.4 +/- 1.4 pCi/l	6.88 +/- 0.86 ug/l	--	--
Outfall006	12/21/2006	TestAmerica	DUP	Validated	F6L210233	2.0 +/- 9.0 U pCi/l	--	--	--	--	--	--	--	--
Outfall006	7/26/2006	Heritage	DO	Validated	4611	--	--	--	--	--	--	--	--	--
Outfall006	6/15/2006	Heritage	DO	Validated	4514	--	--	--	--	--	--	--	--	--
Outfall006	1/19/2006	Heritage	DO	Validated	4063	--	--	--	--	--	--	--	--	--

Table 1
Bridgeton Radiological Chemistry

					Parameter Total or Dissolved	Uranium 238 NA
Location	Date	lab_name_code	Sample Type	Data Status	lab_sdg	
Tank 2	5/29/2014	Eberline	DO	Validated	14-05138	
Tank 2	5/29/2014	Eberline	DUP	Validated	14-05138	
Batch 320-MSD	3/18/2014	Eberline	DO	Validated	14-03120	**0.589 +/- 0.492 pCi/l**
Batch 320-MSD	3/18/2014	Eberline	DUP	Validated	14-03120	**0.947 +/- 0.583 pCi/l**
Outfall008	12/30/2013	Eberline	DO	Validated	14-01006	**4.12 +/- 1.63 pCi/l**
Outfall008	12/30/2013	Eberline	DUP	Validated	14-01006	**6.51 +/- 2.09 pCi/l**
Outfall008	9/13/2013	Eberline	DO	Validated	13-09091	**2.47 +/- 1.15 pCi/l**
Outfall008	9/13/2013	Eberline	DUP	Validated	13-09091	**2.20 +/- 1.15 pCi/l**
Outfall008	9/13/2013	Eberline	DO	Validated	13-10138	--
Outfall008	9/13/2013	Eberline	DUP	Validated	13-10138	--
Outfall008	9/13/2013	Heritage	DO	Validated	65229	--
Outfall008	6/18/2013	Eberline	DO	Validated	13-06059	**0.380 +/- 0.328 pCi/l**
Outfall008	6/18/2013	Eberline	DUP	Validated	13-06059	**0.943 +/- 0.513 pCi/l**
Outfall008	6/18/2013	Heritage	DO	Validated	64835	--
Treat Commingled MSD	4/25/2013	PDC	DO	Validated	3043568	--
Treat Commingled MSD	4/5/2013	Eberline	DO	Validated	1306015	--
Treat Commingled MSD	4/5/2013	Eberline	DUP	Validated	1306015	--
Treat Commingled MSD	4/5/2013	PDC	DO	Validated	3041134	--
Treat Commingled MSD	4/5/2013	TestAmerica	DO	Validated	160-2039-1	--
LCH_Outfall008	12/13/2012	TestAmerica	DO	Validated	160-1108-1	--
Outfall008	12/13/2012	Heritage	DO	Validated	64037	--
Outfall008	9/19/2012	Heritage	DO	Validated	63614	--
Outfall008	9/19/2012	TestAmerica	DO	Validated	F2I190459	--
Outfall008	5/15/2012	Heritage	DO	Validated	63070	--
Outfall008	5/15/2012	TestAmerica	DO	Validated	F2E150442	--
Outfall008	5/15/2012	TestAmerica	DUP	Validated	F2E150442	--
Outfall008	3/6/2012	TestAmerica	DO	Validated	F2C080411	--
Outfall008	3/6/2012	TestAmerica	DUP	Validated	F2C080411	--
Outfall008	11/29/2011	Heritage	DO	Validated	62465	--
Outfall008	11/29/2011	TestAmerica	DO	Validated	F1K290445	--
Outfall008	8/18/2011	Heritage	DO	Validated	61987	--
Outfall008	8/18/2011	TestAmerica	DO	Validated	F1H180440	--
Outfall008	5/11/2011	Heritage	DO	Validated	61541	--
Outfall008	5/11/2011	TestAmerica	DO	Validated	F1E110517	--
Outfall008	3/16/2011	Heritage	DO	Validated	61273	--
Outfall008	3/16/2011	TestAmerica	DO	Validated	F1C160545	--
Outfall008	11/17/2010	Heritage	DO	Validated	60800	--
Outfall008	11/17/2010	TestAmerica	DO	Validated	F0K170562	--
Outfall008	9/8/2010	Heritage	DO	Validated	60486	--
Outfall008	9/8/2010	TestAmerica	DO	Validated	F0I080494	--
Outfall008	5/25/2010	Heritage	DO	Validated	60022	--
Outfall008	5/25/2010	TestAmerica	DO	Validated	F0E250568	--
Outfall008	5/25/2010	TestAmerica	DUP	Validated	F0E250568	--
Outfall008	2/25/2010	Heritage	DO	Validated	59650	--
Outfall008	2/25/2010	TestAmerica	DO	Validated	F0B250518	--
Outfall008	11/4/2009	Heritage	DO	Validated	59175	--
Outfall008	11/4/2009	TestAmerica	DO	Validated	F9K040546	--
Outfall008	8/6/2009	Heritage	DO	Validated	58742	--
Outfall008	8/6/2009	TestAmerica	DO	Validated	F9H060204	--
Outfall008	8/6/2009	TestAmerica	DUP	Validated	F9H060204	--
Outfall008	5/7/2009	Heritage	DO	Validated	58370	--
Outfall008	5/7/2009	TestAmerica	DO	Validated	F9E080107	--
Outfall008	2/12/2009	Heritage	DO	Validated	58064	--
Outfall008	2/12/2009	TestAmerica	DO	Validated	F9B120270	--

Table 1
Bridgeton Radiological Chemistry

					Parameter	Uranium 238
					Total or Dissolved	NA
Location	Date	lab_name_code	Sample Type	Data Status	lab_sdg	
Outfall008	11/4/2008	Heritage	DO	Validated	57674	--
Outfall008	11/4/2008	TestAmerica	DO	Validated	F8K050146	--
Outfall008	11/4/2008	TestAmerica	DUP	Validated	F8K050146	--
Outfall008	7/16/2008	Heritage	DO	Validated	57153	--
Outfall008	7/16/2008	TestAmerica	DO	Validated	F8G160271	--
Outfall008	7/16/2008	TestAmerica	DUP	Validated	F8G160271	--
Outfall008	5/6/2008	Heritage	DO	Validated	56732	--
Outfall008	5/6/2008	TestAmerica	DO	Validated	F8E060240	--
Outfall008	5/6/2008	TestAmerica	DUP	Validated	F8E060240	--
Outfall008	3/13/2008	Heritage	DO	Validated	65044	--
Outfall008	3/13/2008	TestAmerica	DO	Validated	F8C130342	--
Outfall008	3/13/2008	TestAmerica	DUP	Validated	F8C130342	--
Outfall008	11/29/2007	Heritage	DO	Validated	56024	--
Outfall008	11/29/2007	TestAmerica	DO	Validated	F7K290239	--
Outfall008	11/29/2007	TestAmerica	DUP	Validated	F7K290239	--
Outfall006	8/21/2007	Heritage	DO	Validated	55695	--
Outfall006	8/20/2007	TestAmerica	DO	Validated	F7H220163	--
Outfall006	8/20/2007	TestAmerica	DUP	Validated	F7H220163	--
Outfall006	5/22/2007	Heritage	DO	Validated	55411.1	--
Outfall006	5/22/2007	TestAmerica	DO	Validated	F7E220283	--
Outfall006	5/21/2007	TestAmerica	DO	Validated	F7E220283	--
Outfall006	5/21/2007	TestAmerica	DUP	Validated	F7E220283	--
Outfall006	3/8/2007	Heritage	DO	Validated	5400	--
Outfall006	3/8/2007	TestAmerica	DO	Validated	F7C080312	--
Outfall006	3/8/2007	TestAmerica	DUP	Validated	F7C080312	--
Outfall006	12/21/2006	Heritage	DO	Validated	5182	--
Outfall006	12/21/2006	TestAmerica	DO	Validated	F6L210233	--
Outfall006	12/21/2006	TestAmerica	DUP	Validated	F6L210233	--
Outfall006	7/26/2006	Heritage	DO	Validated	4611	--
Outfall006	6/15/2006	Heritage	DO	Validated	4514	--
Outfall006	1/19/2006	Heritage	DO	Validated	4063	--