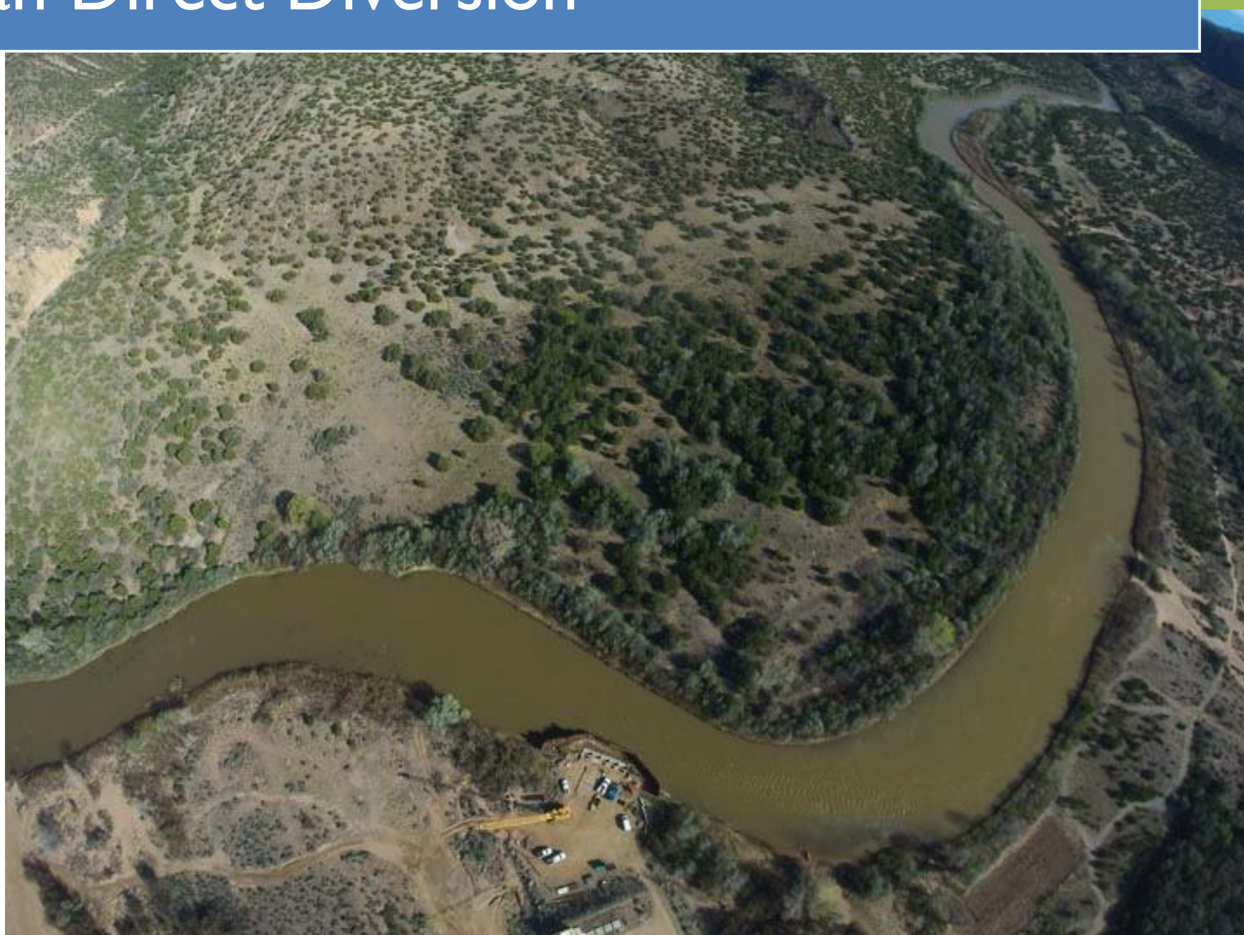
2015

Storm Water Quality Monitoring of Rio Grande at Buckman Direct Diversion



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Buckman Direct Diversion

STORM WATER QUALITY MONITORING OF RIO GRANDE AT BUCKMAN DIRECT DIVERSION

Annual Report 2015

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Executive Summary

The storm water monitoring effort of the Rio Grande at Buckman Direct Diversion (BDD) was conceived as a part of the five years Memorandum of Understanding (MOU) between the Buckman Direct Diversion Board and the US Department of Energy, Los Alamos National Laboratory (DOE LANL) signed by the parties in 2010. A four years report was produced by BDD and summarized the results from that MOU. In 2015 a revised MOU between the parties were signed and this annual report presents the results from the first year of monitoring, summer of 2015, under the 2015 MOU.

The BDD is the source of raw water for the Buckman Regional Water Treatment Plant which treats river water for drinking water purposes. The treated water is then used by the City and County of Santa Fe to supply drinking water to their customers. The objective of the 2015 MOU surface water monitoring program was to sample potential flows from the Los Alamos and Pueblo Canyons (LA/PC) watershed and from the Rio Grande (RG) watershed, and the results were to be used to evaluate the storm water quality of the Rio Grande at BDD. The Los Alamos and Pueblo Canyons are located on the Pajarito Plateau where for decades Los Alamos National Laboratory had discharged contaminated waste and wastewater as part of the "Manhattan Project" and later LANL's nuclear weapons program. The confluence of these canyons with the Rio Grande is located nearby Otowi Bridge, 3.5 miles upgradient from BDD. Another goal of the 2015 MOU was to find an operational parameter or parameters of the Diversion which will help with identifying more specific events when diversion should be halted and when diversion does not need to be halted due to the discharges from the Canyons. Thus, a more efficient and economical monitoring could be applied.

In 2015 BDD sampled 6 out of 12 storm events in LA/PC watershed, and three RG baseflow events. The NMED/DOE OB also sampled a couple of events at BDD, and the data from those is included in the report. *However, BDD would like to stress that even though the NMED/DOE OB data was used throughout this report, data presentations, interpretations, discussions and conclusions were conducted solely by BDD staff and do not represent the opinion of the NMED/DOE OB staff and management.*

The LA/P Canyons are ephemeral streams and when they flow, their run off may carry contaminants from the canyons, discharge them into the Rio Grande near Otowi Bridge and transport them downstream to BDD. The contaminants of greatest concern that could potentially be transported from LA/PCW to BDD via the Rio Grande are radionuclides used and discharged throughout the years of LANL operations, specifically, Plutonium 239/240, Plutonium 238, Americium 241, Strontium 90, Cesium 137, and Uranium isotopes. All 23 metals are also monitored at BDD as a part of the sampling effort. Most radionuclides and metals preferentially transport by suspended sediments, thus storm events would result in storm water samples with higher concentrations of these contaminants than under base flows conditions of the river.

This report summarizes all monitoring data collected during summer of 2015 at the BDD. It also compares found contaminant concentrations to the BDD-calculated Rio Grande sediment background and NMWQCC surface water standards (20.6.4 NMAC) to investigate exceedances from screening values or regulatory limits. During the 2015 season, only a limited number of radionuclides were detected in storm water and base flow samples, Plutonium 238, Plutonium 239/240, Strontium 90, Radium 226, Radium 228, Uranium 234, Uranium 235, and Uranium 238. Except for Sr 90, all detected radionuclides had exceedances from the Rio Grande background levels. Only the sum of Ra 226 and Ra 228 and gross alpha concentrations exceeded the NM WQCC surface water standards.

The concentrations of fifteen metals exceeded the Rio Grande background levels. Those were Al, Sb, Ba, Be, B, Cr, Co, Cu, Pb, Hg, Ni, Se, Tl, U, and Zn. The concentrations of four metals exceeded the NM WQCC standards for dissolved metals: Al, Cd, Cu, and Zn.

Most detections of total PCBs and Dioxins/Furans exceeded the NM WQCC standards, but the concentrations of perchlorate were within the limits observed in groundwater wells as previously measured.

In addition to monitoring the Rio Grande surface water, BDD is conducting a study on The Removal Efficiency and Assessment of Treatments (TREAT). The results from the first two sampling events for the TREAT study were presented but not interpreted at this time. A special report on that study will be issued after all sampling events are completed.

BDD continues to monitor the storm water at the Diversion under the 2015 MOU. For more information on the second phase of the program contact BDD at 505-955-4504.

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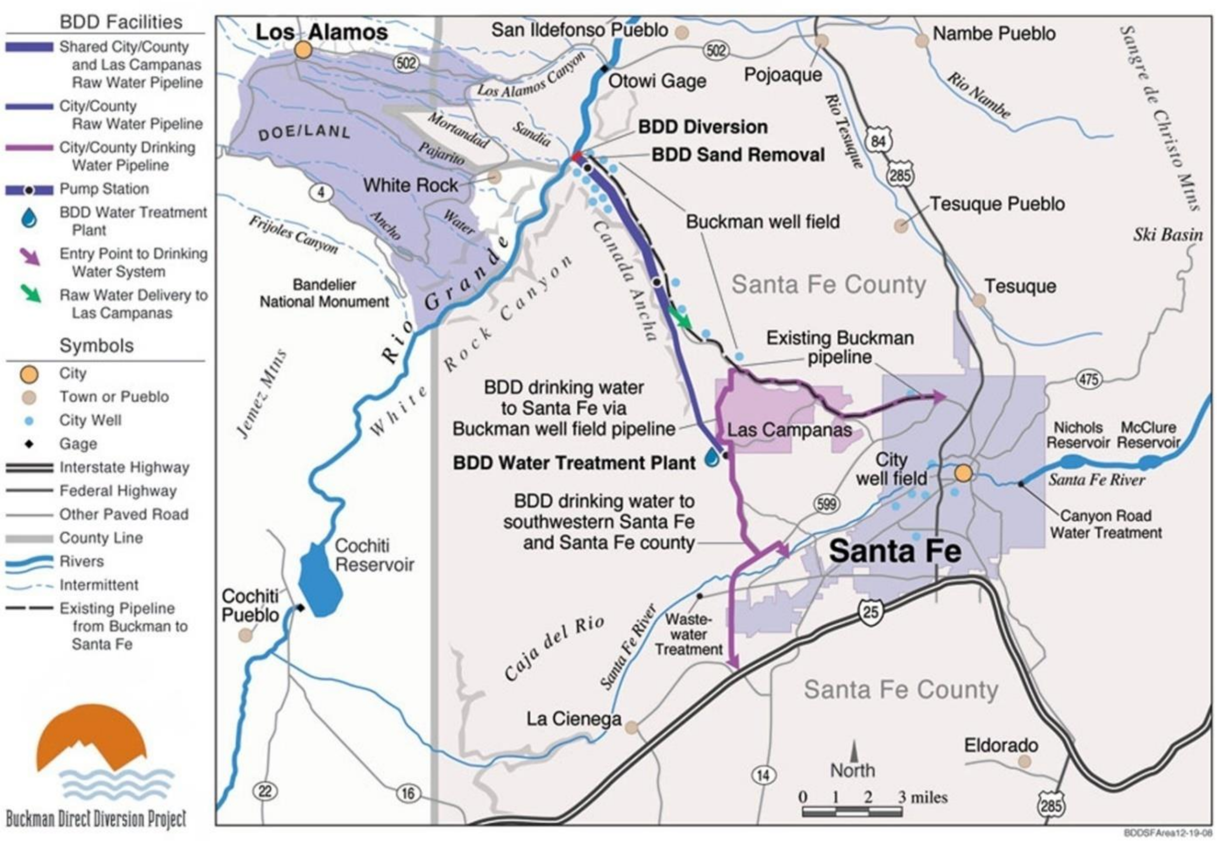
Acronyms and Abbreviations

BDD	Buckman Direct Diversion
BDDB	Buckman Direct Diversion Board
Cfs	cubic feet per second
D/F	Dioxins and Furans
DOE	Department of Energy
DOE OB	New Mexico Environment Department/Department of Energy Oversight Bureau
F	Filtered
GCS	Grade Control Structure
Hrs	hours
HWB	New Mexico Environment Department/Hazardous Waste Bureau
LA	Los Alamos
LA/P	Los Alamos and Pueblo
LACW	Los Alamos Canyon Watershed
LANL	Los Alamos National Laboratory
MOU	Memorandum of Understanding
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
PCBs	Polychlorinated Biphenyls
PCi/g	Picocuries per gram
PCi/l	Picocuries per liter
Rads	Radionuclides
RG	Rio Grande
SCADA	Supervisory Control and Data Acquisition
UF	Unfiltered
USGS	United States Geological Survey

I. BACKGROUND

The Buckman Direct Diversion (BDD) Project was designed to divert surface water from the Rio Grande, treat it, and provide drinking water to the City and County of Santa Fe. The design of the Project began in September 2008 and construction was completed in early 2011. The point of diversion (BDD Intake) is on the east bank of the Rio Grande, about 3.5 miles downstream from where New Mexico Route 502 crosses the river at Otowi Bridge. See Figure 1. At approximately the same location, near the Otowi Bridge, the Los Alamos/Pueblo (LA/P) canyons watershed flows into the Rio Grande. These canyons and their tributaries have been impacted by contamination originating from Los Alamos National Laboratory (LANL) operations, when LANL discharged radioactive liquid wastes into the canyons on the Pajarito Plateau that drained into the Rio Grande. LANL occupies about 36 square miles on the Pajarito Plateau, on the western side of the river, and has operated (under various names) since 1943.

Figure 1. BDD area setting.



I.1 2015 Memorandum of Understanding (2015 MOU)

The BDD Board and US Department of Energy, Los Alamos National Laboratory signed a Memorandum of Understanding in 2010 that included storm water quality monitoring program. The report of the analytical results and conclusions of this program were published in (Bowman, 2011-2014). As a continuation of the original MOU, both parties sign a second MOU in 2015, and the storm water quality monitoring program continued under the 2015 MOU. A copy of the 2015 MOU is provided in Attachment 1 to this report. This report presents the analytical results from the summer season 2015 under the revised MOU. As the original MOU, the 2015 MOU required that both parties meet semiannually to discuss implementation of the terms of the MOU. Table 1 lists the dates and topics discussed during the meetings. Agendas and minutes of the meetings are provided in Attachment 1.

Table 1. MOU meetings in 2015.

Date	Meeting Type	Action/Issue Discussed
04/17/2015	1st Biannual	DOE funding. Sampling plans for 2015 season. E099 discussions. Changes to Appendix A.
11/18/2015	2nd Biannual	Results from 2015 season sampling.

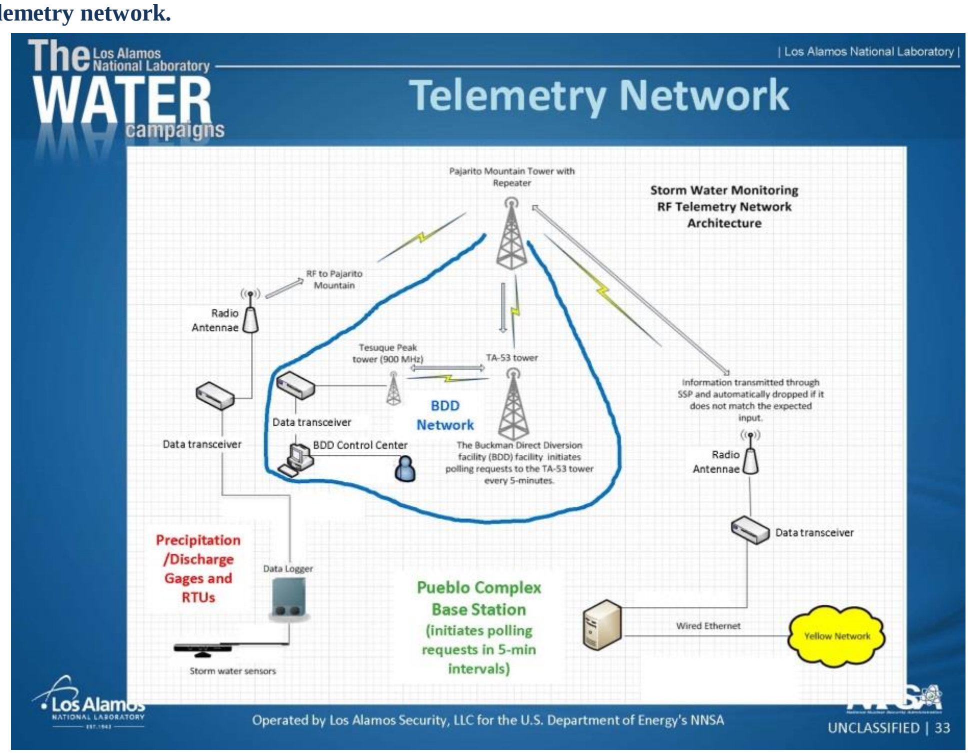
I.2 Revisions to Monitoring Program under the 2015 MOU

The second MOU was signed for three monitoring seasons, and the funding provided for the sampling and analysis of surface water was shared between BDD Board and DOE/LANL. In addition, the responsibility for handling of the samples, including sample inventory, contract laboratory, validation of data, and uploading of the analytical results to a public web site was transferred exclusively to BDD staff. BDD requested that gage station E099 was included in the revised MOU.

II. Early Notification System

The purpose of the early notification system (ENS) was to provide real time stream flow data to the BDD from the following LA/PC watershed locations. A schematic of the BDD network incorporated in the LANL telemetry is provided on Figure 2 (LA-UR-14-25041, 2014).

Figure 2. ENS telemetry network.



The stations participating in the monitoring program in 2015 were:

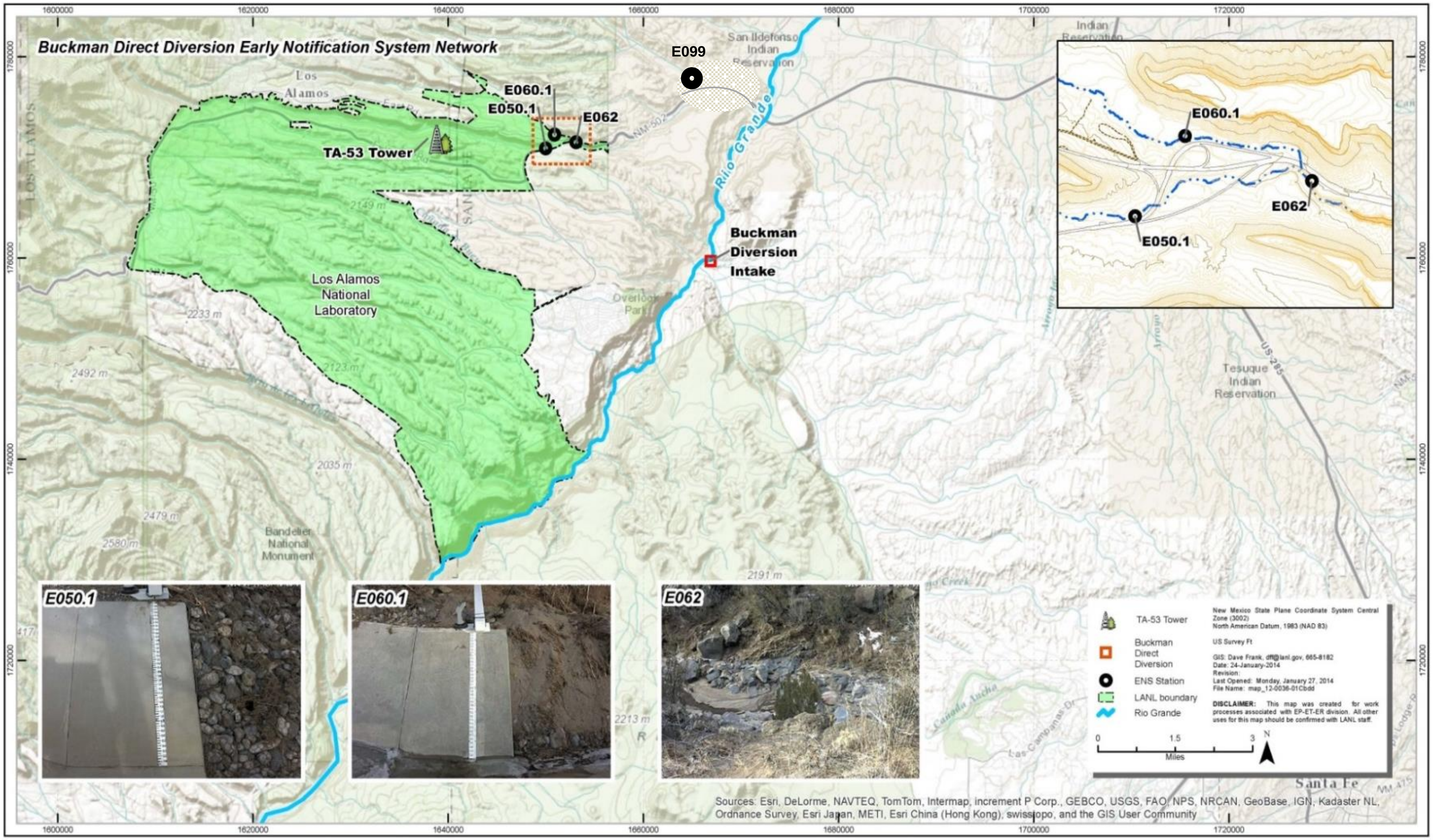
- Gage station E060.1 in Pueblo Canyon above the Los Alamos Canyon confluence and below the grade-control structure;
- Gage station E050.1 in Los Alamos Canyon above the Pueblo Canyon confluence and below the low-head weir;
- Camera station E062.1 in Los Alamos Canyon below its confluence with Pueblo Canyon; and
- Gage station E099 in Guaje Canyon, a major tributary to the Los Alamos Canyon.

Gage stations E050.1 and E060.1 monitor stage height at 5-minute intervals. Sutron 8210 and 9210 data loggers store each recorded stage-height measurement as it is made. Discharge is computed for each 5-minute stage measurement using rating curves for each individual gage. Shaft-encoder float sensors installed in stilling wells were used to measure water levels. Self-contained bubbler pressure sensors (Sutron Accubar) were used to provide backup sensing at E050.1 and E060.1 (LA-UR-11-5459, 2010). An ultrasonic probe sensor (Siemens Miltronics "The Probe") and cameras serve as back up for verification of flow. The cameras collect images every 5 minutes and are available for viewing on a special web site. Discharge data from the gage stations is transmitted to the BDD Control Room through SCADA (see Figure 3).

Gage station E099 does not have a trapezoid flume for measuring the discharge, thus discharges below 50 cfs are only estimates of the actual flows. However, for season 2015, LANL did not release real-time discharge data for this gage, and thus BDD could not use it as a trigger to the ENS as originally intended. The 2011-2014 BDD report on the ENS indicated that E099 flows about 70% of the time when lower LAC flows, and therefore, it was the best indicator of LAC flow that might discharge to the Rio Grande.

The purpose of the ENS was to signal when there is a discharge in the Los Alamos Canyon in order for BDD to initiate closure of the intake of raw water. When discharge at the LANL gage stations was measured to be greater than 5 cfs combined, the BDD was closed and no river water was pumped for 10-12 hours, or until the storm event at Los Alamos region has subsided.

Figure 3. 2015 ENS stations setting.



III. Storm Water Quality Monitoring Program

III.1 LANL Stations, Set up, Capabilities, Triggers

LANL stations monitoring storm water pursuant to the 2015 MOU were gage stations E050.1, E060.1, and E099. Gage stations E050.1 and E060.1 were equipped with concrete, trapezoidal, super-critical flow flume, see Figure 4 (LA-UR-14-25041, 2014). The gages were equipped with measuring equipment of the stage height in order to calculate an accurate discharge through the gage during storm events. In addition, E050.1 and E060.1 were equipped with automated samplers. Station E062 is only equipped with a camera and provides verification of flow or no flow through the LA Canyon after the Pueblo Canyon confluence. LANL maintains a website that hosts real-time images from the cameras to verify flow.

Figure 4. Typical LANL well-equipped gage station.

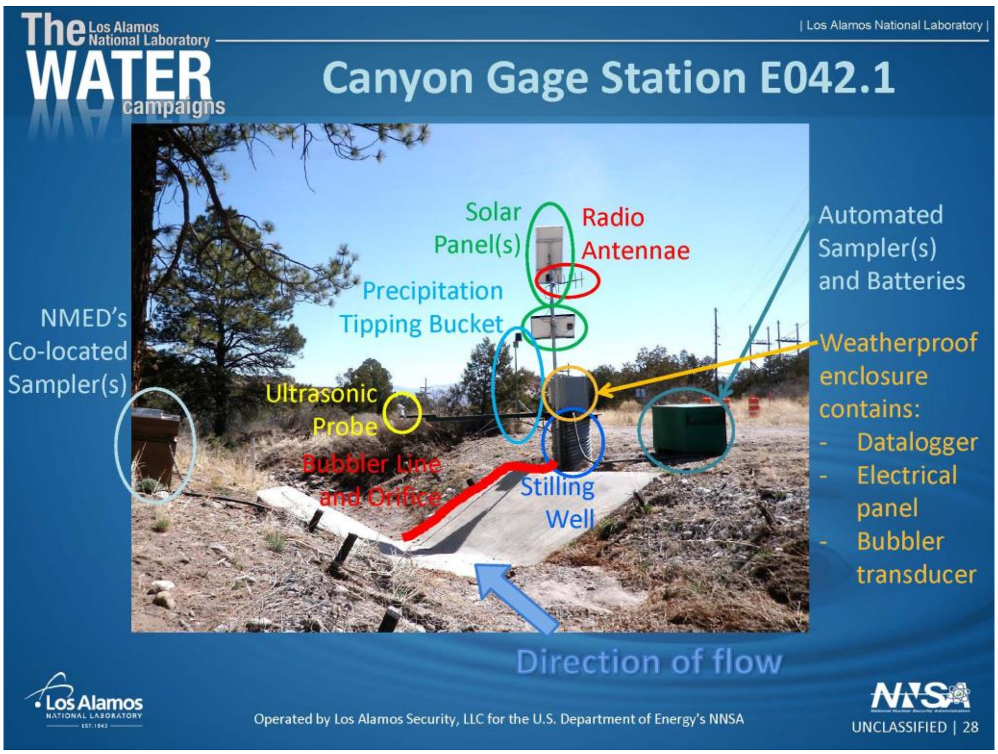
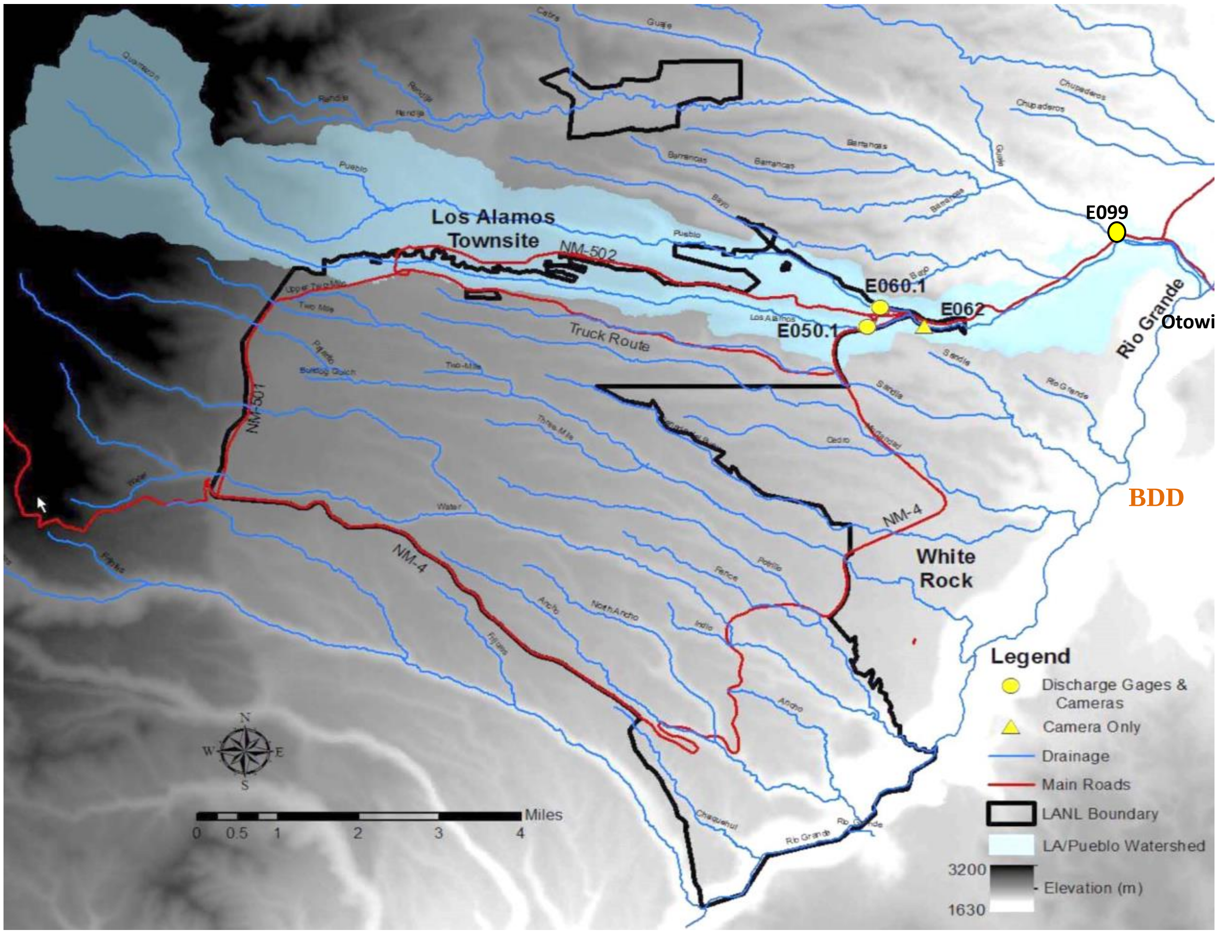


Table 2. LANL gage stations description.

Gage Station	Location ID/Sampling Dates	Latitude (decimal degree)	Longitude (decimal degree)
E050.1	Los Alamos below low-head weir (2011-2015)	35.867182	-106.217583
E060/E060.1	Pueblo below GCS (2010-2015)	35.870942	-106.214606
E062	Los Alamos below Pueblo (no sampling)	35.868828	-106.207102
E099	Guaje at SR-502 (2000-2013)	35.884540	-106.162000

Table 2 lists some of the LANL stations in LA/PC watershed. Analytical data from these stations was used in this report. The "Location ID" is the name under which a gage could be located in the online database Intellus (www.intellusnmdata.com).

Figure 5. LANL gages and sampling stations.



As part of the 2015 MOU, the stations were maintained and inspected by LANL staff. LANL committed to maintain the event sampling system as necessary to support the purpose and performance standards described above. The samplers were inspected no less than weekly from June to October of each year, and after each flow event and/or 72 hours between flow events to collect samples. General maintenance was performed in accordance with LANL SOPs, and included ensuring sampler is powered up and operational, load testing of battery and replacement of battery, inspection of sampler pump tubing, line, and intake to ensure no air leaks, cracks or plugs, and test sample collection cycle to ensure correct programming, tripping and volumes are correct.

III.2 BDD Intake Station: Set up, Capabilities, Triggers

III.2.a. BDD Equipment

The samplers installed at the BDD intake are ISCO Model 3700. Three of the samplers contain 24 1L polyethylene wedge-shaped containers and one contains 6 1L glass and 6 1L polyethylene containers (Figure 6). Thus, the total number of plastic 1-L containers is 77 and the number of 1-L glass containers is 7. The BDD staff maintains the equipment of these samplers.

The samplers can communicate remotely with the BDD Treatment Plant. The samplers can be started or stopped at any time during sampling events, and can be programmed to sample at any frequency and order. Sample collection timing and bottle fill sequence for each sampler can be programmed as well.

Figure 6. BDD intake station set up.

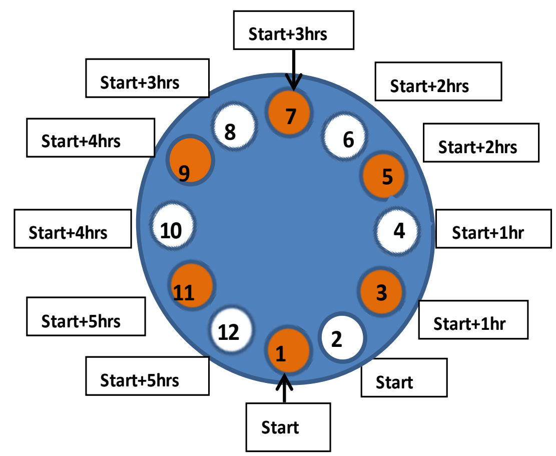
III.2.b. Sampling Strategy

The early warning for BDD to stop diverting and start sampling is a 5 cfs flow in the LA/P canyon system, either canyon (middle Los Alamos Canyon or Pueblo Canyon) or both combined. When such flow is detected, the "storm event" procedure: stop diversion, start sampling is triggered within 10 min of the event. In addition, a baseflow sampling was conducted once a month. The sampling sequence for the 2015 season is described in the chart below, Figure 7. The detailed procedure on how to change the bottles of the sampler can be found in the BDD Laboratory SOP No. 2002.

Figure 7. 2015 Sampling sequence

Three 24-carousel ISCO 3700 containing 24 1-L poly wedges and one 12-carousel ISCO containing 7 1-L amber glass and 5 1-L poly containers									
	24-Samples Carousel No.: 3 ,4, 5							12-Samples Carousel No.: 2	
SUITE	SSC Every 30 min	Iso Rads/GS Every 30 min	Sr-90 Every 30 min	Ra-226/228 Every 30 min	GROSS A/B Every 30 min	Metals Every 30 min	Perchlorate Selected times	DIOX/FUR Every 1 hr	PCB Congener Every 1 hr
LAB	BDD	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS
ANALYTICAL METHOD	ASTM:Method D3977:97C	EPA:901.1 HASL-300	ASTM 5811	EPA:903.1 EPA:904	EPA 900.0	EPA:200.7 EPA:200.8 EPA:245.2	EPA:314.0	EPA:1613B	EPA 1668A
ORDER CODE	SSC	GS+IsoU/Pu/	Sr 90	Ra226/	GAB	Metals	ClO4	D/F	PCBs
FIELD PREP CODE	UF	UF	UF	UF	UF	UF/F	UF	UF	UF
PRESERVATION	ice	HNO3	HNO3	HNO3	HNO3	HNO3	ice	ice	ice
HOLDING TIME (DAYS)	7	180	180	180	180	180	28	365	365
ISCO Type	24	24	24	24	24	24	24	12	12
VOL REQUIRED (L)	1	4	1	1	0.5	2x0.25	0.1	1	1
SHIPPING CONTAINER	poly	poly	poly	poly	poly	poly	poly	glass	glass
Rio Grande at BDD 3	Bottle 1, 9, 17	Bottle 2-5, 10-13,	Bottle 6, 14, 22	Bottle 7, 15, 23	Bottle 8, 16, 24			Selected bottles	Selected bottles
Rio Grande at BDD 4	Bottle 1, 9, 17	Bottle 2-5, 10-13,	Bottle 6, 14, 22	Bottle 7, 15, 23	Bottle 8, 16, 24				
Rio Grande at BDD 5	Bottle 1, 9, 17	Bottle 2-5, 10-13, 18-21	Bottle 6, 14, 22	Bottle 7, 15, 23	Bottle 8, 16, 24				

Timing		BDD 2 bottles	BDD 3 bottles	BDD 4 bottles	BDD 5 bottles
Start	0 hr	sampling 1-2	sampling 1-8	waiting	waiting
Start + 30min		waiting	sampling 9-16	waiting	waiting
Start + 60min	1 hr	sampling 3-4	sampling 17-24	waiting	waiting
Start + 90min		waiting	finished	sampling 1-8	waiting
Start + 120min	2 hrs	sampling 5-6	finished	sampling 9-16	waiting
Start + 150min		waiting	finished	sampling 17-24	waiting
Start + 180min	3 hrs	sampling 7-8	finished	finished	sampling 1-8
Start + 210min		waiting	finished	finished	sampling 9-16
Start + 240min	4 hrs	sampling 9-10	finished	finished	sampling 17-24
Start + 270min		waiting	finished	finished	finished
Start + 210min	5 hrs	sampling 11-12	finished	finished	finished



III.2.c. Analytes and Methods

Samples collected during stormwater sampling will be screened at BDD in order to determine the best representatives of before, during, and after the event. Then, the samples will be sent to a contract laboratory and analyzed for the following analytes using the methods listed in Table 3. The laboratory conducting the analyses for 2015 season was ALS Environmental.

Table 3. Analytes sampled at BDD.

Analytes	Method	Detection Limit*	Field Prep Code
Gross alpha	EPA:900	3 pCi/L	UF
Gross beta	EPA:900	3 pCi/L	UF
Sr-90	ASTM 5811	0.5 pCi/L	UF
Am-241	HASL-300:AM-241	0.05 pCi/L	UF
Ac-228	EPA:901.1	NA	UF
Bi-212	EPA:901.1	NA	UF
Bi-214	EPA:901.1	NA	UF
Cs-137	EPA:901.1	5 pCi/L	UF
Cs-134	EPA:901.1	NA	UF
Co-60	EPA:901.1	5 pCi/L	UF
Na-22	EPA:901.1	10 pCi/L	UF
Np-237	HASL-300: NP-237	10 pCi/L	UF
K-40	EPA:901.1	10 pCi/L	UF
Pa-234m	EPA:901.1	NA	UF
Pb-212	EPA:901.1	NA	UF
Pb-214	EPA:901.1	NA	UF
Th-234	EPA:901.1	NA	UF
Tl-208	EPA:901.1	NA	UF
Pu (isotopic)	HASL-300:ISOPU	0.05 pCi/L	UF
U (isotopic)	HASL-300:ISOU	0.05 pCi/L	UF
Ra-226, -228	903.1, 904	1 pCi/L	UF
TAL metals (23), plus Hg	EPA:200.7, EPA: 200.8, EPA:245.2	0.2 – 300 mg/L	UF, F
SSC	ASTMD3977:97C	3 mg/L	UF
Dioxin-Furans	EPA1613B	0.2 – 0.5 pg/L	UF
PCBs	EPA 1668A	20 – 150 pg/L	UF
Perchlorate	SW846 6850 Modified	0.2 mg/L	UF

III.3 Summary of 2015 Storm Events

III.3.a. Los Alamos/Pueblo Canyons Watershed Storm Events.

The storm events documented by LANL are listed in Table 4. The gage station E050.1 flowed 10 times at discharge rates greater than 5 cfs and gage station E060.1 flowed 3 times at discharge rates greater than 5 cfs.

Table 4. LA/P Canyons storm events documented by LANL.

Table 2.3-1
Maximum Daily Discharge and Storm Water Sampling in the LA/P Watershed during 2015

Date	Los Alamos Canyon Discharge (cfs)[a]							Pueblo and Acid Canyon Discharge (cfs)[a]					
	DP Canyon			Los Alamos Canyon				Acid Canyon		Pueblo Canyon			
	E038	E039.1	E040	E026	E030	E042.1	E050.1	E055.5	E056	E055	E059.5	E059.8	E060.1
21 to 22-May-15	30 BT[b]	24 S[c]	23 S	0 BT	0 BT	6.2 BT	0 BT	<1 IA[d]	4.2 IA	5.3 IA	6.2 BT	—[e]	<1 BT
26-Jun-15	160 S	66 S	41 S	8.4 BT	2.3 BT	0 BT	0 BT	7.1 BT	2.7 BT	1 BT	0 BT	—	0 BT
02-Jul-15	17 BT	5.2 BT	0 BT	<1 BT	0 BT	0 BT	<1 BT	1.9 BT	3.2 BT	12 NS[f]	1.4 BT	—	12 S
03-Jul-15	150 S	51 S	39 S	2.8 BT	5.3 BT	10 S	0 BT	47 NS	31 S	53 S	50 S	—	8.7 NS
07-Jul-15	37 BT	46 S	66 S	18 NS	15 S	53 S	40 S	17 NS	16 NS	12 NS	63 NS	—	3.8 BT
20-Jul-15	78 S	99 S	72 S	4 BT	7.1 BT	56 S	34 S	40 NS	15 S	5.7 BT	5 BT	—	6.7 S
29 to 30-Jul-15	78 S	49 S	28 S	17 NS	6.3 BT	12 NS	22 S	13 NS	9 S	10 NS	<1 NS	—	0 BT
31-Jul-15	110 S	220 S	240 S	25 NS	6.1 BT	74 S	43 S	7.8 BT	2.2 BT	<1 BT	73 S	—	4.2 BT
01-Aug-15	21 BT	25 NS	23 NS	21 NS	4.3 BT	12 NS	15 NS	<1 BT	3.1 BT	4.4 BT	1 BT	—	<1 BT
02-Aug-15	2 BT	1.8 BT	0 BT	66 S	6.7 BT	12 NS	18 NS	<1 BT	1.9 BT	1.3 BT	1.1 BT	—	0 BT
03-Aug-15	8.6 BT	7.5 BT	<1 BT	26 NS	7.1 BT	15 NS	24 NS	<1 BT	3.8 BT	3.5 BT	1.4 BT	—	0 BT
08-Aug-15	52 S	46 S	18 NS	6.8 BT	2.5 BT	6.7 BT	11 S	18 NS	3.2 BT	<1 BT	1.1 BT	—	0 BT
20-Oct-15	10 BT	<1 BT	0 BT	0 BT	0 BT	0 BT	0 BT	2.8 BT	10 NS	0 BT	<1 BT	<1 BT	0 BT
21-Oct-15	16 BT	28 S	37 S	<1 BT	5 BT	17 S	18 S	3.7 BT	25 S	13 NS	5.6 BT	10 S	0 BT
23-Oct-15	5.3 BT	1.1 BT	0 BT	21 NS	9.2 BT	8.1 NS	5.4 S	1.3 BT	14 NS	<1 BT	<1 BT	<1 BT	0 BT
29-Oct-15	9.4 BT	7 BT	<1 BT	1.9 BT	<1 BT	0 BT	0 BT	2.4 BT	11 NS	10 NS	<1 BT	<1 BT	0 BT

[a] Maximum discharge values reported have an accuracy of ± 50 cfs.
[b] BT = Below triggering threshold, no sample collected.
[c] S = Sample was collected, cell is highlighted in yellow.
[d] IA = Sampler was inactive.
[e] — = E059.8 was built in 2015. Sampling equipment was installed, and the sampler was activated on September 28, 2015.
[f] NS = No sample was collected, cell is highlighted in blue.

III.3.b. BDD Sampled Storm Events.

Table 5 lists the sampled storm events at the Diversion and the most important parameters associated with each event. The documented events were all triggered by discharges at either E050.1 or E060.1 LANL gages. BDD also sampled four baseflow dates: 6/19/2015, 7/9/2015, 9/1/2015, and 9/23/2015.

Table 5. BDD documented 2015 storm events.

Date	Crossover Date	PeakFlow E109.9	PeakTime E109.9	PeakFlow E050.1	PeakTime E050.1	PeakFlow E060.1	PeakTime E060.1	Samples?	Max Otowi Flow (cfs)	Comments
7/2/15		no station	na	0.5	1550	24	1648	Y	1,640	Small river event at 1730. Guaje flow of 80 cfs at 1705.
7/7/15	AM & PM 7/8	no station	na	53	0722	16/19	0615/1025	Y	3,190	River events of 3,080 cfs and 3,190 cfs at 0600 and 0830. Another river event of 3,600 cfs on 7/8 at 0300. Guaje flow 7.5 cfs at 0555, 13 cfs at 0915, and 97 cfs at 1745.
7/20/15	7/21	no station	na	40	2200	5.6	1947	Y	1,370	Small river event at 2345. Guaje flow 4.3 cfs at 1940.
7/30/15	7/29	no station	na	23.6	0020	<1		Y	no record	River event at 0000. Guaje flow.
7/31/15		no station	na	53	1551	4.5	1746	Y	1,910	Small river event at 1530, and Guaje flow of 31.5 cfs at 1450.
10/21/15		no station	na	24.3	1930			Y	2,540	River event at 19:30. Guaje flow 21 cfs at 1620.
10/24/15	10/23	no station	na	6.6	0017	<1		Y	723	Small river event with max discharge at 0715.

III.3.c. LA/P Canyons Daily Discharges

The LANL report (LA-UR-16-22705, 2016) published the 5 min discharge data for many of the gages located in the LA/PC Watershed. From that data and from the 5 min discharges through the E099 gage in the Guaje Canyon, Table 6 was put together. If the flow at any gage E050.1, E060.1, or E099 was 5 cfs or greater, that date was included in the table along with the discharges of the remaining gages. The total days during which the flow through E050.1 were greater than 5 cfs were 15, through E060.1 - 2, and through E099 - 10. However, the flow measurements at E099 are only estimates for discharges below 50 cfs, and, therefore the total days of flows that might have been 5 cfs or greater may be as high as 16-18. An interesting fact from the table is that there are a few dates when Guaje Canyon flowed but samples in the LA/P Canyons watershed were not collected by BDD, and, therefore important data of the surface water monitoring was omitted. Those dates were 7/3/2015, 7/5/2015, and 8/17/2015.

Table 6. Maximum daily discharges for gages in LA/P Canyons watershed.

Date	E050.1	E060.1	E099	BDD Sampled
7/2/2015	0.1	11.3 S	79.8	Y
7/3/2015	0	1.4	499.9	N
7/5/2015	0	0	3.3	N
7/7/2015	40.4 S	3.8	96.6	Y
7/9/2015	3.6	0.0	5.3	Y
7/20/2015	34.2 S	6.7 S	4.3	Y
7/21/2015	26.5	0.1	2.6	N
7/29/2015	22.0 S	0	0.1	Y
7/30/2015	18.0	0	0	N
7/31/2015	43.0 S	4.2	31.5	Y
8/1/2015	15.1	0.4	23.0	N
8/2/2015	18.4	0	28.0	N
8/3/2015	24.0	0	10.0	N
8/4/2015	15.9	0	4.8	N
8/5/2015	10.3	0	2.9	N
8/6/2015	7.0	0	0.7	N
8/8/2015	10.6 S	0	1.5	N
8/17/2015	0	0	10.0	N
10/21/2015	18.4 S	0	17.5	Y
10/23/2015	5.4 S	0	0	Y
Total Days	15	2	10	

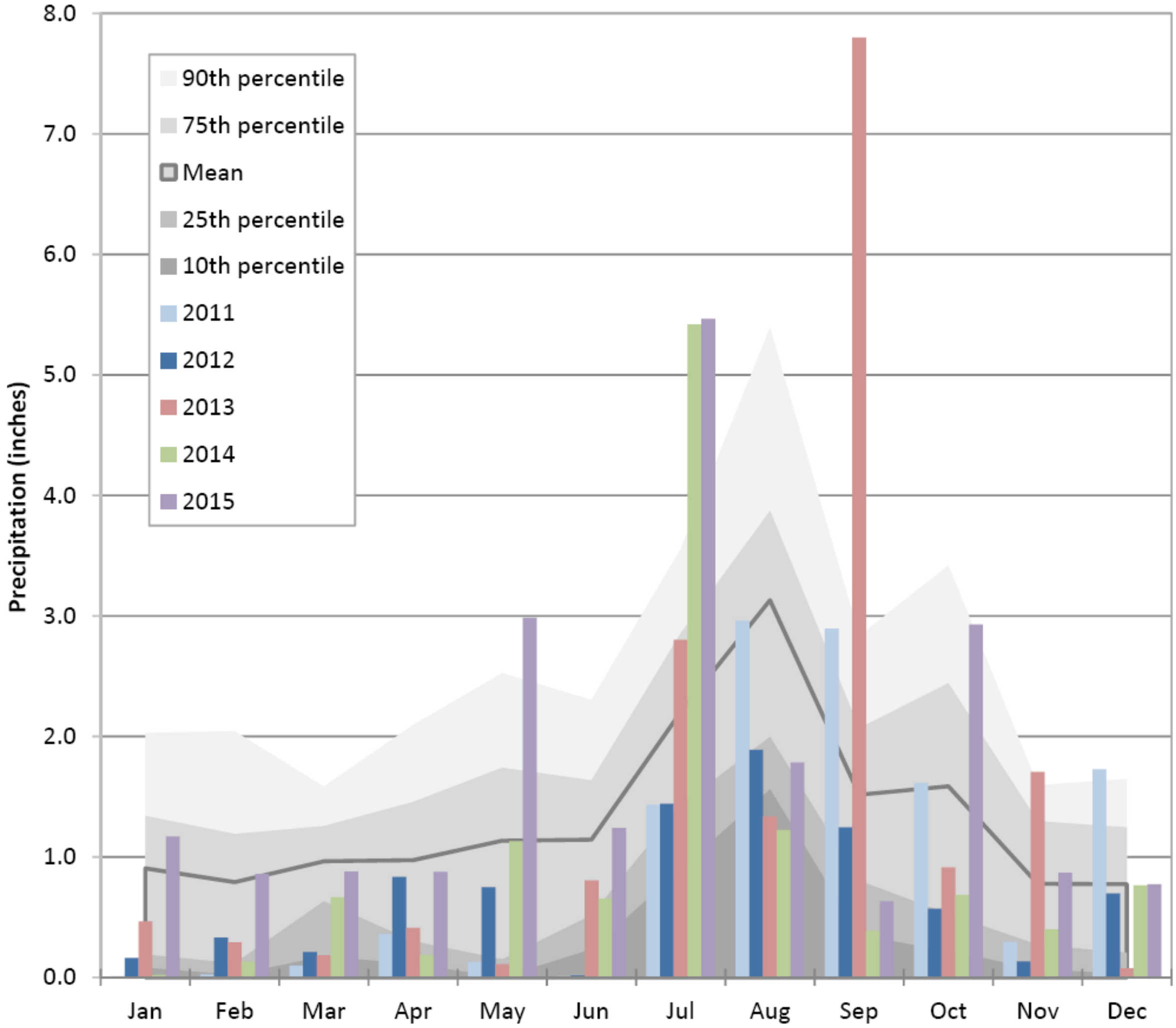
S means this event was sampled by LANL

IV. BDD STORM EVENTS - DETAILS

IV.1 Summer Precipitation 2015

The total precipitation for the region of Los Alamos is pictured on Figure 8 ((LA-UR-16-22705, 2016).

Figure 8. Total precipitation 2011-2015 for Los Alamos.



The daily precipitation data as collected for Santa Fe, NM is provided in Table 7.

Table 7. 2015 Daily precipitation data Santa Fe.

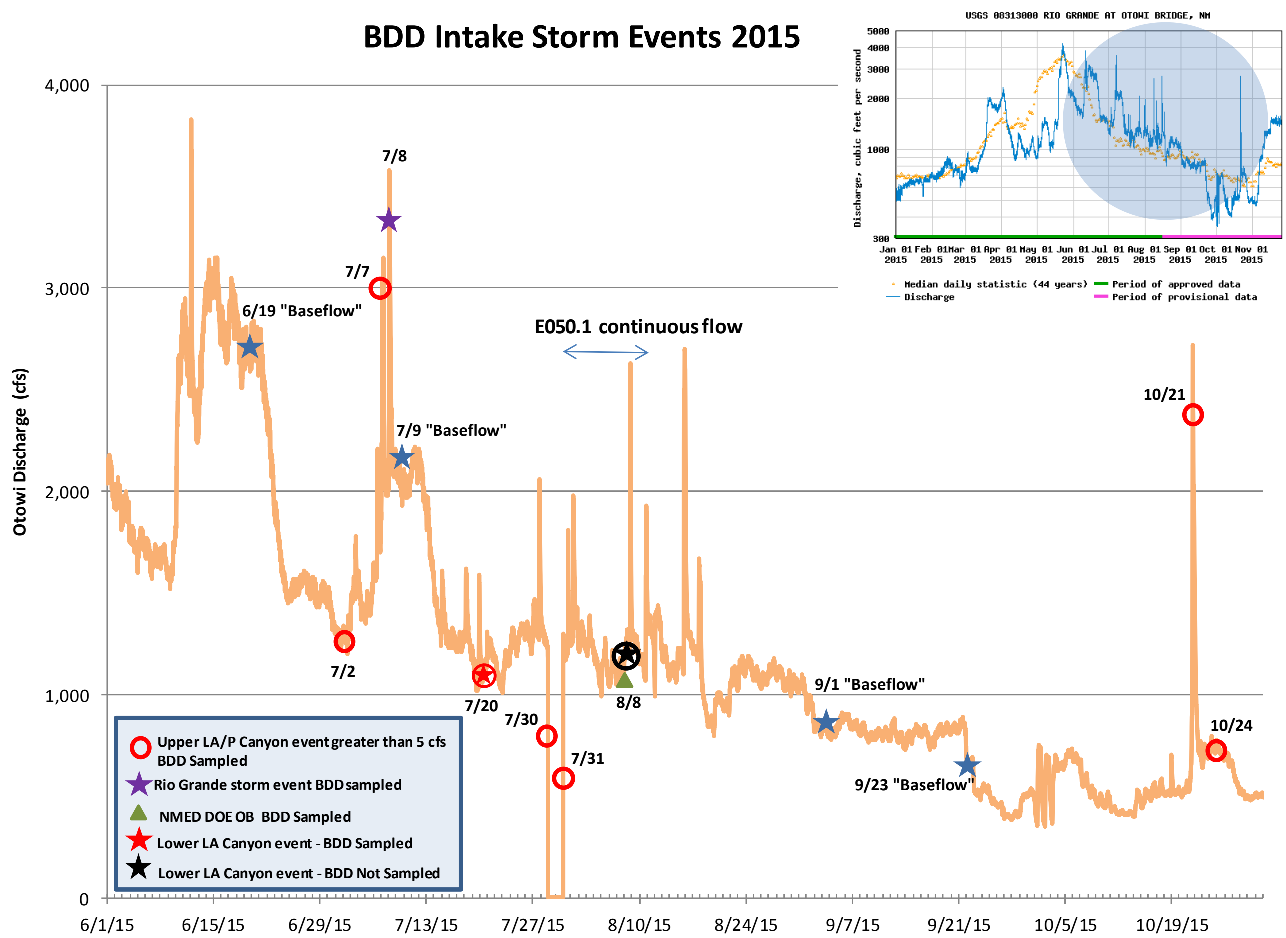
Jul-15			Aug-15			Sep-15			Oct-15		
Day	Precip (in)	Event	Day	Precip (in)	Event	Day	Precip (in)	Event	Day	Precip (in)	Event
1	0	Rain	1	0.02	Rain	1	0	Rain	1	0	
2	0.58	Rain	2	0.05	Rain	2	0	Rain	2	0	
3	0.2	Rain	3	0.05	Fog , Rain	3	0		3	0.05	Rain
4	0		4	0		4	0.01	Rain	4	0.15	Rain
5	0.36	Rain	5	0		5	0		5	0.17	Rain
6	0.1	Rain	6	0		6	0		6	0.05	Rain

7	0.71	Rain	7	0.02	Rain	7	0	Rain	7	0.04	
8	0.01	Rain	8	0.22	Rain	8	0	Rain	8	0	
9	0.02	Rain	9	0.17		9	0		9	0	
10	0.02	Rain	10	0.11	Rain	10	0		10	0	
11	0	Rain	11	0	Fog	11	0	Rain	11	0	
12	0.12	Rain	12	0		12	0		12	0	
13	0	Rain	13	0		13	0		13	0	
14	0.17	Rain	14	0.04	Rain	14	0		14	0	
15	0.15	Rain	15	0.01	Rain	15	0.02	Rain	15	0	
16	0.01	Rain	16	0.01	Rain	16	0		16	0	Rain
17	0		17	0.27	Rain	17	0		17	0	
18	0.08	Rain	18	0	Rain	18	0		18	0.02	Rain
19	0.09	Rain	19	0		19	0		19	0.01	Rain
20	0.59	Rain	20	0		20	0		20	0.13	Rain
21	0.08	Fog , Rain	21	0		21	0		21	1.15	Rain
22	0	Rain	22	0	Rain	22	0.26	Rain	22	0.02	Rain
23	0.27		23	0.02	Rain	23	0.06	Rain	23	0.02	Rain
24	0		24	0.02		24	0.01		24	0.01	Rain
25	0		25	0.01	Rain	25	0		25	0	
26	0.06	Rain	26	0.02	Rain	26	0		26	0	
27	0.01	Rain	27	0.02	Rain	27	0		27	0	
28	0.08	Rain	28	0		28	0		28	0	
29	0.49	Rain	29	0.02	Rain	29	0		29	0.13	Rain
30	0.07	Rain	30	0		30	0	Rain	30	0.19	Rain
31	0.59	Rain	31	0.05	Rain				31	0	Fog

IV.2 2015 Storm Events

The graph below pictures the Rio Grande discharge as measured at the Otowi Gage station. Superimposed on the graph are storm events that occurred in the LA/PCW. The graph also marks which of those events were sampled by BDD. The green triangles mark events that were sampled by NMED DOE OB at the BDD intake.

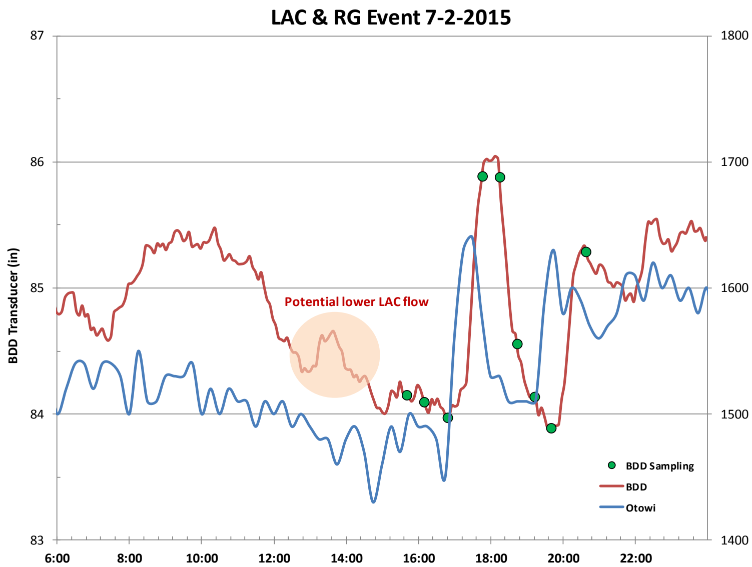
Figure 9. Rio Grande hydrograph at Otowi Gage, 6/1/2015 - 10/31/2015.



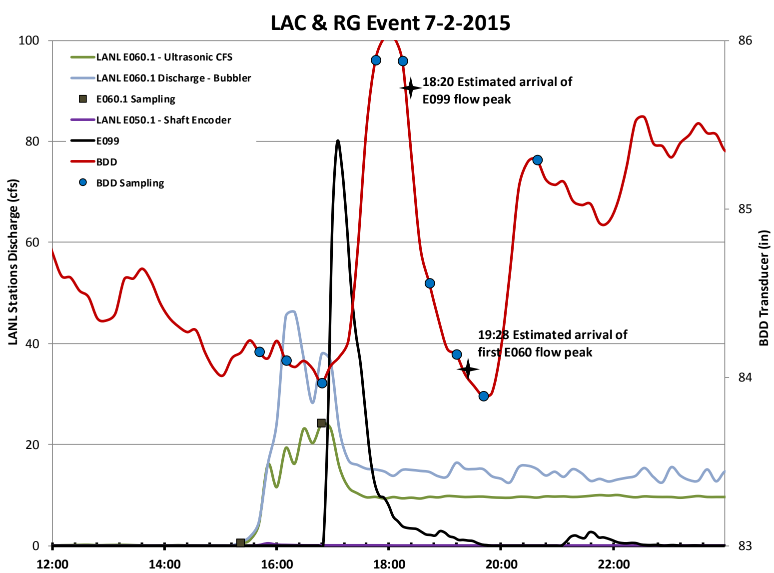
The rest of this section dedicates a page or two for each storm event sampled by BDD. The data for each event consists of weather information, sampling times, discharge data, hydrographs, and SSC and turbidity data as a function of time at BDD. The storm water concentrations of Pu 239/240 during each event are also presented together with the SSC.

IV.2.a. July 2, 2015 LAC & RG Storm Event

Narrative of Event: This was a LA canyon and Rio Grande storm event. Sampling was triggered by E060.1 flow. Its flow was too low to be observed at BDD Intake, but potential lower LAC flows were detected.



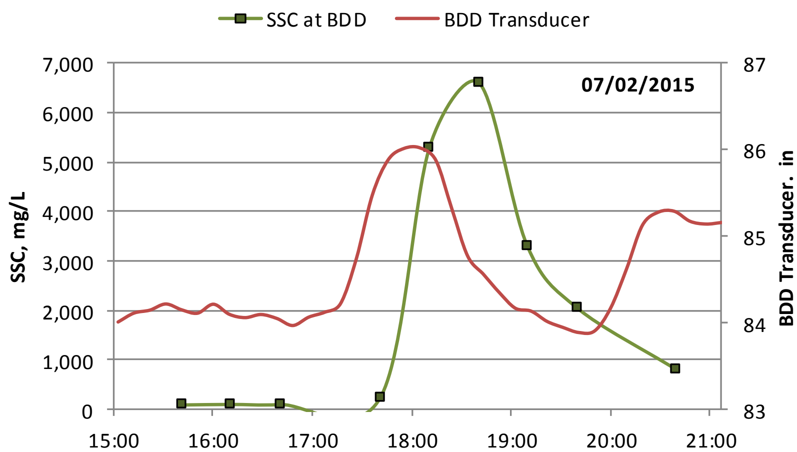
Station	Max Discharge cfs	Time Max
Otowi	1640	17:30
E050.1	0.5	15:50
E060.1	24	16:48
E099	80	17:05
BDD	na	17:55



Sampling & Analyses Information			
Bottle	**Sampler BDD2**	**Time**	**Otowi (cfs)**
1	SSC	15:41	1460
2	Metals UF/F	15:41	1460
3	SSC	16:41	1490
4	Metals UF/F	16:41	1490
5	PCBs	17:41	1560
6	D/F	17:41	1560
7	PCBs	18:41	1530
8	D/F	18:41	1530
9	SSC	19:40	1510
10	U/Pu/Np/Am/GS	19:40	1510
11	SSC	20:40	1580
12	U/Pu/Np/Am/GS	20:40	1580
Bottle	**Sampler BDD3**	**Time**	**Otowi (cfs)**
1	U/Pu/Np/Am/GS	15:41	1460
2	U/Pu/Np/Am/GS	15:41	1460
3	U/Pu/Np/Am/GS	15:41	1460
4	U/Pu/Np/Am/GS	15:41	1460
5	Sr-90	15:41	1460
6	Ra 226/228	15:41	1460
7	Gross a/b	15:41	1460
8		15:41	1460
9	SSC	16:11	1500
10	U/Pu/Np/Am/GS	16:11	1500
11	U/Pu/Np/Am/GS	16:11	1500
12	U/Pu/Np/Am/GS	16:11	1500
13	U/Pu/Np/Am/GS	16:11	1500
14	Sr-90	16:11	1500
15	Ra 226/228	16:11	1500
16	Gross a/b	16:11	1500
17	U/Pu/Np/Am/GS	16:41	1490
18	U/Pu/Np/Am/GS	16:41	1490
19	U/Pu/Np/Am/GS	16:41	1490
20	U/Pu/Np/Am/GS	16:41	1490
21	Sr-90	16:41	1490
22	Ra 226/228	16:41	1490
23		16:41	1490
24		16:41	1490

2015	Temp. (°F)			Humidity (%)			Wind (mph)			Precip. (in)	Events
Jul	high	avg	low	high	avg	low	high	avg	high	sum	
1	88	74	61	64	38	18	21	8	28	0	Rain
2	82	71	60	85	63	29	16	7	26	0.58	Rain
3	74	65	56	100	70	45	17	5	23	0.2	Rain
4	77	68	60	78	57	32	24	6	-	0	
5	78	68	58	100	62	38	15	5	22	0.36	Rain
6	74	66	57	100	75	51	18	5	16	0.1	Rain
7	70	62	54	100	81	51	15	6	21	0.71	Rain

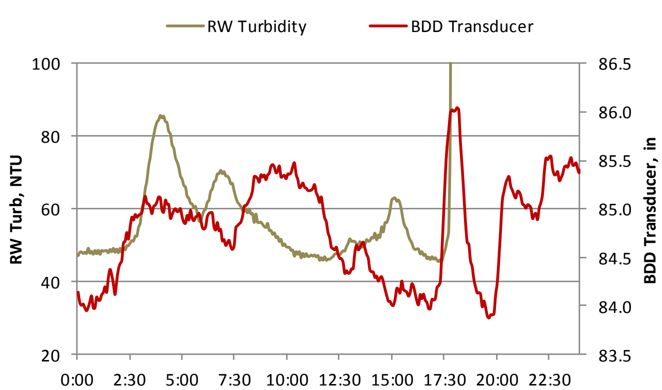
The RG experienced small storm event on this date, about 12% rise in discharge. However, it did have an impact on the SSC. The plot below indicates that the increase in SSC was most probably due to the increase in RG discharge as detected by the BDD transducer. The increase in SSC had a 45-min delay with respect to the increase in discharge.

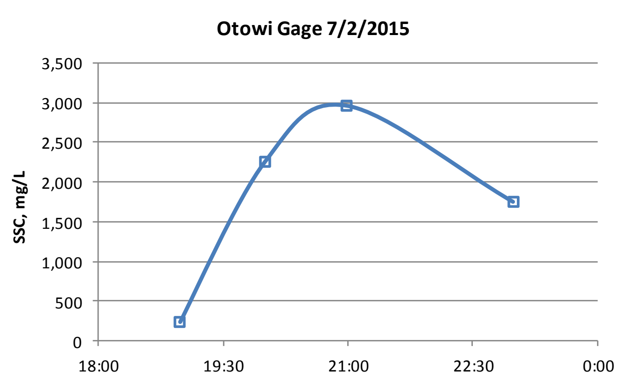


Bottle	Sampler BDD4	Time	Otowi (cfs)
1	SSC	17:41	1560
2	U/Pu/Np/Am/GS	17:41	1560
3	U/Pu/Np/Am/GS	17:41	1560
4	U/Pu/Np/Am/GS	17:41	1560
5	U/Pu/Np/Am/GS	17:41	1560
6	Sr-90	17:41	1560
7	Ra 226/228	17:41	1560
8	Metals UF/F	17:41	1560
9	SSC	18:11	1580
10	U/Pu/Np/Am/GS	18:11	1580
11	U/Pu/Np/Am/GS	18:11	1580
12	U/Pu/Np/Am/GS	18:11	1580
13	U/Pu/Np/Am/GS	18:11	1580
14	Sr-90	18:11	1580
15	Ra 226/228	18:11	1580
16	Metals UF/F	18:11	1580
17	SSC	18:41	1530
18	U/Pu/Np/Am/GS	18:41	1530
19	U/Pu/Np/Am/GS	18:41	1530
20	U/Pu/Np/Am/GS	18:41	1530
21	U/Pu/Np/Am/GS	18:41	1530
22	Sr-90	18:41	1530
23	Ra 226/228	18:41	1530
24	Metals UF/F	18:41	1530
Bottle	**Sampler BDD5**	**Time**	**Otowi (cfs)**
1-8		missed	
9	SSC	19:10	1510
10	U/Pu/Np/Am/GS	19:10	1510
11	U/Pu/Np/Am/GS	19:10	1510
12	U/Pu/Np/Am/GS	19:10	1510
13	U/Pu/Np/Am/GS	19:10	1510
14	Sr-90	19:10	1510
15	Ra 226/228	19:10	1510
16	Metals UF/F	19:10	1510
17-24		missed	

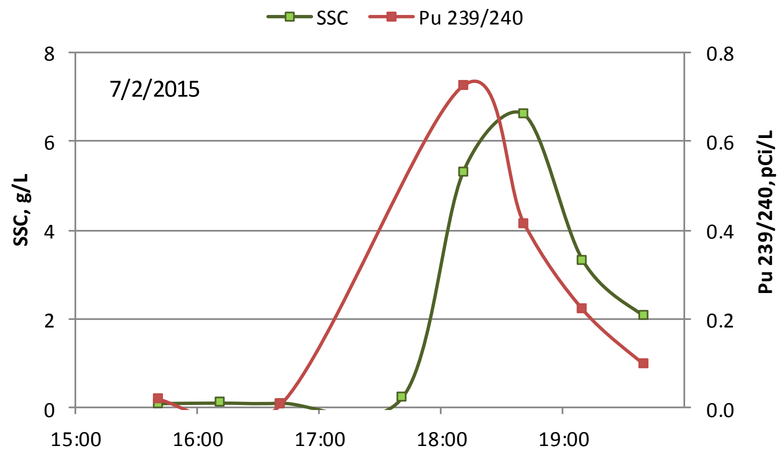
In order to determine the origin of some peaks in the BDD transducer and whether they may be due to discharge from the lower LAC, we plotted the turbidity as measured on the pumped raw water. An increase in turbidity together with a BDD transducer peak that does not "show" on the Otowi gage discharge plot may indicate a flow from the lower LAC.

On the plot below, the first peak in BDD transducer is followed by a peak in turbidity and therefore an indication of lower LAC flow. The second peak of the BDD transducer was not followed by a peak in turbidity and therefore excluded as a potential lower LAC flow. However, the third peak in BDD transducer was followed by an increase in turbidity, and, therefore attributed to the lower LAC flow. This conclusion was confirmed by the SSC sampling at Otowi gage which peaked at 21:00 on 7/2/2015.





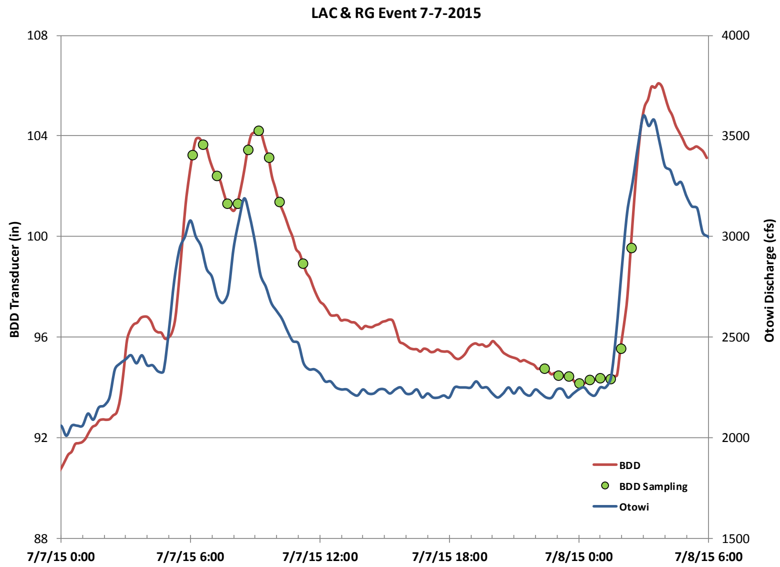
The concentrations of Pu 239/240 and SSC were plotted. The Pu peak of the concentrations occurred before the SSC peak which may indicate a strong LAC flow flowing into the RG during the event.



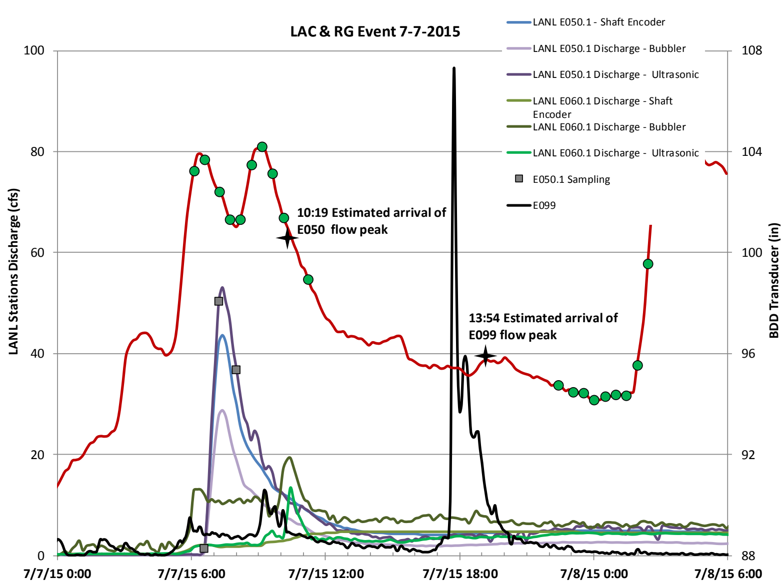
Considering the fact that Guaje Canyon flowed at high 90 cfs, that a potential lower LAC flow was detected by the BDD transducer substantially earlier than RG rise, and that the RG discharge rose only 12%, we would expect a “strong” (high flow) LAC event. In the 2011-2014 report, Figure 211 presented a fit/model of the Pu 239/240 concentrations as a function of the SSC for “strong” LAC events. We tested this model for the 7/2/2015 event, and compared with the measured values of Pu 239/240. The results are shown in Table 14. The model appears to be working well for this event in predicting contaminant concentrations in storm water, and confirmed that 7/2/2015 event could be qualified as “strong”, meaning the flow of the lower LAC was 10% or higher than the RG flow.

IV.2.a. July 7, 2015 AM LAC & RG Storm Event

Narrative of Event: The AM event was a LA canyon and Rio Grande storm event. Sampling was triggered by E060.1 flow, but both canyons, Los Alamos and Pueblo, flowed. Both flows were too low in comparison to RG flow to be observed at BDD Intake. The PM event was triggered by the ENS but it was insignificant in strength.



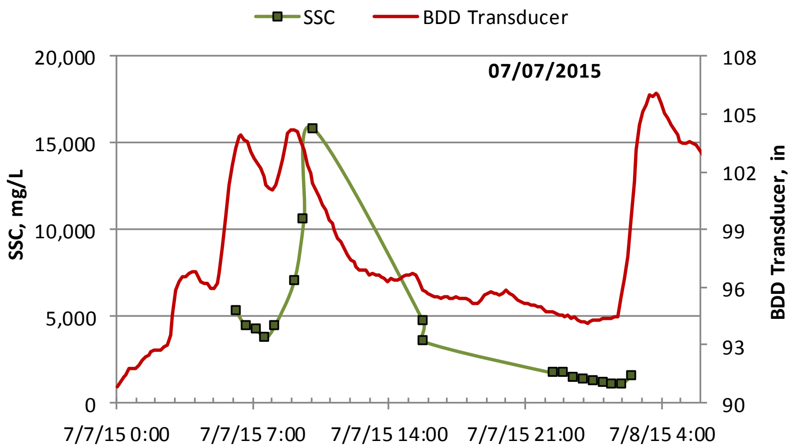
Station	Max Discharge cfs	Time Max
Otowi	3080/3190	6:00/8:30
E050.1	53.1	7:22
E060.1	16/19	6:15/10:25
E099	7.5 - 97	5:55 – 17:45
BDD	NA	6:34/8:50



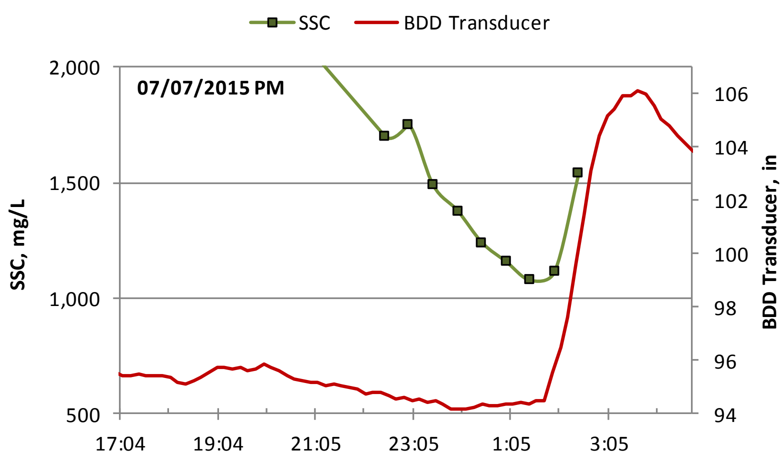
Sampling & Analyses Information			
Bottle	**Sampler BDD2**	**Time**	**Otowi cfs**
1	SSC	6:09	2940
2	Metals UF/F	6:09	2940
3	PCBs	7:09	2950
4	D/F	7:09	2950
5	PCBs	8:09	2670
6	D/F	8:09	2670
7	SSC	9:08	3190
8	broken	9:08	
9	SSC	10:08	2750
10	Metals UF/F	10:08	2750
11	SSC	11:09	2530
12	U/Pu/Np/Am/GS	11:09	2530
Bottle	**Sampler BDD3**	**Time**	**Otowi cfs**
1	U/Pu/Np/Am/GS	6:09	2940
2	U/Pu/Np/Am/GS	6:09	2940
3	U/Pu/Np/Am/GS	6:09	2940
4	U/Pu/Np/Am/GS	6:09	2940
5	Sr-90	6:09	2940
6	Ra 226/228	6:09	2940
7	Gross a/b	6:09	2940
8		6:09	
9	SSC	6:39	3080
10	U/Pu/Np/Am/GS	6:39	3080
11	U/Pu/Np/Am/GS	6:39	3080
12	U/Pu/Np/Am/GS	6:39	3080
13	U/Pu/Np/Am/GS	6:39	3080
14	Sr-90	6:39	3080
15	Ra 226/228	6:39	3080
16	Metals UF/F	6:39	3080
17	SSC	7:09	2950
18	U/Pu/Np/Am/GS	7:09	2950
19	U/Pu/Np/Am/GS	7:09	2950
20	U/Pu/Np/Am/GS	7:09	2950
21	U/Pu/Np/Am/GS	7:09	2950
22	Sr-90	7:09	2950
23	Ra 226/228	7:09	2950
24	Metals UF/F	7:09	2950

2015	Temp. (°F)			Humidity (%)			Wind (mph)			Precip. (in)	Events
Jul	high	avg	low	high	avg	low	high	avg	high	sum	
5	78	68	58	100	62	38	15	5	22	0.36	Rain
6	74	66	57	100	75	51	18	5	16	0.1	Rain
7	70	62	54	100	81	51	15	6	21	0.71	Rain
8	69	60	52	99	71	44	18	5	28	0.01	Rain
9	70	62	54	100	65	46	15	5	-	0.02	Rain
10	73	63	53	97	63	26	16	5	30	0.02	Rain
11	75	65	55	68	51	31	18	7	26	0	Rain

Starting on 7/7/2015, the RG experienced storm events for two consecutive days. The plot below indicates that the increase in SSC was most probably due to the increase in RG discharge as detected by the BDD transducer. The increase in SSC had a 3.5-hrs delay with respect to the first peak of RG discharge.



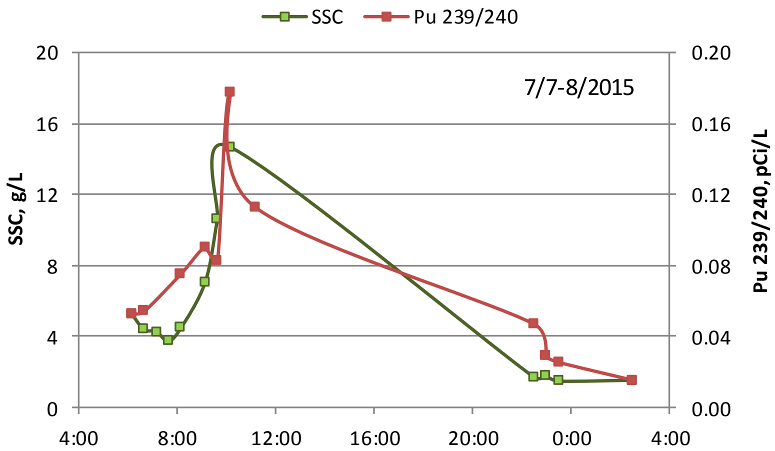
A close up of the PM sampling of the SSC is presented below. In this PM sampling, the SSC increase followed the Otowi discharge peak closely.



Potential lower LAC flows could not be identified using the BDD raw water turbidity measurements because BDD was not pumping raw water during this period of time.

Sampling & Analyses Information				
Bottle		**Sampler BDD4**	**Time**	**Otowi cfs**
1	SSC		7:39	2800
2	U/Pu/Np/Am/GS		7:39	2800
3	U/Pu/Np/Am/GS		7:39	2800
4	U/Pu/Np/Am/GS		7:39	2800
5	U/Pu/Np/Am/GS		7:39	2800
6	Sr-90		7:39	2800
7	Ra 226/228		7:39	2800
8	Metals UF/F		7:39	2800
9	SSC		8:09	2670
10	U/Pu/Np/Am/GS		8:09	2670
11	U/Pu/Np/Am/GS		8:09	2670
12	U/Pu/Np/Am/GS		8:09	2670
13	U/Pu/Np/Am/GS		8:09	2670
14	Sr-90		8:09	2670
15	Ra 226/228		8:09	2670
16	Metals UF/F		8:09	2670
17	SSC		8:39	2940
18	U/Pu/Np/Am/GS		8:39	2940
19	U/Pu/Np/Am/GS		8:39	2940
20	U/Pu/Np/Am/GS		8:39	2940
21	U/Pu/Np/Am/GS		8:39	2940
22	Sr-90		8:39	2940
23	Ra 226/228		8:39	2940
24	Metals UF/F		8:39	2940
Bottle		**Sampler BDD5**	**Time**	**Otowi cfs**
1	U/Pu/Np/Am/GS		9:08	3190
2	U/Pu/Np/Am/GS		9:08	3190
3	U/Pu/Np/Am/GS		9:08	3190
4	U/Pu/Np/Am/GS		9:08	3190
5	Sr-90		9:08	3190
6	Ra 226/228		9:08	3190
7	Metals UF/F		9:08	3190
8	Gross a/b		9:08	3190
9	SSC		9:38	2970
10	U/Pu/Np/Am/GS		9:38	2970
11	U/Pu/Np/Am/GS		9:38	2970
12	U/Pu/Np/Am/GS		9:38	2970
13	U/Pu/Np/Am/GS		9:38	2970
14	Sr-90		9:38	2970
15	Ra 226/228		9:38	2970
16	Metals UF/F		9:38	2970
17	U/Pu/Np/Am/GS		10:08	2750
18	U/Pu/Np/Am/GS		10:08	2750
19	U/Pu/Np/Am/GS		10:08	2750
20	U/Pu/Np/Am/GS		10:08	2750
21	Sr-90		10:08	2750
22	Ra 226/228		10:08	2750
23	Gross a/b		10:08	2750
24			10:08	2750

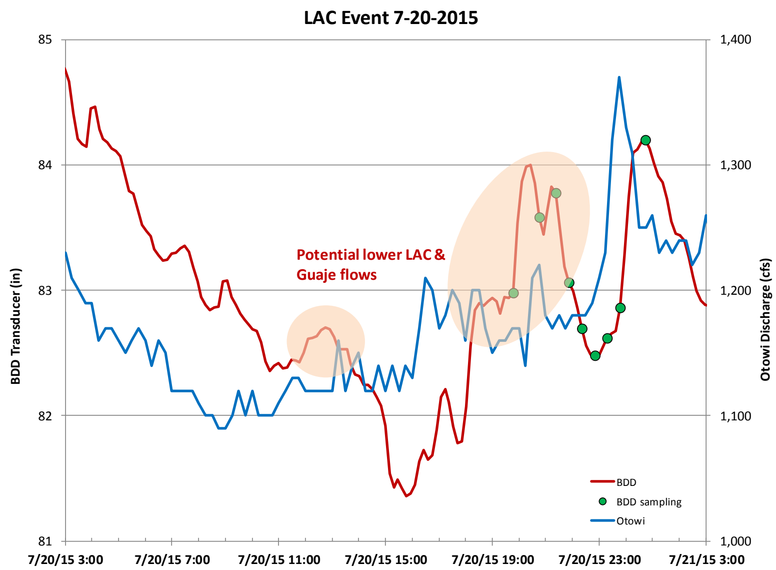
The concentrations of Pu 239/240 and SSC were plotted. There was a good agreement of the Pu storm water concentrations and SSC peaks but the concentrations of Pu 239/240 were very low which is indicative of high dilution by the RG flow.



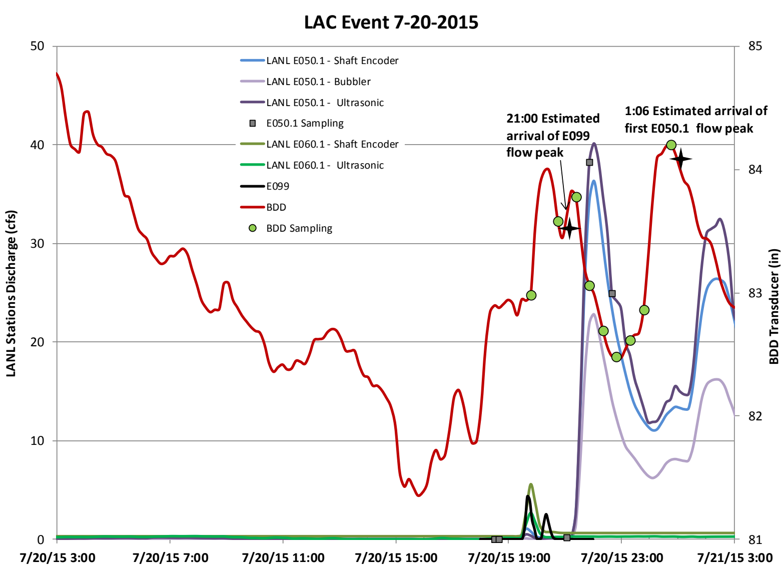
The RG experienced strong storm event with more than 50% change in its discharge, and high absolute discharges. Guaje Canyon flow was very low and insignificant in the AM event. All these factors indicate the occurrence of a not “strong” LAC event and therefore, the model from 2011-2014 MOU Report would not be appropriate to predict concentrations of Pu 239/240 at BDD for this date.

IV.2.a. July 20, 2015 LAC & RG Storm Event

Narrative of Event: This was a LA canyon and Rio Grande storm event. Sampling was triggered by E060.1 flow, but both canyons, Los Alamos and Pueblo, flowed. Their flows were too low to be observed at BDD Intake, but potential lower LAC flows were detected. The RG event occurred later, in the early hours of 7/21/2015.



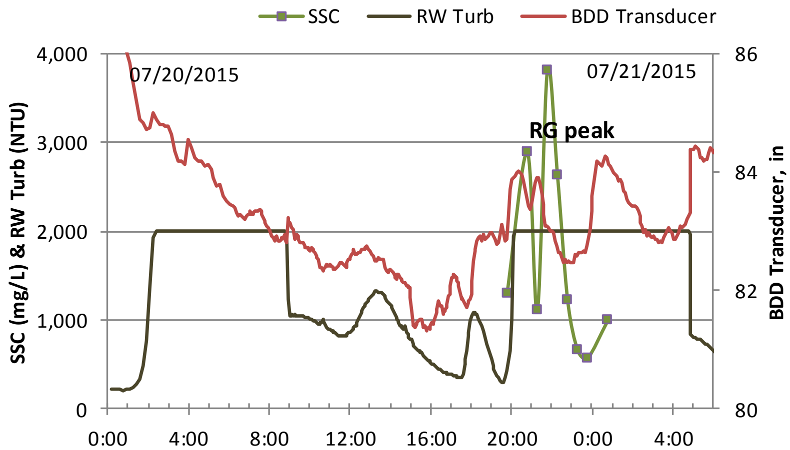
Station	Max Discharge cfs	Time Max
Otowi	1370	23:45
E050.1	40	22:00
E060.1	5.6	19:47
E099	4.3	19:40
BDD	NA	20:25



Sampling & Analyses Information			
Bottle	**Sampler BDD2**	**Time**	**Otowi cfs**
1	SSC	19:48	1160
2	U/Pu/Np/Am/GS	19:48	1160
3	SSC	20:48	1160
4	U/Pu/Np/Am/GS	20:48	1160
5	PCBs	21:48	1170
6	D/F	21:48	1170
7	SSC	22:48	1180
8	PCBs	22:48	1180
9	SSC	23:48	1230
10	Metals UF/F	23:48	1230
11	SSC	0:48	1370
12	U/Pu/Np/Am/GS	0:48	1370
Bottle	**Sampler BDD3**	**Time**	**Otowi cfs**
1-24 not sampled			
Bottle	**Sampler BDD4**	**Time**	**Otowi cfs**
1	SSC	21:18	1270
2	U/Pu/Np/Am/GS	21:18	1270
3	U/Pu/Np/Am/GS	21:18	1270
4	U/Pu/Np/Am/GS	21:18	1270
5	U/Pu/Np/Am/GS	21:18	1270
6	Sr-90	21:18	1270
7	Ra 226/228	21:18	1270
8	Metals UF/F	21:18	1270
9	SSC	21:48	1170
10	U/Pu/Np/Am/GS	21:48	1170
11	U/Pu/Np/Am/GS	21:48	1170
12	U/Pu/Np/Am/GS	21:48	1170
13	U/Pu/Np/Am/GS	21:48	1170
14	Sr-90	21:48	1170
15	Ra 226/228	21:48	1170
16	Metals UF/F	21:48	1170

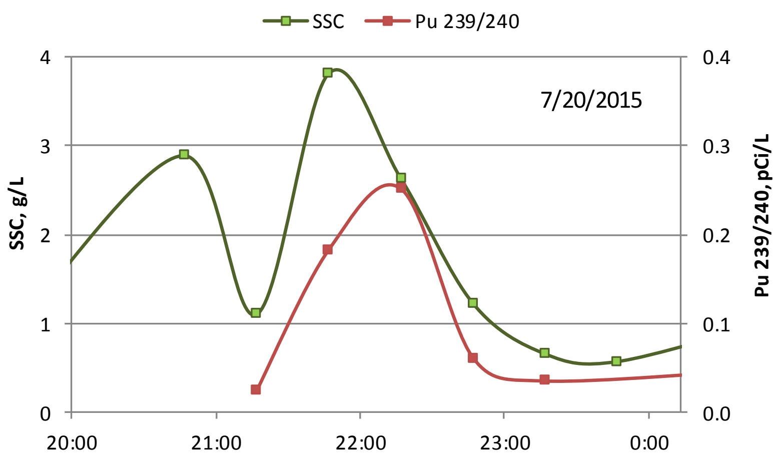
2015	Temp. (°F)			Humidity (%)			Wind (mph)			Precip. (in)	Events
Jul	high	avg	low	high	avg	low	high	avg	high	sum	
18	77	68	59	81	48	33	16	2	28	0.08	Rain
19	75	65	55	100	69	49	13	4	22	0.09	Rain
20	80	68	56	100	65	32	25	4	31	0.59	Rain
21	79	67	55	100	68	23	10	3	17	0.08	Fog , Rain
22	80	70	59	72	45	25	14	5	23	0	Rain
23	82	72	62	56	36	19	14	7	21	0.27	
24	85	74	64	62	37	22	20	5	32	0	

The RG experienced small storm event after midnight, a few hours after SSC peaked at the BDD. The plot below indicates that both peaks in SSC were most probably due to lower LAC discharge as detected by the BDD transducer and the BDD raw water turbidimeter.



The Rio Grande storm event occurred later and the SSC begun to respond to that discharge increase as well.

The concentrations of Pu 239/240 and SSC were plotted. The concentrations of Pu were high indicating a potential "strong" event in LAC.

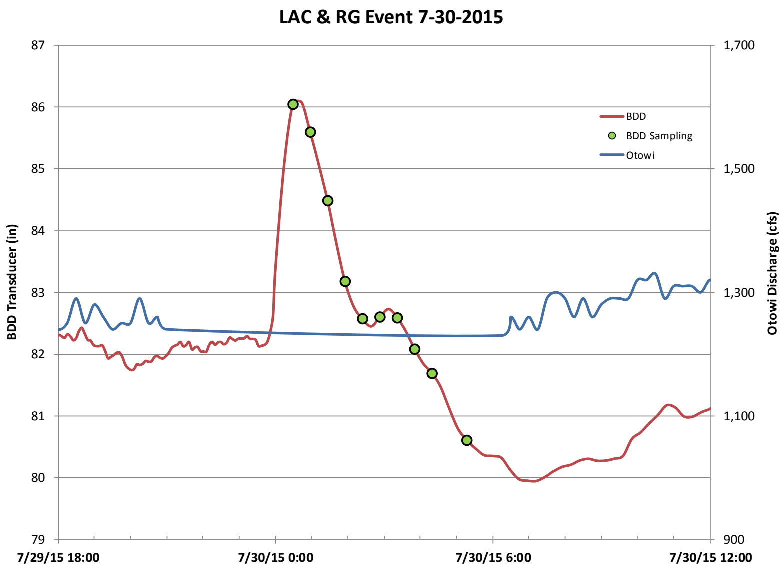


Sampling & Analyses Information			
Bottle	**Sampler BDD4**	**Time**	**Otowi cfs**
17	SSC	22:18	1170
18	U/Pu/Np/Am/GS	22:18	1170
19	U/Pu/Np/Am/GS	22:18	1170
20	U/Pu/Np/Am/GS	22:18	1170
21	U/Pu/Np/Am/GS	22:18	1170
22	Sr-90	22:18	1170
23	Ra 226/228	22:18	1170
24	Metals UF/F	22:18	1170
Bottle	**Sampler BDD5**	**Time**	**Otowi cfs**
1	U/Pu/Np/Am/GS	22:48	1180
2	U/Pu/Np/Am/GS	22:48	1180
3	U/Pu/Np/Am/GS	22:48	1180
4	U/Pu/Np/Am/GS	22:48	1180
5	Sr-90	22:48	1180
6	Ra 226/228	22:48	1180
7	Gross a/b	22:48	1180
8	Metals UF/F	22:48	1180
9	SSC	23:18	1190
10	U/Pu/Np/Am/GS	23:18	1190
11	U/Pu/Np/Am/GS	23:18	1190
12	U/Pu/Np/Am/GS	23:18	1190
13	U/Pu/Np/Am/GS	23:18	1190
14	Sr-90	23:18	1190
15	Ra 226/228	23:18	1190
16	Metals UF/F	23:18	1190
17		23:48	1230
18	U/Pu/Np/Am/GS	23:48	1230
19	U/Pu/Np/Am/GS	23:48	1230
20	U/Pu/Np/Am/GS	23:48	1230
21	U/Pu/Np/Am/GS	23:48	1230
22	Sr-90	23:48	1230
23	Ra 226/228	23:48	1230
24	Gross a/b	23:48	1230

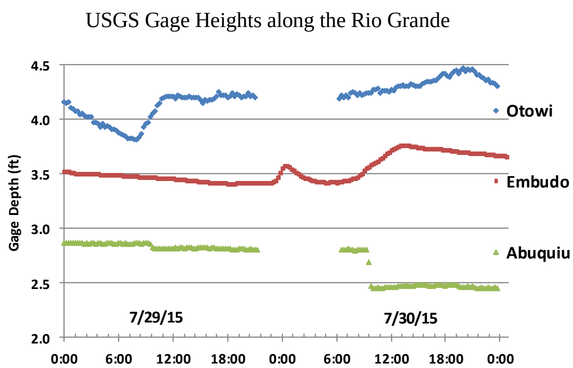
Even though the Guaje Canyon flow was low, it occurred much earlier than the RG event and potential lower LAC flows was detected by the BDD transducer. Since the RG discharge rose only 10%, we would expect a "strong" (high flow) LAC event. The predicted values in Table 14 confirmed that 7/20/2015 LAC flow for that date was at 10% or higher in comparison to the RG flow.

IV.2.a. July 30, 2015 LAC & RG Storm Event

Narrative of Event: This was a LA canyon and Rio Grande storm event. Sampling was triggered by E050.1 flow. Due to the failure of the Otowi gage, direct comparison between BDD transducer and Otowi discharge could not be conducted in order to determine whether the LAC flow was observed at BDD.



Station	Max Discharge cfs	Time Max
Otowi	NA	Approx. 0:00
E050.1	23.6	00:20
E060.1	<1	
BDD	NA	00:43



Sampling & Analyses Information			
Bottle	**Sampler BDD2**	**Time**	**Otowi, cfs**
1	SSC	0:22	NA
2		0:22	NA
3	SSC	1:22	NA
4		1:22	NA
5	PCBs	2:22	NA
6	D/F	2:22	NA
7	PCBs	3:22	NA
8	D/F	3:22	NA
9		4:22	NA
10		4:22	NA
11	SSC	5:22	NA
12	U/Pu/Np/Am/GS	5:22	NA
Bottle	**Sampler BDD3**	**Time**	**Otowi, cfs**
1	U/Pu/Np/Am/GS	0:22	NA
2	U/Pu/Np/Am/GS	0:22	NA
3	U/Pu/Np/Am/GS	0:22	NA
4	U/Pu/Np/Am/GS	0:22	NA
5	Sr-90	0:22	NA
6	Ra 226/228	0:22	NA
7	Gross a/b	0:22	NA
8	Metals UF	0:22	NA
9	SSC	0:52	NA
10	U/Pu/Np/Am/GS	0:52	NA
11	U/Pu/Np/Am/GS	0:52	NA
12	U/Pu/Np/Am/GS	0:52	NA
13	U/Pu/Np/Am/GS	0:52	NA
14	Sr-90	0:52	NA
15	Ra 226/228	0:52	NA
16	Gross a/b/Metals UF	0:52	NA
17	U/Pu/Np/Am/GS	1:22	NA
18	U/Pu/Np/Am/GS	1:22	NA
19	U/Pu/Np/Am/GS	1:22	NA
20	U/Pu/Np/Am/GS	1:22	NA
21	Sr-90	1:22	NA
22	Ra 226/228	1:22	NA
23	Gross a/b	1:22	NA
24	Metals UF	1:22	NA

As it can be seen by the figures above, the USGS Otowi Gage failed from 7/29/15 20:30 until 7/30/15 6:15. In order to determine whether Rio Grande experienced a storm event, two USGS gage upgradient from the Otowi Gage were plotted. Also, the weather conditions, especially the precipitation (see below), in the area and along the Rio Grande, were plotted for those two days.
The upstream gages did not indicate that a storm event could have occurred in the Rio Grande at Otowi Gage at the time of interest, when the BDD transducer showed a peak. From the weather pattern, conclusion could be drawn that the Rio Grande experienced a storm event around or shortly after midnight on 7/29/2015. Therefore, the peak in the BDD transducer will

be attributed to the Rio Grande storm event. The size of the BDD transducer peak suggests that the Rio Grande experienced a substantial discharge increase as a result of the storm event.

Weather Stations along the Rio Grande (downstream from Embudo)
Blue line - cumulative precip; Green line – precip rate

Embudo — Max cum precip 0.15 in at 23:45

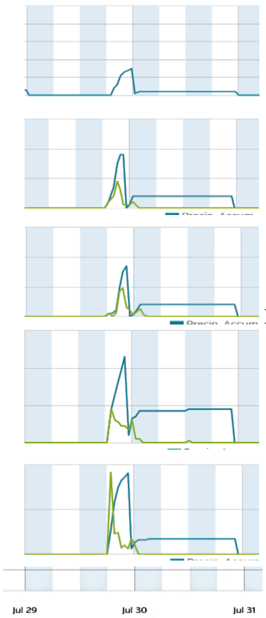
Velarde — Max cum precip 0.18 in at 22:41

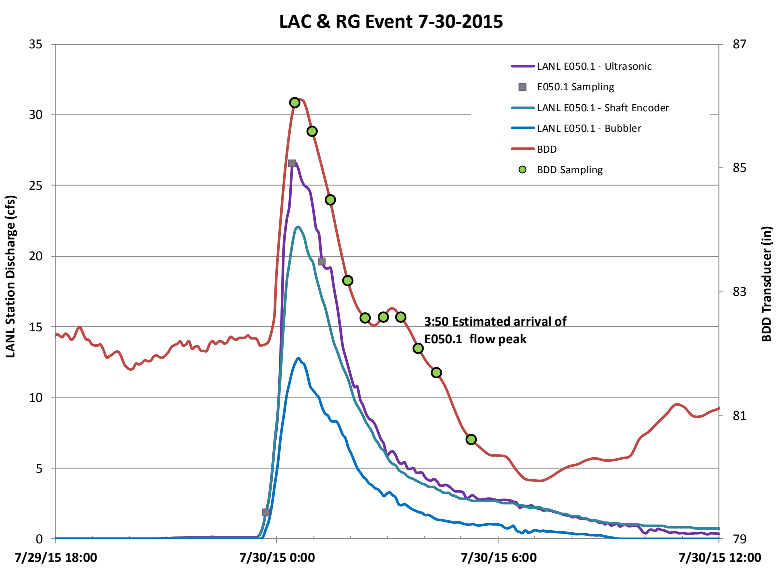
Espanola — Max cum precip 0.34 in at 22:22

Jaconita — Max cum precip 0.46 in at 22:26

White Rock — Max cum precip 0.66 in at 22:55

Date

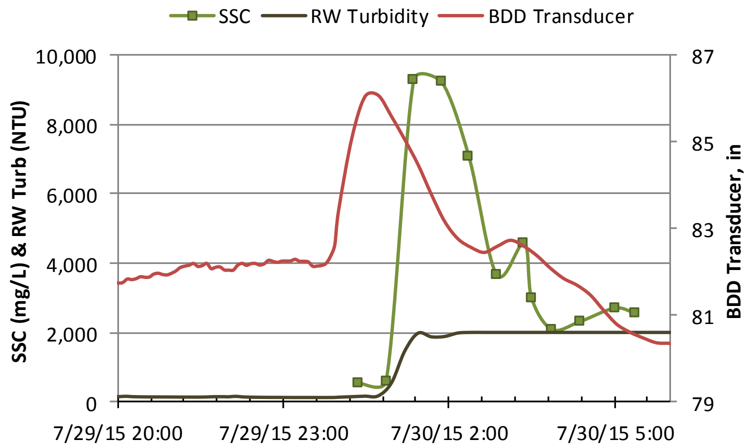




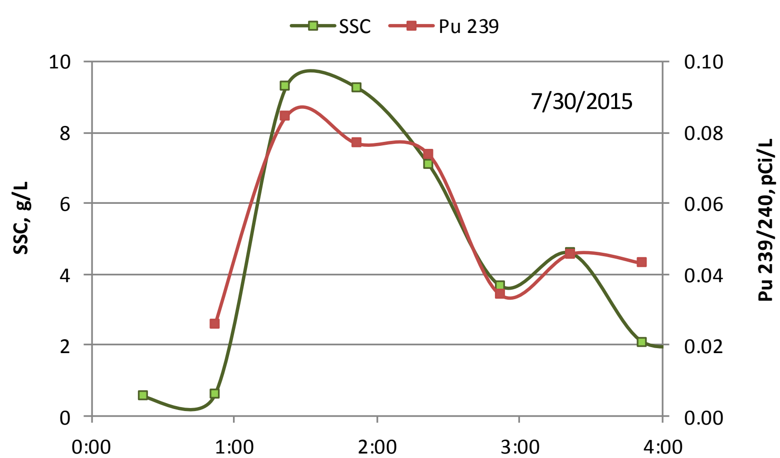
Sampling & Analyses Information			
Bottle	Sampler BDD4	Time	Otowi Discharge
1	SSC	1:52	NA
2	U/Pu/Np/Am/GS	1:52	NA
3	U/Pu/Np/Am/GS	1:52	NA
4	U/Pu/Np/Am/GS	1:52	NA
5	U/Pu/Np/Am/GS	1:52	NA
6	Sr-90	1:52	NA
7	Ra 226/228	1:52	NA
8	Gross a/b/Metals UF	1:52	NA
9	SSC	2:22	NA
10	U/Pu/Np/Am/GS	2:22	NA
11	U/Pu/Np/Am/GS	2:22	NA
12	U/Pu/Np/Am/GS	2:22	NA
13	U/Pu/Np/Am/GS	2:22	NA
14	Sr-90	2:22	NA
15	Ra 226/228	2:22	NA
16	Gross a/b/Metals UF/F	2:22	NA
17	SSC	2:52	NA
18	U/Pu/Np/Am/GS	2:52	NA
19	U/Pu/Np/Am/GS	2:52	NA
20	U/Pu/Np/Am/GS	2:52	NA
21	U/Pu/Np/Am/GS	2:52	NA
22	Sr-90	2:52	NA
23	Ra 226/228	2:52	NA
24	Gross a/b/Metals UF	2:52	NA
Bottle	Sampler BDD5	Time	Otowi, cfs
1	SSC	3:22	NA
2	U/Pu/Np/Am/GS	3:22	NA
3	U/Pu/Np/Am/GS	3:22	NA
4	U/Pu/Np/Am/GS	3:22	NA
5	U/Pu/Np/Am/GS	3:22	NA
6	Sr-90	3:22	NA
7	Ra 226/228	3:22	NA
8	Metals UF/F	3:22	NA
9	SSC	3:52	NA
10	U/Pu/Np/Am/GS	3:52	NA
11	U/Pu/Np/Am/GS	3:52	NA
12	U/Pu/Np/Am/GS	3:52	NA
13	U/Pu/Np/Am/GS	3:52	NA
14	Sr-90	3:52	NA
15	Ra 226/228	3:52	NA
16	Gross a/b/Metals UF	3:52	NA
17	SSC	4:22	NA
18	U/Pu/Np/Am/GS	4:22	NA
19	U/Pu/Np/Am/GS	4:22	NA
20	U/Pu/Np/Am/GS	4:22	NA
21	U/Pu/Np/Am/GS	4:22	NA
22	Sr-90	4:22	NA
23	Ra 226/228	4:22	NA
24	Gross a/b/Metals UF	4:22	NA

2015	Temp. (°F)			Humidity (%)			Wind (mph)			Precip. (in)	Events
Jul	high	avg	low	high	avg	low	high	avg	high	sum	
25	85	74	62	62	41	21	10	4	23	0	
26	85	72	59	100	38	21	18	4	30	0.06	Rain
27	83	70	57	100	53	21	16	7	26	0.01	Rain
28	82	72	63	80	43	20	24	7	30	0.08	Rain
29	74	66	58	100	66	42	20	8	32	0.49	Rain
30	71	63	55	100	83	52	12	4	20	0.07	Rain
31	70	64	57	93	78	58	9	5	28	0.59	Rain

From the analysis earlier, it was assumed that the RG experienced significant storm event after midnight. The increase in SSC and RW turbidity appears to be as a response to the change in BDD transducer with 52 min delay in the SSC peak with respect to the BDD Transducer peak.

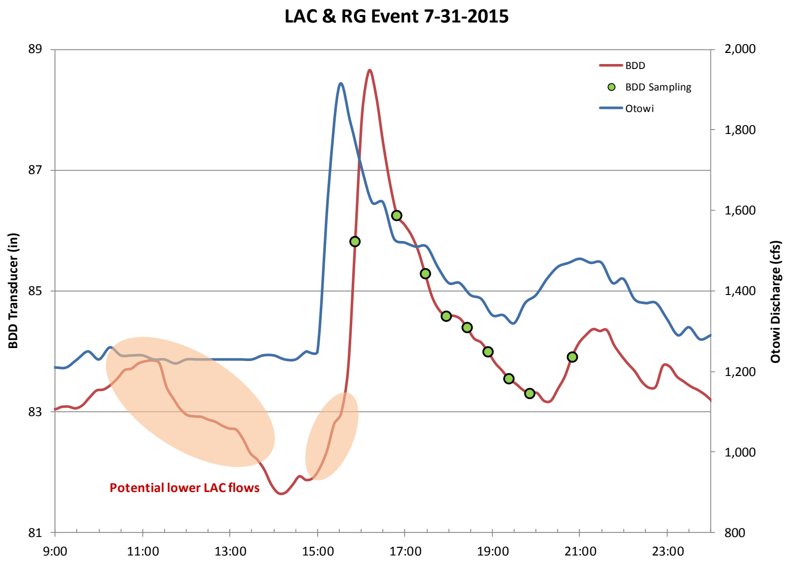


The concentrations of Pu 239/240 and SSC were plotted. The SSC and Pu peaks coincide very well but the concentrations for Pu were low for this event probably due to great dilution by the RG flow. There were no detections of lower LAC flow by the BDD transducer, and no information of the RG discharge since the Otowi gage was out of order for this period of time.

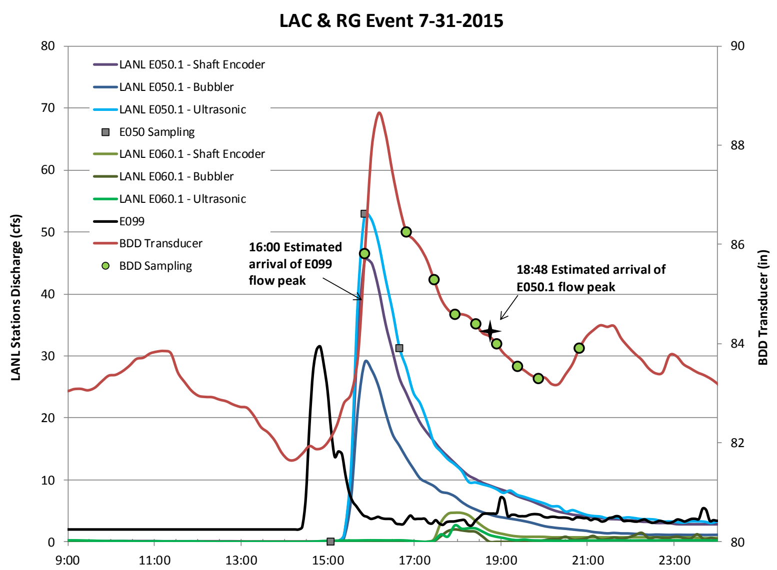


IV.2.a. July 31, 2015 LAC & RG Storm Event

Narrative of Event: This was a LA canyon and Rio Grande storm event. Sampling was triggered by E050.1 flow, but both canyons, Los Alamos and Pueblo, flowed. Their flows could not be observed at BDD Intake, but potential lower LAC flows were detected.

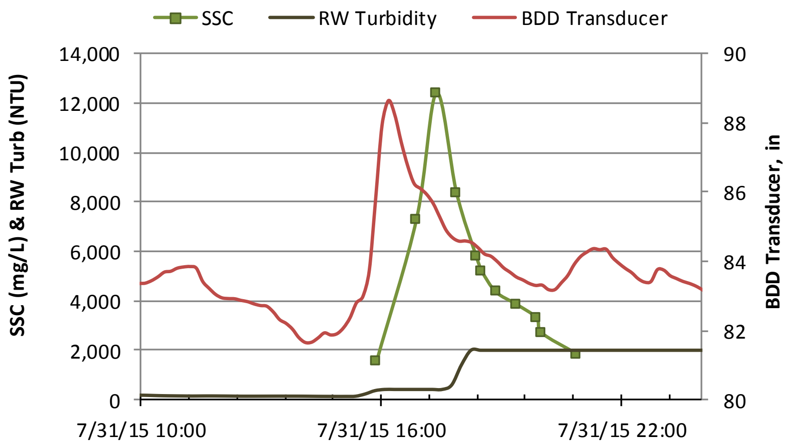


Station	Max Discharge cfs	Time Max
Otowi	1910	15:30
E050.1	53	15:51
E060.1	4.5	17:46
E099	31.5	14:50
BDD	NA	16:10

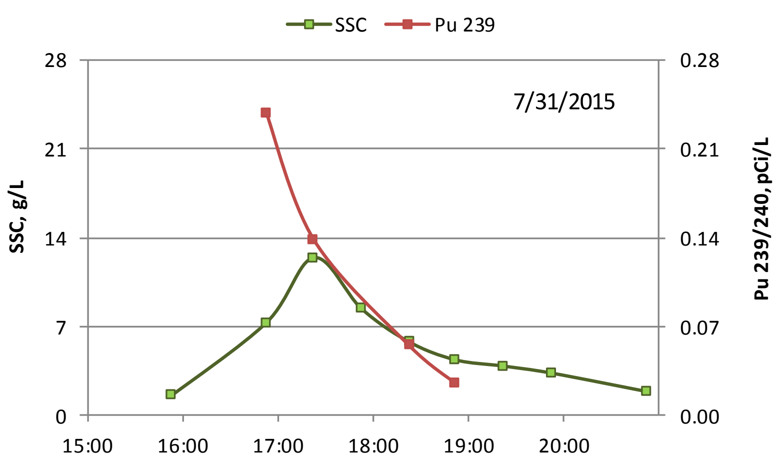


2015	Temp. (°F)			Humidity (%)			Wind (mph)			Precip. (in)	Events
Jul	high	avg	low	high	avg	low	high	avg	high	sum	
25	85	74	62	62	41	21	10	4	23	0	
26	85	72	59	100	38	21	18	4	30	0.06	Rain
27	83	70	57	100	53	21	16	7	26	0.01	Rain
28	82	72	63	80	43	20	24	7	30	0.08	Rain
29	74	66	58	100	66	42	20	8	32	0.49	Rain
30	71	63	55	100	83	52	12	4	20	0.07	Rain
31	70	64	57	93	78	58	9	5	28	0.59	Rain

The RG experienced storm event and the BDD transducer and SSC responded to that event. The plot below indicates that the SSC peak is most probably a result of the RG storm event and it had a 73-min delay with respect to the BDD transducer peak.



The concentrations of Pu 239/240 and SSC were plotted. The Pu peak of storm water concentrations occurred before the SSC peak which may indicate a strong LAC flow flowing into the RG during the event.

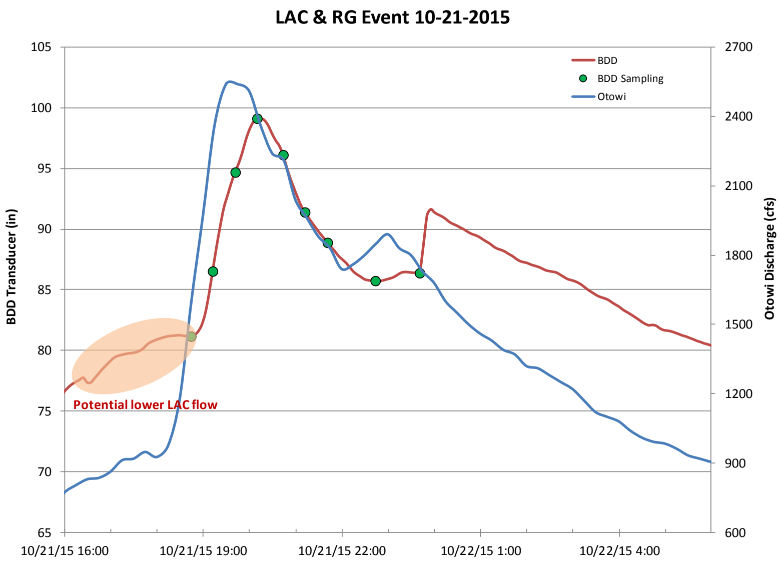


Even though Guaje Canyon flowed at 31.5 cfs and the BDD transducer detected lower LAC flows, the Pu concentrations were low probably due to the high RG dilution since the RG experienced more than 50% rise in discharge and occurred shortly after LAC flowed. Thus, the Pu concentrations declined fast due to that dilution.

Sampling & Analyses Information			
Bottle	**Sampler BDD2**	**Time**	**Otowi cfs**
1	SSC	15:53	1650
2	U/Pu/Np/Am/GS	15:53	1650
3	SSC	16:53	1620
4	U/Pu/Np/Am/GS	16:53	1620
5	PCBs	17:53	1510
6	D/F	17:53	1510
7	PCBs	18:53	1420
8	D/F	18:53	1420
9	SSC	19:53	1340
10	U/Pu/Np/Am/GS	19:53	1340
11	SSC	20:53	1430
12	U/Pu/Np/Am/GS	20:53	1430
Bottle	**Sampler BDD3**	**Time**	**Otowi cfs**
1-24	no samples		
Bottle	**Sampler BDD4**	**Time**	**Otowi cfs**
1	SSC	17:23	1530
2	U/Pu/Np/Am/GS	17:23	1530
3	U/Pu/Np/Am/GS	17:23	1530
4	U/Pu/Np/Am/GS	17:23	1530
5	U/Pu/Np/Am/GS	17:23	1530
6	Sr-90	17:23	1530
7	Ra 226/228	17:23	1530
8	Metals UF/F	17:23	1530
9	SSC	17:53	1510
10	U/Pu/Np/Am/GS	17:53	1510
11	U/Pu/Np/Am/GS	17:53	1510
12	U/Pu/Np/Am/GS	17:53	1510
13	U/Pu/Np/Am/GS	17:53	1510
14	Sr-90	17:53	1510
15	Ra 226/228	17:53	1510
16	Gross a/b/Metals UF	17:53	1510
17	SSC	18:23	1460
18	U/Pu/Np/Am/GS	18:23	1460
19	U/Pu/Np/Am/GS	18:23	1460
20	U/Pu/Np/Am/GS	18:23	1460
21	U/Pu/Np/Am/GS	18:23	1460
22	Sr-90	18:23	1460
23		18:23	1460
24		18:23	1460
Bottle	**Sampler BDD5**	**Time**	**Otowi cfs**
1	SSC	18:53	1420
2	U/Pu/Np/Am/GS	18:53	1420
3	U/Pu/Np/Am/GS	18:53	1420
4	U/Pu/Np/Am/GS	18:53	1420
5	U/Pu/Np/Am/GS	18:53	1420
6	Sr-90	18:53	1420
7	Ra 226/228	18:53	1420
8	Metals UF/F	18:53	1420
9	SSC	19:22	1380
10	U/Pu/Np/Am/GS	19:22	1380
11		19:22	1380
12-24	no sampling		

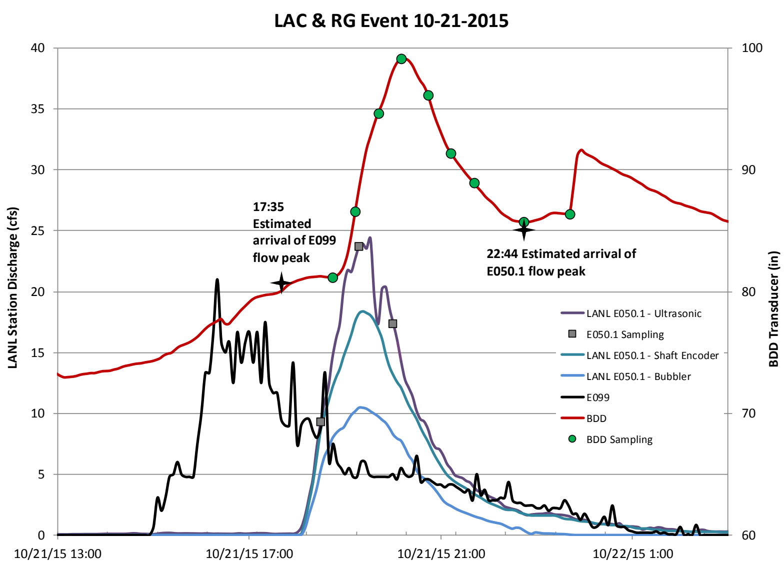
IV.2.a. October 21, 2015 LAC & RG Storm Event

Narrative of Event: This was a LA canyon and a Rio Grande storm event. Sampling was triggered by E050.1 flow. Its flow was too low to be observed at BDD Intake, but potential lower LAC flows were detected.



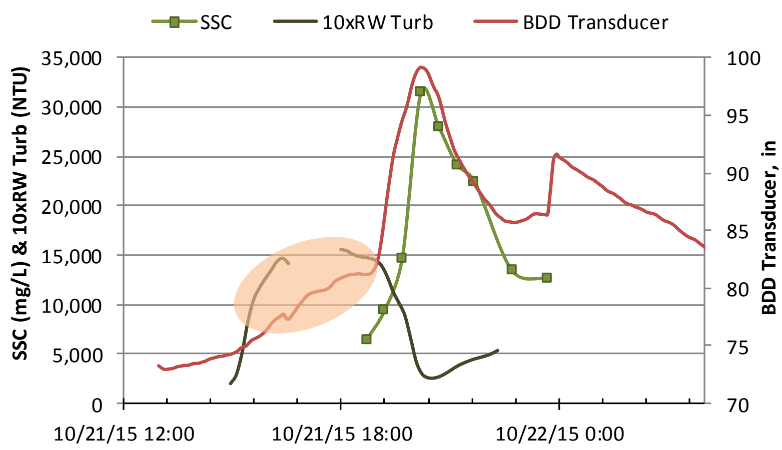
Station	Max Discharge cfs	Time Max
Otowi	2540	19:30
E050.1	24.3	19:30
E060.1	NA	-
E099	21	16:20
BDD	NA	20:10

Sampling & Analyses Information			
Bottle	Sampler BDD2	Time	Otowi cfs
1	SSC	18:42	926
2	PCBs/ClO4	18:42	926
3	SSC	19:42	1970
4	IsoPu/U/Am-GS	19:42	1970
5	SSC	20:42	2510
6	D/F	20:42	2510
7	SSC	21:42	2040
8	IsoPu/U/Am-GS	21:42	2040
9	PCBs	22:42	1740
10	D/F	22:42	1740
11	SSC	23:42	1890
12	IsoPu/U/Am-GS	23:42	1890
Bottle	Sampler BDD3	Time	Otowi cfs
1	IsoPu/U/Am-GS	18:42	926
2	IsoPu/U/Am-GS	18:42	926
3	IsoPu/U/Am-GS	18:42	926
4	IsoPu/U/Am-GS	18:42	926
5	Sr-90	18:42	926
6	Ra-226/228	18:42	926
7	Gross a/b	18:42	926
8	Metals UF/F	18:42	926
9	SSC	19:12	1180
10	IsoPu/U/Am-GS	19:12	1180
11	Sr-90	19:12	1180
12-24 not sampled			

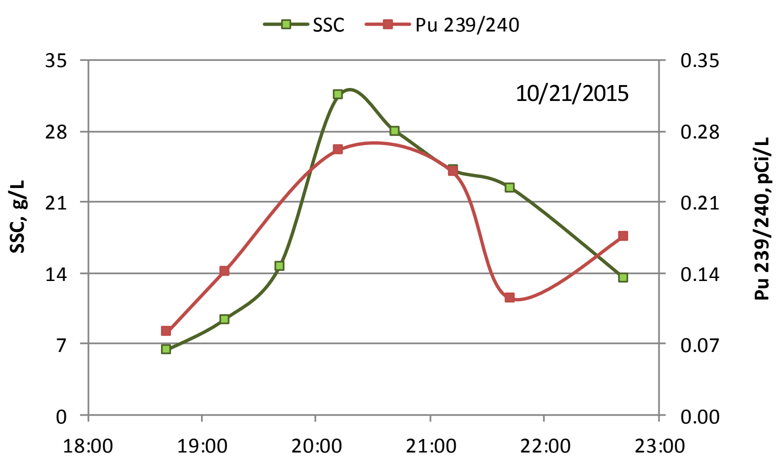


2015	Temp. (°F)			Humidity (%)			Wind (mph)			Precip. (in)	Events
Oct	high	avg	low	high	avg	low	high	avg	high	sum	
18	64	56	47	100	71	46	15	8	22	0.02	Rain
19	63	56	50	87	67	48	16	7	22	0.01	Rain
20	63	53	43	100	70	41	20	4	40	0.13	Rain
21	47	42	36	100	94	69	22	7	29	1.15	Rain
22	51	44	37	100	81	61	16	8	23	0.02	Rain
23	57	48	38	98	70	43	12	3	16	0.02	Rain
24	54	48	42	100	76	51	9	5	-	0.01	Rain
25	57	48	39	83	63	44	12	5	16	0	

The RG experienced storm event at 19:30, coinciding with SSC peak at the BDD. The plot below indicates that the peak in SSC were most probably due to lower LAC and Guaje Canyon discharge as detected by the BDD transducer and the BDD raw water turbidimeter.



The concentrations of Pu 239/240 and SSC were plotted. The SSC and Pu peaks coincide very well but the concentrations for Pu were low for this event probably due to great dilution by the RG flow.

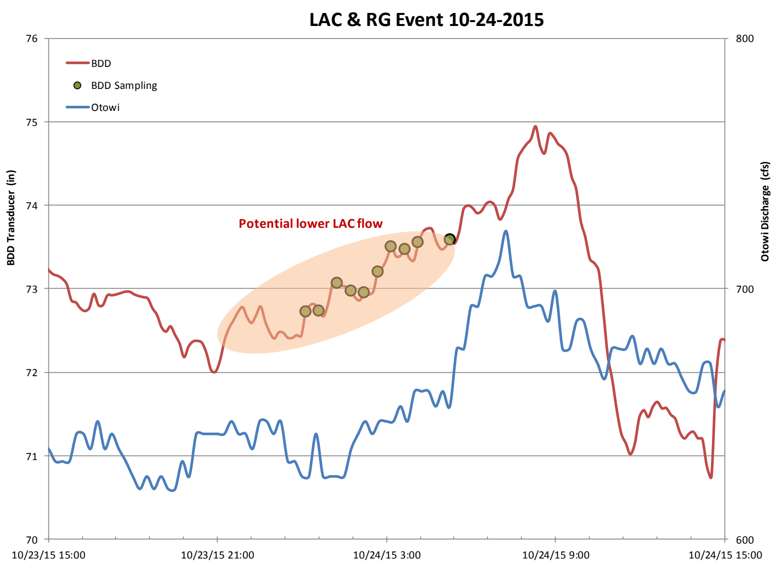


Sampling & Analyses Information			
Bottle	Sampler BDD4	Time	Otowi cfs
1	SSC/ClO4	20:12	2540
2	IsoPu/U/Am-GS	20:12	2540
3	IsoPu/U/Am-GS	20:12	2540
4	IsoPu/U/Am-GS	20:12	2540
5	IsoPu/U/Am-GS	20:12	2540
6	Sr-90	20:12	2540
7	Ra-226/228	20:12	2540
8	Gross a/b/MetalsUF	20:12	2540
9	IsoPu/U/Am-GS	20:42	2510
10	IsoPu/U/Am-GS	20:42	2510
11	IsoPu/U/Am-GS	20:42	2510
12	IsoPu/U/Am-GS	20:42	2510
13	Sr-90	20:42	2510
14	Ra-226/228	20:42	2510
15	Gross a/b	20:42	2510
16	Metals UF/F	20:42	2510
17	SSC	21:12	2240
18	IsoPu/U/Am-GS	21:12	2240
19	IsoPu/U/Am-GS	21:12	2240
20	IsoPu/U/Am-GS	21:12	2240
21	IsoPu/U/Am-GS	21:12	2240
22	Sr-90	21:12	2240
23	Ra-226/228	21:12	2240
24	Gross a/b/Metals F	21:12	2240
Bottle	Sampler BDD5	Time	Otowi cfs
1-16	not sampled		
17	IsoPu/U/Am-GS	22:42	1740
18	IsoPu/U/Am-GS	22:42	1740
19	IsoPu/U/Am-GS	22:42	1740
20	IsoPu/U/Am-GS	22:42	1740
21	Sr-90	22:42	1740
22	Ra-226/228	22:42	1740
23	Gross a/b	22:42	1740
24	Metals UF	22:42	1740

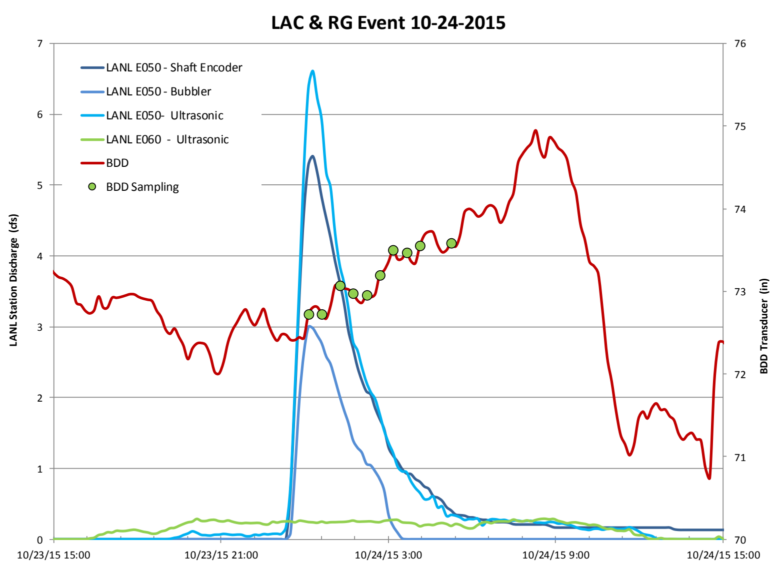
Even though Guaje Canyon flowed at 21 cfs and the BDD transducer detected lower LAC, the Pu concentrations were low probably due to the high RG dilution since the RG experienced more than 150% rise in discharge and occurred shortly after LAC flowed. Thus, the Pu concentrations stayed low for the duration of this event due to that dilution.

IV.2.a. October 24, 2015 LAC & RG Storm Event

Narrative of Event: This was a LA canyon and a Rio Grande storm event. Sampling was triggered by E050.1 flow. Its flow was too low to be observed at BDD Intake, but potential lower LAC flows were detected.



Station	Max Discharge cfs	Time Max
Otowi	723	7:15
E050.1	6.6	0:17
E060.1	0.28	-
BDD	NA	8:17

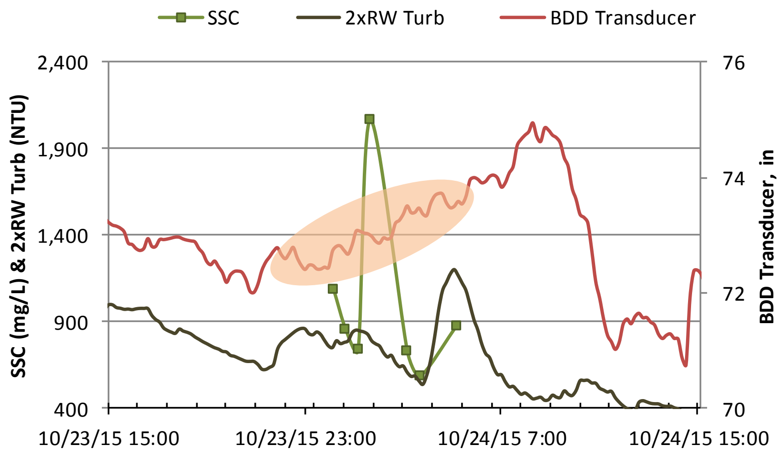


Sampling & Analyses Information			
Bot #	Sampler BDD2	Time	Otowi (cfs)
1	SSC/ClO4	0:11	631
2	PCBs	0:11	631
3	SSC/ClO4	1:11	642
4	D/F	1:11	642
5	SSC	2:11	625
6		2:11	625
7		3:11	642
8		3:11	642
9	SSC/ClO4	4:11	653
10	PCBs	4:11	653
11		5:11	659
12		5:11	659
Bot #	Sampler BDD3	Time	Otowi (cfs)
1	IsoPu/U/Am-GS	0:11	631
2	IsoPu/U/Am-GS	0:11	631
3	IsoPu/U/Am-GS	0:11	631
4	IsoPu/U/Am-GS	0:11	631
5	Sr-90	0:11	631
6	Ra-226/228	0:11	631
7	Gross a/b	0:11	625
8	Metals UF/F	0:11	625
9	IsoPu/U/Am-GS	0:41	625
10	IsoPu/U/Am-GS	0:41	625
11	IsoPu/U/Am-GS	0:41	625
12	IsoPu/U/Am-GS	0:41	625
13	Sr-90	0:41	625
14	Ra-226/228	0:41	625
15	SSC	0:41	625
16	Metals UF	0:41	625
17	IsoPu/U/Am-GS	1:11	642
18	IsoPu/U/Am-GS	1:11	642
19	IsoPu/U/Am-GS	1:11	642
20	IsoPu/U/Am-GS	1:11	642
21	Sr-90	1:11	642
22	Ra-226/228	1:11	642
23	Gross a/b	1:11	642
24	Metals UF/F	1:11	642

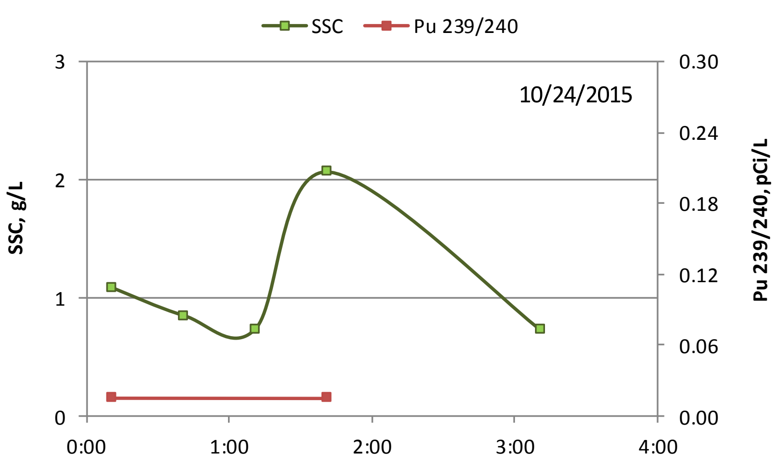
2015	Temp. (°F)			Humidity (%)			Wind (mph)			Precip. (in)	Events
Oct	high	avg	low	high	avg	low	high	avg	high	sum	
18	64	56	47	100	71	46	15	8	22	0.02	Rain
19	63	56	50	87	67	48	16	7	22	0.01	Rain
20	63	53	43	100	70	41	20	4	40	0.13	Rain
21	47	42	36	100	94	69	22	7	29	1.15	Rain
22	51	44	37	100	81	61	16	8	23	0.02	Rain
23	57	48	38	98	70	43	12	3	16	0.02	Rain
24	54	48	42	100	76	51	9	5	-	0.01	Rain
25	57	48	39	83	63	44	12	5	16	0	

The RG experienced small storm event at 7:15 in the morning, a few hours after SSC peaked at the BDD. The plot below indicates that high results in SSC were most probably due to lower LAC discharge as detected by the BDD raw water turbidimeter.

Bot #	Sampler BDD4	Time	Otowi (cfs)
1	IsoPu/U/Am-GS	1:41	625
2	IsoPu/U/Am-GS	1:41	625
3	IsoPu/U/Am-GS	1:41	625
4	IsoPu/U/Am-GS	1:41	625
5	Sr-90	1:41	625
6	Ra-226/228	1:41	625
7	SSC	1:41	625
8	Metals UF	1:41	625
9-24			
Bot #	**Sampler BDD5**	**Time**	**Otowi (cfs)**
1-16			
17	IsoPu/U/Am-GS	4:11	653
18	IsoPu/U/Am-GS	4:11	653
19	IsoPu/U/Am-GS	4:11	653
20	IsoPu/U/Am-GS	4:11	653
21	Sr-90	4:11	653
22	Ra-226/228 Gross a/b;	4:11	653
23	Perchlorate	4:11	653
24	Metals UF/F	4:11	653



The concentrations of Pu 239/240 and SSC were plotted, but the concentrations for Pu were very low for this event. Guaje Canyon did not flow on this date. The BDD transducer and RW turbidimeter have some indicators of potential lower LAC flow, but those flows might have been very low to deliver any concentrations of Pu 239/240 above background.



V. Comparison Values

The occurrences of radionuclides and metals during the 2015 storm season were compared to the Rio Grande sediment background values previously calculated in the BDD 2011-2014 report. Those are provided in Table 8. Table 9 lists the NM WQCC standards and screening values for surface water.

Table 8. RG background values.

pCi/g	Pu 239/240	Pu 238	Am 241	Sr 90	Cs 137	U 238	U 234	U 235
RG UTL av	**0.014**	**0.008**	**0.018**	**0.76**	**0.50**	**1.28**	**1.43**	**0.083**
PP UTL[1]	0.068	0.006	0.040	1.04	0.90	2.29	2.59	0.200
pCi/g	**Ra 226**	**Ra 228**	**K 40**	**Gross α**	**Gross β**	**Gross γ**		
RG UTL av	**1.32**	**1.67**	**28.47**	**18.64**	**31.5**	**11.78**		
PP UTL[1]	2.59	2.33	36.80					

mg/kg	Al	As	Ba	Be	B	Cd	Cr	Co	Cu	Fe	Pb
RG UTL av	**9,067**	**4.80**	**284**	**0.603**	**8.54**	**0.833**	**11.87**	**8.04**	**11.71**	**16,189**	**9.74**
PP UTL[1]	15,400	3.98	127	1.310	-	0.400	10.50	4.73	11.20	13,800	19.70
mg/kg	**Hg**	**Mo**	**Ni**	**Se**	**Ag**	**Sr**	**Tl**	**Sb**	**U**	**V**	**Zn**
RG UTL av	**0.0284**	**2.35**	**9.80**	**0.87**	**0.52**	**100.6**	**0.114**	**NA**	**3.70**	**35.2**	**56.2**
PP UTL[1]	0.1000	-	9.38	0.30	1.00	-	0.730	0.83	2.22/6.99	19.7	60.2

Table 9. NM WQCC standards and screening values.

NMWQCC Surface Water Standards								
Analytical Suite	**Analyte Code**	**Analyte Name**	**Field Prep**	**Acute Aquatic**	**Human Health Persistent**	**Lifestock Watering**	**Wildlife Habitat**	**Screening Criteria**
METALS	Al	Aluminum	F	658	n/a	n/a	n/a	
METALS	Sb	Antimony	F	n/a	640	n/a	n/a	
METALS	As	Arsenic	F	340	9	200	n/a	
METALS	B	Boron	F	n/a	n/a	5,000	n/a	
METALS	Cd	Cadmium	F	0.59	n/a	50	n/a	
METALS	Cr	Chromium	F	n/a	n/a	1,000	n/a	
METALS	Cr(III)	Chromium(III)	F	210	n/a	n/a	n/a	
METALS	Co	Cobalt	F	n/a	n/a	1,000	n/a	
METALS	Cu	Copper	F	4	n/a	500	n/a	
METALS	Pb	Lead	F	17	n/a	100	n/a	
METALS	Mn	Manganese	F	1,999	n/a	n/a	n/a	
METALS	Hg	Mercury	F	1.4	n/a	n/a	n/a	
METALS	Hg	Mercury	UF	n/a	n/a	10	0.77	
METALS	Ni	Nickel	F	170	4,600	n/a	n/a	
METALS	Se	Selenium	F	n/a	4,200	50	n/a	
METALS	Se	Selenium	UF	20	n/a	n/a	5	
METALS	Ag	Silver	F	0.4	n/a	n/a	n/a	
METALS	Tl	Thallium	F	n/a	0.47	n/a	n/a	
METALS	V	Vanadium	F	n/a	n/a	100	n/a	
METALS	Zn	Zinc	F	54	26,000	25,000	n/a	
WET_CHEM	CN(TOTAL)	Cyanide(Total)	UF	22	140	n/a	5.2	
PCB_CONG	1336-36-3	Total PCBs	UF	n/a	0.00064	n/a	0.014	
DIOX/FUR	n/a	Dioxin (TEQ)	UF	n/a	0.000000051	n/a	n/a	
RAD	GROSSA	Gross alpha	UF	n/a	n/a	15	n/a	
RAD	Ra-226+228	Radium-226 & 228	UF	n/a	n/a	30	n/a	
RAD	Am-241	Americium-241	UF					1.9
RAD	Cs-137	Cesium-137	UF					6.4
RAD	Pu-238	Plutonium-238	UF					1.5
RAD	Pu-239/240	Plutonium-239/240	UF					1.5
RAD	Sr-90	Strontium-90	UF					3.5
RAD	H-3	Tritium	UF					4,000
All units are ug/L except for RAD, which are pCi/L								
F=filtered and UF=unfiltered								

[1] Pajarito Plateau UTLs: Values were reported in (R. T. Ryti, 1998)

VI. Storm Water Analytical Results

VI.1 BDD Sediment Transport

BDD sampled storm and base flow throughout the 2015 summer season and the descriptive statistics of the results are listed below. A graphical representation of the results is offered on Figure 10.

Table 10. Descriptive statistics of SSC results.

SSC mg/L						
Num Obs	**Min**	**Max**	**Mean**	**SD**	**Median**	**95%ile**
142	69.3	31,483.0	3,064.0	5,275.0	909.9	13,457.0

Figure 10. SSC at BDD for 2015 season.

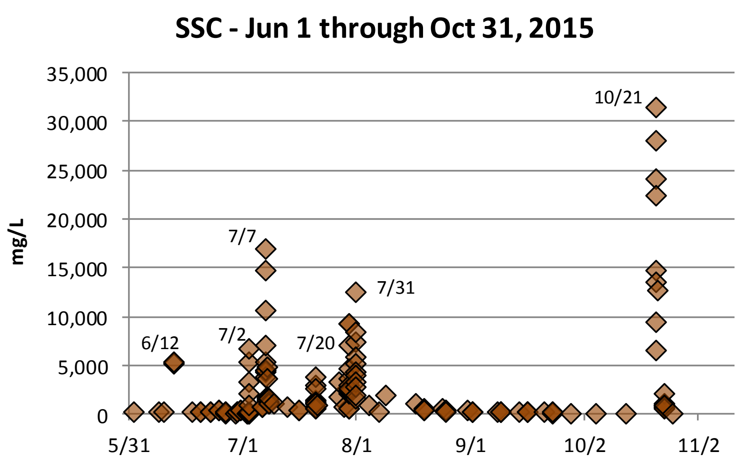


Figure 11. Comparison of SSC results at BDD and Otowi Gage.

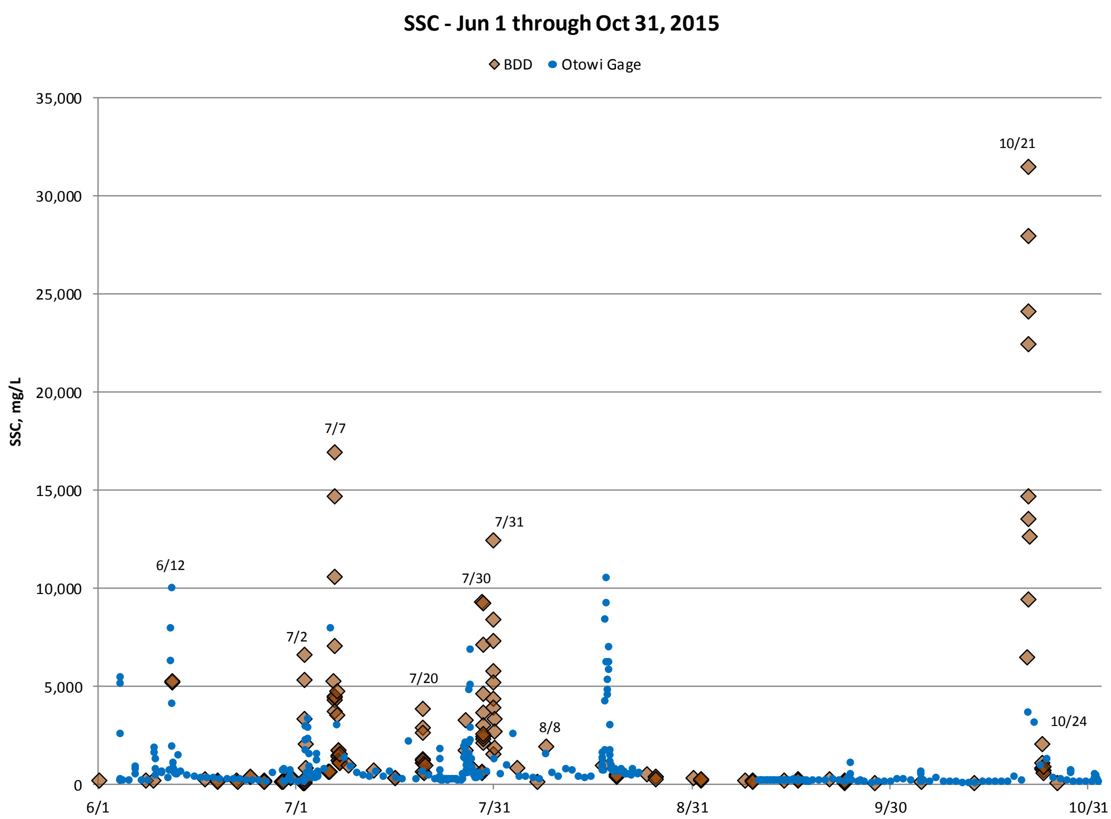


Figure 11 presented the results of SSC of samples collected at BDD and Otowi Gage. The collection time did not always coincide but the graph gives an estimate of how the results at both sample locations compare. In order to be able to compare the values, a direct comparison of the SSC results was compiled. Table 11 presents part of the SSC results at Otowi Gage selected at the closest date and time to the BDD collection.

It should be expected that the SSC results at Otowi Gage will be higher than at BDD because those results are corrected for the cross-sectional SSC, while at BDD the SSC results represent a specific location SSC rather than cross-sectional.

Table 11. SSC comparison between BDD and Otowi Gage at specific date & time.

BDD Intake		Otowi Gage		BDD Intake		Otowi Gage	
Date & Time	SSC, mg/L	Date & Time	SSC, mg/L	Date & Time	SSC, mg/L	Date & Time	SSC, mg/L
6/8/15 8:06	160	6/7/15 20:00	216	7/27/15 9:26	2,484	7/27/15 9:44	1,800
6/12/15 10:10	5,215	6/12/15 10:00	4,110	7/28/15 13:00	771	7/28/15 11:44	890
6/17/15 10:10	270	6/17/15 20:00	299	7/30/15 0:22	549	7/29/15 20:00	399
6/19/15 9:13	143	6/19/15 20:00	263	7/30/15 5:22	2,566	7/30/15 20:00	618
6/22/15 10:00	161	6/22/15 20:00	248	7/31/15 20:01	2,279	7/31/15 20:00	1,300
6/24/15 9:26	381	6/24/15 20:00	198	8/4/15 9:30	833	8/4/15 20:00	369
6/26/15 11:21	132	6/26/15 20:00	152	8/7/15 10:45	144	8/7/15 20:00	231
6/29/15 11:10	195	6/29/15 12:35	707	8/8/15 20:59	1,900	8/8/15 20:00	1,550
6/29/15 11:15	161	6/29/15 13:15	144	8/17/15 10:39	985	8/17/15 11:32	929
6/30/15 15:25	355	6/30/15 20:00	183	8/19/15 14:38	506	8/19/15 11:32	751
7/2/15 17:41	225	7/2/15 16:59	137	9/9/15 15:15	114	9/10/15 12:09	175
7/2/15 19:10	3,306	7/2/15 18:59	237	9/14/15 9:55	183	9/14/15 4:09	189
7/2/15 20:40	806	7/2/15 20:00	2,250	9/16/15 13:29	230	9/16/15 12:09	209
7/6/15 10:41	632	7/5/15 20:00	751	9/21/15 9:01	221	9/21/15 20:00	220
7/6/15 11:46	649	7/6/15 20:00	7,970	9/23/15 13:32	132	9/23/15 20:00	137
7/7/15 22:30	1,703	7/7/15 20:00	3,020	9/28/15 8:33	83	9/28/15 20:00	92
7/8/15 2:29	1,540	7/8/15 20:00	1,370	10/5/15 10:54	99	10/5/15 10:53	137
7/9/15 13:00	976	7/9/15 20:00	915	10/13/15 11:45	81	10/13/15 20:00	78
7/13/15 8:56	693	7/13/15 20:00	629	10/21/15 18:42	6,456	10/21/15 20:00	3,630
7/16/15 14:04	331	7/16/15 20:00	300	10/24/15 0:11	1,086	10/23/15 20:00	941
7/20/15 19:48	1,299	7/20/15 20:00	642	10/24/15 5:11	873	10/24/15 20:00	1,300
7/21/15 7:40	947	7/21/15 20:00	451	10/26/15 9:10	75	10/26/15 20:00	266

Certain dates in this table make an impression with the fact that the SSC results were higher at BDD than at Otowi Gage at very similar times. Those dates were 6/12, 7/2, 7/20, 7/27, 7/31, 8/8, and 10/21. The implication is that lower LAC flows may have contributed to the flows reaching BDD when they were not flowing through Otowi Gage. However, LANL did not document any flows through the LA/PCW during the dates 6/12 and 7/27. The differences for these two dates remain unexplainable.

VI.2 BDD Intake Radionuclides' Results

Table 12 presented the descriptive statistics of radionuclides. There were no detects for Americium 241 and Cesium 137, so these constituents were not included in the table.

Table 12. Descriptive statistics of storm water and sediment concentrations for radionuclides.

Rads	Num Obs	Non-detects			Detects						NDs & Ds	
		Num	**Min**	**Max**	**Num**	**Min**	**Max**	**Mean**	**Median**	**St Dev**	**Median**	**95% ile**
Pu 238, pCi/L	60	34	-0.001	0.129	26	0.0108	0.553	0.0980	0.0436	0.1340	0.0295	0.1600
Pu 238 sed, pCi/g	32	7	9.00E-04	0.0117	25	0.005	0.194	0.0290	0.0100	0.0443	0.0091	0.1010
Pu-239/240, pCi/L	64	19	0.007	0.12	45	0.0062	0.725	0.1100	0.0613	0.1310	0.0475	0.2770
Pu-239/240 sed, pCi/g	47	2	0.0015	0.0049	45	0.0051	0.417	0.0443	0.0172	0.0752	0.0171	0.1760
Ra 226, pCi/L	52	4	0.08	0.54	48	0.235	55.2	9.661	5.565	12.150	4.800	36.250
Ra 226 sed, pCi/g	47	CALC	N/A	N/A	47	0.339	10.9	1.972	1.748	1.480	1.748	3.544
Ra 228, pCi/L	52	4	0.61	0.91	48	0.820	57.3	9.587	5.945	11.190	5.385	27.660
Ra 228 sed, pCi/g	46	CALC	N/A	N/A	46	0.639	9.2	2.041	1.749	1.266	1.749	3.054
U 234, pCi/L	66	0	N/A	N/A	66	0.682	25.17	7.322	5.039	6.512	5.039	20.950
U 234 sed, pCi/g	65	CALC	N/A	N/A	65	0.514	13.56	2.238	1.671	2.133	1.671	6.727
U 238, pCi/L	66	0	N/A	N/A	66	0.413	25.49	7.136	5.006	6.652	5.006	21.280
U 238 sed, pCi/g	65	CALC	N/A	N/A	65	0.472	8.57	1.836	1.625	1.245	1.625	4.122
U 235, pCi/L	66	1	0.0198	0.0198	65	0.0138	1.310	0.340	0.247	0.323	0.2370	0.8880
U 235 sed, pCi/g	64	CALC	N/A	N/A	64	0.0178	0.440	0.086	0.079	0.062	0.0791	0.1590
Sr 90, pCi/L	58	55	-0.57	1.99	3	0.313	0.590	0.424	0.370	0.146	0.150	0.598
Sr 90 sed, pCi/g	3	CALC	N/A	N/A	3	0.097	0.178	0.142	0.150	0.041	0.150	0.176

CALC indicates that the values were calculated from the detect concentrations of the storm water results.

In this section the results for radionuclides were presented in chronological form, and in graphical form, such as chronological plots for storm water and sediment, and storm water concentrations vs. SSC. In the plot of storm water concentrations vs SSC, if any results were above the "black" line, it indicated an exceedance of the RG background values, and, therefore potential LANL contribution to the contaminants.

The graphical presentation of the data led to the following conclusions. There were regular exceedances of the RG background levels for Pu 238, 239/240, Ra 226, Ra 228, U 234, U 238, and U 235. The coefficient of determination listed on every storm water concentration vs SSC plot for Pu 238, Ra 226, and Ra 228 was greater than 0.8, an indication of naturally occurring constituents. On the other hand, the coefficients of determination of Pu 239/240, and U isotopes were much less than 0.8 which was indicative of the presence of anthropological sources.

VI.2.a. Plutonium 238.

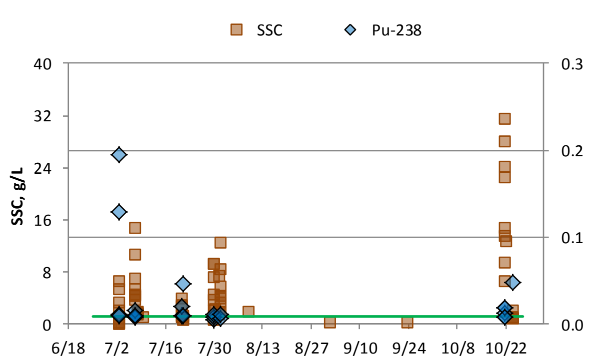
Table 13. Chronological results for Pu 238.

2015 Pu-238 & SSC				
Date&Time	Flag	SSC, g/L	pCi/g	pCi/L
7/2/15 15:41	LT	0.089	0.1944 C	0.0174
7/2/15 16:11	LT	0.100	0.1281 C	0.0128
7/2/15 16:41	U	0.097		ND
7/2/15 17:41	U	0.225		ND
7/2/15 18:11	U,M	5.309		ND
7/2/15 18:41	U,M	6.600		ND
7/2/15 19:10	LT	3.306	0.0100 C	0.0330
7/2/15 19:40	LT	2.054	0.0089 C	0.0182
7/7/15 6:09	LT	5.279	0.0096 C	0.0505 C
7/7/15 6:39	U	4.396	ND	ND
7/7/15 7:09	LT	4.276	NC	0.0410
7/7/15 7:39	U	3.723		ND
7/7/15 8:09	LT	4.473	0.0084	0.0376 C
7/7/15 8:39	LT	NS	0.0099	NC
7/7/15 9:08	LT	7.038	0.0154	0.1084 C
7/7/15 9:38	LT	10.595	0.0070	0.0742 C
7/7/15 10:08	LT	14.685	0.0093	0.1366 C
7/7/15 11:09		NS	NC	0.1560
7/7/15 22:30	U	1.703		ND
7/7/15 23:00	U	1.751		ND
7/7/15 23:30	U	1.488		ND
7/8/15 2:29	U	1.540		ND
7/9/15 13:00	U	0.976		ND
7/20/15 19:48	U	1.299		ND
7/20/15 20:48	U	2.886		ND
7/20/15 21:18	U	1.102		ND
7/20/15 21:48	LT	3.813	0.0087 C	0.0330
7/20/15 22:18	LT	2.626	0.0198 C	0.0520 C
7/20/15 22:48	LT	1.222	0.0088	0.0108 C
7/20/15 23:18	LT	0.656	0.0467 C	0.0306
7/20/15 23:48	U	0.570		ND
7/21/15 0:48	U	0.993		ND
7/30/15 0:22	U	0.549		ND
7/30/15 0:52	U	0.603		ND
7/30/15 1:22	U	9.288	ND	ND

2015 Pu-238 & SSC				
Date&Time	Flag	SSC, g/L	pCi/g	pCi/L
7/30/15 1:52	LT	9.250	0.0050	0.0462 C
7/30/15 2:22	LT	7.086	0.0079 C	0.0560
7/30/15 2:52	U	3.676	ND	ND
7/30/15 3:22	U	4.586	ND	ND
7/30/15 3:52	LT	2.088	0.0108	0.0226 C
7/30/15 4:22	U	2.305		ND
7/31/15 15:53	U	1.531		ND
7/31/15 16:53	U,M	7.299		ND
7/31/15 17:23	U,M	12.419		ND
7/31/15 17:53	U,M	8.384		ND
7/31/15 18:23	LT	5.773	0.0061	0.0352 C
7/31/15 18:52	U	4.364	ND	ND
7/31/15 19:22	U	3.876		ND
7/31/15 19:53	LT	3.313	0.0103 C	0.0340
7/31/15 20:53	U	1.859		ND
8/8/15 20:59	U	1.900		ND
8/8/15 22:59	U	NS		ND
9/1/15 12:48	U	0.243		ND
9/23/15 13:34	U	0.167		ND
10/21/15 18:42	U	6.456	ND	ND
10/21/15 19:12	M3	9.430	0.0126 C	0.1190
10/21/15 19:41	U,M	14.675		ND
10/21/15 20:12	LT	31.483	0.0076	0.2393 C
10/21/15 20:42	LT	27.933	0.0191 C	0.4391 C
10/21/15 21:12	LT	24.134	0.0190 C	0.3780 C
10/21/15 21:42	U,M	22.429		ND
10/21/15 22:42	LT	13.502	0.0079	0.1067 C
10/21/15 23:41	U,M	12.615		ND
10/24/15 0:11	U,M	1.086	ND	ND
10/24/15 0:41	LT	0.852	0.0470 C	0.0400
10/24/15 1:11	U	0.735		ND
10/24/15 1:41	U	2.066		ND
10/24/15 3:11	U	0.730		ND
10/24/15 4:11	LT	NS	NC	0.0410

C indicates that the values were calculated from the detect concentrations of the storm water results.

Figure 12. Plots of Pu 238 & SSC results for storm water and sediment.



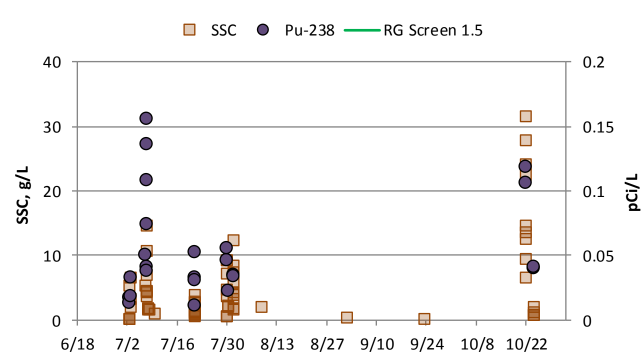
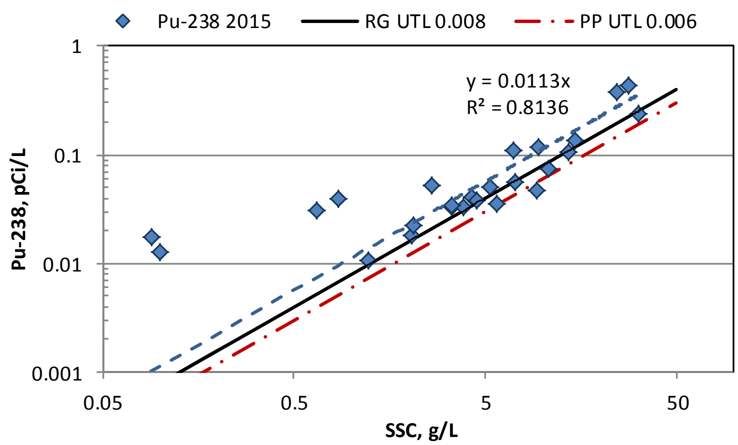


Figure 13. Pu 238 storm water concentrations vs. SSC.



The detected concentrations for Pu 239/240 for the "strong" events identified in Chapter IV, dating 7/2/2015 and 7/20/2015, were compared to the predicted values by the best fit/model derived from Figure 211 of the 2011-2014 MOU Report. According to that model, for strong LAC event, the concentration of Pu 239/240 could be predicted using the formula:

$$C_{Pu239/240}(pCi/L) = 0.0648 \times SSC(g/L)$$

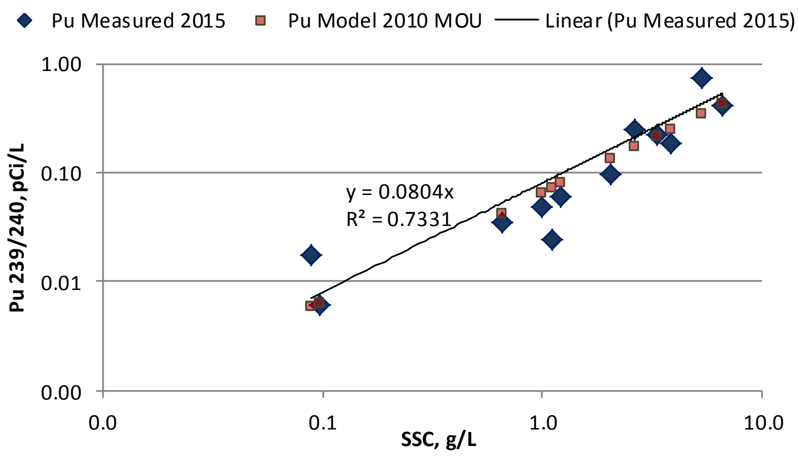
The results are presented in the table below.

Table 14. Measured vs predicted concentrations of storm water for Pu 239/240.

Date&Time	Flag	SSC g/L	Pu 239/240 Measured pCi/L	Pu 239/240 Predicted pCi/L	% Difference
7/2/15 15:41	LT	0.089	0.0173	0.00580	66.5%
7/2/15 16:11	U	0.100	ND	0.00648	
7/2/15 16:41	LT	0.097	0.0062	0.00629	1.5%
7/2/15 17:41	U	0.225	ND	0.01459	
7/2/15 18:11	M3	5.309	0.725	0.34405	52.5%
7/2/15 18:41		6.600	0.414	0.42766	3.3%
7/2/15 19:10		3.306	0.22	0.21422	2.6%
7/2/15 19:40		2.054	0.097	0.13312	37.2%
7/20/15 19:48	U	1.299	ND	0.08419	
7/20/15 20:48	U	2.886	ND	0.18700	
7/20/15 21:18	LT	1.102	0.0246	0.07141	190.3%
7/20/15 21:48		3.813	0.1830	0.24707	35.0%
7/20/15 22:18		2.626	0.2513	0.17016	32.3%
7/20/15 22:48		1.222	0.0611	0.07920	29.6%
7/20/15 23:18	LT	0.656	0.0351	0.04248	21.0%
7/20/15 23:48	U	0.570	ND	0.03691	
7/21/15 0:48	LT	0.993	0.0480	0.06436	34.1%

The predicted values were very close to the measured Pu 239/240 concentrations. Both measured and modeled values were plotted together on Figure 14 and showed a very good agreement between each other. The 2015 measured storm water concentrations for strong LAC events were fitted with best straight line in order to obtain the equation for this year's fit. The slope of the best fit was similar to the 2011-2014 MOU Report, but the coefficient of determination was much better, a great improvement in comparison to the previous report.

Figure 14. Measured vs predicted Pu 239/240 storm water concentrations.



The conclusion from the 2011-2014 report was confirmed: the Pu 239/240 concentrations flowing into the RG during strong storm events in the LAC could be predicted based on the measured SSC if sufficient information of the LAC flow is collected before and during the event.

VI.2.b. Plutonium 239/240

Table 15. Chronological results for Pu 239/240.

2015 Pu-239/240 & SSC				
Date&Time	Flag	SSC	pCi/g	pCi/L
7/2/15 15:41	LT	0.089	0.1933 C	0.0173
7/2/15 16:11	U	0.100		ND
7/2/15 16:41	LT	0.097	0.0638 C	0.0062
7/2/15 17:41	U	0.225		ND
7/2/15 18:11	M3	5.309	0.1366 C	0.7250
7/2/15 18:41		6.600	0.0627 C	0.4140
7/2/15 19:10		3.306	0.0665 C	0.2200
7/2/15 19:40		2.054	0.0472 C	0.0970
7/7/15 6:09	LT	5.279	0.0100 C	0.0529 C
7/7/15 6:39	LT	4.396	0.0123	0.0541 C
7/7/15 7:09	U	4.276	ND	ND
7/7/15 7:39	U	3.723		ND
7/7/15 8:09	LT	4.473	0.0168	0.0751 C
7/7/15 8:39	LT	NS	0.0134	NC
7/7/15 9:08	LT	7.038	0.0128	0.0901 C
7/7/15 9:38	LT	10.595	0.0078	0.0826 C
7/7/15 10:08	LT	14.685	0.0121	0.1777 C
7/7/15 11:09		NS	NC	0.1130
7/7/15 22:30	LT	1.703	0.0276 C	0.0470
7/7/15 23:00	LT	1.751	0.0166 C	0.0290
7/7/15 23:30	LT	1.488	0.0171 C	0.0255
7/8/15 2:29	LT	1.540	0.0101 C	0.0155
7/9/15 13:00	LT	0.976	0.0210 C	0.0205
7/20/15 19:48	U	1.299		ND
7/20/15 20:48	U	2.886		ND
7/20/15 21:18	LT	1.102	0.0223 C	0.0246
7/20/15 21:48		3.813	0.0480 C	0.1830
7/20/15 22:18		2.626	0.0957 C	0.2513 C
7/20/15 22:48		1.222	0.0500	0.0611 C
7/20/15 23:18	LT	0.656	0.0535 C	0.0351
7/20/15 23:48	U	0.570		ND
7/21/15 0:48	LT	0.993	0.0483 C	0.0480
7/30/15 0:22	U	0.549		ND
7/30/15 0:52	LT	0.603	0.0428 C	0.0258
7/30/15 1:22	LT	9.288	0.0091	0.0845 C
7/30/15 1:52	LT	9.250	0.0083	0.0768 C
7/30/15 2:22	LT	7.086	0.0104	0.0737 C
7/30/15 2:52	LT	3.676	0.0093	0.0342 C
7/30/15 3:22	LT	4.586	0.0100 C	0.0458 C
7/30/15 3:52		2.088	0.0206	0.0430 C
7/30/15 4:22	U	2.305		ND
7/31/15 15:53	U	1.531		ND
7/31/15 16:53		7.299	0.0326 C	0.2380
7/31/15 17:23	M3	12.419	0.0111 C	0.1380
7/31/15 17:53	U,M	8.384		ND
7/31/15 18:23	LT	5.773	0.0095	0.0548 C
7/31/15 18:52	LT	4.364	0.0058	0.0253 C
7/31/15 19:22	U	3.876		ND
7/31/15 19:53	U	3.313		ND
7/31/15 20:53	U	1.859		ND
8/8/15 20:59		1.900	0.0179 C	0.0340
8/8/15 22:59	U	NS		ND
9/1/15 12:48	U	0.158		ND
9/23/15 13:34	LT	0.082	0.2650 C	0.0217
10/21/15 18:42	LT	6.456	0.0127	0.0820 C
10/21/15 19:12	M3	9.430	0.0151 C	0.1420
10/21/15 19:41	U,M	14.675		ND
10/21/15 20:12	LT	31.483	0.0083	0.2613 C
10/21/15 20:42	U	27.933	ND	ND
10/21/15 21:12	LT	24.134	0.0115	0.2392 C
10/21/15 21:42		22.429	0.0051 C	0.1150
10/21/15 22:42	LT	13.502	0.0135	0.1762 C
10/21/15 23:41	U,M	12.615		ND
10/24/15 0:11	LT	1.086	0.0140	0.0152 C
10/24/15 0:41	U	0.852		ND
10/24/15 1:11	U	0.735		ND
10/24/15 1:41	LT	2.066	0.0073 C	0.015
10/24/15 3:11	U	0.730		ND
10/24/15 4:11	U	NS		ND

C indicates that the values were calculated from the detect concentrations of the storm water results.

Figure 15. Plots of Pu 239/240 & SSC results for storm water and sediment.

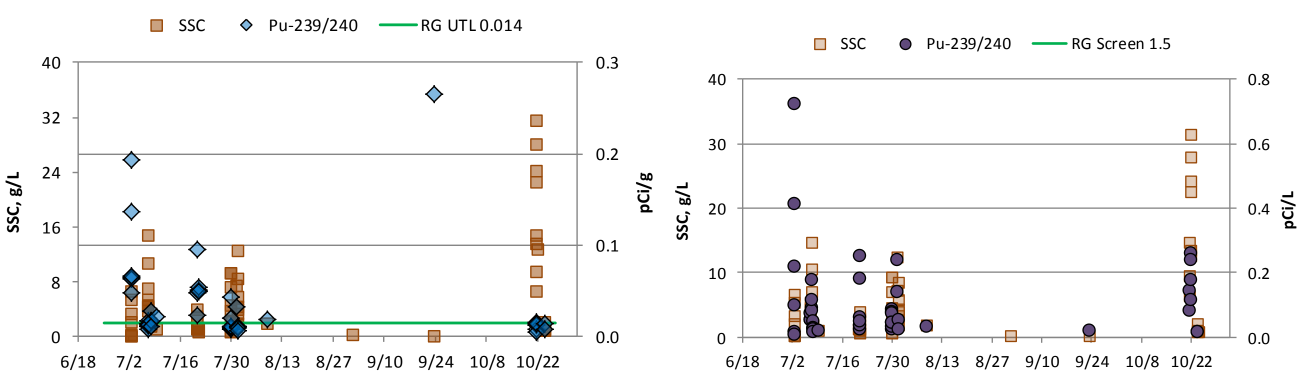
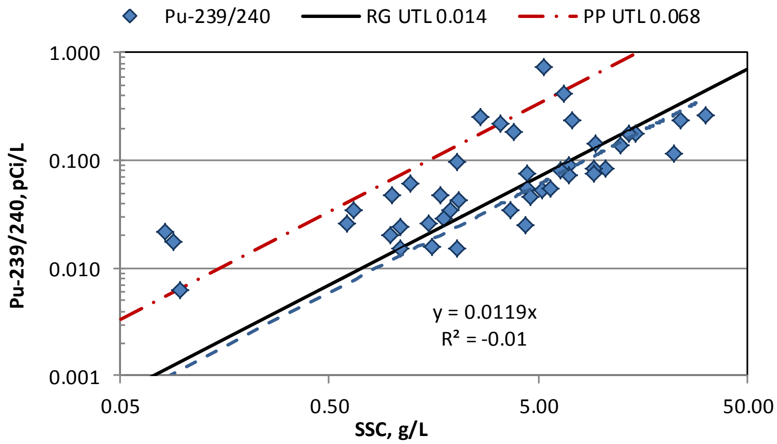


Figure 16. Pu 239/240 storm water concentrations vs. SSC.



VI.2.c. Radium 226

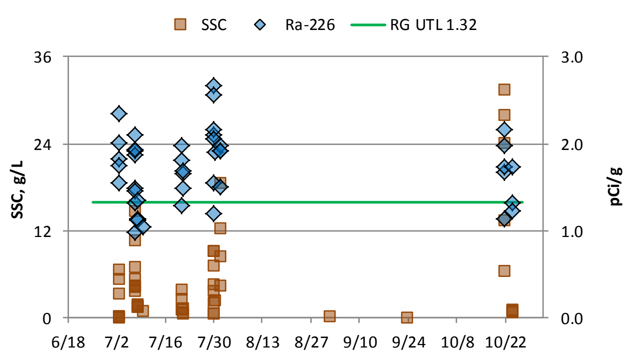
Table 16. Chronological results for Ra 226.

2015 Ra-226 & SSC				
Date&Time	Flag	SSC	pCi/g	pCi/L
7/2/15 15:41	U	0.089		ND
7/2/15 16:11	LT	0.100	2.35 C	0.24
7/2/15 16:41	U	0.097		ND
7/2/15 17:41	LT	0.225	1.55 C	0.35
7/2/15 18:11		5.309	2.02 C	10.70
7/2/15 18:41		6.600	1.82 C	12.00
7/2/15 19:10		3.306	1.75 C	5.78
7/7/15 6:09		5.279	2.10 C	11.10
7/7/15 6:39		4.396	1.91 C	8.40
7/7/15 7:09		4.276	1.87 C	8.00
7/7/15 7:39		3.723	0.98 C	3.64
7/7/15 8:09		4.473	1.49 C	6.65
7/7/15 8:39	U	NS	C	ND
7/7/15 9:08		7.038	1.93 C	13.60
7/7/15 9:38		10.595	1.31 C	13.90
7/7/15 10:08		14.685	1.45 C	21.30
7/7/15 22:30	M3	1.703	10.92 C	18.60
7/7/15 23:00		1.751	1.14 C	2.00
7/7/15 23:30		1.488	1.12 C	1.66
7/8/15 2:29		1.540	1.35 C	2.08
7/9/15 13:00		0.976	1.05 C	1.02
7/20/15 21:18		1.102	1.29 C	1.42
7/20/15 21:48		3.813	1.80 C	6.88
7/20/15 22:18		2.626	1.98 C	5.21
7/20/15 22:48		1.222	1.48 C	1.81
7/20/15 23:18		0.656	1.66 C	1.09

2015 Ra-226 & SSC				
Date&Time	Flag	SSC	pCi/g	pCi/L
7/20/15 23:48	LT	0.570	1.69 C	0.96
7/30/15 0:22	LT	0.549	1.20 C	0.66
7/30/15 0:52		0.603	2.11 C	1.27
7/30/15 1:22		9.288	2.16 C	20.10
7/30/15 1:52	U,M	9.250		ND
7/30/15 2:22		7.086	2.06 C	14.60
7/30/15 2:52		3.676	2.67 C	9.80
7/30/15 3:22		4.586	1.54 C	7.08
7/30/15 3:52		2.088	2.56 C	5.35
7/30/15 4:22		2.305	1.90 C	4.39
7/31/15 17:23	M3	18.600	1.98 C	36.80
7/31/15 17:53		8.384	1.92 C	16.10
7/31/15 18:52		4.364	1.92 C	8.40
9/1/15 12:48	LT	0.158	4.04 C	0.64
9/23/15 13:34	LT	0.082	3.92 C	0.32
10/21/15 18:42		6.456	1.67 C	10.80
10/21/15 20:12	M3	31.483	1.14 C	35.80
10/21/15 20:42	M3	27.933	1.98 C	55.20
10/21/15 21:12	M3	24.134	1.73 C	41.70
10/21/15 22:42		13.502	2.16 C	29.20
10/24/15 0:11		1.086	1.32 C	1.43
10/24/15 0:41		0.852	1.23 C	1.05
10/24/15 1:11		0.735	1.74 C	1.28
10/24/15 1:41	LT	2.066	0.34 C	0.70
10/24/15 3:11		0.730	1.37 C	1.00
10/24/15 4:11		NS	NC	1.66

C indicates that the values were calculated from the detect concentrations of the storm water results.

Figure 17. Plots of Ra 226 & SSC results for storm water and sediment.



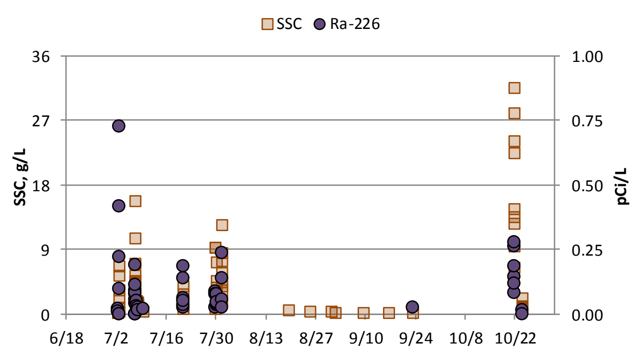
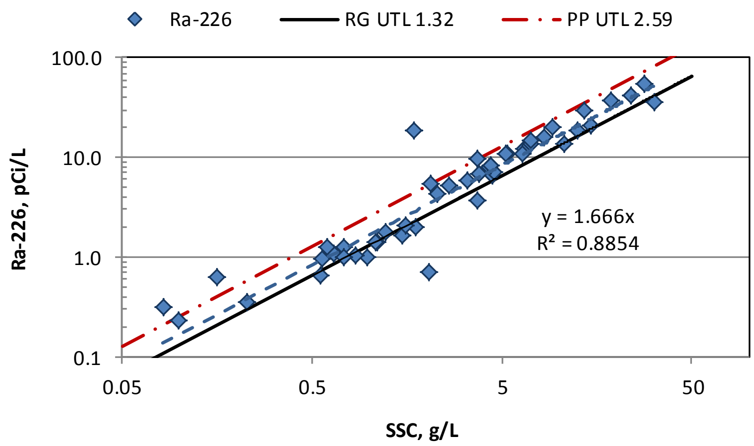


Figure 18. Ra 226 storm water concentrations vs. SSC.



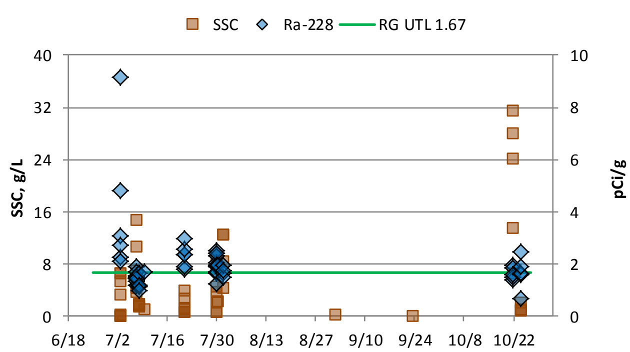
VI.2.d. Radium 228

Table 17. Chronological results for Ra 228.

2015 Ra-228 & SSC					2015 Ra-228 & SSC				
Date&Time	Flag	SSC	pCi/g	pCi/L	Date&Time	Flag	SSC	pCi/g	pCi/L
7/2/15 15:41	Y1,LT	0.089	9.16 C	0.82	7/20/15 23:48		0.570	2.95 C	1.68
7/2/15 16:11	U	0.100		ND	7/30/15 0:22	LT	0.549	1.66 C	0.91
7/2/15 16:41	Y1,U	0.097		ND	7/30/15 0:52		0.603	2.49 C	1.50
7/2/15 17:41	Y1	0.225	4.80 C	1.08	7/30/15 1:22	M3	9.288	2.06 C	19.10
7/2/15 18:11	M3	5.309	3.09 C	16.40	7/30/15 1:52	M3	9.250	2.28 C	21.10
7/2/15 18:41	M3	6.600	2.24 C	14.80	7/30/15 2:22	M3	7.086	1.71 C	12.10
7/2/15 19:10	M3	3.306	2.69 C	8.90	7/30/15 2:52	M3	3.676	2.42 C	8.90
7/7/15 6:09	M3	5.279	1.89 C	10.00	7/30/15 3:22	M3	4.586	1.23 C	5.66
7/7/15 6:39	M3	4.396	1.68 C	7.40	7/30/15 3:52	M3	2.088	1.96 C	4.09
7/7/15 7:09	M3	4.276	1.19 C	5.11	7/30/15 4:22	M3	2.305	1.94 C	4.48
7/7/15 7:39	M3	3.723	1.55 C	5.76	7/31/15 17:23	M3	12.419	1.64 C	20.40
7/7/15 8:09	M3	4.473	1.42 C	6.36	7/31/15 17:53	M3	8.384	1.93 C	16.20
7/7/15 8:39	M3	NS	NC	9.80	7/31/15 18:52	M3	4.364	1.72 C	7.50
7/7/15 9:08	M3	7.038	1.31 C	9.20	9/1/15 12:48	Y1,U	0.158		ND
7/7/15 9:38	M3	10.595	1.46 C	15.50	9/23/15 13:34	U	0.082		ND
7/7/15 10:08	M3	14.685	1.45 C	21.30	10/21/15 18:42	M3	6.456	1.94 C	12.50
7/7/15 22:30		1.703	1.63 C	2.78	10/21/15 20:12	M3	31.483	1.82 C	57.30
7/7/15 23:00		1.751	1.12 C	1.96	10/21/15 20:42	M3	27.933	1.37 C	38.30
7/7/15 23:30		1.488	1.16 C	1.72	10/21/15 21:12	M3	24.134	1.46 C	35.20
7/8/15 2:29		1.540	0.99 C	1.52	10/21/15 22:42	M3	13.502	1.59 C	21.50
7/9/15 13:00		0.976	1.70 C	1.66	10/24/15 0:11	M3	1.086	2.46 C	2.67
7/20/15 21:18		1.102	1.78 C	1.96	10/24/15 0:41		0.852	1.61 C	1.37
7/20/15 21:48	M3	3.813	1.90 C	7.25	10/24/15 1:11		0.735	1.63 C	1.20
7/20/15 22:18	M3	2.626	2.33 C	6.13	10/24/15 1:41		2.066	0.64 C	1.32
7/20/15 22:48	M3	1.222	2.37 C	2.90	10/24/15 3:11		0.730	1.90 C	1.39
7/20/15 23:18		0.656	2.55 C	1.67	10/24/15 4:11		NS	NC	1.83

C indicates that the values were calculated from the detect concentrations of the storm water results.

Figure 19. Plots of Ra 228 & SSC results for storm water and sediment.



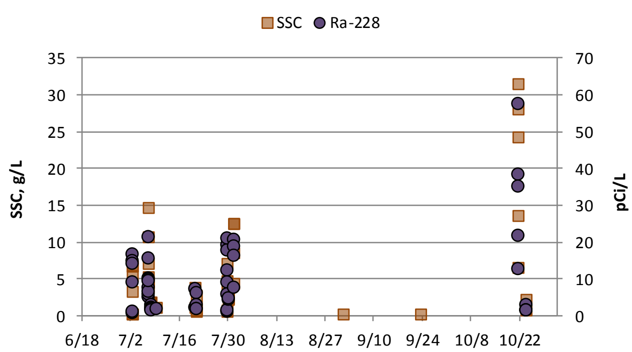
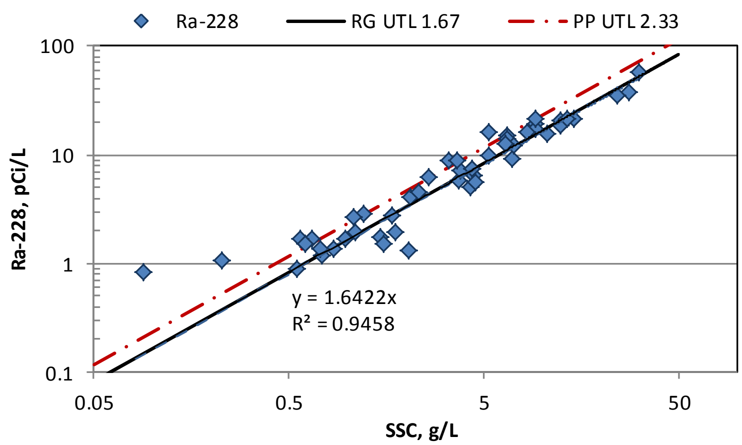


Figure 20. Ra 228 storm water concentrations vs. SSC.



VI.2.e. Uranium 234

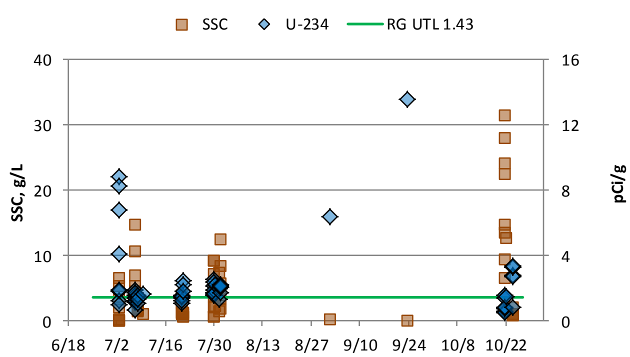
Table 18. Chronological results for U 234.

2015 U-234 & SSC				
Date&Time	Flag	SSC, g/L	pCi/g	pCi/L
7/2/15 15:41		0.089	8.83 C	0.79
7/2/15 16:11		0.100	6.82 C	0.68
7/2/15 16:41		0.097	8.25 C	0.80
7/2/15 17:41		0.225	4.08 C	0.92
7/2/15 18:11		5.309	1.81 C	9.61
7/2/15 18:41	M3	6.600	1.20 C	7.91
7/2/15 19:10		3.306	1.89 C	6.25
7/2/15 19:40		2.054	0.99 C	2.04
7/7/15 6:09		5.279	1.90 C	10.02 C
7/7/15 6:39		4.396	1.56 C	6.86 C
7/7/15 7:09		4.276	1.16 C	4.96 C
7/7/15 7:39		3.723	1.16 C	4.33
7/7/15 8:09		4.473	1.23 C	5.49 C
7/7/15 8:39		NS	0.67	NC
7/7/15 9:08		7.038	1.36 C	9.56 C
7/7/15 9:38		10.595	1.58 C	18.80 C
7/7/15 10:08		14.685	1.71 C	25.17 C
7/7/15 11:09	M3	NS	NC	22.50
7/7/15 22:30		1.703	1.44 C	2.45
7/7/15 23:00		1.751	1.04 C	1.82
7/7/15 23:30		1.488	1.55 C	2.30
7/8/15 2:29		1.540	1.31 C	2.01
7/9/15 13:00		0.976	1.67 C	1.63
7/20/15 19:48		1.299	1.42 C	1.84
7/20/15 20:48		2.886	1.08 C	3.13
7/20/15 21:18		1.102	1.56 C	1.72
7/20/15 21:48		3.813	1.45 C	5.51
7/20/15 22:18		2.626	1.21 C	3.19 C
7/20/15 22:48		1.222	1.84 C	2.24 C
7/20/15 23:18		0.656	2.46 C	1.61
7/20/15 23:48		0.570	2.19 C	1.25
7/21/15 0:48		0.993	1.81 C	1.80
7/30/15 0:22		0.549	2.15 C	1.18

2015 U-234 & SSC				
Date&Time	Flag	SSC, g/L	pCi/g	pCi/L
7/30/15 0:52		0.603	2.52 C	1.52
7/30/15 1:22		9.288	1.54 C	14.33 C
7/30/15 1:52		9.250	1.67 C	15.43 C
7/30/15 2:22		7.086	1.69 C	11.98 C
7/30/15 2:52		3.676	1.92 C	7.06 C
7/30/15 3:22		4.586	1.65 C	7.55 C
7/30/15 3:52		2.088	2.38 C	4.98 C
7/30/15 4:22		2.305	2.21 C	5.10
7/31/15 15:53		1.531	1.29 C	1.98
7/31/15 16:53	M3	7.299	2.00 C	14.60
7/31/15 17:23	M3	12.419	1.74 C	21.60
7/31/15 17:53	M3	8.384	2.05 C	17.20
7/31/15 18:23		5.773	2.04 C	11.80 C
7/31/15 18:52		4.364	2.14 C	9.32 C
7/31/15 19:22		3.876	2.21 C	8.55
7/31/15 19:53		3.313	2.02 C	6.69
7/31/15 20:53		1.859	2.09 C	3.88
9/1/15 12:48		0.158	6.34 C	1.00
9/23/15 13:34		0.082	13.56 C	1.11
10/21/15 18:42		6.456	1.38 C	8.90 C
10/21/15 19:12	M3	9.430	1.53 C	14.40
10/21/15 19:41	M3	14.675	1.55 C	22.70
10/21/15 20:12		31.483	0.54 C	15.38 C
10/21/15 20:42		27.933	0.55 C	13.04 C
10/21/15 21:12		24.134	0.51 C	12.41 C
10/21/15 21:42	M3	22.429	0.78 C	17.40
10/21/15 22:42		13.502	0.80 C	10.76 C
10/21/15 23:41	M3	12.615	1.51 C	19.00
10/24/15 0:11		1.086	2.76 C	2.99 C
10/24/15 0:41		0.852	2.68 C	2.28
10/24/15 1:11		0.735	3.30 C	2.43
10/24/15 1:41		2.066	0.78 C	1.61
10/24/15 3:11		0.730	3.37 C	2.46
10/24/15 4:11		NS	NC	3.52

C indicates that the values were calculated from the detect concentrations of the storm water results.

Figure 21. Plots of U 234 & SSC results for storm water and sediment.



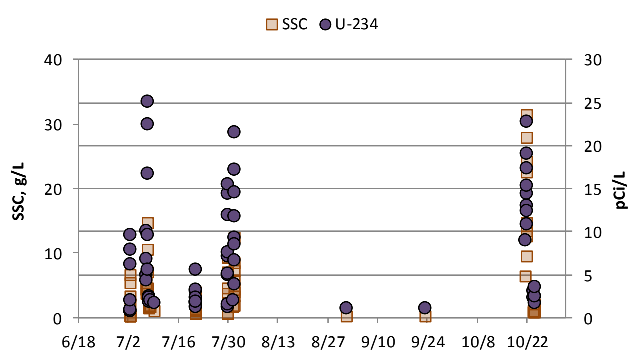
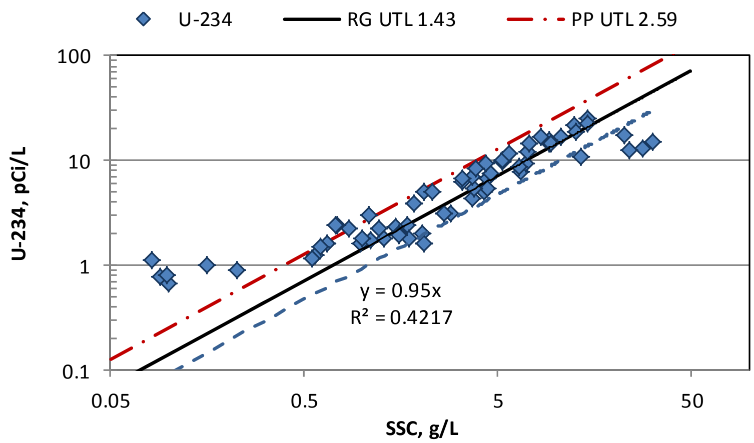


Figure 22. U 234 storm water concentrations vs. SSC.



VI.2.f. Uranium 238

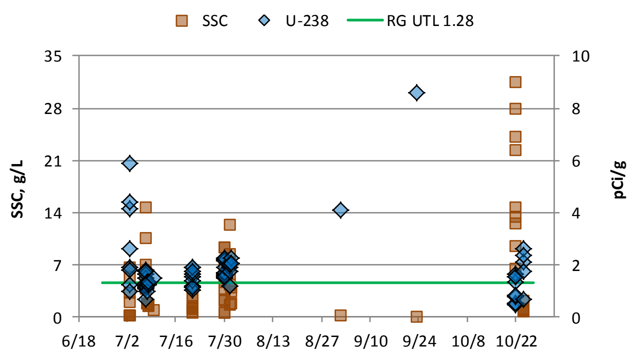
Table 19. Chronological results for U 238.

2015 U-238 & SSC				
Date&Time	Flag	SSC	pCi/g	pCi/L
7/2/15 15:41		0.089	5.86 C	0.52
7/2/15 16:11		0.100	4.13 C	0.41
7/2/15 16:41		0.097	4.41 C	0.43
7/2/15 17:41		0.225	2.62 C	0.59
7/2/15 18:11	M3	5.309	1.87 C	9.95
7/2/15 18:41		6.600	1.22 C	8.06
7/2/15 19:10		3.306	1.78 C	5.87
7/2/15 19:40		2.054	0.95 C	1.96
7/7/15 6:09		5.279	1.81 C	9.56 C
7/7/15 6:39		4.396	1.46 C	6.41 C
7/7/15 7:09		4.276	1.14 C	4.87 C
7/7/15 7:39		3.723	1.09 C	4.07
7/7/15 8:09	M3	4.473	1.20 C	5.36 C
7/7/15 8:39		NS	0.66	NC
7/7/15 9:08		7.038	1.28 C	9.01 C
7/7/15 9:38	M3	10.595	1.62 C	17.13 C
7/7/15 10:08		14.685	1.74 C	25.49 C
7/7/15 11:09	M3	NS	NC	22.60
7/7/15 22:30		1.703	1.33 C	2.27
7/7/15 23:00		1.751	0.96 C	1.68
7/7/15 23:30		1.488	1.22 C	1.82
7/8/15 2:29		1.540	1.32 C	2.04
7/9/15 13:00		0.976	1.47 C	1.43
7/20/15 19:48		1.299	1.16 C	1.51
7/20/15 20:48		2.886	1.02 C	2.94
7/20/15 21:18		1.102	1.54 C	1.70
7/20/15 21:48		3.813	1.41 C	5.36
7/20/15 22:18		2.626	1.13 C	2.98 C
7/20/15 22:48	M3	1.222	1.63 C	1.99 C
7/20/15 23:18		0.656	1.89 C	1.24
7/20/15 23:48		0.570	1.88 C	1.07
7/21/15 0:48		0.993	1.73 C	1.72
7/30/15 0:22		0.549	1.60 C	0.88

2015 U-238 & SSC				
Date&Time	Flag	SSC	pCi/g	pCi/L
7/30/15 0:52		0.603	2.19 C	1.32
7/30/15 1:22		9.288	1.50 C	13.97 C
7/30/15 1:52		9.250	1.65 C	15.22 C
7/30/15 2:22		7.086	1.67 C	11.85 C
7/30/15 2:52		3.676	1.87 C	6.88 C
7/30/15 3:22		4.586	1.54 C	7.06 C
7/30/15 3:52		2.088	2.13 C	4.46 C
7/30/15 4:22		2.305	2.23 C	5.14
7/31/15 15:53		1.531	1.18 C	1.80
7/31/15 16:53		7.299	1.89 C	13.80
7/31/15 17:23		12.419	1.76 C	21.90
7/31/15 17:53		8.384	1.98 C	16.60
7/31/15 18:23	M3	5.773	2.03 C	11.72 C
7/31/15 18:52		4.364	2.02 C	8.80 C
7/31/15 19:22		3.876	2.24 C	8.67
7/31/15 19:53		3.313	2.03 C	6.71
7/31/15 20:53		1.859	2.07 C	3.84
9/1/15 12:48		0.158	4.08 C	0.65
9/23/15 13:34		0.082	8.57 C	0.70
10/21/15 18:42	M3	6.456	1.33 C	8.57 C
10/21/15 19:12	M3	9.430	1.63 C	15.40
10/21/15 19:41	M3	14.675	1.55 C	22.70
10/21/15 20:12		31.483	0.50 C	15.59 C
10/21/15 20:42		27.933	0.47 C	13.19 C
10/21/15 21:12	M3	24.134	0.52 C	12.63 C
10/21/15 21:42		22.429	0.75 C	16.90
10/21/15 22:42		13.502	0.80 C	10.83 C
10/21/15 23:41	M3	12.615	1.54 C	19.40
10/24/15 0:11	M3	1.086	2.07 C	2.25 C
10/24/15 0:41		0.852	1.76 C	1.50
10/24/15 1:11		0.735	2.61 C	1.92
10/24/15 1:41		2.066	0.66 C	1.37
10/24/15 3:11		0.730	2.37 C	1.73
10/24/15 4:11		NS	NC	3.03

C indicates that the values were calculated from the detect concentrations of the storm water results.

Figure 23. Plots of U 238 & SSC results for storm water and sediment.



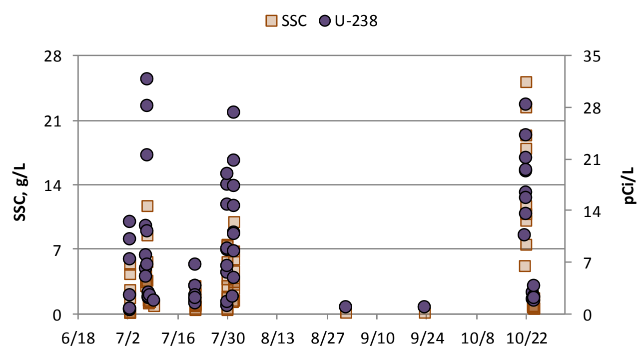
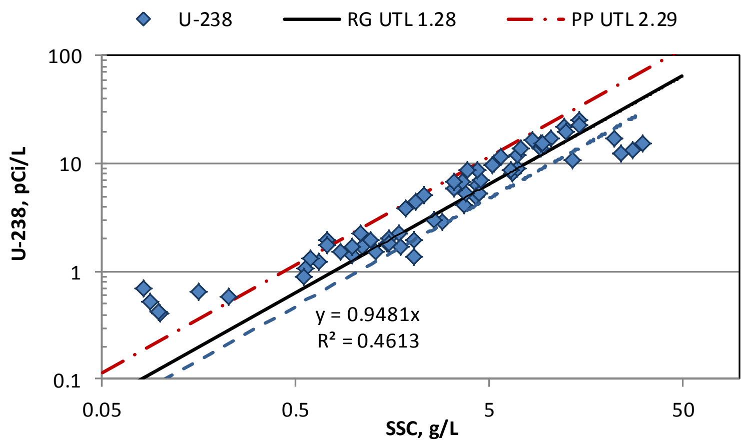


Figure 24. U 238 storm water concentrations vs. SSC.



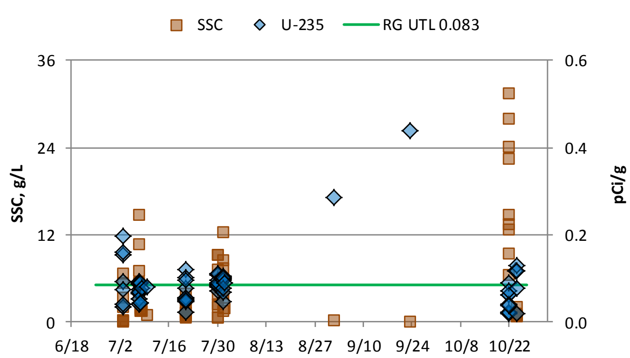
VI.2.g. Uranium 235

Table 20. Chronological results for U 235.

2015 U-235 & SSC				
Date&Time	Flag	SSC, g/L	pCi/g	pCi/L
7/2/15 15:41	LT	0.089	0.1542 C	0.0138
7/2/15 16:11	U	0.100		ND
7/2/15 16:41	LT	0.097	0.1957 C	0.0190
7/2/15 17:41	LT	0.225	0.1599 C	0.0360
7/2/15 18:11		5.309	0.0925 C	0.4910
7/2/15 18:41		6.600	0.0342 C	0.2260
7/2/15 19:10		3.306	0.0747 C	0.2470
7/2/15 19:40	LT	2.054	0.0394 C	0.0810
7/7/15 6:09		5.279	0.0913 C	0.4821 C
7/7/15 6:39		4.396	0.0741 C	0.3259 C
7/7/15 7:09		4.276	0.0636 C	0.2721 C
7/7/15 7:39		3.723	0.0669 C	0.2490
7/7/15 8:09		4.473	0.0688 C	0.3078 C
7/7/15 8:39		NS	0.0414 C	NC
7/7/15 9:08	M3	7.038	0.0516 C	0.3633 C
7/7/15 9:38		10.595	0.0872 C	0.9234 C
7/7/15 10:08	M3	14.685	0.0879 C	1.2908 C
7/7/15 11:09		NS	NC	0.8900
7/7/15 22:30		1.703	0.0904 C	0.1540
7/7/15 23:00	LT	1.751	0.0434 C	0.0760
7/7/15 23:30	LT	1.488	0.0430 C	0.0640
7/8/15 2:29		1.540	0.0766 C	0.1180
7/9/15 13:00	LT	0.976	0.0810 C	0.0790
7/20/15 19:48	LT	1.299	0.0754 C	0.0980
7/20/15 20:48	LT	2.886	0.0211 C	0.0610
7/20/15 21:18	LT	1.102	0.0517 C	0.0570
7/20/15 21:48		3.813	0.0548 C	0.2090
7/20/15 22:18		2.626	0.0454 C	0.1191 C
7/20/15 22:48	LT, M3	1.222	0.0501 C	0.0612 C
7/20/15 23:18	LT	0.656	0.1205 C	0.0790
7/20/15 23:48	LT	0.570	0.1001 C	0.0570
7/21/15 0:48	LT	0.993	0.0946 C	0.0940
7/30/15 0:22	LT	0.549	0.0948 C	0.0520
7/30/15 0:52	LT	0.603	0.0697 C	0.0420
7/30/15 1:22		9.288	0.0825 C	0.7660 C
7/30/15 1:52		9.250	0.0806 C	0.7457 C
7/30/15 2:22		7.086	0.0870 C	0.6165 C
7/30/15 2:52		3.676	0.0828 C	0.3042 C
7/30/15 3:22		4.586	0.0885 C	0.4059 C
7/30/15 3:52		2.088	0.1080 C	0.2255 C
7/30/15 4:22		2.305	0.1089 C	0.2510
7/31/15 15:53	LT	1.531	0.0464 C	0.0710
7/31/15 16:53		7.299	0.1055 C	0.7700
7/31/15 17:23	M3	12.419	0.0660 C	0.8200
7/31/15 17:53	M3	8.384	0.1002 C	0.8400
7/31/15 18:23		5.773	0.0979 C	0.5654 C
7/31/15 18:52		4.364	0.0953 C	0.4160 C
7/31/15 19:22		3.876	0.1001 C	0.3880
7/31/15 19:53		3.313	0.0764 C	0.2530
7/31/15 20:53		1.859	0.0877 C	0.1630
9/1/15 12:48	LT	0.158	0.2842 C	0.0450
9/23/15 13:34	LT	0.082	0.4397 C	0.0360
10/21/15 18:42		6.456	0.0606 C	0.3913 C
10/21/15 19:12		9.430	0.0604 C	0.5700
10/21/15 19:41		14.675	0.0893 C	1.3100
10/21/15 20:12		31.483	0.0254 C	0.7003 C
10/21/15 20:42		27.933	0.0207 C	0.4981 C
10/21/15 21:12		24.134	0.0224 C	0.5417 C
10/21/15 21:42	M3	22.429	0.0392 C	0.8800
10/21/15 22:42	M3	13.502	0.0363 C	0.4897 C
10/21/15 23:41	M3	12.615	0.0698 C	0.8800
10/24/15 0:11		1.086	0.1180 C	0.1282 C
10/24/15 0:41		0.852	0.1280 C	0.1090
10/24/15 1:11	LT	0.735	0.0775 C	0.0570
10/24/15 1:41	LT	2.066	0.0189 C	0.0390
10/24/15 3:11	LT	0.730	0.1151 C	0.0840
10/24/15 4:11		NS	NC	0.1320

C indicates that the values were calculated from the detect concentrations of the storm water results.

Figure 25. Plots of U 235 & SSC results for storm water and sediment.



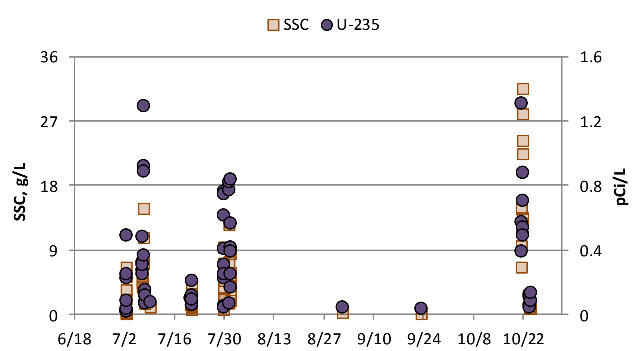
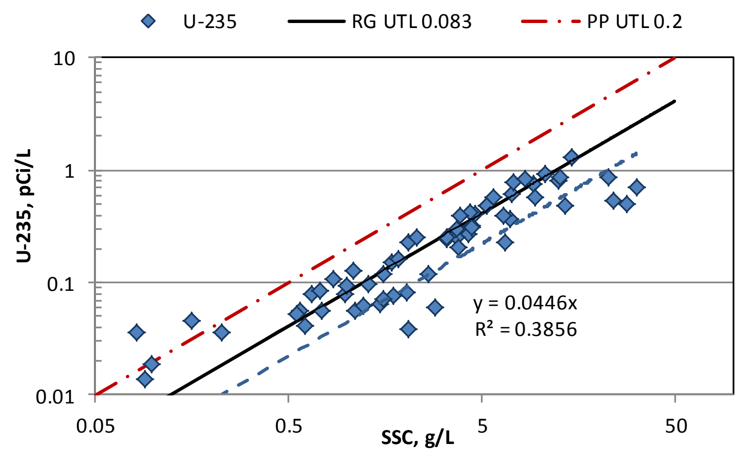


Figure 26. U 235 storm water vs. SSC.



In addition to the standard plots, we plotted the U 234/U 238 ratio for all samples. Only 12 percent of the samples had the ratio of 1, and 23 percent of the samples had a ratio of greater than 1.4 indicative of uranium from anthropological sources.

Figure 27. Histogram of U234/U238 ratio.

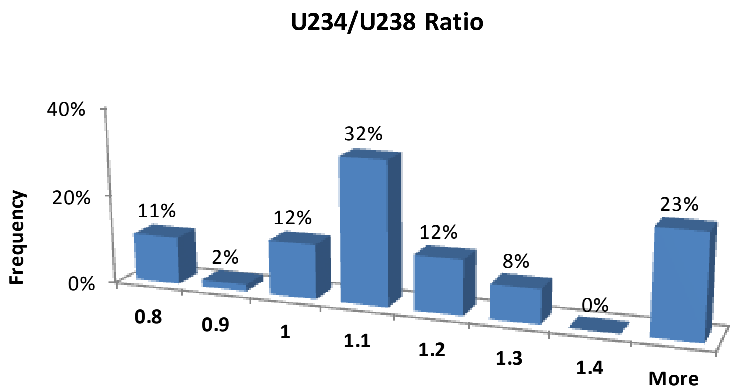
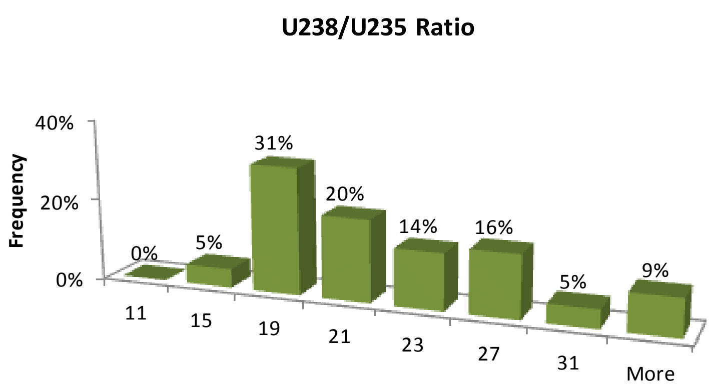
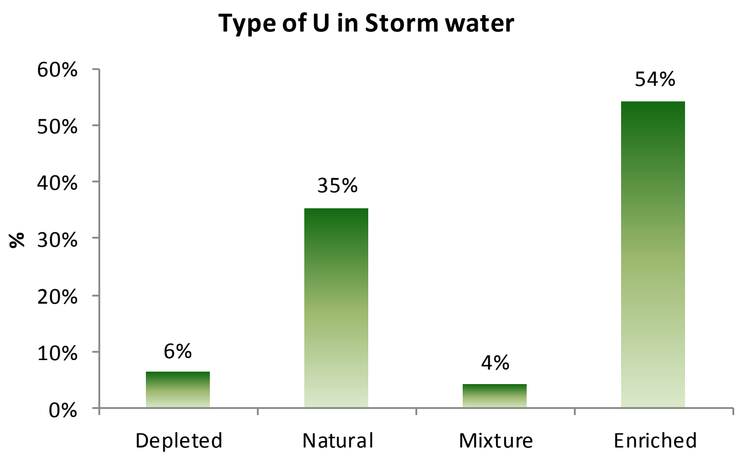


Figure 28. Histogram of U238/U235 ratio.



For the ratio U 238/U 235, a large percent was less than the naturally occurring ratio of 21, and, therefore indicative of higher concentrations of U 235 and anthropological sources of uranium. Using the data we have obtained for total uranium, we were able to calculate the percent U 235, and found that 54% of the time, enriched uranium has been transported and detected at BDD. See Figure 29.

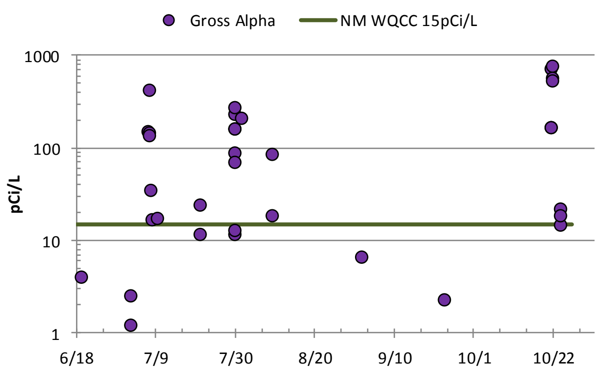
Figure 29. Type of Uranium in storm water.

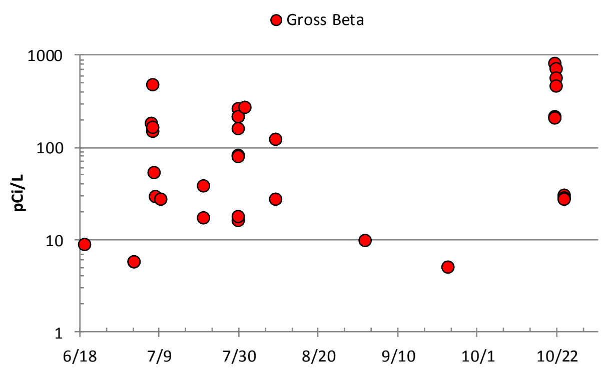


VI.2.h. Gross Alpha and Beta

The following figures depict the results of the 2015 sampling for gross alpha and beta radionuclides. The pattern of the values appears similar implying that the same radionuclides may be responsible for the concentrations.

Figure 30. Gross alpha and beta stormwater results.





There were regular exceedances of the surface water standard for gross alpha during this monitoring period, which is similar to occurrences during previous monitoring seasons.

VI.3 Analytical Results for Metals

Table 21. Descriptive statistics of metal concentrations in storm water.

Name	Num Obs	Non-detects, ug/L			Detects, ug/L						NDs & Ds, ug/L	
		Num	Min	Max	Num	Min	Max	Mean	Median	SD	50% ile	95% ile
As UF	55	0	N/A	N/A	55	1.9	64	13.1	7	14.48	7	43.8
As F	37	5	3.8	3.8	32	0.92	7.185	2.35	2.053	1.173	2.2	3.92
Al UF	55	0	N/A	N/A	55	1,600	310,000	65,556	34,000	76,911	34,000	239,000
Al F	38	4	43	43	34	15	2,620	557.8	200	695.9	144.8	1,915
Sb UF	59	41	0.3	0.3	18	0.11	0.47	0.24	0.21	0.088	0.30	0.302
Sb F	37	10	0.18	0.3	27	0.18	0.44	0.29	0.30	0.075	0.30	0.416
Ba UF	56	0	N/A	N/A	56	67	6,000	1,034	587.5	1,194	587.5	3,025
Ba F	35	0	N/A	N/A	35	42	719	93.5	75	111.3	75	123
Be UF	59	9	0.13	0.62	50	0.17	27	5.85	4.1	6.33	2.7	16.6
Be F	43	42	0.13	0.62	1	2.39	2.39	2.39	2.39	N/A	0.5	0.62
B UF	53	0	N/A	N/A	53	14	190	63.5	54	40.0	54	162
B F	32	0	N/A	N/A	32	20	48.15	29.27	28.50	7.31	28.50	41.32
Cd UF	63	22	0.09	0.51	41	0.09	4.9	1.04	0.7	0.94	0.44	2.17
Cd F	43	42	0.18	0.51	1	0.77	0.77	0.77	0.77	N/A	0.30	0.51
Ca UF	54	0	N/A	N/A	54	25,000	1,200,000	187,196	77,250	237,110	77,250	602,500
Ca F	33	0	N/A	N/A	33	24,000	255,000	37,033	29,000	39,339	29,000	40,800
Cr UF	58	0	N/A	N/A	58	1.4	260	49.6	24.5	61.0	24.5	186
Cr F	43	26	0.6	10	17	0.6	2.1	1.03	0.98	0.47	1.5	10
Co UF	56	0	N/A	N/A	56	0.81	180	31.72	16.5	38.23	16.5	105
Co F	35	4	1	1.2	31	0.27	5.4	2.94	3.24	1.40	3	4.82
Cu UF	58	9	3.1	10	49	3.3	280	67.04	46	67.21	35.5	187.5
Cu F	43	42	3.1	10	1	11.5	11.5	11.5	11.5	N/A	10	10
Fe UF	57	0	N/A	N/A	57	1,400	240,000	49,434	27,000	57,559	27,000	178,000
Fe F	41	13	24.7	100	28	25	1,600	431.3	205	500.8	100	1,400
Pb UF	57	0	N/A	N/A	57	1.3	280	55.44	33	62.94	33	172
Pb F	39	27	0.13	0.5	12	0.18	11.9	1.96	0.73	3.29	0.5	2.25
Mg UF	54	0	N/A	N/A	54	4,400	180,000	37,833	18,500	42,529	18,500	137,000
Mg F	32	0	N/A	N/A	32	3,250	11,250	4,554	4,200	1,443	4,200	6,580
Mn UF	57	0	N/A	N/A	57	90	14,000	2,359	1,500	2,971	1,500	8,160
Mn F	35	2	0.84	0.84	33	1.5	1075	67.84	9.9	189.1	8.45	184
Hg UF	62	34	0.06	0.2	28	0.061	0.3	0.146	0.12	0.074	0.2	0.269
Hg F	43	43	0.06	0.2	0	N/A	N/A	N/A	N/A	N/A	0.2	0.2
Ni UF	59	3	2.44	5	56	2.6	360	70.52	39	83.75	29.5	236
Ni F	42	29	1.8	5	13	2.8	6	4.37	3.9	1.36	5	5.90
K UF	55	0	N/A	N/A	55	2,000	87,000	18,404	10,000	20,467	10,000	66,900
K F	33	1	2,320	2,320	32	1,745	4,645	2,557	2,475	632.4	2,450	3,780
Se UF	58	14	0.663	1	44	0.78	26	5.56	3.4	6.09	1.85	16.45
Se F	41	33	0.675	1	8	0.8	1.4	1.04	1.01	0.25	1	1.1
Ag UF	58	15	0.038	0.1	43	0.04	0.52	0.18	0.15	0.132	0.1	0.413
Ag F	41	35	0.038	0.1	6	0.04	0.08	0.055	0.05	0.016	0.1	0.1
Na UF	55	0	N/A	N/A	55	7,000	26,000	15,125	14,000	3,942	14,000	22,900
Na F	32	0	N/A	N/A	32	10,000	20,000	13,122	12,000	2,774	12,000	19,000
Tl UF	55	3	0.040	0.2	52	0.06	4.6	0.935	0.57	1.077	0.47	3.34
Tl F	41	29	0.040	0.2	12	0.05	0.1	0.0675	0.065	0.0171	0.2	0.2
U UF	54	0	N/A	N/A	54	1.1	100	17.6	6.53	24.77	6.53	76.65
U F	32	0	N/A	N/A	32	0.99	10.25	2.837	1.825	2.389	1.825	7.886
V UF	57	0	N/A	N/A	57	4.935	340	83.76	55	84.4	55	282
V F	35	0	N/A	N/A	35	2.545	19	5.676	5	3.074	5	9.56
Zn UF	58	5	6.21	20	53	11	1,100	224.2	140	253.7	125	698.5
Zn F	43	39	5.6	20	4	8.6	160	48.54	12.78	74.35	20	20

"UF" stands for unfiltered (total), and "F" stands for filtered (dissolved) metals.

VI.3.a. Aluminum (Al)

Table 22. Chronological results for Al..

Date & Time	Flag	SSC, g/L	Al, ug/L Unfiltered	Al, ug/L Filtered
6/19/15 9:20		0.169	2,100	
	J			49
				60
7/2/15 15:41		0.089	1,850	
			1,800	
	J			21
	J			32
7/2/15 16:11		0.100	1,600	
	J			31
7/2/15 16:41		0.097	1,600	
	J			30
7/2/15 17:41		0.225	3,100	
	J			33
7/2/15 18:11		5.309	71,000	
				370
7/2/15 18:41		6.600	64,000	
				460
7/2/15 19:10		3.306	38,000	
				950
7/7/15 6:09		5.279	77,000	
				1,500
7/7/15 6:39		4.396	67,000	
				1,200
7/7/15 7:09		4.276	54,000	
				870
7/7/15 7:39		3.723	60,000	
				69
				230
7/7/15 8:09		4.473	59,000	
				71
				130
7/7/15 8:39		NS	83,000	
				230
7/7/15 9:08		7.038	93,000	
				140
7/7/15 9:38		10.595	140,000	
				2,000
7/7/15 10:08		14.685	140,000	
				1,900
7/7/15 11:09		NS	26,000	
				370
7/7/15 23:00		1.751	25,000	
			22,000	
7/7/15 23:30		1.488	19,000	
			22,000	
7/8/15 0:00		1.378	19,000	
7/8/15 1:00		1.156	15,000	
7/8/15 1:59		1.113	11,000	
7/9/15 13:00		0.976	15,000	
7/20/15 21:18		1.102	26,000	
			36,000	
				67
				130
7/20/15 21:48		3.813	45,000	
				1,200

Date & Time	Flag	SSC, g/L	Al, ug/L, Unfiltered	Al, ug/L, Filtered
7/20/15 22:48		1.222	20,000	
	J			35
	J			39
7/20/15 23:18		0.656	12,000	
	J			21
	J			15
7/20/15 23:48		0.570	8,900	
	J			26
7/30/15 0:22		0.549	8,800	
7/30/15 0:52		0.603	13,000	
7/30/15 1:22		9.288	84,000	
7/30/15 1:52		9.250	130,000	
7/30/15 2:22		7.086	110,000	
				940
7/30/15 2:52		3.676	76,000	
7/30/15 3:22		4.586	65,000	
				210
7/30/15 3:52		2.088	47,000	
7/30/15 4:22		2.305	34,000	
7/31/15 17:23		12.419	150,000	
				1,700
7/31/15 17:53		8.384	110,000	
7/31/15 18:52		4.364	75,000	
				690
8/8/15 20:59		1.900	15,000	
	U			
8/8/15 22:59		NS	130,000	
	J			54
8/9/15 0:59		NS	230,000	
	U			
9/1/15 12:48		0.158	3,050	
			3,100	
9/23/15 13:34		0.082	2,400	
10/21/15 18:42		6.456	92,000	
				2,640
				2,600
10/21/15 20:12		31.483	310,000	
10/21/15 20:42		27.933	310,000	
				243
				920
10/21/15 21:12		24.134	260,000	
10/21/15 22:42		13.502	220,000	
10/24/15 0:11		1.086	22,000	
				190
10/24/15 0:41		0.852	13,000	
10/24/15 1:11		0.735	14,000	
				75
10/24/15 1:41		2.066	9,710	
			8,500	
10/24/15 3:11		0.730	14,000	
			14,200	
10/24/15 4:11		NS	18,000	
				92

Figure 31. Al storm water concentrations vs. SSC

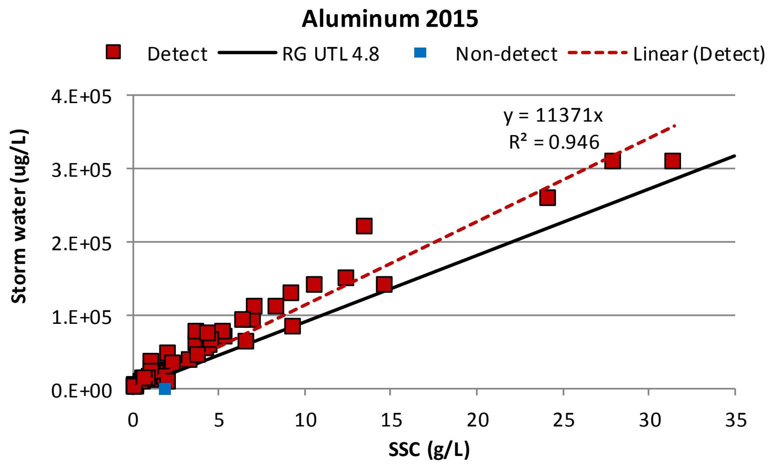
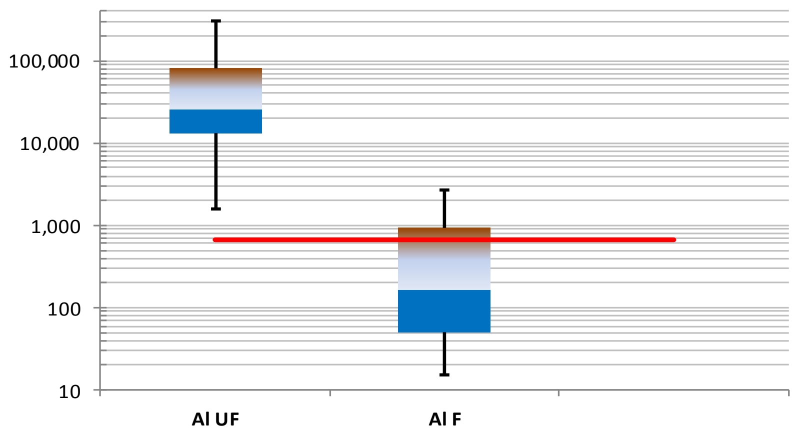


Figure 32. Unfiltered and filtered results for Al.



Max	310,000		2,640.0	
75th	81,500		925.0	
Median	26,000		165.0	
25th	13,000		50.6	
Min	1,600		15.0	

The concentrations of unfiltered samples exceeded the RG background, and a few filtered samples exceeded the NM WQCC standards. The Al concentrations for unfiltered and filtered samples differ with two orders of magnitude and imply high affinity to solid particles and preferential sediment transport. The high coefficient of determination in the storm water concentration vs SSC results indicate naturally occurring source(s) along the RG.

VI.3.b. Arsenic (As)

Table 23. Chronological results for As.

Date & Time	Flag	SSC, g/L	As, ug/L Unfiltered	As, ug/L Filtered
6/19/15 9:20		0.169	2.30	
	J			1.89
	J			1.20
7/2/15 15:41		0.089	2.19	
			2.20	
	J			1.85
	J			1.30
7/2/15 16:11	J	0.100	1.90	
	J			1.50
7/2/15 16:41		0.097	2.10	
	J			1.20
7/2/15 17:41		0.225	2.30	
	J			1.70
7/2/15 18:11		5.309	15.00	
				3.10
7/2/15 18:41		6.600	13.00	
	J			1.70
7/2/15 19:10		3.306	7.00	
	J			1.80
7/7/15 6:09		5.279	12.00	
	J			2.00
7/7/15 6:39		4.396	10.00	
				2.20
7/7/15 7:09		4.276	7.80	
	J			1.70
7/7/15 7:39		3.723	9.70	
	J			1.66
				2.50
7/7/15 8:09		4.473	9.60	
	J			1.53
	J			1.60
7/7/15 8:39		NS	14.00	
				2.30
7/7/15 9:08		7.038	18.00	
				3.10
7/7/15 9:38		10.595	25.00	
				4.00
7/7/15 10:08		14.685	27.00	
				3.90
7/7/15 11:09		NS	5.40	
				2.90
7/7/15 23:00		1.751	5.70	
			5.20	
7/7/15 23:30		1.488	5.20	
			5.30	
7/8/15 0:00		1.378	4.60	
7/8/15 1:00		1.156	3.00	
7/8/15 1:59	J	1.113	2.00	
7/9/15 13:00		0.976	4.90	
7/20/15 21:18		1.102	4.00	
			9.40	
	J			1.70
	J			1.50
7/20/15 21:48		3.813	8.60	
	J			1.60

Date & Time	Flag	SSC, g/L	As, ug/L Unfiltered	As, ug/L Filtered
7/20/15 22:48		1.222	5.50	
	J			1.25
				2.80
7/20/15 23:18		0.656	3.20	
				2.20
	J			2.00
7/20/15 23:48	J	0.570	2.00	
	J			1.60
7/30/15 0:22		0.549	2.90	
7/30/15 0:52		0.603	4.40	
7/30/15 1:22		9.288	18.00	
7/30/15 1:52		9.250	27.00	
7/30/15 2:22		7.086	21.00	
				2.90
7/30/15 2:52		3.676	16.00	
7/30/15 3:22		4.586	14.00	
				2.50
7/30/15 3:52		2.088	8.90	
7/30/15 4:22		2.305	7.50	
7/31/15 17:23		12.419	29.00	
				2.50
7/31/15 17:53		8.384	22.00	
7/31/15 18:52		4.364	16.00	
				2.80
8/8/15 20:59	J	1.900	5.40	
	U			ND
8/8/15 22:59		NS	27.00	
	U			ND
8/9/15 0:59		NS	36.00	
	U			ND
9/1/15 12:48		0.158	2.89	
			2.60	
9/23/15 13:34		0.082	3.00	
10/21/15 18:42		6.456	19.00	
				8.57
				5.80
10/21/15 20:12		31.483	62.00	
10/21/15 20:42		27.933	64.00	
				4.95
				2.60
10/21/15 21:12		24.134	48.00	
10/21/15 22:42		13.502	42.00	
10/24/15 0:11		1.086	4.70	
	J			1.60
10/24/15 0:41		0.852	3.40	
10/24/15 1:11		0.735	4.00	
	J			0.92
10/24/15 1:41		2.066	2.40	
			2.28	
10/24/15 3:11		0.730	3.80	
			3.93	
10/24/15 4:11		NS	5.00	
				2.30

Figure 33. As storm water concentrations vs. SSC

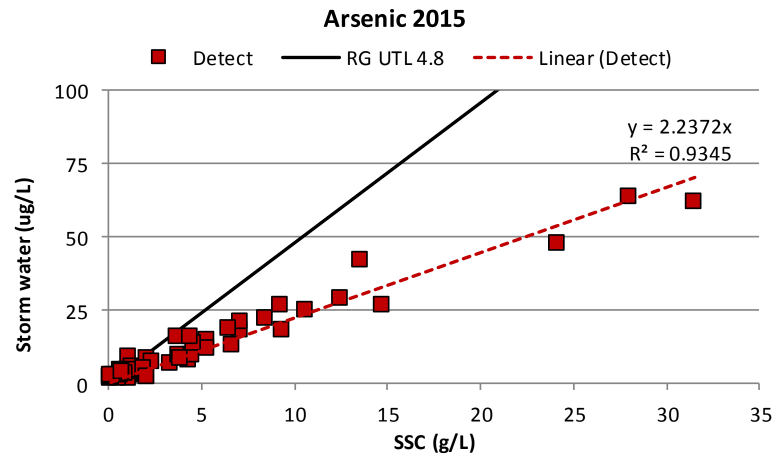
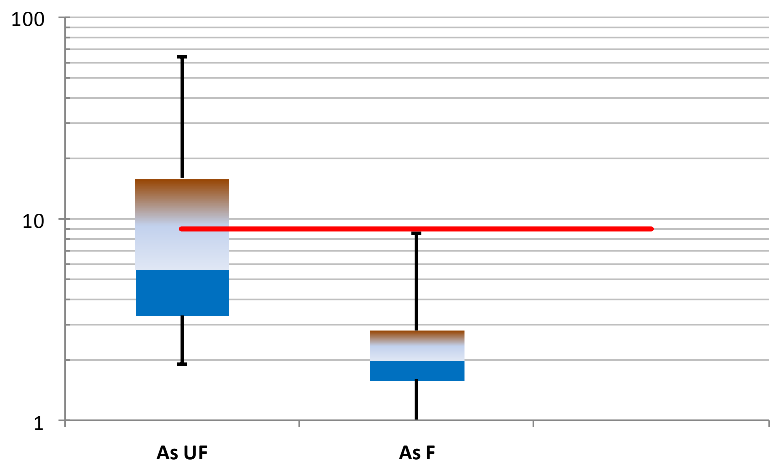


Figure 34. Unfiltered and filtered results for As.



Max	64		8.57	
75th	16		2.8	
Median	5.6		2	
25th	3.35		1.6	
Min	1.9		0.92	

There were no substantial exceedances of RG background values and the NM WQCC standards. The As concentrations for unfiltered and filtered samples differ with less than an order of magnitude and imply some solubility in water and somewhat sediment transport. The high coefficient of determination in the storm water concentration vs SSC results indicate naturally occurring source(s) along the RG.

VI.3.c. Antimony (Sb)

Table 24. Chronological results for Sb.

Date & Time	Flag	SSC, g/L	Sb, ug/L Unfiltered	Sb, ug/L Filtered
6/19/15 9:20	U	0.169	ND	
	U			ND
	J			0.26
7/2/15 15:41	J	0.089	0.29	
	J		0.27	
	J			0.18
	J			0.22
7/2/15 16:11	J	0.100	0.18	
	U			ND
7/2/15 16:41		0.097	0.36	
	U			ND
7/2/15 17:41	U	0.225	ND	
	U			ND
7/2/15 18:11		5.309	0.47	
	U			ND
7/2/15 18:41		6.600	0.32	
	J			0.19
7/2/15 19:10	J	3.306	0.21	
	J			0.3
7/7/15 6:09	U	5.279	ND	
				0.31
7/7/15 6:39	U	4.396	ND	
	U			ND
7/7/15 7:09	U	4.276	ND	
				0.32
7/7/15 7:39	U	3.723	ND	
	U			ND
				0.33
7/7/15 8:09	U	4.473	ND	
	J			0.3
				0.31
7/7/15 8:39	U	NS	ND	
	J			0.3
7/7/15 9:08	U	7.038	ND	
	J			0.3
7/7/15 9:38	U	10.595	ND	
	J			0.26
7/7/15 10:08	J	14.685	0.18	
				0.44
7/7/15 11:09	U	NS	ND	
	J			0.21
7/7/15 23:00	U	1.751	ND	
	U		ND	
7/7/15 23:30	U		ND	
	U	1.488	ND	
7/8/15 0:00	U	1.378	ND	
7/8/15 1:00	U	1.156	ND	
7/8/15 1:59	J	1.113	0.18	
7/9/15 13:00	U	0.976	ND	
7/20/15 21:18	U	1.102	ND	
	J		0.28	
	J			0.25
	U			ND
7/20/15 21:48	U	3.813	ND	
				0.31

Date & Time	Flag	SSC, g/L	Sb, ug/L Unfiltered	Sb, ug/L Filtered
7/20/15 22:48	U	1.222	ND	
	U			ND
				0.35
7/20/15 23:18	U	0.656	ND	
	U			ND
				0.44
7/20/15 23:48	U	0.570	ND	
	J			0.29
7/30/15 0:22	J	0.549	0.18	
7/30/15 0:52	U	0.603	ND	
7/30/15 1:22	J	9.288	0.28	
7/30/15 1:52	U	9.250	ND	
7/30/15 2:22	J	7.086	0.19	
	J			0.21
7/30/15 2:52	U	3.676	ND	
7/30/15 3:22	U	4.586	ND	
	J			0.18
7/30/15 3:52	U	2.088	ND	
7/30/15 4:22	U	2.305	ND	
7/31/15 17:23	U	12.419	ND	
	J			0.23
7/31/15 17:53	U	8.384	ND	
7/31/15 18:52	J	4.364	0.28	
	J			0.21
8/8/15 20:59	U	1.900	ND	
	U			ND
8/8/15 22:59	U	NS	ND	
	U			ND
8/9/15 0:59	J	NS	QA/QC	
	U			ND
9/1/15 12:48	J	0.158	0.24	
	U		ND	
9/23/15 13:34	U	0.082	ND	
10/21/15 18:42	U	6.456	ND	
				0.43
				0.32
10/21/15 20:12	U	31.483	ND	
10/21/15 20:42	U	27.933	ND	
				0.42
	J			0.3
10/21/15 21:12	U	24.134	ND	
10/21/15 22:42	U	13.502	ND	
10/24/15 0:11	U	1.086	ND	
				0.41
10/24/15 0:41	J	0.852	0.14	
10/24/15 1:11	J	0.735	0.19	
				0.38
10/24/15 1:41	J	2.066	0.11	
	U		ND	
10/24/15 3:11	J	0.730	0.12	
	J		0.16	
10/24/15 4:11	J	NS	0.21	
	J			0.23

Figure 35. Sb storm water concentrations vs. SSC.

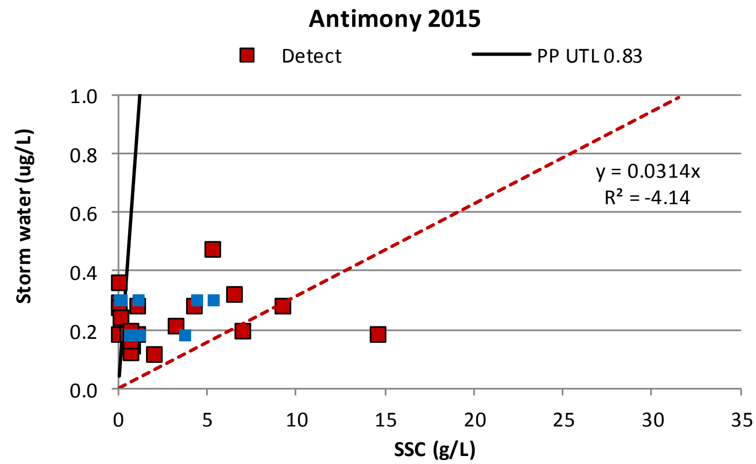
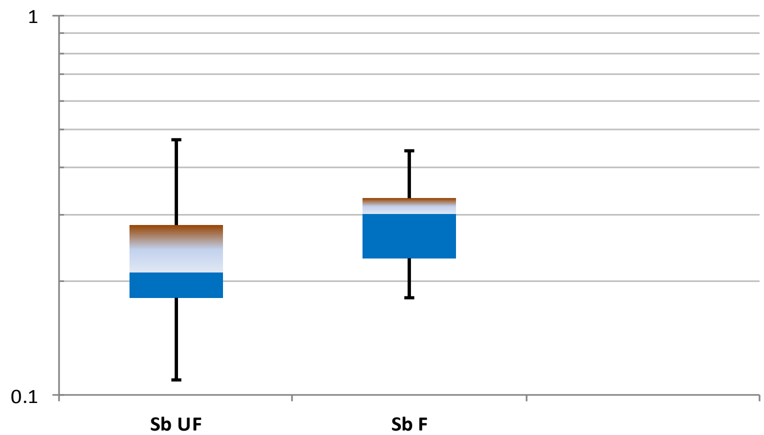


Figure 36. Unfiltered and filtered results for Sb.



Max	0.47		0.44	
75th	0.28		0.33	
Median	0.21		0.30	
25th	0.18		0.23	
Min	0.11		0.18	

There were a few concentrations of unfiltered samples that exceeded the RG background, and none of the filtered samples exceeded the NM WQCC standards. The Sb concentrations for unfiltered and filtered samples were very compatible in magnitude, indicating that the soluble form of antimony is prevalent in the river. The poor coefficient of determination in the storm water concentration vs SSC results suggests anthropogenic source(s).

VI.3.d. Barium (Ba)

Table 25. Chronological results for Ba.

Date&Time	Flag	SSC, g/L	Ba, ug/L Unfiltered	Ba, ug/L Filtered
6/19/15 9:20		0.169	75	
				43.5
				43
7/2/15 15:41		0.089	74.4	
			71	
				42
				43
7/2/15 16:11		0.100	67	
				43
7/2/15 16:41		0.097	74	
				42
7/2/15 17:41		0.225	90	
				45
7/2/15 18:11		5.309	1000	
				54
7/2/15 18:41		6.600	940	
				53
7/2/15 19:10		3.306	520	
				58
7/7/15 6:09		5.279	1100	
				75
7/7/15 6:39		4.396	940	
				74
7/7/15 7:09		4.276	780	
				67
7/7/15 7:39		3.723	920	
				63.9
				62
7/7/15 8:09		4.473	1000	
				63.3
				63
7/7/15 8:39		NS	1300	
				83
7/7/15 9:08		7.038	1600	
				85
7/7/15 9:38		10.595	2200	
				110
7/7/15 10:08		14.685	2800	
				120
7/7/15 11:09		NS	450	
				65
7/7/15 23:00		1.751	420	
			440	
7/7/15 23:30		1.488	390	
			370	
7/8/15 0:00		1.378	360	
7/8/15 1:00		1.156	290	
7/8/15 1:59		1.113	210	
7/9/15 13:00		0.976	330	
7/20/15 21:18		1.102	480	
			590	
				69
				65
7/20/15 21:48		3.813	760	
				75
7/20/15 22:48		1.222	340	
				59.7
				60
7/20/15 23:18		0.656	230	
				59.4
				57
7/20/15 23:48		0.570	210	
				59
7/30/15 0:22		0.549	270	
7/30/15 0:52		0.603	280	
7/30/15 1:22		9.288	1800	
7/30/15 1:52		9.250	2100	
7/30/15 2:22		7.086	1700	
				89
7/30/15 2:52		3.676	1300	
7/30/15 3:22		4.586	850	
				79
7/30/15 3:52		2.088	690	
7/30/15 4:22		2.305	640	
7/31/15 17:23		12.419	2700	
				120
7/31/15 17:53		8.384	1700	
7/31/15 18:52		4.364	1000	
				79
8/8/15 20:59		1.900	350	
	J			75
8/8/15 22:59		NS	1500	
				100
8/9/15 0:59		NS	2700	
				130
9/1/15 12:48		0.158	142	
			140	
9/23/15 13:34		0.082	110	
10/21/15 18:42		6.456	1600	
				718
				720
10/21/15 20:12		31.483	6400	
10/21/15 20:42		27.933	5600	
				94.1
				110
10/21/15 21:12		24.134	5000	
10/21/15 22:42		13.502	3700	
10/24/15 0:11		1.086	380	
				91
10/24/15 0:41		0.852	300	
10/24/15 1:11		0.735	270	
				88
10/24/15 1:41		2.066	190	
			180	
10/24/15 3:11		0.730	310	
			290	
10/24/15 4:11		NS	320	
				95

Figure 37. Ba storm water concentrations vs. SSC.

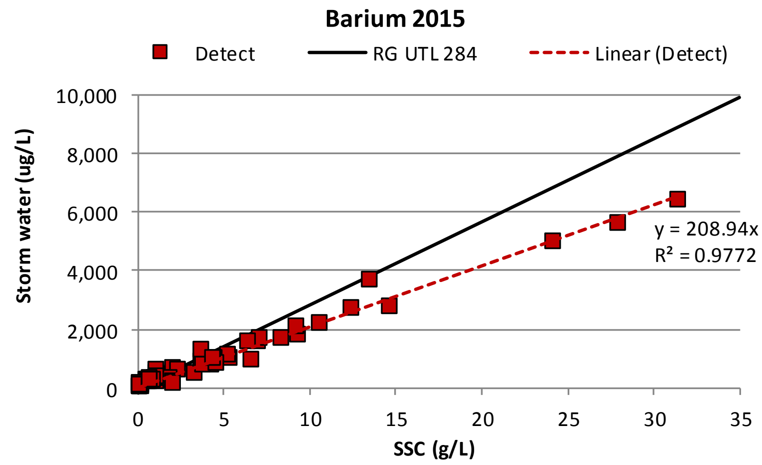
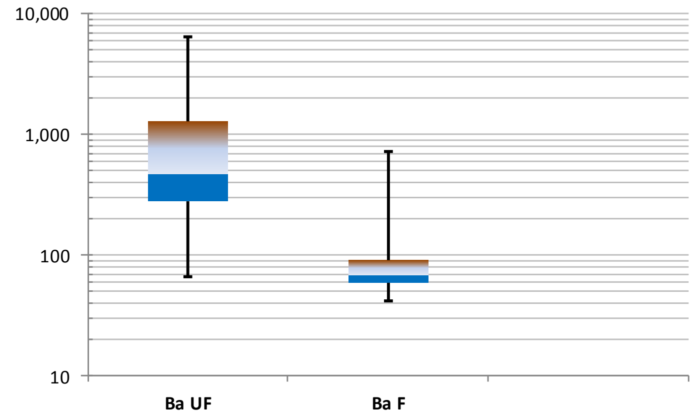


Figure 38. Unfiltered and filtered results for Ba.



Max	6,400		720.0	
75th	1,300		90.5	
Median	465		68.0	
25th	278		58.8	
Min	67		42.0	

Only a few concentrations of unfiltered samples exceeded the RG background. The Ba concentrations for unfiltered and filtered samples differ with one order of magnitude and imply affinity to solid particles and preferential sediment transport. The high coefficient of determination in the storm water concentration vs SSC results suggests naturally occurring source(s) of Ba along the RG.

VI.3.e. Beryllium (Be)

Table 26. Chronological results for Be.

Date&Time	Flag	SSC, g/L	Be, ug/L Unfiltered	Be, ug/L Filtered
6/19/15 9:20	J	0.169	0.17	
	U			ND
	U			ND
7/2/15 15:41	U	0.089	ND	
	U		ND	
	U			ND
	U			ND
7/2/15 16:11	U	0.100	ND	
	U			ND
7/2/15 16:41	U	0.097	ND	
	U			ND
7/2/15 17:41	U	0.225	ND	
	U			ND
7/2/15 18:11		5.309	7.6	
	U			ND
7/2/15 18:41		6.600	7.8	
	U			ND
7/2/15 19:10		3.306	4.1	
	U			ND
7/7/15 6:09		5.279	5.4	
	U			ND
7/7/15 6:39		4.396	4.7	
	U			ND
7/7/15 7:09		4.276	3.8	
	U			ND
7/7/15 7:39		3.723	4.3	
	U			ND
	U			ND
7/7/15 8:09		4.473	4.2	
	U			ND
	U			ND
7/7/15 8:39		NS	6.3	
	U			ND
7/7/15 9:08		7.038	7.4	
	U			ND
7/7/15 9:38		10.595	11	
	U			ND
7/7/15 10:08		14.685	12	
	U			ND
7/7/15 11:09		NS	1.8	
	U			ND
7/7/15 23:00		1.751	1.4	
			2.1	
7/7/15 23:30		1.488	1.2	
			1.5	
7/8/15 0:00		1.378	1.2	
7/8/15 1:00		1.156	0.73	
7/8/15 1:59	J	1.113	0.36	
7/9/15 13:00		0.976	0.72	
7/20/15 21:18		1.102	1.4	
			3.1	
	U			ND
	U			ND
7/20/15 21:48		3.813	4	
	U			ND
7/20/15 22:48		1.222	1.3	
	U			ND
	U			ND
7/20/15 23:18		0.656	0.53	
	U			ND
	U			ND
7/20/15 23:48	J	0.570	0.33	
	U			ND
7/30/15 0:22	J	0.549	0.3	
7/30/15 0:52	J	0.603	0.43	
7/30/15 1:22		9.288	9.2	
7/30/15 1:52		9.250	11	
7/30/15 2:22		7.086	8.4	
	U			ND
7/30/15 2:52		3.676	5.7	
7/30/15 3:22		4.586	4.1	
	U			ND
7/30/15 3:52		2.088	2.9	
7/30/15 4:22		2.305	2.7	
7/31/15 17:23		12.419	13	
	U			ND
7/31/15 17:53		8.384	8.8	
7/31/15 18:52		4.364	5.5	
	U			ND
8/8/15 20:59	U	1.900	ND	
	U			ND
8/8/15 22:59		NS	8.5	
	U			ND
8/9/15 0:59		NS	14	
	U			ND
9/1/15 12:48	U	0.158	ND	
	U		ND	
9/23/15 13:34	U	0.082	ND	
10/21/15 18:42		6.456	7.8	
				2.48
				2.3
10/21/15 20:12		31.483	27	
10/21/15 20:42		27.933	25	
	U			ND
	U			ND
10/21/15 21:12		24.134	22	
10/21/15 22:42		13.502	16	
10/24/15 0:11		1.086	1.1	
	U			ND
10/24/15 0:41		0.852	0.95	
10/24/15 1:11		0.735	0.57	
	U			ND
10/24/15 1:41		2.066	0.55	
			0.56	
10/24/15 3:11		0.730	0.81	
			1.5	
10/24/15 4:11		NS	0.74	
	U			ND

Figure 39. Be storm water concentrations vs. SSC.

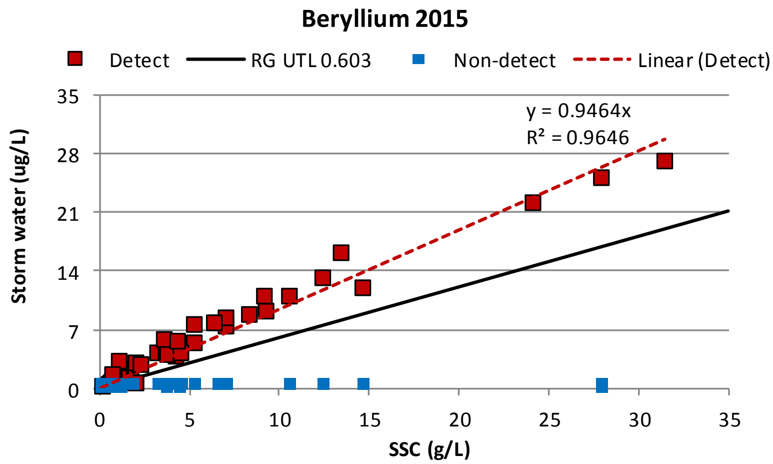
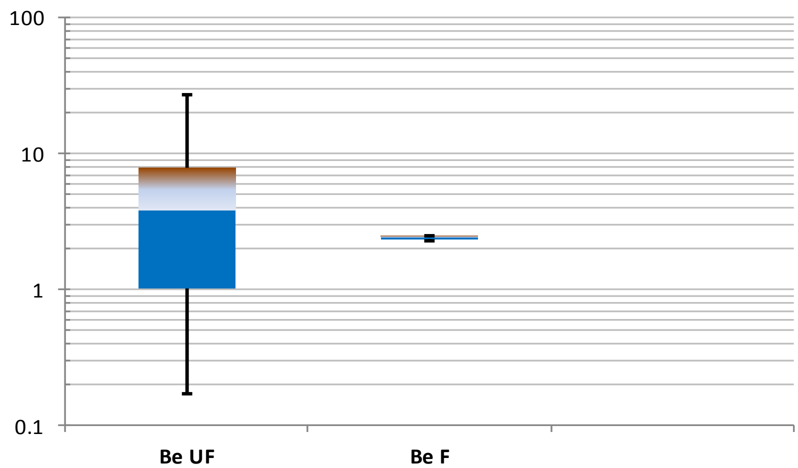


Figure 40. Unfiltered and filtered results for Be.



	Be UF	Be F
Max	27.0	2.5
75th	7.8	too few values
Median	3.8	2.4
25th	1.0	too few values
Min	0.2	2.3

Most concentrations of unfiltered samples exceeded the RG background. There were only a few detects for filtered samples implying affinity to solid particles and preferential sediment transport. The high coefficient of determination in the storm water concentration vs SSC results suggests naturally occurring source(s) of Be along the RG.

VI.3.f. Boron (B)

Table 27. Chronological results for B.

Date&Time	Flag	SSC, g/L	B, ug/L Unfiltered	B, ug/L Filtered
6/19/15 9:20	J	0.169	26	
	J			19.1
	J			23
7/2/15 15:41	J	0.089	30.9	
			58	
	J			33.3
				63
7/2/15 16:11		0.100	61	
	J			39
7/2/15 16:41	J	0.097	35	
	J			33
7/2/15 17:41	J	0.225	32	
	J			29
7/2/15 18:11		5.309	53	
	J			25
7/2/15 18:41		6.600	50	
	J			24
7/2/15 19:10	J	3.306	38	
	J			23
7/7/15 6:09		5.279	64	
	J			23
7/7/15 6:39		4.396	58	
	J			20
7/7/15 7:09	J	4.276	48	
	J			20
7/7/15 7:39		3.723	71	
	J			21.5
	J			27
7/7/15 8:09		4.473	80	
	J			24.8
	J			35
7/7/15 8:39			96	
	J			37
7/7/15 9:08		7.038	78	
	J			32
7/7/15 9:38		10.595	100	
	J			30
7/7/15 10:08		14.685	95	
	J			30
7/7/15 11:09	J	NS	35	
	J			21
7/7/15 23:00	J	1.751	29	
			92	
7/7/15 23:30	J	1.488	26	
	J		47	
7/8/15 0:00	J	1.378	26	
7/8/15 1:00	J	1.156	24	
7/8/15 1:59	J	1.113	14	
7/9/15 13:00	J	0.976	23	
7/20/15 21:18	J	1.102	32	
	J		33	
	J			22
	J			20
7/20/15 21:48	J	3.813	37	
	J			21
7/20/15 22:48		1.222	54	
	J			23.4
	J			29
7/20/15 23:18		0.656	60	
	J			25.8
	J			34
7/20/15 23:48		0.570	58	
	J			38
7/30/15 0:22	J	0.549	23	
7/30/15 0:52	J	0.603	39	
7/30/15 1:22		9.288	80	
7/30/15 1:52		9.250	90	
7/30/15 2:22		7.086	84	
	J			28
7/30/15 2:52		3.676	67	
7/30/15 3:22		4.586	61	
	J			27
7/30/15 3:52	J	2.088	47	
7/30/15 4:22	J	2.305	50	
7/31/15 17:23		12.419	94	
	J			26
7/31/15 17:53			72	
7/31/15 18:52		4.364	63	
	J			24
9/1/15 12:48	J	0.158	27.2	
	J		31	
9/23/15 13:34	J	0.082	27	
10/21/15 18:42		6.456	97	
	J			42.3
	J			44
10/21/15 20:12		31.483	190	
10/21/15 20:42		27.933	180	
	J			31.1
	J			35
10/21/15 21:12		24.134	190	
10/21/15 22:42		13.502	150	
10/24/15 0:11			55	
	J	1.086		39
10/24/15 0:41		0.852	52	
10/24/15 1:11	J	0.735	45	
	J			35
10/24/15 1:41	J	2.066	31	
	J		29.1	
10/24/15 3:11		0.730	100	
			52.3	
10/24/15 4:11	J		47	
	J			35

Figure 41. B storm water concentrations vs SSC.

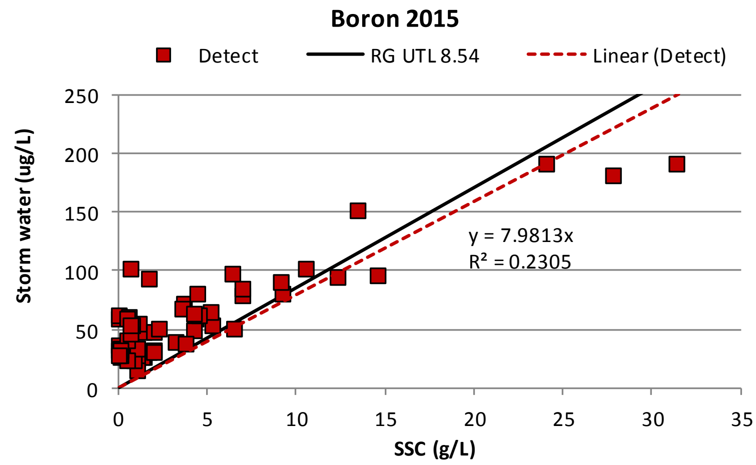
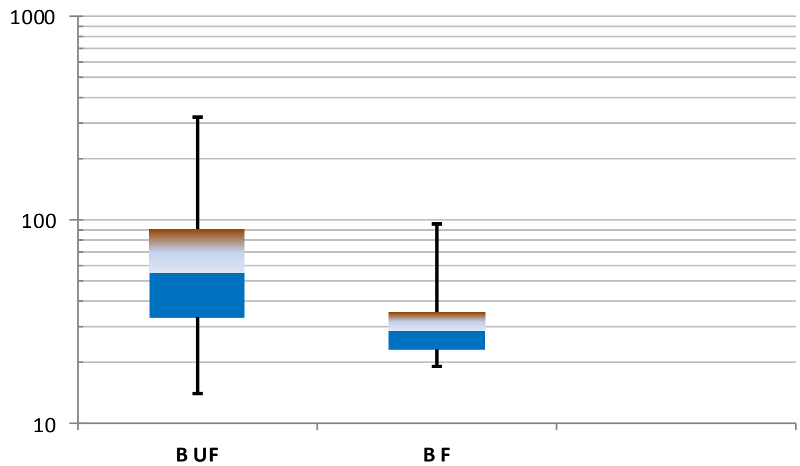


Figure 42. Unfiltered and filtered results for B.



Max	320.0		95.0	
75th	90.5		35.0	
Median	54.5		28.5	
25th	33.5		23.1	
Min	14.0		19.1	

Most concentrations of unfiltered samples exceeded the RG background, but there were no exceedances of the NM WQCC standard for filtered samples. The B concentrations of filtered samples were less in magnitude than unfiltered but clearly showed higher water solubility than other metals. The low coefficient of determination in the storm water concentration vs SSC results suggests anthropogenic source(s).

VI.3.g. Cadmium (Cd)

Table 28. Chronological results for Cd.

Date&Time	Flag	SSC, g/L	Cd, ug/L Unfiltered	Cd, ug/L Filtered
6/19/15 9:20	U	0.1690	ND	
	U			ND
	U			ND
7/2/15 15:41	U	0.0895	ND	
	U		ND	
	U			ND
	U			ND
7/2/15 16:11	U	0.0999	ND	
	U			ND
7/2/15 16:41	U	0.0971	ND	
	U			ND
7/2/15 17:41	U	0.2252	ND	
	U			ND
7/2/15 18:11		5.3094	1.50	
	U			ND
7/2/15 18:41		6.5996	1.30	
	U			ND
7/2/15 19:10		3.3058	1.00	
	U			ND
7/7/15 6:09		5.2790	0.70	
	U			ND
7/7/15 6:39		4.3956	0.57	
	U			ND
7/7/15 7:09		4.2762	0.65	
	U			ND
7/7/15 7:39		3.7234	0.46	
	U			ND
	U			ND
7/7/15 8:09		4.4731	0.66	
	U			ND
	U			ND
7/7/15 8:39		NS	0.74	
	U			ND
7/7/15 9:08		7.0379	1.00	
	U			ND
7/7/15 9:38		10.5947	1.50	
	U			ND
7/7/15 10:08		14.6845	1.70	
	U			ND
7/7/15 11:09		NS	0.32	
	U			ND
7/7/15 23:00	U	1.7513	ND	
	J		0.26	
7/7/15 23:30	J	1.4880	0.26	
	J		0.17	
7/8/15 0:00		1.3779	0.53	
7/8/15 1:00		1.1562	0.43	
7/8/15 1:59	J	1.1127	0.19	
7/9/15 13:00	J	0.9757	0.23	
7/20/15 21:18	U	1.1020	ND	
			0.63	
	U			ND
	U			ND
7/20/15 21:48		3.8128	0.43	
	U			ND

Date&Time	Flag	SSC, g/L	Cd, ug/L Unfiltered	Cd, ug/L Filtered
7/20/15 22:48	J	1.2222	0.22	
	U			ND
	U			ND
7/20/15 23:18	U	0.6555	ND	
	U			ND
	U			ND
7/20/15 23:48	U	0.5696	ND	
	U			ND
7/30/15 0:22		0.5487	0.33	
7/30/15 0:52	U	0.6030	ND	
7/30/15 1:22		9.2881	1.10	
7/30/15 1:52		9.2500	1.60	
7/30/15 2:22		7.0858	1.10	
	U			ND
7/30/15 2:52		3.6758	0.69	
7/30/15 3:22		4.5864	0.59	
	U			ND
7/30/15 3:52		2.0882	0.44	
7/30/15 4:22		2.3049	0.45	
7/31/15 17:23		12.4195	1.90	
	U			ND
7/31/15 17:53			1.40	
7/31/15 18:52		4.3642	0.93	
	U			ND
8/8/15 20:59	U	1.9000	ND	
	U			ND
8/8/15 22:59	J	NS	1.10	
	U			ND
8/9/15 0:59	J	NS	1.70	
	U			ND
9/1/15 12:48	U	0.1584	ND	
	U		ND	
9/23/15 13:34	U	0.0819	ND	
10/21/15 18:42		6.4560	0.96	
				0.86
				0.68
10/21/15 20:12		31.4834	4.90	
10/21/15 20:42		27.9332	3.00	
	U			ND
	U			ND
10/21/15 21:12		24.1342	3.00	
10/21/15 22:42		13.5017	2.20	
10/24/15 0:11	U		ND	
	U	1.0860		ND
10/24/15 0:41	U	0.8516	ND	
10/24/15 1:11	U	0.7355	ND	
	U			ND
10/24/15 1:41	U	2.0657	ND	
	U		ND	
10/24/15 3:11	U	0.7298	ND	
	J		0.09	
10/24/15 4:11	U		ND	
	U			ND

Figure 43. Cd storm water concentrations vs SSC.

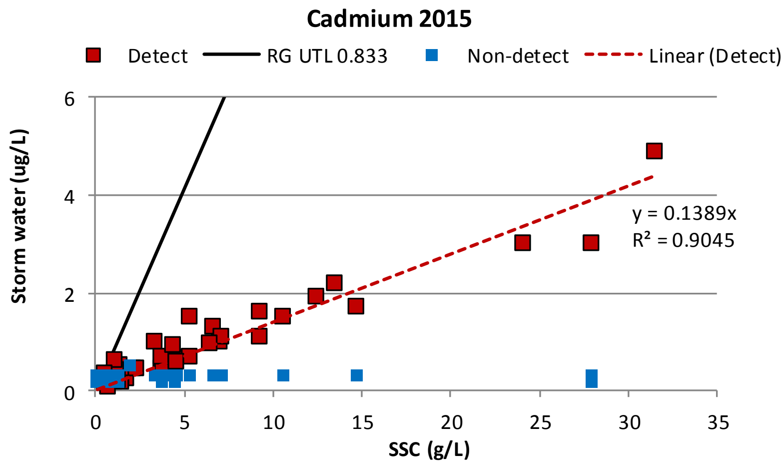
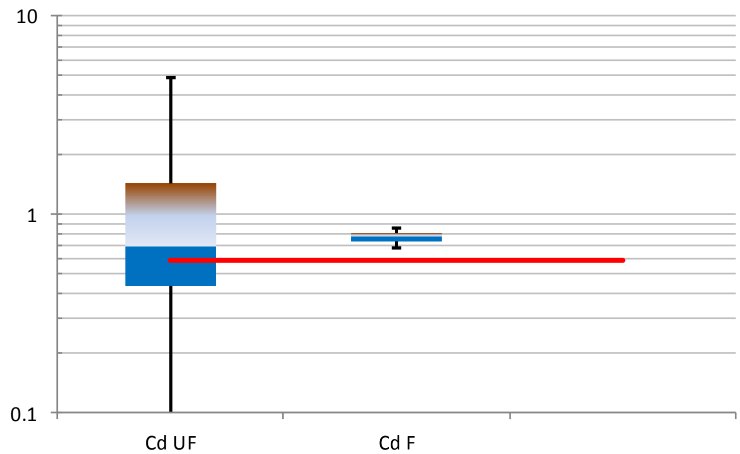


Figure 44. Unfiltered and filtered results for Cd.



	Cd UF	Cd F
Max	4.90	0.9
75th	1.43	too few values
Median	0.70	0.8
25th	0.43	too few values
Min	0.09	0.7

Most concentrations of unfiltered samples did not exceed the RG background, and all filtered samples exceeded the NM WQCC standards. There were only a few detects for filtered samples implying affinity to solid particles and preferential sediment transport. The high coefficient of determination in the storm water concentration vs SSC results suggests naturally occurring source(s) of Cd along the RG.

VI.3.h. Calcium (Ca)

Table 29. Chronological results for Ca.

Date&Time	Flag	SSC, g/L	Ca, ug/L Unfiltered	Ca, ug/L Filtered
6/19/15 9:20		0.169	35,000	
				31,700
				32,000
7/2/15 15:41		0.089	28,700	
			30,000	
				26,400
				25,000
7/2/15 16:11		0.100	25,000	
				28,000
7/2/15 16:41		0.097	27,000	
				24,000
7/2/15 17:41		0.225	33,000	
				25,000
7/2/15 18:11		5.309	85,000	
				28,000
7/2/15 18:41		6.600	76,000	
				29,000
7/2/15 19:10		3.306	55,000	
				28,000
7/7/15 6:09		5.279	200,000	
				29,000
7/7/15 6:39		4.396	170,000	
				28,000
7/7/15 7:09		4.276	130,000	
				27,000
7/7/15 7:39		3.723	140,000	
				28,700
				28,000
7/7/15 8:09		4.473	140,000	
				29,000
				31,000
7/7/15 8:39		NS	200,000	
				31,000
7/7/15 9:08		7.038	250,000	
				32,000
7/7/15 9:38		10.595	410,000	
				35,000
7/7/15 10:08		14.685	530,000	
				35,000
7/7/15 11:09		NS	89,000	
				28,000
7/7/15 23:00		1.751	87,000	
			83,000	
7/7/15 23:30		1.488	78,000	
			79,000	
7/8/15 0:00		1.378	71,000	
7/8/15 1:00		1.156	59,000	
7/8/15 1:59		1.113	37,000	
7/9/15 13:00		0.976	56,000	
7/20/15 21:18		1.102	67,000	
			61,000	
				28,000
				29,000
7/20/15 21:48		3.813	72,000	
				31,000

Date&Time	Flag	SSC, g/L	Ca, ug/L Unfiltered	Ca, ug/L Filtered
7/20/15 22:48		1.222	44,000	
				27,400
				27,000
7/20/15 23:18		0.656	40,000	
				28,800
				28,000
7/20/15 23:48		0.570	39,000	
				28,000
7/30/15 0:22		0.549	45,000	
7/30/15 0:52		0.603	51,000	
7/30/15 1:22		9.288	470,000	
7/30/15 1:52		9.250	470,000	
7/30/15 2:22		7.086	370,000	
				29,000
7/30/15 2:52		3.676	260,000	
7/30/15 3:22		4.586	170,000	
				31,000
7/30/15 3:52		2.088	140,000	
7/30/15 4:22		2.305	130,000	
7/31/15 17:23		12.419	550,000	
				36,000
7/31/15 17:53		8.384	350,000	
7/31/15 18:52		4.364	200,000	
				30,000
8/8/15 20:59		1.900	67,000	
				39,000
8/8/15 22:59		NS	200,000	
				52,000
8/9/15 0:59		NS	280,000	
				54,000
9/1/15 12:48		0.158	45,800	
			43,000	
9/23/15 13:34		0.082	39,000	
10/21/15 18:42		6.456	290,000	
				250,000
				260,000
10/21/15 20:12		31.483	1,300,000	
10/21/15 20:42		27.933	1,100,000	
				28,400
				27,000
10/21/15 21:12		24.134	950,000	
10/21/15 22:42		13.502	700,000	
10/24/15 0:11		1.086	71,000	
				40,000
10/24/15 0:41		0.852	62,000	
10/24/15 1:11		0.735	62,000	
				37,000
10/24/15 1:41		2.066	38,000	
			37,700	
10/24/15 3:11		0.730	65,000	
			65,200	
10/24/15 4:11		NS	65,000	
				42,000

Figure 45. Ca storm water concentrations vs. SSC

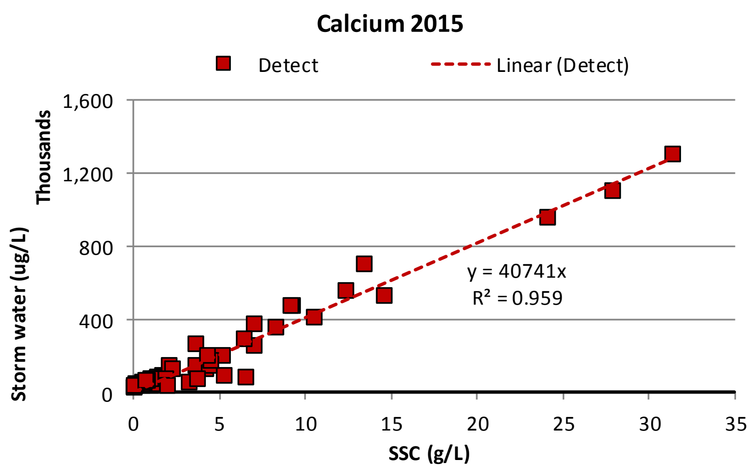
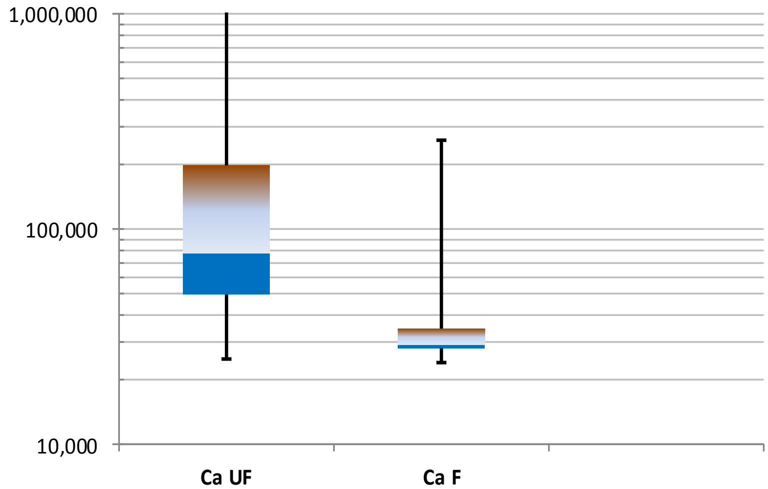


Figure 46. Unfiltered and filtered results for Ca.



Max	1,300,000		260,000	
75th	200,000		34,250	
Median	77,000		29,000	
25th	49,700		28,000	
Min	25,000		24,000	

The concentrations of filtered samples were reduced in comparison to unfiltered indicating somewhat sediment transport for this constituent. The high coefficient of determination in the storm water concentration vs SSC results suggests naturally occurring source(s) of Ca along the RG.

VI.3.i. Chromium (Cr)

Table 30. Chronological results for Cr.

Date&Time	Flag	SSC, g/L	Cr, ug/L Unfiltered	Cr, ug/L Filtered
6/19/15 9:20	J	0.169	1.5	
	U			ND
	U			ND
7/2/15 15:41	J	0.089	1.79	
	J		2	
	U			ND
	J			0.76
7/2/15 16:11	J	0.100	1.4	
	U			ND
7/2/15 16:41	J	0.097	2	
	U			ND
7/2/15 17:41	J	0.225	2	
	U			ND
7/2/15 18:11		5.309	42	
	J			0.64
7/2/15 18:41		6.600	34	
	U			ND
7/2/15 19:10		3.306	19	
	J			0.6
7/7/15 6:09		5.279	64	
	J			1
7/7/15 6:39		4.396	53	
	J			1.5
7/7/15 7:09		4.276	40	
	J			0.63
7/7/15 7:39		3.723	43	
	U			ND
	U			ND
7/7/15 8:09		4.473	42	
	U			ND
	U			ND
7/7/15 8:39		NS	61	
	U			ND
7/7/15 9:08		7.038	72	
	U			ND
7/7/15 9:38		10.595	120	
	J			2
7/7/15 10:08		14.685	130	
	J			2.1
7/7/15 11:09		NS	18	
	J			0.61
7/7/15 23:00		1.751	19	
			17	
7/7/15 23:30		1.488	16	
			17	
7/8/15 0:00		1.378	14	
7/8/15 1:00		1.156	11	
7/8/15 1:59	J	1.113	8.2	
7/9/15 13:00	J	0.976	7.8	
7/20/15 21:18		1.102	14	
			24	
	U			ND
	U			ND
7/20/15 21:48		3.813	28	
	J			1.1
7/20/15 22:48		1.222	11	
	U			ND
	U			ND
7/20/15 23:18	J	0.656	7.7	
	U			ND
	U			ND
7/20/15 23:48	J	0.570	6.3	
	J			0.96
7/30/15 0:22	J	0.549	6	
7/30/15 0:52	J	0.603	7.9	
7/30/15 1:22		9.288	71	
7/30/15 1:52		9.250	100	
7/30/15 2:22		7.086	87	
	U			ND
7/30/15 2:52		3.676	63	
7/30/15 3:22		4.586	49	
	U			ND
7/30/15 3:52		2.088	37	
7/30/15 4:22		2.305	25	
7/31/15 17:23		12.419	120	
	J			1.4
7/31/15 17:53		8.384	83	
7/31/15 18:52		4.364	58	
	J			1
8/8/15 20:59		1.900	14	
	U			ND
8/8/15 22:59		NS	61	
	U			ND
8/9/15 0:59		NS	120	
	U			ND
9/1/15 12:48	J	0.158	1.98	
	J		1.8	
9/23/15 13:34	J	0.082	1.8	
10/21/15 18:42		6.456	74	
	U			ND
	J			0.98
10/21/15 20:12		31.483	260	
10/21/15 20:42		27.933	260	
	U			ND
	J			1
10/21/15 21:12		24.134	220	
10/21/15 22:42		13.502	180	
10/24/15 0:11		1.086	14	
	J			0.65
10/24/15 0:41	J	0.852	9.6	
10/24/15 1:11	J	0.735	9.8	
	U			ND
10/24/15 1:41	J	2.066	6.98	
	J		6.3	
10/24/15 3:11		0.730	12	
			10.4	
10/24/15 4:11		NS	12	
	J			0.6

Figure 47. Cr storm water concentrations vs SSC.

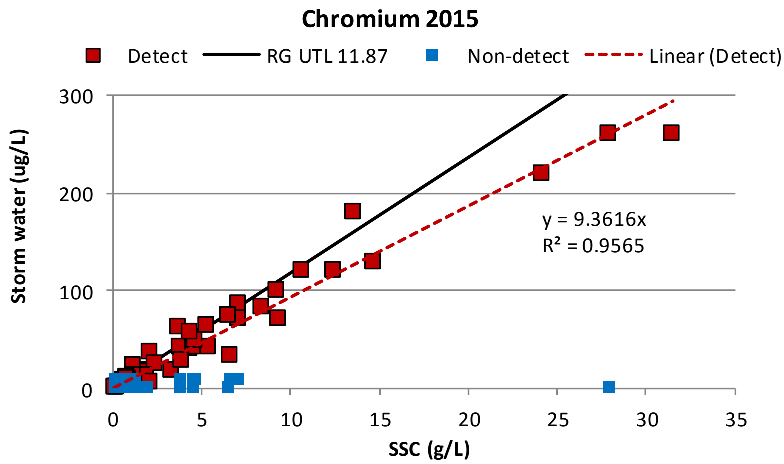
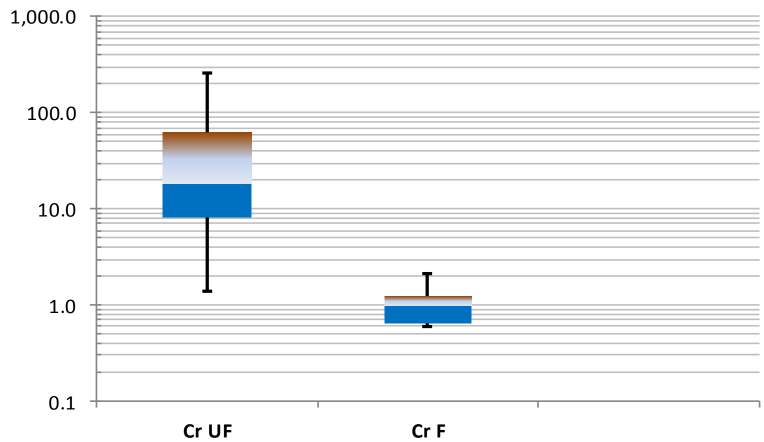


Figure 48. Unfiltered and filtered results for Cr.



	Cr UF		Cr F	
Max	260.0		2.10	
75th	62.5		1.25	
Median	18.5		0.98	
25th	8.1		0.64	
Min	1.4		0.60	

A few concentrations of unfiltered samples exceeded the RG background, but no filtered samples exceeded the NM WQCC standards. The Cr concentrations for unfiltered and filtered samples differ with one order of magnitude and imply high affinity to solid particles and preferential sediment transport. The high coefficient of determination in the storm water concentration vs SSC results suggests naturally occurring source(s) of Cr along the RG.

VI.3.j. Cobalt (Co)

Table 31. Chronological results for Co.

Date&Time	Flag	SSC, g/L	Co, ug/L Unfiltered	Co, ug/L Filtered
6/19/15 9:20		0.169	1.2	
				2.02
				2.2
7/2/15 15:41		0.089	1.02	
			1.1	
				1.19
				1.1
7/2/15 16:11	J	0.100	0.82	
				2
7/2/15 16:41		0.097	1	
	J			0.78
7/2/15 17:41		0.225	1.8	
				1.9
7/2/15 18:11		5.309	31	
				3.2
7/2/15 18:41		6.600	27	
				3.7
7/2/15 19:10		3.306	15	
				3.4
7/7/15 6:09		5.279	39	
				3.9
7/7/15 6:39		4.396	33	
				3.4
7/7/15 7:09		4.276	26	
				3.8
7/7/15 7:39		3.723	29	
				3.51
				3.7
7/7/15 8:09		4.473	29	
				3.07
				3.4
7/7/15 8:39		NS	41	
				4.1
7/7/15 9:08		7.038	47	
				4.2
7/7/15 9:38		10.595	76	
				4.7
7/7/15 10:08		14.685	85	
				5.4
7/7/15 11:09		NS	13	
				3.7
7/7/15 23:00		1.751	13	
			11	
7/7/15 23:30		1.488	10	
			11	
7/8/15 0:00		1.378	10	
7/8/15 1:00		1.156	8.3	
7/8/15 1:59		1.113	4.8	
7/9/15 13:00		0.976	6	
7/20/15 21:18		1.102	11	
			16	
				2.4
				2.7
7/20/15 21:48		3.813	20	
				2.9
7/20/15 22:48		1.222	7.6	
				1.89
				2
7/20/15 23:18		0.656	4.5	
				1.92
				1.9
7/20/15 23:48		0.570	3.2	
				1.7
7/30/15 0:22		0.549	3.8	
7/30/15 0:52		0.603	4.8	
7/30/15 1:22		9.288	56	
7/30/15 1:52		9.250	73	
7/30/15 2:22		7.086	58	
				3.7
7/30/15 2:52		3.676	42	
7/30/15 3:22		4.586	28	
				3
7/30/15 3:52		2.088	21	
7/30/15 4:22		2.305	18	
7/31/15 17:23		12.419	85	
				5.1
7/31/15 17:53		8.384	57	
7/31/15 18:52		4.364	34	
				4.2
8/8/15 20:59	J	1.900	7.2	
	U			ND
8/8/15 22:59		NS	52	
	U			ND
8/9/15 0:59		NS	100	
	U			ND
9/1/15 12:48		0.158	1.09	
			1.3	
9/23/15 13:34	J	0.082	0.81	
10/21/15 18:42		6.456	50	
				4.5
				4.7
10/21/15 20:12		31.483	180	
10/21/15 20:42		27.933	180	
	J			0.65
	J			0.95
10/21/15 21:12		24.134	150	
10/21/15 22:42		13.502	120	
10/24/15 0:11		1.086	8.6	
	J			0.32
10/24/15 0:41		0.852	5.7	
10/24/15 1:11		0.735	5.1	
	U			ND
10/24/15 1:41		2.066	3.8	
			4.08	
10/24/15 3:11		0.730	6	
			5.91	
10/24/15 4:11		NS	7.8	
	J			0.27

Figure 49. Co storm water concentrations vs. SSC.

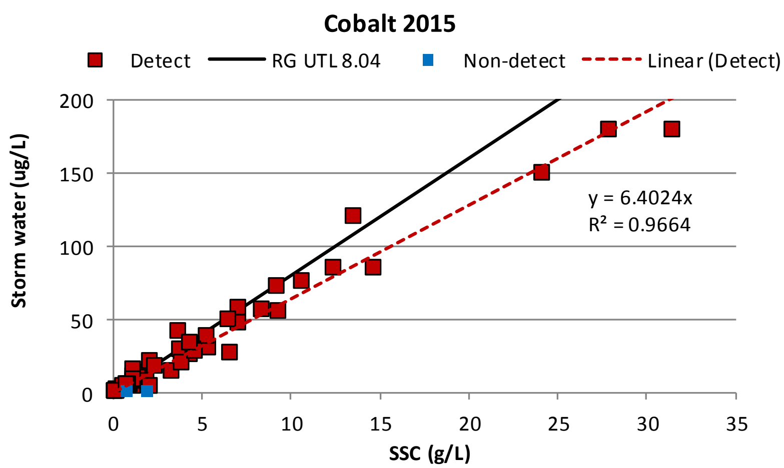
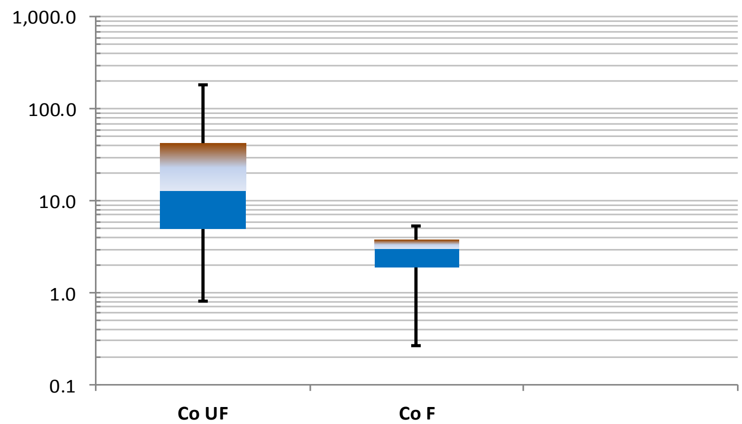


Figure 50. Unfiltered and filtered results for Co.



Max	180.0		5.40	
75th	41.8		3.78	
Median	13.0		3.04	
25th	5.0		1.90	
Min	0.8		0.27	

A few concentrations of unfiltered samples exceeded the RG background, and no filtered samples exceeded the NM WQCC standards. The Co concentrations for unfiltered and filtered samples differ with one order of magnitude and imply affinity to solid particles and preferential sediment transport. The high coefficient of determination in the storm water concentration vs SSC results suggests naturally occurring source(s) of Co along the RG.

VI.3.k. Copper (Cu)

Table 32. Chronological results for Cu.

Date&Time	Flag	SSC, g/L	Cu, ug/L Unfiltered	Cu, ug/L Filtered
6/19/15 9:20	U	0.1650	ND	
	U			ND
	U			ND
7/2/15 15:41	U	0.0895	ND	
	U		ND	
	U			ND
	U			ND
7/2/15 16:11	U	0.0999	ND	
	U			ND
7/2/15 16:41	U	0.0971	ND	
	U			ND
7/2/15 17:41	U	0.2252	ND	
	U			ND
7/2/15 18:11		5.3094	74	
	U			ND
7/2/15 18:41		6.5996	64	
	U			ND
7/2/15 19:10		3.3058	44	
	U			ND
7/7/15 6:09		5.2790	85	
	U			ND
7/7/15 6:39		4.3956	52	
	U			ND
7/7/15 7:09		4.2762	36	
	U			ND
7/7/15 7:39		3.7234	44	
	U			ND
	U			ND
7/7/15 8:09		4.4731	46	
	U			ND
	U			ND
7/7/15 8:39		NS	65	
	U			ND
7/7/15 9:08		7.0379	76	
	U			ND
7/7/15 9:38		10.5947	130	
	U			ND
7/7/15 10:08		14.6845	140	
	U			ND
7/7/15 11:20		NS	23	
	U			ND
7/7/15 23:00		1.7513	20	
			29	
7/7/15 23:30		1.4880	260	
			28	
7/8/15 0:00		1.3779	14	
7/8/15 1:00	J	1.1562	9.3	
7/8/15 1:59	U	1.1127	ND	
7/9/15 13:00		0.9757	17	
7/20/15 21:18		1.1020	10	
			32	
	U			ND
	U			ND
7/20/15 21:48		3.8128	37	
	U			ND
7/20/15 22:48	J	1.2222	9.5	
	U			ND
	U			ND
7/20/15 23:18	J	0.6555	3.3	
	U			ND
	U			ND
7/20/15 23:48	U	0.5696	ND	
	U			ND
7/30/15 0:22	J	0.5487	8.5	
7/30/15 0:52	J	0.6030	8.9	
7/30/15 1:22		9.2881	95	
7/30/15 1:52		9.2500	130	
7/30/15 2:22		7.0858	92	
	U			ND
7/30/15 2:52		3.6758	70	
7/30/15 3:22		4.5864	52	
	U			ND
7/30/15 3:52		2.0882	33	
7/30/15 4:22		2.3049	35	
7/31/15 17:23		12.4195	130	
	U			ND
7/31/15 17:53		8.3843	83	
7/31/15 18:52		4.3642	52	
	U			ND
8/8/15 20:59		1.9000	15	
	U			ND
8/8/15 22:59		NS	69	
	U			ND
8/9/15 0:59		NS	140	
	U			ND
9/1/15 12:48	J	0.1584	7.94	
	J		8.7	
9/23/15 13:34	U	0.0819	ND	
10/21/15 18:42		6.4560	80	
				11
				12
10/21/15 20:12		31.4834	280	
10/21/15 20:42		27.9332	270	
	U			ND
	U			ND
10/21/15 21:12		24.1342	230	
10/21/15 22:42		13.5017	180	
10/24/15 0:11		1.0860	12	
	U			ND
10/24/15 0:41		0.8516	16	
10/24/15 1:11	J	0.7355	5	
	U			ND
10/24/15 1:41	J	2.0657	9.8	
			10.5	
10/24/15 3:11		0.7298	15	
			13.7	
10/24/15 4:11	J	NS	7.2	
	U			ND

Figure 51. Cu storm water concentrations vs. SSC.

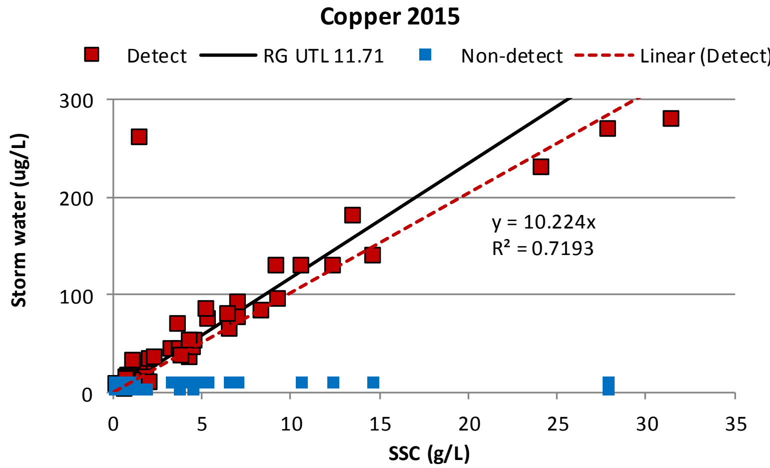
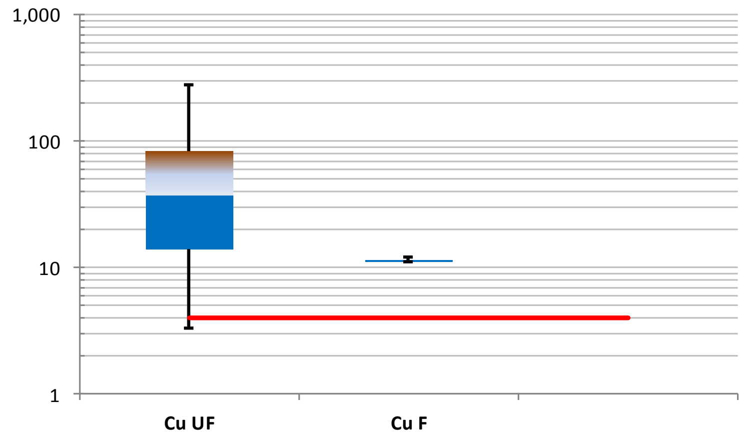


Figure 52. Unfiltered and filtered results for Cu.



Max	280.0	12.0
75th	83.0	too few values
Median	37.0	11.5
25th	13.9	too few values
Min	3.3	11.0

Half the concentrations of unfiltered samples exceeded the RG background, and one detect of the filtered samples exceeded the NM WQCC standards. All but one of the filtered samples were non-detects implying high affinity to solid particles and preferential sediment transport. The intermediate coefficient of determination in the storm water concentration vs SSC results suggests mixed, naturally occurring and anthropogenic, source(s) of Cu along the RG.

VI.3.l. Iron (Fe)

Table 33. Chronological results for Fe.

Date&Time	Flag	SSC, g/L	Fe, ug/L Unfiltered	Fe, ug/L Filtered	Date&Time	Flag	SSC, g/L	Fe, ug/L Unfiltered	Fe, ug/L Filtered
6/19/15 9:20		0.165	2,100						760
				144	7/20/15 22:48		1.222	14,000	
	J			91		U			ND
7/2/15 15:41		0.089	2,080			U			ND
			1,700		7/20/15 23:18		0.656	8,000	
	J			27		U			ND
	U			ND		U			ND
7/2/15 16:11		0.100	1,400		7/20/15 23:48		0.570	6,100	
	U			ND		U			ND
7/2/15 16:41		0.097	1,600		7/30/15 0:22		0.549	6,000	
	J			25	7/30/15 0:52		0.603	8,800	
7/2/15 17:41		0.225	2,500		7/30/15 1:22		9.288	66,000	
	U			ND	7/30/15 1:52		9.250	100,000	
7/2/15 18:11		5.309	57,000		7/30/15 2:22		7.086	84,000	
				260		J			70
7/2/15 18:41		6.600	49,000		7/30/15 2:52		3.676	63,000	
				290	7/30/15 3:22		4.586	51,000	
7/2/15 19:10		3.306	27,000						140
				630	7/30/15 3:52		2.088	36,000	
7/7/15 6:09		5.279	60,000		7/30/15 4:22		2.305	27,000	
				1,300	7/31/15 17:23		12.419	120,000	
7/7/15 6:39		4.396	50,000						1,400
				980	7/31/15 17:53		8.384	84,000	
7/7/15 7:09		4.276	39,000		7/31/15 18:52		4.364	58,000	
				600					540
7/7/15 7:39		3.723	43,000		8/8/15 20:59		1.900	13,000	
	J			34		U			ND
				140	8/8/15 22:59		NS	67,000	
7/7/15 8:09		4.473	43,000			U			ND
	U			ND	8/9/15 0:59		NS	130,000	
	J			59		U			ND
7/7/15 8:39		NS	62,000		9/1/15 12:48		0.158	2,000	
				170				2,100	
7/7/15 9:08		7.038	69,000		9/23/15 13:34		0.082	1,500	
	J			94	10/21/15 18:42		6.456	75,000	
7/7/15 9:38		10.595	110,000						294
				1,600					340
7/7/15 10:08		14.685	110,000		10/21/15 20:12		31.483	240,000	
				1,600	10/21/15 20:42		27.933	240,000	
7/7/15 11:20		NS	17,000						147
				240					740
7/7/15 23:00		1.751	17,000		10/21/15 21:12		24.134	210,000	
			16,000		10/21/15 22:42		13.502	170,000	
7/7/15 23:30		1.488	14,000		10/24/15 0:11		1.086	14,000	
			16,000			J			97
7/8/15 0:00		1.378	13,000		10/24/15 0:41		0.852	8,500	
7/8/15 1:00		1.156	11,000		10/24/15 1:11		0.735	8,900	
7/8/15 1:59		1.113	7,800			J			31
7/9/15 13:00		0.976	9,500		10/24/15 1:41		2.066	5,600	
7/20/15 21:18		1.102	17,000					6,360	
			31,000		10/24/15 3:11		0.730	9,600	
	U			ND				9,680	
	J			75	10/24/15 4:11		NS	13,000	
7/20/15 21:48		3.813	35,000			J			37

Figure 53. Fe storm water concentrations vs. SSC.

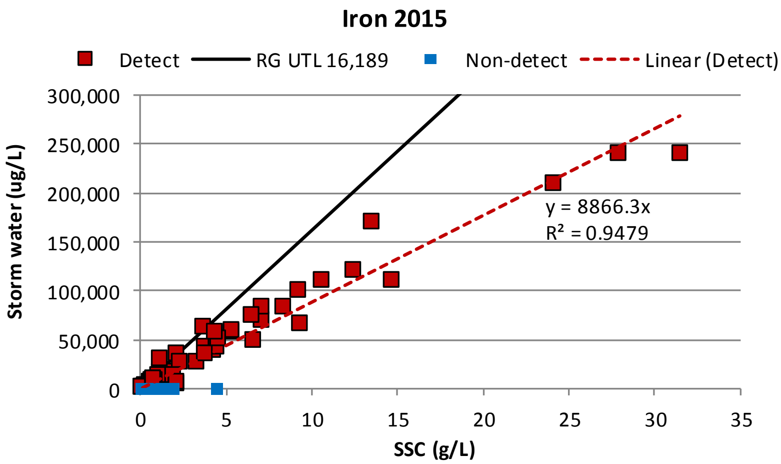
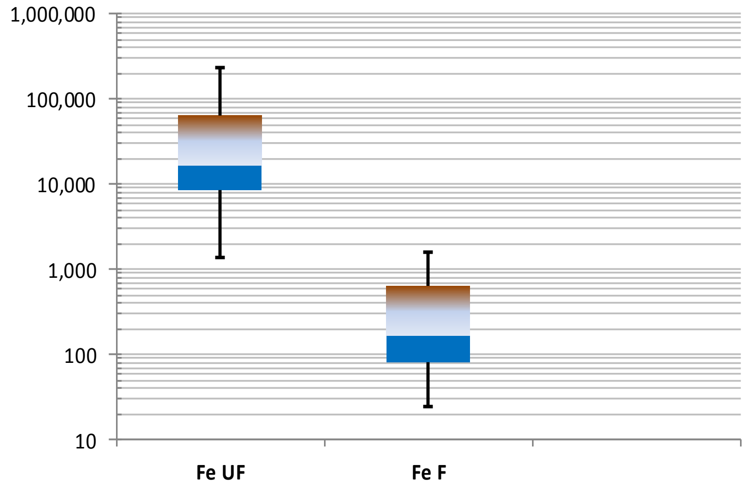


Figure 54. Unfiltered and filtered results for Fe.



Max	240,000		1,600	
75th	62,750		630	
Median	17,000		170	
25th	8,725		83	
Min	1,400		25	

A few concentrations of unfiltered samples exceeded the RG background. The Fe concentrations for unfiltered and filtered samples differ with two orders of magnitude and imply high affinity to solid particles and preferential sediment transport. The high coefficient of determination in the storm water concentration vs SSC results suggests naturally occurring source(s) of Fe along the RG.

VI.3.m. Lead (Pb)

Table 34. Chronological results for Pb.

Date&Time	Flag	SSC, g/L	Pb, ug/L Unfiltered	Pb, ug/L Filtered	Date&Time	Flag	SSC, g/L	Pb, ug/L Unfiltered	Pb, ug/L Filtered
6/19/15 9:20		0.165	3			J			0.44
	J			0.21	7/20/15 22:48		1.222	17	
	J			0.16		U			ND
7/2/15 15:41		0.089	2.66			U			ND
			2		7/20/15 23:18		0.656	9.1	
	U			ND		U			ND
	U			ND		U			ND
7/2/15 16:11		0.100	2.1		7/20/15 23:48		0.570	6.7	
	U			ND		U			ND
7/2/15 16:41		0.097	2.2		7/30/15 0:22		0.549	6.7	
	U			ND	7/30/15 0:52		0.603	8.7	
7/2/15 17:41		0.225	4.5		7/30/15 1:22		9.288	90	
	U			ND	7/30/15 1:52		9.250	100	
7/2/15 18:11		5.309	110		7/30/15 2:22		7.086	87	
	J			0.25		U			ND
7/2/15 18:41		6.600	110		7/30/15 2:52		3.676	60	
	U			ND	7/30/15 3:22		4.586	42	
7/2/15 19:10		3.306	58			U			ND
				0.97	7/30/15 3:52		2.088	33	
7/7/15 6:09		5.279	57		7/30/15 4:22		2.305	29	
				3.6	7/31/15 17:23		12.419	130	
7/7/15 6:39		4.396	47						1.6
	J			0.45	7/31/15 17:53		8.384	84	
7/7/15 7:09		4.276	39		7/31/15 18:52		4.364	50	
	J			0.18		U			ND
7/7/15 7:39		3.723	42		8/8/15 20:59		1.900	12	
	U			ND		U			ND
	U			ND	8/8/15 22:59		NS	77	
7/7/15 8:09		4.473	45			U			ND
	U			ND	8/9/15 0:59		NS	140	
	U			ND		U			ND
7/7/15 8:39		NS	64		9/1/15 12:48		0.158	2.44	
	U			ND				2.5	
7/7/15 9:08		7.038	77		9/23/15 13:34		0.082	1.3	
	U			ND	10/21/15 18:42		6.456	85	
7/7/15 9:38		10.595	120						11.8
				1.3					12
7/7/15 10:08		14.685	140		10/21/15 20:12		31.483	280	
				2.1	10/21/15 20:42		27.933	250	
7/7/15 11:20		NS	21			U			ND
	U			ND		J			0.48
7/7/15 23:00		1.751	19		10/21/15 21:12		24.134	220	
			19		10/21/15 22:42		13.502	160	
7/7/15 23:30		1.488	39		10/24/15 0:11		1.086	11	
			18			U			ND
7/8/15 0:00		1.378	15		10/24/15 0:41		0.852	11	
7/8/15 1:00		1.156	11		10/24/15 1:11		0.735	7.9	
7/8/15 1:59		1.113	6.7			U			ND
7/9/15 13:00		0.976	13		10/24/15 1:41		2.066	5.7	
7/20/15 21:18		1.102	15					6.12	
			43		10/24/15 3:11		0.730	9.1	
	U			ND				8.94	
	U			ND	10/24/15 4:11		NS	10	
7/20/15 21:48		3.813	58			U			ND

Figure 55. Pb storm water concentrations vs. SSC.

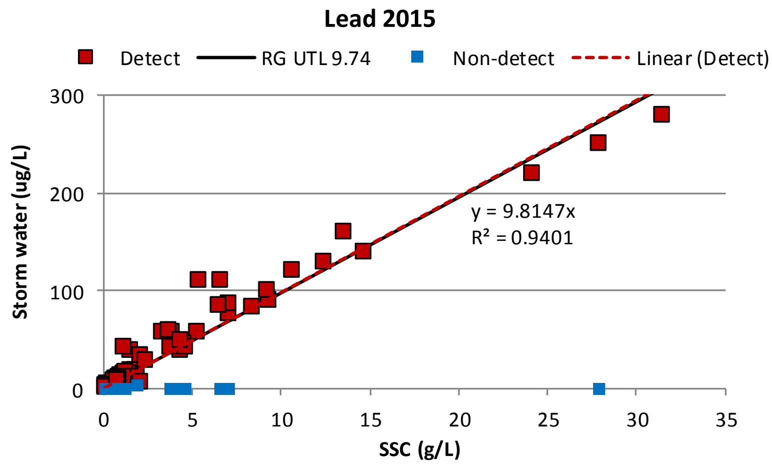
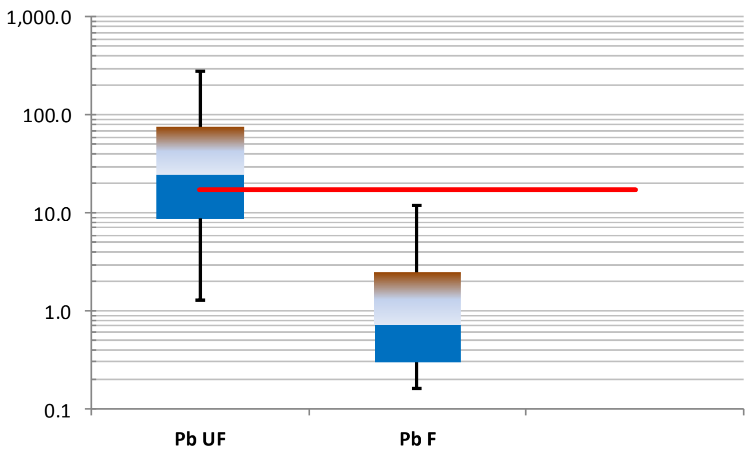


Figure 56. Unfiltered and filtered results for Pb.



Max	280.0		12.00	
75th	77.0		2.48	
Median	25.0		0.73	
25th	8.9		0.30	
Min	1.3		0.16	

Most concentrations of unfiltered samples exceeded the RG background, and no filtered samples exceeded the NM WQCC standards. The concentrations of filtered samples were one order of magnitude less than unfiltered samples implying affinity to solid particles and preferential sediment transport. The high coefficient of determination in the storm water concentration vs SSC results suggests naturally occurring source(s) of Pb along the RG.

VI.3.n. Magnesium (Mg)

Table 35. Chronological results for Mg.

Date&Time	Flag	SSC, g/L	Mg, ug/L Unfiltered	Mg, ug/L Filtered	Date&Time	Flag	SSC, g/L	Mg, ug/L Unfiltered	Mg, ug/L Filtered
6/19/15 9:20		0.169	5,600						4,300
				4,840	7/20/15 22:48		1.222	11,000	
				4,800					4,140
7/2/15 15:41		0.089	5,400						4,200
			4,900		7/20/15 23:18		0.656	8,100	
				4,700					4,180
				4,390					4,200
7/2/15 16:11		0.100	4,400		7/20/15 23:48		0.570	7,600	
				4,400					4,200
7/2/15 16:41		0.097	4,700		7/30/15 0:22		0.549	8,200	
				4,400	7/30/15 0:52		0.603	9,800	
7/2/15 17:41		0.225	5,600		7/30/15 1:22		9.288	60,000	
				4,500	7/30/15 1:52		9.250	77,000	
7/2/15 18:11		5.309	27,000		7/30/15 2:22		7.086	64,000	
				4,200					3,900
7/2/15 18:41		6.600	24,000		7/30/15 2:52		3.676	47,000	
				3,800	7/30/15 3:22		4.586	37,000	
7/2/15 19:10		3.306	15,000						4,100
				4,300	7/30/15 3:52		2.088	28,000	
7/7/15 6:09		5.279	46,000		7/30/15 4:22		2.305	23,000	
				3,500	7/31/15 17:23		12.419	92,000	
7/7/15 6:39		4.396	38,000						4,200
				3,600	7/31/15 17:53		8.384	64,000	
7/7/15 7:09		4.276	30,000		7/31/15 18:52		4.364	42,000	
				4,000					3,800
7/7/15 7:39		3.723	31,000		8/8/15 20:59		1.900	13,000	
				3,890	8/8/15 20:59				6,000
				4,200	8/8/15 22:59		NS	55,000	
7/7/15 8:09		4.473	33,000		8/8/15 22:59				7,100
				4,110	8/9/15 0:59		NS	89,000	
				4,300	8/9/15 0:59				7,300
7/7/15 8:39		NS	47,000		9/1/15 12:48		0.158	6,780	
				4,200				6,800	
7/7/15 9:08		7.038	54,000		9/23/15 13:34		0.082	6,700	
				3,800	10/21/15 18:42		6.456	54,000	
7/7/15 9:38		10.595	85,000						10,500
				4,500					12,000
7/7/15 10:08		14.685	96,000		10/21/15 20:12		31.483	180,000	
				4,000	10/21/15 20:42		27.933	180,000	
7/7/15 11:20		NS	17,000						2,900
				4,200					3,600
7/7/15 23:00		1.751	17,000		10/21/15 21:12		24.134	150,000	
			15,000		10/21/15 22:42		13.502	130,000	
7/7/15 23:30		1.488	15,000		10/24/15 0:11		1.086	16,000	
			15,000						6,200
7/8/15 0:00		1.378	14,000		10/24/15 0:41		0.852	13,000	
7/8/15 1:00		1.156	12,000		10/24/15 1:11		0.735	13,000	
7/8/15 1:59		1.113	7,500						6,400
7/9/15 13:00		0.976	9,900		10/24/15 1:41		2.066	8,330	
7/20/15 21:18		1.102	14,000					8,100	
			17,000		10/24/15 3:11		0.730	13,500	
				4,100				13,000	
				3,800	10/24/15 4:11		NS	15,000	
7/20/15 21:48		3.813	20,000						6,800

Figure 57. Mg storm water concentrations vs. SSC.

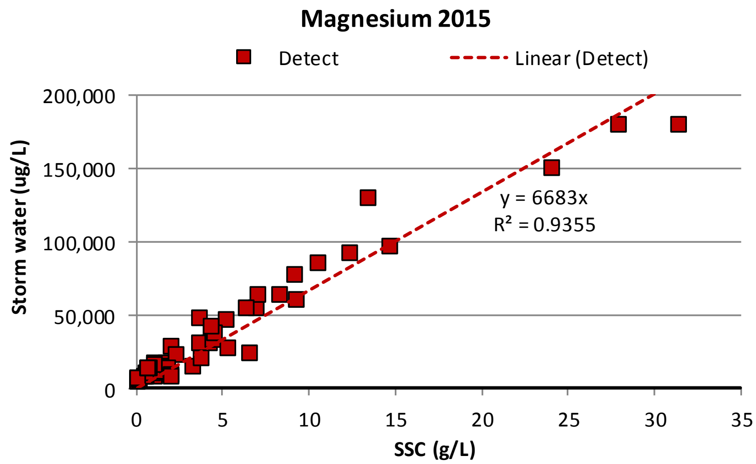
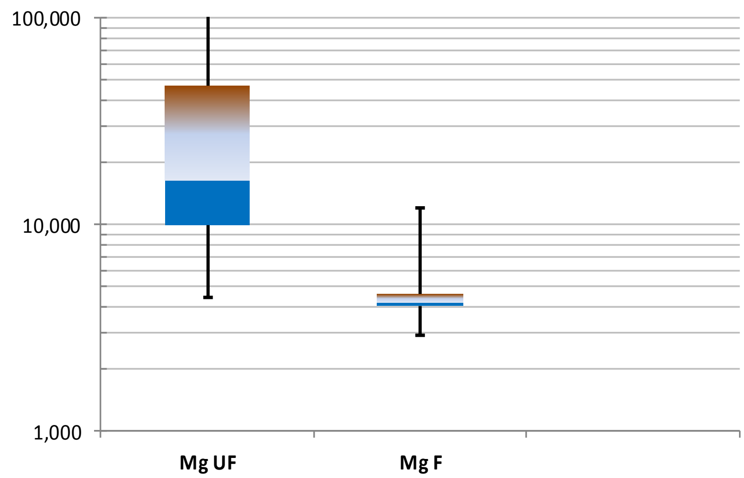


Figure 58. Unfiltered and filtered results for Mg.



Max	180,000		12,000	
75th	47,000		4,650	
Median	16,500		4,200	
25th	9,875		4,000	
Min	4,400		2,900	

The concentrations of filtered samples were reduced in comparison to unfiltered indicating somewhat sediment transport for this constituent. The high coefficient of determination in the storm water concentration vs SSC results suggests naturally occurring source(s) of Mg along the RG.

VI.3.o. Manganese (Mn)

Table 36. Chronological results for Mn.

Date&Time	Flag	SSC, g/L	Mn, ug/L Unfiltered	Mn, ug/L Filtered
6/19/15 9:20		0.169	160	
				5.64
				5.9
7/2/15 15:41		0.089	160	
			150	
				3
				2.37
7/2/15 16:11		0.100	130	
				3.6
7/2/15 16:41		0.097	150	
	J			1.5
7/2/15 17:41		0.225	190	
				3.7
7/2/15 18:11		5.309	2,900	
				19
7/2/15 18:41		6.600	2,800	
				21
7/2/15 19:10		3.306	1,500	
				37
7/7/15 6:09		5.279	2,400	
				74
7/7/15 6:39		4.396	2,000	
				39
7/7/15 7:09		4.276	1,700	
				29
7/7/15 7:39		3.723	1,900	
				5.58
				10
7/7/15 8:09		4.473	1,900	
				4.39
				6.3
7/7/15 8:39		NS	2,600	
				95
7/7/15 9:08		7.038	3,000	
				27
7/7/15 9:38		10.595	4,700	
				240
7/7/15 10:08		14.685	5,600	
				160
7/7/15 11:20		NS	940	
				17
7/7/15 23:00		1.751	880	
			850	
7/7/15 23:30		1.488	770	
			810	
7/8/15 0:00		1.378	690	
7/8/15 1:00		1.156	570	
7/8/15 1:59		1.113	340	
7/9/15 13:00		0.976	490	
7/20/15 21:18		1.102	660	
			1,300	
				5.9
				11
7/20/15 21:48		3.813	1,700	
				41
7/20/15 22:48		1.222	610	
				2.36
				3.3
7/20/15 23:18		0.656	370	
				2.39
				2.9
7/20/15 23:48		0.570	290	
				3.2
7/30/15 0:22		0.549	290	
7/30/15 0:52		0.603	360	
7/30/15 1:22		9.288	4,100	
7/30/15 1:52		9.250	4,900	
7/30/15 2:22		7.086	4,100	
				8.3
7/30/15 2:52		3.676	2,900	
7/30/15 3:22		4.586	2,000	
				9.9
7/30/15 3:52		2.088	1,500	
7/30/15 4:22		2.305	1,200	
7/31/15 17:23		12.419	6,000	
				110
7/31/15 17:53		8.384	3,800	
7/31/15 18:52		4.364	2,200	
				26
8/8/15 20:59		1.900	480	
	U			ND
8/8/15 22:59		NS	2,700	
	J			2.8
8/9/15 0:59		NS	4,400	
	U			ND
9/1/15 12:48		0.158	127	
			130	
9/23/15 13:34		0.082	90	
10/21/15 18:42		6.456	3,800	
				1,050
				1,100
10/21/15 20:12		31.483	14,000	
10/21/15 20:42		27.933	13,000	
				154
				150
10/21/15 21:12		24.134	10,000	
10/21/15 22:42		13.502	7,700	
10/24/15 0:11		1.086	550	
				5.6
10/24/15 0:41		0.852	390	
10/24/15 1:11		0.735	370	
				2.5
10/24/15 1:41		2.066	245	
			240	
10/24/15 3:11		0.730	405	
			400	
10/24/15 4:11		NS	460	
	J			2

Figure 59. Mn storm water concentrations vs. SSC.

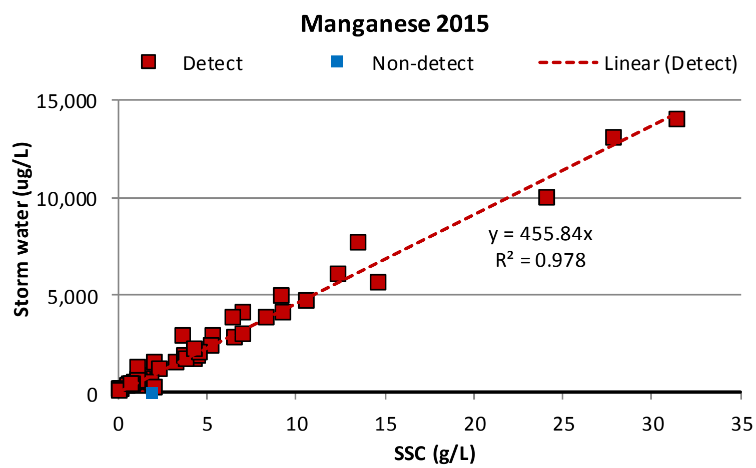
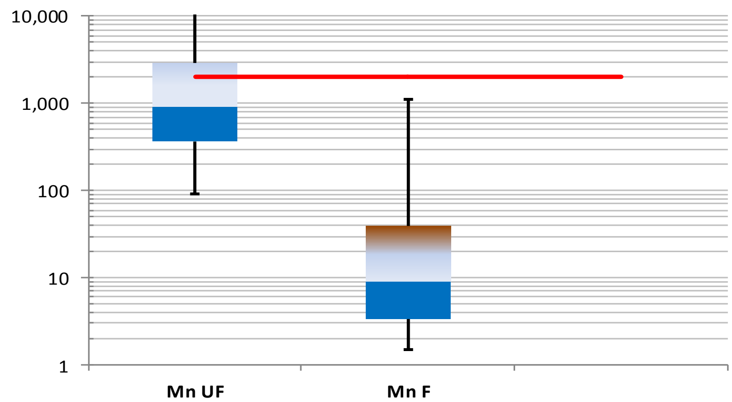


Figure 60. Unfiltered and filtered results for Mn.



Max	14,000		1,100.0	
75th	2,875		39.5	
Median	910		9.1	
25th	370		3.4	
Min	90		1.5	

All concentrations of filtered samples were below the NM WQCC standards. The concentrations of filtered samples were reduced in comparison to unfiltered two orders of magnitude indicating preferential sediment transport for this constituent. The high coefficient of determination in the storm water concentration vs SSC results suggests naturally occurring source(s) of Mn along the RG.

VI.3.p. Mercury (Hg)

Table 37. Chronological results for Hg.

Date&Time	Flag	SSC, g/L	Hg, ug/L Unfiltered	Hg, ug/L Filtered
6/19/15 9:20	U	0.169	ND	
	U			ND
7/2/15 15:41	J	0.089	0.061	
	U			ND
	U			ND
7/2/15 16:11	U	0.100	ND	
	U		ND	
	U			ND
7/2/15 16:41	U	0.097	ND	
	U			ND
7/2/15 17:41	U	0.225	ND	
	U			ND
7/2/15 18:11		5.309	0.25	
	U			ND
7/2/15 18:41		6.600	0.27	
	U			ND
7/2/15 19:10	J	3.306	0.14	
	U			ND
7/7/15 6:09	J	5.279	0.086	
	U			ND
7/7/15 6:39	J	4.396	0.062	
	U			ND
7/7/15 7:09	U	4.276	ND	
	U			ND
7/7/15 7:39	J	3.723	0.074	
	U			ND
	U			ND
7/7/15 8:09	J	4.473	0.075	
	U			ND
	U			ND
7/7/15 8:39	J	NS	0.1	
	U			ND
7/7/15 9:08	J	7.038	0.12	
	U			ND
7/7/15 9:38	J	10.595	0.17	
	U			ND
7/7/15 10:08		14.685	0.21	
	U			ND
7/7/15 11:20	U	NS	ND	
	U			ND
7/7/15 23:00	U	1.751	ND	
	U		ND	
7/7/15 23:30	U	1.488	ND	
	U		ND	
7/8/15 0:00	U	1.378	ND	
7/8/15 1:00	U	1.156	ND	
7/8/15 1:59	U	1.113	ND	
7/9/15 13:00	U		ND	
7/20/15 21:18	U	1.102	ND	
	J		0.076	
	U			ND
	U			ND
7/20/15 21:48	J	3.813	0.098	
	U			ND
7/20/15 22:48	U	1.222	ND	
	U			ND
	U			ND
7/20/15 23:18	U	0.656	ND	
	U			ND
	U			ND
7/20/15 23:48	U	0.570	ND	
	U			ND
7/30/15 0:22	U	0.549	ND	
7/30/15 0:52	U	0.603	ND	
7/30/15 1:22	J	9.288	0.12	
7/30/15 1:52	J	9.250	0.15	
7/30/15 2:22	J	7.086	0.13	
	U			ND
7/30/15 2:52	J	3.676	0.1	
7/30/15 3:22	U	4.586	ND	
	U			ND
7/30/15 3:52	U	2.088	ND	
7/30/15 4:22	U	2.305	ND	
7/31/15 17:23	J	12.419	0.19	
	U			ND
7/31/15 17:53	J	8.384	0.12	
7/31/15 18:52	J	4.364	0.064	
	U			ND
8/8/15 20:59	UH	1.900	ND	
	UH			ND
8/8/15 22:59		NS	0.1	
	UH			ND
8/9/15 0:59		NS	0.27	
	UH			ND
9/1/15 12:48	U	0.158	ND	
	U		ND	
9/23/15 13:34	U	0.082	ND	
10/21/15 18:42	J	6.456	0.089	
	U			ND
	U			ND
10/21/15 20:12		31.483	0.3	
10/21/15 20:42		27.933	0.27	
	U			ND
	U			ND
10/21/15 21:12		24.134	0.23	
10/21/15 22:42	J	13.502	0.16	
10/24/15 0:11	U		ND	
	U	1.086		ND
10/24/15 0:41	U	0.852	ND	
10/24/15 1:11	U	0.735	ND	
	U			ND
10/24/15 1:41	U	2.066	ND	
10/24/15 3:11	U	0.730	ND	
10/24/15 4:11	U	NS	ND	
	U			ND

Figure 61. Hg storm water concentrations vs. SSC

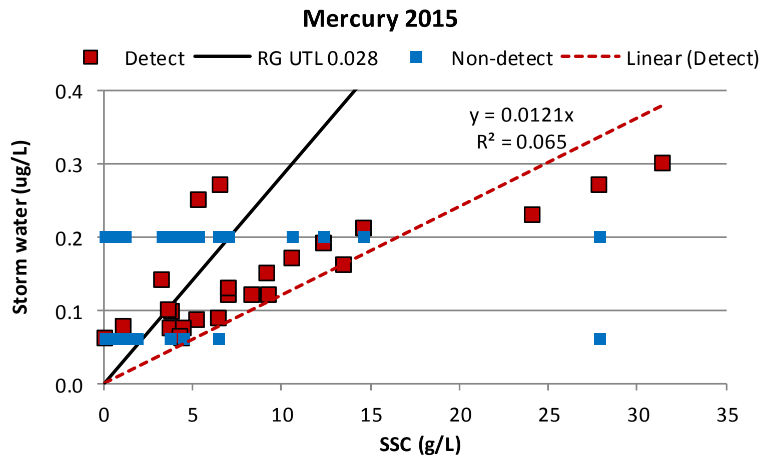
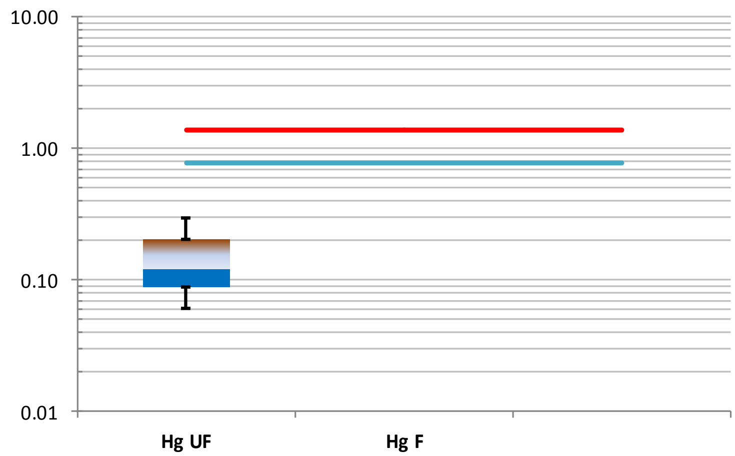


Figure 62. Unfiltered and filtered results for Hg.



Max	0.300		ND	
75th	0.205		ND	
Median	0.120		ND	
25th	0.088		ND	
Min	0.061		ND	

A few concentrations of unfiltered samples exceeded the RG background, but none exceeded the NM WQCC standard. There were detects of the filtered samples implying affinity to solid particles and preferential sediment transport. The low coefficient of determination in the storm water concentration vs SSC results suggests anthropogenic source(s).

VI.3.q. Nickel (Ni)

Table 38. Chronological results for Ni.

Date&Time	Flag	SSC, g/L	Ni, ug/L Unfiltered	Ni, ug/L Filtered	Date&Time	Flag	SSC, g/L	Ni, ug/L Unfiltered	Ni, ug/L Filtered
6/19/15 9:20	J	0.165	2.6			U			ND
	U			ND	7/20/15 22:48		1.222	15	
	U			ND		U			ND
7/2/15 15:41	U	0.089	ND			J			2.8
	U		ND		7/20/15 23:18		0.656	7.6	
	J			3.36		U			ND
	U			ND		U			ND
7/2/15 16:11		0.100	5.9		7/20/15 23:48		0.570	9.1	
	U			ND		J			2.9
7/2/15 16:41	J	0.097	3.9		7/30/15 0:22		0.549	8.2	
	U			ND	7/30/15 0:52		0.603	12	
7/2/15 17:41	J	0.225	3		7/30/15 1:22		9.288	120	
	J			2.8	7/30/15 1:52		9.250	150	
7/2/15 18:11		5.309	66		7/30/15 2:22		7.086	120	
	U			ND		U			ND
7/2/15 18:41		6.600	50		7/30/15 2:52		3.676	81	
	U			ND	7/30/15 3:22		4.586	60	
7/2/15 19:10		3.306	29			U			ND
	U			ND	7/30/15 3:52		2.088	43	
7/7/15 6:09		5.279	88		7/30/15 4:22		2.305	39	
	J			4.8	7/31/15 17:23		12.419	170	
7/7/15 6:39		4.396	68						5.8
	U			ND	7/31/15 17:53		8.384	110	
7/7/15 7:09		4.276	52		7/31/15 18:52		4.364	65	
	U			ND		U			
7/7/15 7:39		3.723	55		8/8/15 20:59	J	1.900	17	
	J			3.72		U			ND
	J			2.9	8/8/15 22:59		NS	95	
7/7/15 8:09		4.473	58			U			ND
	U			ND	8/9/15 0:59		NS	210	
	U			ND		U			ND
7/7/15 8:39		NS	80		9/1/15 12:48	U	0.158	ND	
				6				7.5	
7/7/15 9:08		7.038	90		9/23/15 13:34		0.082	5.3	
	J			3.4	10/21/15 18:42		6.456	97	
7/7/15 9:38		10.595	160						5.06
				5.9					6.9
7/7/15 10:08		14.685	180		10/21/15 20:12		31.483	360	
	J			3.9	10/21/15 20:42		27.933	340	
7/7/15 11:20		NS	28			U			ND
	U			ND					5.8
7/7/15 23:00		1.751	28		10/21/15 21:12		24.134	290	
			25		10/21/15 22:42		13.502	230	
7/7/15 23:30		1.488	23		10/24/15 0:11		1.086	21	
			26			U			ND
7/8/15 0:00		1.378	20		10/24/15 0:41		0.852	17	
7/8/15 1:00		1.156	18		10/24/15 1:11		0.735	15	
7/8/15 1:59		1.113	10			U			ND
7/9/15 13:00		0.976	8.7		10/24/15 1:41		2.066	9.3	
7/20/15 21:18		1.102	24					10.2	
			35		10/24/15 3:11		0.730	15	
	U			ND				13.4	
	U			ND	10/24/15 4:11		NS	15	
7/20/15 21:48		3.813	39			U			ND

Figure 63. Ni storm water concentrations vs. SSC.

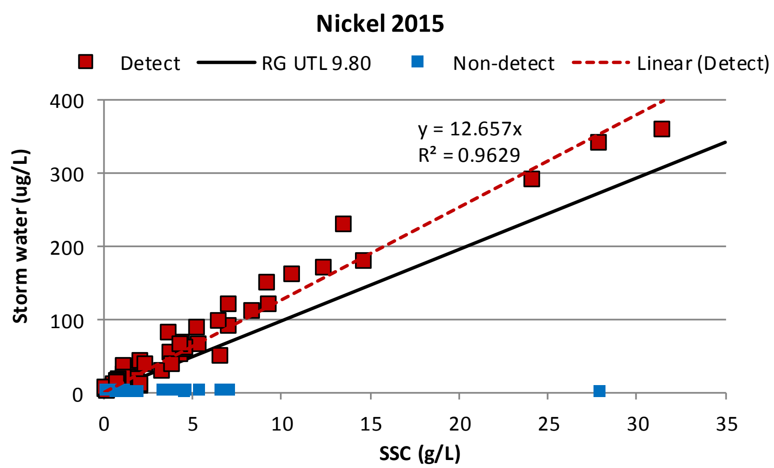
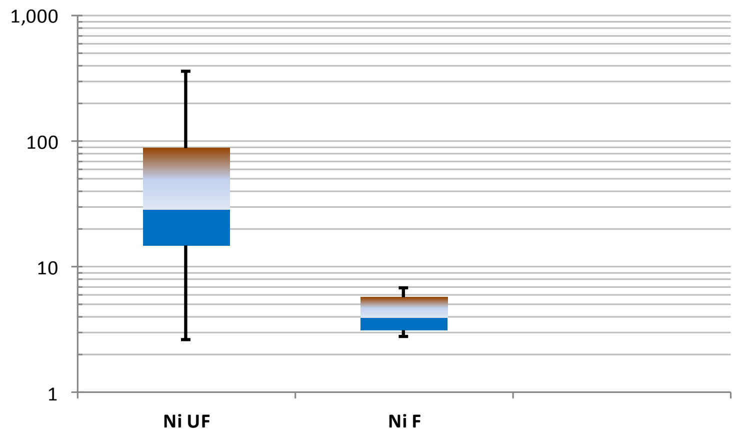


Figure 64. Unfiltered and filtered results for Ni.



Max	360.0		6.9	
75th	89.0		5.8	
Median	29.0		3.9	
25th	15.0		3.1	
Min	2.6		2.8	

Most concentrations of unfiltered samples exceeded the RG background. The concentrations of filtered samples were one order of magnitude less than unfiltered samples implying affinity to solid particles and preferential sediment transport. The high coefficient of determination in the storm water concentration vs SSC results suggests naturally occurring source(s) of Ni along the RG.

VI.3.r. Potassium (K)

Table 39. Chronological results for K.

Date&Time	Flag	SSC, g/L	K, ug/L Unfiltered	K, ug/L Filtered
6/19/15 9:20		0.169	2,500	
				2,150
				2,100
7/2/15 15:41		0.089	2,300	
			2,160	
				1,800
				1,690
7/2/15 16:11		0.100	2,000	
				1,800
7/2/15 16:41		0.097	2,400	
				2,100
7/2/15 17:41		0.225	2,700	
				2,000
7/2/15 18:11		5.309	17,000	
				2,700
7/2/15 18:41		6.600	15,000	
				2,600
7/2/15 19:10		3.306	10,000	
				2,700
7/7/15 6:09			23,000	
		5.279		3,000
7/7/15 6:39		4.396	20,000	
				2,600
7/7/15 7:09		4.276	15,000	
				2,300
7/7/15 7:39		3.723	16,000	
				2,140
				2,500
7/7/15 8:09		4.473	15,000	
				2,500
				2,400
7/7/15 8:39		NS	22,000	
				2,700
7/7/15 9:08		7.038	26,000	
				2,800
7/7/15 9:38		10.595	42,000	
				3,700
7/7/15 10:08		14.685	45,000	
				3,900
7/7/15 11:20		NS	7,500	
				2,000
7/7/15 23:00		1.751	7,600	
			7,700	
7/7/15 23:30		1.488	6,700	
			7,700	
7/8/15 0:00		1.378	6,400	
7/8/15 1:00		1.156	5,600	
7/8/15 1:59		1.113	3,600	
7/9/15 13:00		0.976	5,600	
7/20/15 21:18		1.102	7,100	
			10,000	
				1,900
				2,400
7/20/15 21:48		3.813	12,000	
				2,800
7/20/15 22:48		1.222	6,500	
				1,940
				2,000
7/20/15 23:18		0.656	4,600	
				1,870
				2,000
7/20/15 23:48		0.570	4,100	
				2,200
7/30/15 0:22		0.549	4,300	
7/30/15 0:52		0.603	5,000	
7/30/15 1:22		9.288	25,000	
7/30/15 1:52		9.250	35,000	
7/30/15 2:22		7.086	29,000	
				2,400
7/30/15 2:52		3.676	22,000	
7/30/15 3:22		4.586	18,000	
				2,200
7/30/15 3:52		2.088	14,000	
7/30/15 4:22		2.305	11,000	
7/31/15 17:23		12.419	47,000	
				2,900
7/31/15 17:53		8.384	31,000	
7/31/15 18:52		4.364	23,000	
				2,200
8/8/15 20:59		1.900	6,200	
				2,400
8/8/15 22:59		NS	23,000	
				2,400
8/9/15 0:59		NS	41,000	
				2,400
9/1/15 12:48		0.158	2,860	
			3,000	
9/23/15 13:34		0.082	2,900	
10/21/15 18:42		6.456	26,000	
				4,590
				4,700
10/21/15 20:12		31.483	87,000	
10/21/15 20:42		27.933	87,000	
				3,200
				3,200
10/21/15 21:12		24.134	76,000	
10/21/15 22:42		13.502	63,000	
10/24/15 0:11		1.086	7,500	
				2,700
10/24/15 0:41		0.852	6,500	
10/24/15 1:11		0.735	6,200	
				2,500
10/24/15 1:41		2.066	4,540	
			4,300	
10/24/15 3:11		0.730	6,960	
			7,100	
10/24/15 4:11		NS	7,300	
				2,800

Figure 65. K storm water concentrations vs. SSC.

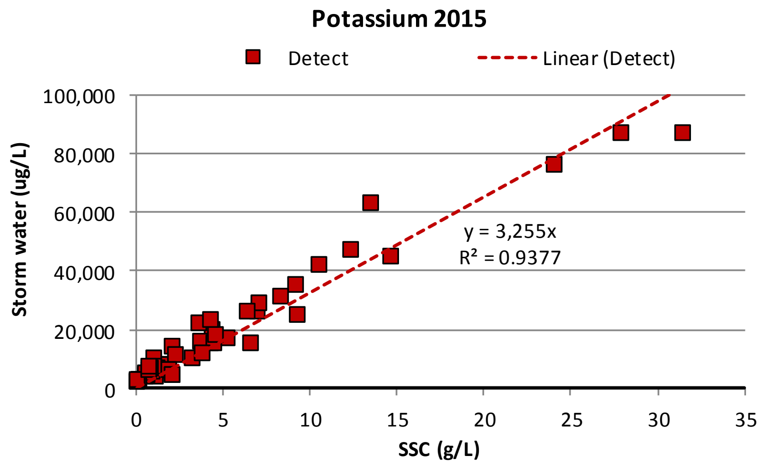
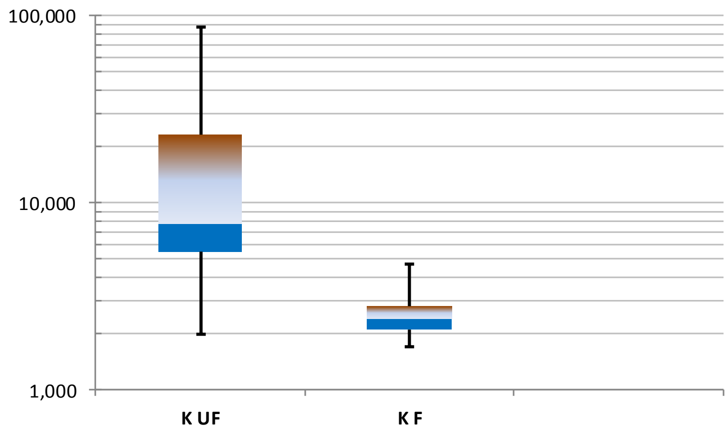


Figure 66. Unfiltered and filtered results for K.



Max	87,000		4,700	
75th	23,000		2,775	
Median	7,700		2,400	
25th	5,450		2,100	
Min	2,000		1,690	

The concentrations of filtered samples were reduced in comparison to unfiltered indicating somewhat sediment transport for this constituent. The high coefficient of determination in the storm water concentration vs SSC results suggests naturally occurring source(s) of K along the RG.

VI.3.s. Selenium (Se)

Table 40. Chronological results for Se.

Date&Time	Flag	SSC, g/L	Se, ug/L Unfiltered	Se, ug/L Filtered
6/19/15 9:20	U	0.169	ND	
	U			ND
	U			ND
7/2/15 15:41	U	0.089	ND	
	J		0.87	
	U			ND
	U			ND
7/2/15 16:11	U	0.100	ND	
	U			ND
7/2/15 16:41	U	0.097	ND	
	U			ND
7/2/15 17:41	U	0.225	ND	
	U			ND
7/2/15 18:11		5.309	5.6	
	U			ND
7/2/15 18:41		6.600	7.1	
	U			ND
7/2/15 19:10		3.306	2.7	
	U			ND
7/7/15 6:09		5.279	5.8	
	U			ND
7/7/15 6:39		4.396	3.7	
	U			ND
7/7/15 7:09		4.276	2.9	
	U			ND
7/7/15 7:39		3.723	3.7	
	U			ND
	U			ND
7/7/15 8:09		4.473	1.8	
	U			ND
	U			ND
7/7/15 8:39		NS	5.2	
	U			ND
7/7/15 9:08		7.038	5.8	
	U			ND
7/7/15 9:38		10.595	9	
	U			ND
7/7/15 10:08		14.685	11	
				1.4
7/7/15 11:20	U	NS	ND	
	U			ND
7/7/15 23:00		1.751	2.4	
			1.1	
7/7/15 23:30		1.488	1.7	
			1.3	
7/8/15 0:00		1.378	1	
7/8/15 1:00		1.156	1	
7/8/15 1:59		1.113	1	
7/9/15 13:00	J	0.976	0.78	
7/20/15 21:18		1.102	1.7	
			2.6	
	U			ND
	J			0.82
7/20/15 21:48		3.813	5.2	
	U			ND
7/20/15 22:48		1.222	1.4	
	J			1
	J			0.8
7/20/15 23:18		0.656	1.9	
	U			ND
	J			0.81
7/20/15 23:48	U	0.570	ND	
	U			ND
7/30/15 0:22	U	0.549	ND	
7/30/15 0:52		0.603	1.1	
7/30/15 1:22		9.288	8.3	
7/30/15 1:52		9.250	10	
7/30/15 2:22		7.086	7.4	
				1.1
7/30/15 2:52		3.676	4.4	
7/30/15 3:22		4.586	3.1	
	U			ND
7/30/15 3:52		2.088	2.6	
7/30/15 4:22		2.305	2.7	
7/31/15 17:23		12.419	14	
	U			ND
7/31/15 17:53		8.384	6.4	
7/31/15 18:52		4.364	4.9	
	U			ND
8/8/15 20:59	U	1.900	ND	
	U			ND
8/8/15 22:59	U	NS	ND	
	U			ND
8/9/15 0:59	U	NS	ND	
	U			ND
9/1/15 12:48	J	0.158	0.99	
	U		ND	
9/23/15 13:34	J	0.082	0.8	
10/21/15 18:42		6.456	5.8	
				1.02
				1.4
10/21/15 20:12		31.483	25	
10/21/15 20:42		27.933	26	
	U			ND
	U			ND
10/21/15 21:12		24.134	19	
10/21/15 22:42		13.502	16	
10/24/15 0:11		1.086	1	
	U			ND
10/24/15 0:41	U	0.852	ND	
10/24/15 1:11		0.735	1.6	
	U			ND
10/24/15 1:41	U	2.066	ND	
	U		ND	
10/24/15 3:11	J	0.730	0.79	
	U		ND	
10/24/15 4:11	U	NS	ND	
	U			ND

Figure 67. Se storm water concentrations vs. SSC.

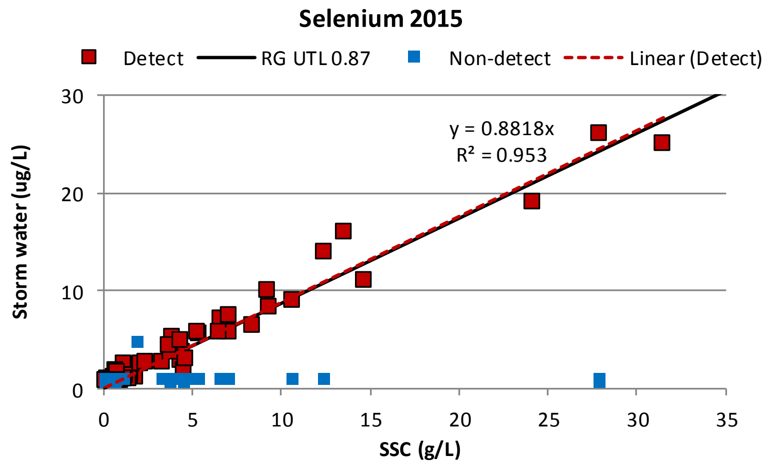
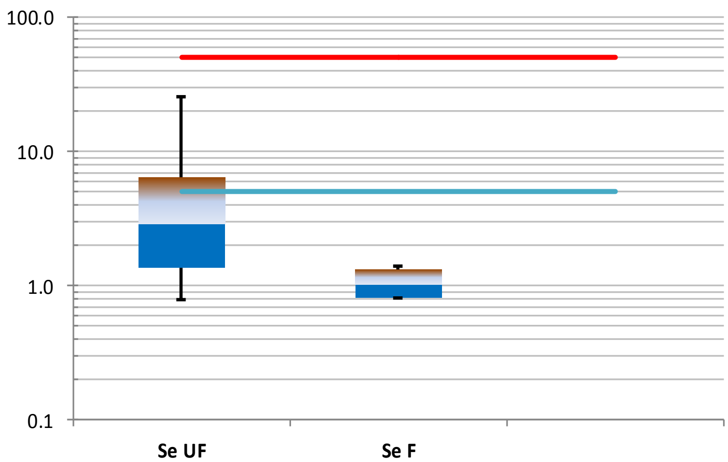


Figure 68. Unfiltered and filtered results for Se.



Max	26.00		1.40	
75th	6.40		1.33	
Median	2.90		1.01	
25th	1.35		0.82	
Min	0.78		0.80	

About half the concentrations of unfiltered samples exceeded the RG background and a few exceeded the NM WQCC standard (blue line), and no filtered samples exceeded the NM WQCC standards (red line). The concentrations of filtered samples were less in magnitude than unfiltered samples implying some sediment transport. The high coefficient of determination in the storm water concentration vs SSC results suggests naturally occurring source(s) of Se along the RG.

VI.3.t. Silver (Ag)

Table 41. Chronological results for Ag.

Date&Time	Flag	SSC, g/L	Ag, ug/L Unfiltered	Ag, ug/L Filtered
6/19/15 9:20	J	0.169	0.05	
	U			ND
	U			ND
7/2/15 15:41	U	0.089	ND	
	U		ND	
	U			ND
	U			ND
7/2/15 16:11	J	0.100	0.04	
	U			ND
7/2/15 16:41	U	0.097	ND	
	U			ND
7/2/15 17:41	U	0.225	ND	
	U			ND
7/2/15 18:11		5.309	0.52	
	U			ND
7/2/15 18:41		6.600	0.44	
	U			ND
7/2/15 19:10		3.306	0.2	
	U			ND
7/7/15 6:09		5.279	0.21	
	U			ND
7/7/15 6:39		4.396	0.31	
	U			ND
7/7/15 7:09		4.276	0.18	
	U			ND
7/7/15 7:39	J	3.723	0.07	
	U			ND
	J			0.05
7/7/15 8:09		4.473	0.2	
	U			ND
	J			0.04
7/7/15 8:39		NS	0.2	
	J			0.05
7/7/15 9:08		7.038	0.27	
	U			ND
7/7/15 9:38		10.595	0.29	
	U			ND
7/7/15 10:08		14.685	0.41	
	U			ND
7/7/15 11:20	J	NS	0.04	
	U			ND
7/7/15 23:00		1.751	0.11	
	J		0.07	
7/7/15 23:30	J	1.488	0.06	
	J		0.07	
7/8/15 0:00		1.378	0.11	
7/8/15 1:00	U	1.156	ND	
7/8/15 1:59	J	1.113	0.05	
7/9/15 13:00		0.976	0.1	
7/20/15 21:18	U	1.102	ND	
			0.17	
	U			ND
	U			ND
7/20/15 21:48		3.813	0.18	
	J			0.04
7/20/15 22:48		1.222	0.14	
	U			ND
	U			ND
7/20/15 23:18	U	0.656	ND	
	U			ND
	U			ND
7/20/15 23:48	J	0.570	0.05	
	U			ND
7/30/15 0:22	U	0.549	ND	
7/30/15 0:52	J	0.603	0.05	
7/30/15 1:22		9.288	0.17	
7/30/15 1:52		9.250	0.15	
7/30/15 2:22		7.086	0.2	
	J			0.08
7/30/15 2:52		3.676	0.11	
7/30/15 3:22		4.586	0.12	
	U			ND
7/30/15 3:52	U	2.088	ND	
7/30/15 4:22	J	2.305	0.04	
7/31/15 17:23		12.419	0.28	
	U			ND
7/31/15 17:53		8.384	0.16	
7/31/15 18:52		4.364	0.12	
	U			ND
8/8/15 20:59	U	1.900	ND	
	U			ND
8/8/15 22:59	U	NS	ND	
	U			ND
8/9/15 0:59	U	NS	ND	
	U			ND
9/1/15 12:48	J	0.158	0.06	
	J		0.06	
9/23/15 13:34	U	0.082	ND	
10/21/15 18:42		6.456	0.15	
	U			ND
	U			ND
10/21/15 20:12		31.483	0.41	
10/21/15 20:42		27.933	0.43	
	U			ND
	J			0.07
10/21/15 21:12		24.134	0.38	
10/21/15 22:42		13.502	0.37	
10/24/15 0:11	J	1.086	0.06	
	U			ND
10/24/15 0:41	U	0.852	ND	
10/24/15 1:11	U	0.735	ND	
	U			ND
10/24/15 1:41	J	2.066	0.05	
	U		ND	
10/24/15 3:11	J	0.730	0.05	
	U		ND	
10/24/15 4:11	U		ND	
	U			ND

Figure 69. Ag storm water concentrations vs. SSC.

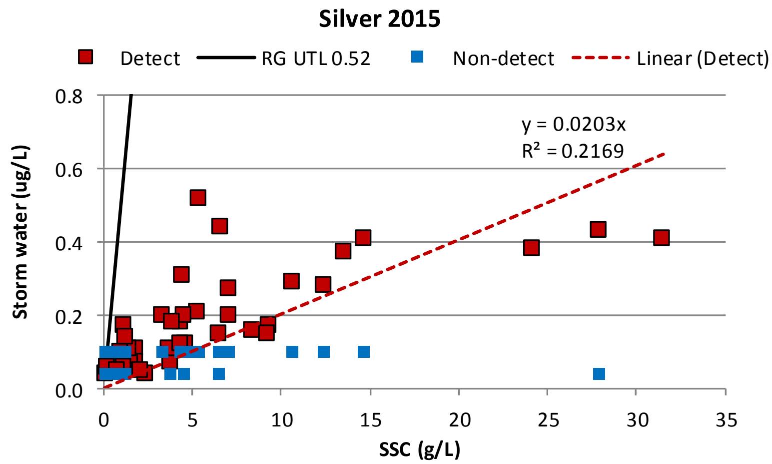
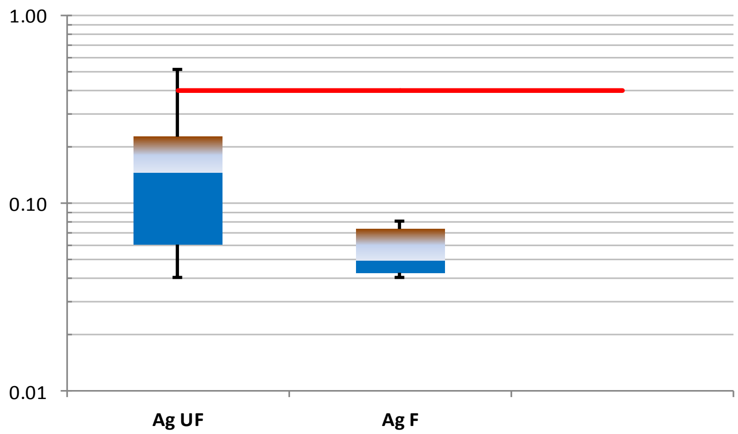


Figure 70. Unfiltered and filtered results for Ag.



Max	0.52		0.08	
75th	0.23		0.07	
Median	0.15		0.05	
25th	0.06		0.04	
Min	0.04		0.04	

Only a few concentrations of unfiltered samples exceeded the RG background, and no filtered samples exceeded the NM WQCC standards. The concentrations of filtered samples were less in magnitude than unfiltered samples implying some preferential sediment transport. The low coefficient of determination in the storm water concentration vs SSC results suggests anthropogenic source(s).

VI.3.u. Sodium (Na)

Table 42. Chronological results for Na.

Date&Time	Flag	SSC, g/L	Na, ug/L Unfiltered	Na, ug/L Filtered
6/19/15 9:20		0.165	12,000	
				11,300
				11,000
7/2/15 15:41		0.089	10,700	
			11,000	
				10,800
				11,000
7/2/15 16:11		0.100	10,000	
				11,000
7/2/15 16:41		0.097	11,000	
				11,000
7/2/15 17:41		0.225	12,000	
				11,000
7/2/15 18:11		5.309	14,000	
				11,000
7/2/15 18:41		6.600	13,000	
				10,000
7/2/15 19:10		3.306	13,000	
				11,000
7/7/15 6:09		5.279	14,000	
				11,000
7/7/15 6:39		4.396	14,000	
				12,000
7/7/15 7:09		4.276	14,000	
				12,000
7/7/15 7:39		3.723	14,000	
				12,300
				12,000
7/7/15 8:09		4.473	13,000	
				12,400
				13,000
7/7/15 8:39		NS	14,000	
				13,000
7/7/15 9:08		7.038	14,000	
				12,000
7/7/15 9:38		10.595	15,000	
				13,000
7/7/15 10:08		14.685	18,000	
				15,000
7/7/15 11:20		NS	13,000	
				12,000
7/7/15 23:00		1.751	13,000	
			14,000	
7/7/15 23:30		1.488	13,000	
			12,000	
7/8/15 0:00		1.378	12,000	
7/8/15 1:00		1.156	12,000	
7/8/15 1:59		1.113	7,000	
7/9/15 13:00		0.976	12,000	
7/20/15 21:18		1.102	13,000	
			13,000	
				12,000
		1.102		11,000
7/20/15 21:48		3.813	13,000	
				12,000
7/20/15 22:48		1.222	13,000	
				11,400
				12,000
7/20/15 23:18		0.656	12,000	
				11,900
				12,000
7/20/15 23:48		0.570	12,000	
				12,000
7/30/15 0:22		0.549	13,000	
7/30/15 0:52		0.603	13,000	
7/30/15 1:22		9.288	16,000	
7/30/15 1:52		9.250	17,000	
7/30/15 2:22		7.086	16,000	
				14,000
7/30/15 2:52		3.676	15,000	
7/30/15 3:22		4.586	15,000	
				13,000
7/30/15 3:52		2.088	14,000	
7/30/15 4:22		2.305	14,000	
7/31/15 17:23		12.419	18,000	
				14,000
7/31/15 17:53		8.384	16,000	
7/31/15 18:52		4.364	15,000	
				13,000
8/8/15 20:59		1.900	16,000	
				15,000
8/8/15 22:59		NS	18,000	
				15,000
8/9/15 0:59		NS	18,000	
				12,000
9/1/15 12:48		0.158	14,200	
			14,000	
9/23/15 13:34		0.082	17,000	
10/21/15 18:42		6.456	19,000	
				17,900
				18,000
10/21/15 20:12		31.483	25,000	
10/21/15 20:42		27.933	26,000	
				18,800
				19,000
10/21/15 21:12		24.134	25,000	
10/21/15 22:42		13.502	22,000	
10/24/15 0:11		1.086	20,000	
				20,000
10/24/15 0:41		0.852	22,000	
10/24/15 1:11		0.735	21,000	
				19,000
10/24/15 1:41		2.066	12,600	
			12,000	
10/24/15 3:11		0.730	22,000	
			21,000	
10/24/15 4:11		NS	20,000	
				19,000

Figure 71. Na storm water concentrations vs. SSC.

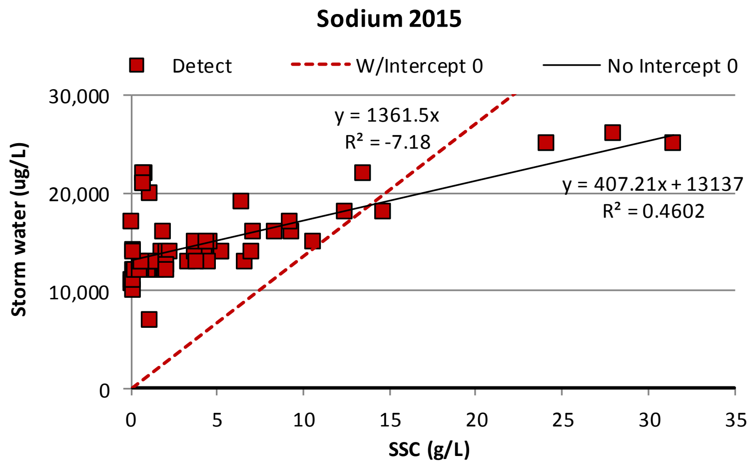
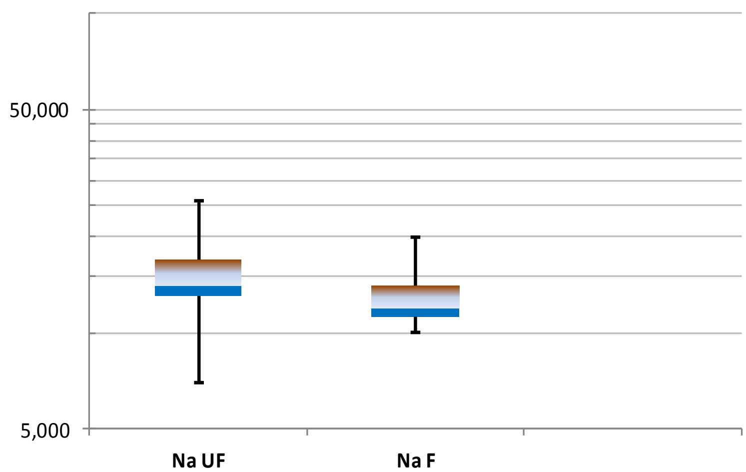


Figure 72. Unfiltered and filtered results for Na.



	Na UF		Na F	
Max	26,000		20,000	
75th	17,000		14,000	
Median	14,000		12,000	
25th	13,000		11,225	
Min	7,000		10,000	

The concentrations of unfiltered and filtered samples were within the same range suggestive of very high water solubility for Na. That explains the low coefficient of determination on the storm water concentrations vs SSC plot.

VI.3.v. Thallium (Tl)

Table 43. Chronological results for Tl.

Date&Time	Flag	SSC, g/L	Tl, ug/L Unfiltered	Ti, ug/L Filtered	Date&Time	Flag	SSC, g/L	Tl, ug/L Unfiltered	Ti, ug/L Filtered
6/19/15 9:20	U	0.169	ND			J			0.05
	U			ND	7/20/15 22:48		1.222	0.35	
	U			ND		U			ND
7/2/15 15:41	J	0.089	0.08			U			ND
	U		ND		7/20/15 23:18		0.656	0.24	
	U			ND		U			ND
	J			0.08		U			ND
7/2/15 16:11	J	0.100	0.12		7/20/15 23:48	J	0.570	0.16	
	U			ND		U			ND
7/2/15 16:41	U	0.097	ND		7/30/15 0:22	J	0.549	0.1	
	U			ND	7/30/15 0:52	J	0.603	0.17	
7/2/15 17:41	J	0.225	0.06		7/30/15 1:22		9.288	1.2	
	U			ND	7/30/15 1:52		9.250	1.7	
7/2/15 18:11		5.309	1.2		7/30/15 2:22		7.086	1.4	
	U			ND		J			0.05
7/2/15 18:41		6.600	1.2		7/30/15 2:52		3.676	1.1	
	J			0.05	7/30/15 3:22		4.586	0.81	
7/2/15 19:10		3.306	0.66			J			0.05
	U			ND	7/30/15 3:52		2.088	0.54	
7/7/15 6:09		5.279	0.99		7/30/15 4:22		2.305	0.47	
	J			0.06	7/31/15 17:23		12.419	2.4	
7/7/15 6:39		4.396	0.82			J			0.1
	U			ND	7/31/15 17:53		8.384	1.6	
7/7/15 7:09		4.276	0.6		7/31/15 18:52		4.364	1.1	
	U			ND		J			0.07
7/7/15 7:39		3.723	0.76		8/8/15 20:59	U	1.900	ND	
	U			ND		U			ND
	U			ND	8/8/15 22:59	U	NS	ND	
7/7/15 8:09		4.473	0.77			U			ND
	U			ND	8/9/15 0:59	U	NS	ND	
	U			ND		J			QA/QC
7/7/15 8:39		NS	1.1		9/1/15 12:48	J	0.158	0.05	
	U			ND		J		0.09	
7/7/15 9:08		7.038	1.2		9/23/15 13:34	J	0.082	0.06	
	J			0.06	10/21/15 18:42		6.456	1.4	
7/7/15 9:38		10.595	1.9			U			ND
	J			0.08		J			0.09
7/7/15 10:08		14.685	1.9		10/21/15 20:12		31.483	4.6	
	J			0.07	10/21/15 20:42		27.933	4.5	
7/7/15 11:20		NS	0.35			U			ND
	U			ND		U			ND
7/7/15 23:00		1.751	0.29		10/21/15 21:12		24.134	3.9	
			0.42		10/21/15 22:42		13.502	3.1	
7/7/15 23:30		1.488	0.24		10/24/15 0:11		1.086	0.35	
			0.35			U			ND
7/8/15 0:00		1.378	0.24		10/24/15 0:41		0.852	0.23	
7/8/15 1:00		1.156	0.22		10/24/15 1:11	J	0.735	0.14	
7/8/15 1:59	J	1.113	0.17			U			ND
7/9/15 13:00	J	0.976	0.19		10/24/15 1:41	J	2.066	0.16	
7/20/15 21:18		1.102	0.21			J		0.12	
			0.63		10/24/15 3:11		0.730	0.24	
	U			ND				0.22	
	U	1.102		ND	10/24/15 4:11		NS	0.21	
7/20/15 21:48		3.813	0.75			U			ND

Figure 73. Tl storm water concentrations vs. SSC.

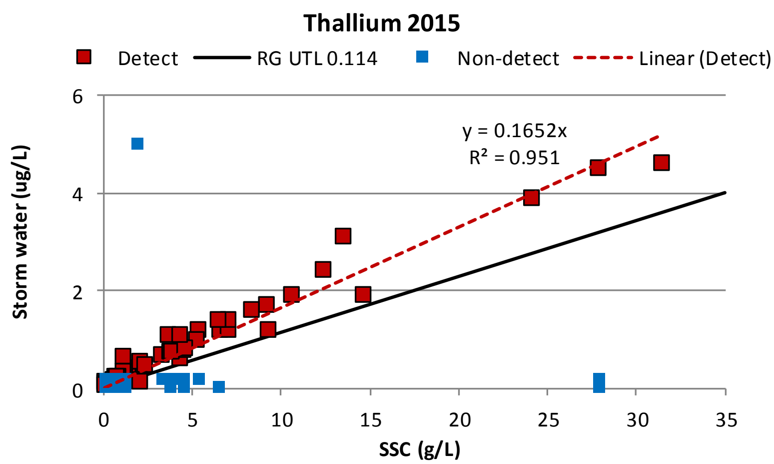
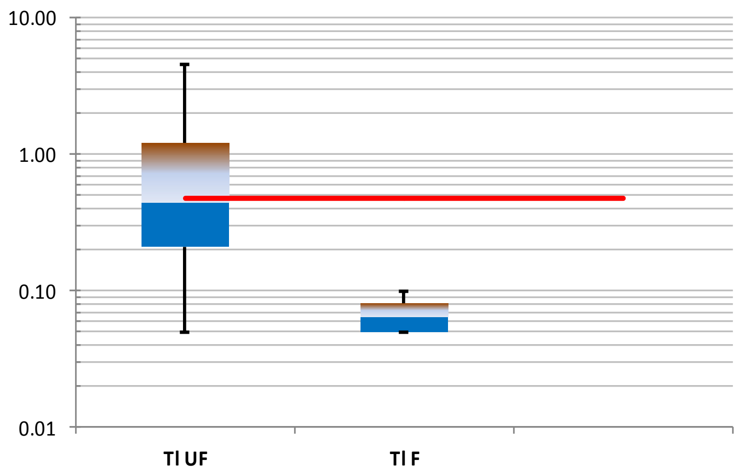


Figure 74. Unfiltered and filtered results for Tl.



	Tl UF		Tl F
Max	4.60		0.10
75th	1.20		0.08
Median	0.45		0.07
25th	0.21		0.05
Min	0.05		0.05
			max 5.1 was removed as QA/QC suspicious

Most concentrations of unfiltered samples exceeded the RG background, and no filtered samples exceeded the NM WQCC standards. The concentrations of filtered samples were less in magnitude than unfiltered samples implying some preferential sediment transport. The high coefficient of determination in the storm water concentration vs SSC results suggests naturally occurring source(s) of Tl along the RG.

VI.3.w. Uranium (U)

Table 44. Chronological results for U.

Date&Time	Flag	SSC, g/L	U, ug/L Unfiltered	U, ug/L Filtered
6/19/15 9:20		0.169	1.2	
				1.13
				1.1
7/2/15 15:41		0.089	1.2	
			1.2	
				1.11
				1.1
7/2/15 16:11		0.100	1.1	
				1.2
7/2/15 16:41		0.097	1.3	
				1.1
7/2/15 17:41		0.225	1.4	
				0.99
7/2/15 18:11		5.309	7.9	
				1.2
7/2/15 18:41		6.600	7.4	
				1
7/2/15 19:10		3.306	4.6	
				1.2
7/7/15 6:09		5.279	21	
				2.7
7/7/15 6:39		4.396	14	
				2.2
7/7/15 7:09		4.276	9.6	
				1.9
7/7/15 7:39		3.723	8.2	
				1.58
				1.6
7/7/15 8:09		4.473	9.2	
				1.8
				1.7
7/7/15 8:39		NS	15	
				2.2
7/7/15 9:08		7.038	21	
				2.8
7/7/15 9:38		10.595	46	
				5.3
7/7/15 10:08		14.685	60	
				7.2
7/7/15 11:20		NS	3.9	
				1.5
7/7/15 23:00		1.751	3.8	
			5.4	
7/7/15 23:30		1.488	3.4	
			4.6	
7/8/15 0:00		1.378	3.3	
7/8/15 1:00		1.156	2.8	
7/8/15 1:59		1.113	1.9	
7/9/15 13:00			2.4	
7/20/15 21:18		1.102	3	
			4.4	
				1.2
				1.3
7/20/15 21:48		3.813	5.6	
				1.3
7/20/15 22:48		1.222	2.7	
				1.29
				1.3
7/20/15 23:18		0.656	2.1	
				1.35
				1.3
7/20/15 23:48		0.570	2	
				1.4
7/30/15 0:22		0.549	2	
7/30/15 0:52		0.603	3.2	
7/30/15 1:22		9.288	32	
7/30/15 1:52		9.250	34	
7/30/15 2:22		7.086	27	
				3.6
7/30/15 2:52		3.676	19	
7/30/15 3:22		4.586	13	
				2.7
7/30/15 3:52		2.088	10	
7/30/15 4:22		2.305	10	
7/31/15 17:23		12.419	52	
				7
7/31/15 17:53		8.384	37	
7/31/15 18:52		4.364	23	
				4.3
9/1/15 12:48		0.158	1.6	
			1.8	
9/23/15 13:34		0.082	2.2	
10/21/15 18:42		6.456	25	
				8.55
				8.9
10/21/15 20:12		31.483	100	
10/21/15 20:42		27.933	99	
				10.5
				10
10/21/15 21:12		24.134	89	
10/21/15 22:42		13.502	70	
10/24/15 0:11		1.086	5.4	
				3.1
10/24/15 0:41		0.852	6	
10/24/15 1:11		0.735	4.1	
				3
10/24/15 1:41		2.066	3.7	
			3.2	
10/24/15 3:11		0.730	7.5	
			6.6	
10/24/15 4:11		NS	6	
				3.5

Figure 75. U storm water concentrations vs. SSC.

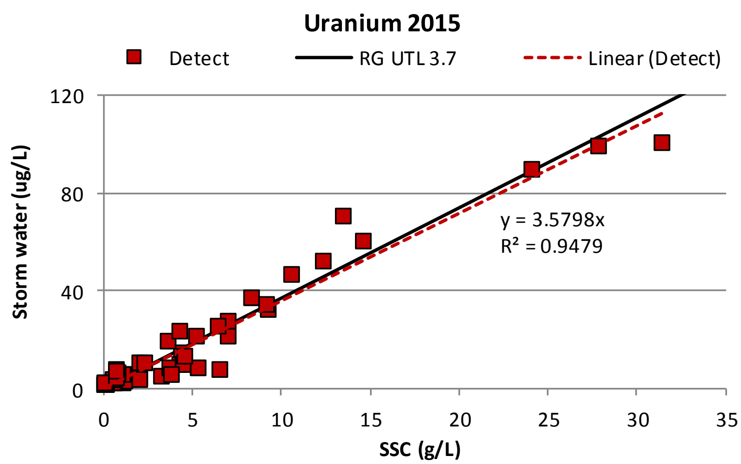
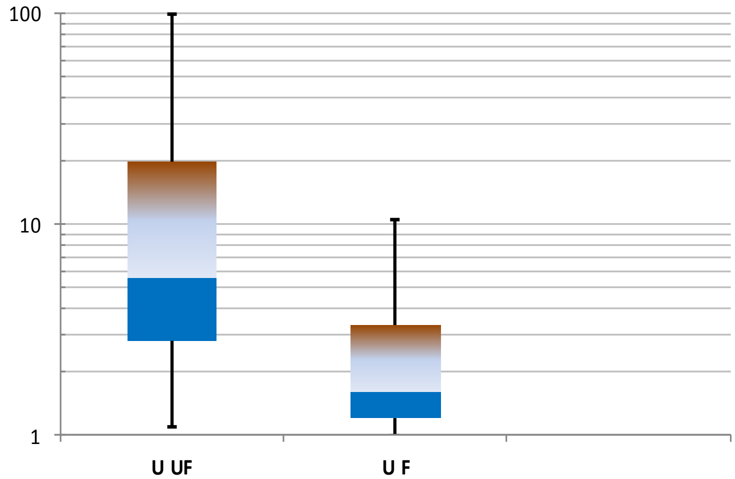


Figure 76. Unfiltered and filtered results for U.



Max	100.0		10.5	
75th	20.0		3.3	
Median	5.6		1.6	
25th	2.8		1.2	
Min	1.1		1.0	

Some concentrations of unfiltered samples exceeded the RG background. The concentrations of filtered samples were less in magnitude than unfiltered samples implying some affinity to solid particles and preferential sediment transport. The high coefficient of determination in the storm water concentration vs SSC results suggests naturally occurring source(s) of U along the RG.

VI.3.x. Vanadium (V)

Table 45. Chronological results for V.

Date&Time	Flag	SSC, g/L	V, ug/L Unfiltered	V, ug/L Filtered
6/19/15 9:20		0.169	5.7	
				2.39
				2.7
7/2/15 15:41		0.089	4.8	
			5.07	
				2.61
				2.5
7/2/15 16:11		0.100	5	
				2.8
7/2/15 16:41		0.097	5.4	
				3.1
7/2/15 17:41		0.225	7.7	
				2.8
7/2/15 18:11		5.309	86	
				3.9
7/2/15 18:41		6.600	71	
				3.4
7/2/15 19:10		3.306	42	
				4.2
7/7/15 6:09		5.279	97	
				7.2
7/7/15 6:39		4.396	90	
				7.7
7/7/15 7:09		4.276	71	
				6.5
7/7/15 7:39		3.723	78	
				5.13
				6.1
7/7/15 8:09		4.473	82	
				4.94
				5.9
7/7/15 8:39		NS	110	
				6.6
7/7/15 9:08		7.038	120	
				7.1
7/7/15 9:38		10.595	170	
				9.7
7/7/15 10:08		14.685	180	
				9.5
7/7/15 11:20		NS	43	
				5
7/7/15 23:00		1.751	41	
			41	
7/7/15 23:30		1.488	33	
			39	
7/8/15 0:00		1.378	34	
7/8/15 1:00		1.156	26	
7/8/15 1:59		1.113	18	
7/9/15 13:00			20	
7/20/15 21:18		1.102	37	
			52	
				5.4
				5.2
7/20/15 21:48		3.813	60	

Date&Time	Flag	SSC, g/L	V, ug/L Unfiltered	V, ug/L Filtered
				6.5
7/20/15 22:48		1.222	27	
				4.83
				4.4
7/20/15 23:18		0.656	17	
				4.38
				5.1
7/20/15 23:48		0.570	14	
				4.7
7/30/15 0:22		0.549	14	
7/30/15 0:52		0.603	19	
7/30/15 1:22		9.288	130	
7/30/15 1:52		9.250	170	
7/30/15 2:22		7.086	150	
				7.2
7/30/15 2:52		3.676	110	
7/30/15 3:22		4.586	91	
				6.5
7/30/15 3:52		2.088	67	
7/30/15 4:22		2.305	55	
7/31/15 17:23		12.419	190	
				9
7/31/15 17:53		8.384	130	
7/31/15 18:52		4.364	94	
				6.6
8/8/15 20:59		1.900	32	
	J			3
8/8/15 22:59		NS	150	
	J			4.8
8/9/15 0:59		NS	280	
	J			3.1
9/1/15 12:48		0.158	7.5	
			7.6	
9/23/15 13:34		0.082	7.5	
10/21/15 18:42		6.456	130	
				19
				19
10/21/15 20:12		31.483	330	
10/21/15 20:42		27.933	340	
				6.81
				7.7
10/21/15 21:12		24.134	290	
10/21/15 22:42		13.502	240	
10/24/15 0:11		1.086	29	
				3.6
10/24/15 0:41		0.852	23	
10/24/15 1:11		0.735	21	
				3.4
10/24/15 1:41		2.066	16.5	
			16	
10/24/15 3:11		0.730	25	
			24.6	
10/24/15 4:11		NS	27	
				3.7

Figure 77. V storm water concentrations vs. SSC.

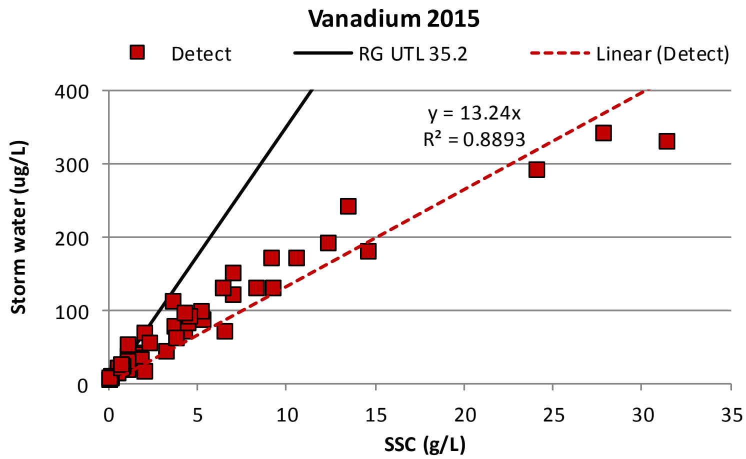
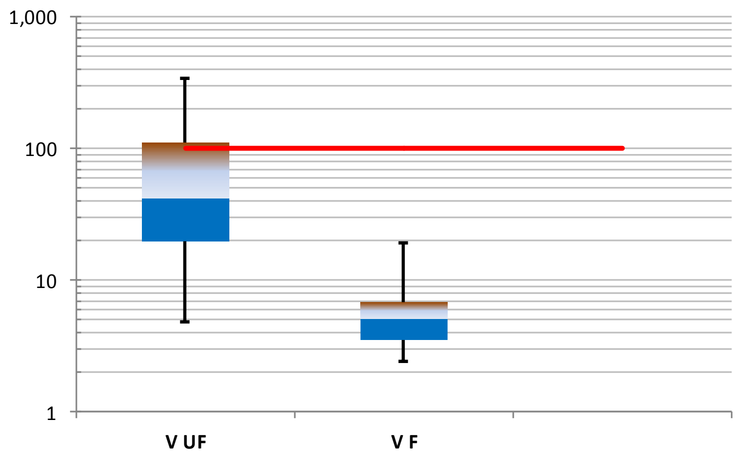


Figure 78. Unfiltered and filtered results for V.



Max	340.0		19.0	
75th	110.0		6.8	
Median	41.5		5.1	
25th	19.8		3.6	
Min	4.8		2.4	

Most concentrations of unfiltered samples did not exceed the RG background, and no filtered samples exceeded the NM WQCC standards. The concentrations of filtered samples were approximately one order of magnitude less than unfiltered samples implying affinity to solid particles and preferential sediment transport. The high coefficient of determination in the storm water concentration vs SSC results suggests naturally occurring source(s) of V along the RG.

VI.3.y. Zinc (Zn)

Table 46. Chronological results for Zn.

Date&Time	Flag	SSC, g/L	Zn, ug/L Unfiltered	Zn, ug/L Filtered
6/19/15 9:20		0.169	22	
	U			ND
	J			11
7/2/15 15:41	U	0.089	ND	
	U		ND	
	U			ND
	U			ND
7/2/15 16:11	U	0.100	ND	
	U			ND
7/2/15 16:41	U	0.097	ND	
	U			ND
7/2/15 17:41		0.225	43	
	U			ND
7/2/15 18:11		5.309	250	
	U			ND
7/2/15 18:41		6.600	210	
	U			ND
7/2/15 19:10		3.306	140	
	U			ND
7/7/15 6:09		5.279	250	
	U			ND
7/7/15 6:39		4.396	190	
	U			ND
7/7/15 7:09		4.276	160	
	U			ND
7/7/15 7:39		3.723	170	
	U			ND
	U	3.723		ND
7/7/15 8:09		4.473	190	
	U			ND
	U			ND
7/7/15 8:39		NS	210	
	U			ND
7/7/15 9:08		7.038	260	
	U			ND
7/7/15 9:38		10.595	430	
	U			ND
7/7/15 10:08		14.685	480	
	U			ND
7/7/15 11:20		NS	67	
	U			ND
7/7/15 23:00		1.751	60	
			88	
7/7/15 23:30		1.488	170	
			70	
7/8/15 0:00		1.378	53	
7/8/15 1:00		1.156	39	
7/8/15 1:59		1.113	24	
7/9/15 13:00		0.976	38	
7/20/15 21:18		1.102	35	
			96	
	U			ND
	U			ND
7/20/15 21:48		3.813	140	
	U			ND
7/20/15 22:48		1.222	48	
	U			ND
	U			ND
7/20/15 23:18	J	0.656	17	
	U			ND
	U			ND
7/20/15 23:48	J		15	
	U	0.570		ND
7/30/15 0:22	J	0.549	11	
7/30/15 0:52		0.603	24	
7/30/15 1:22		9.288	300	
7/30/15 1:52		9.250	410	
7/30/15 2:22		7.086	370	
				160
7/30/15 2:52		3.676	270	
7/30/15 3:22		4.586	190	
	U			ND
7/30/15 3:52		2.088	130	
7/30/15 4:22		2.305	120	
7/31/15 17:23		12.419	510	
	U			ND
7/31/15 17:53		8.384	350	
7/31/15 18:52		4.364	510	
	U			ND
8/8/15 20:59		1.900	58	
	J			8.6
8/8/15 22:59		NS	230	
	U			ND
8/9/15 0:59		NS	400	
	U			ND
9/1/15 12:48	J	0.158	9.72	
	J		15	
9/23/15 13:34	U	0.082	ND	
10/21/15 18:42		6.456	310	
	J			10.1
	J			19
10/21/15 20:12		31.483	1,100	
10/21/15 20:42		27.933	1,100	
	U			ND
	U			ND
10/21/15 21:12		24.134	860	
10/21/15 22:42		13.502	670	
10/24/15 0:11		1.086	60	
	U			ND
10/24/15 0:41		0.852	41	
10/24/15 1:11	J	0.735	19	
	U			ND
10/24/15 1:41		2.066	23.9	
			26	
10/24/15 3:11		0.730	41.4	
			40	
10/24/15 4:11		NS	32	
	U			ND

Figure 79. Zn storm water concentrations vs. SSC.

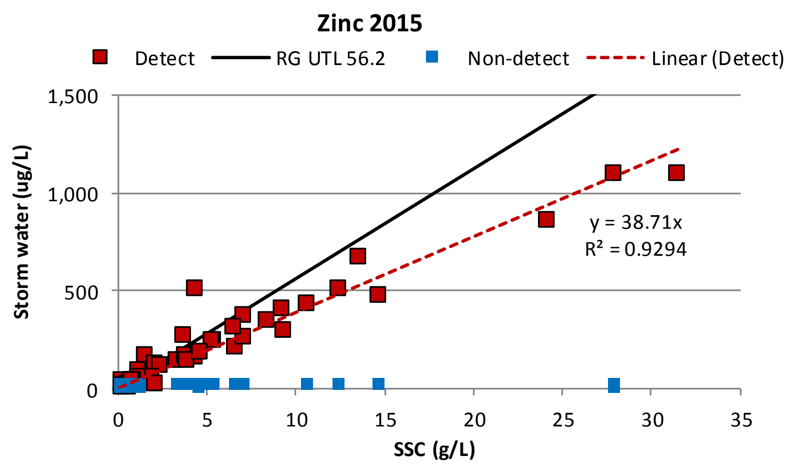
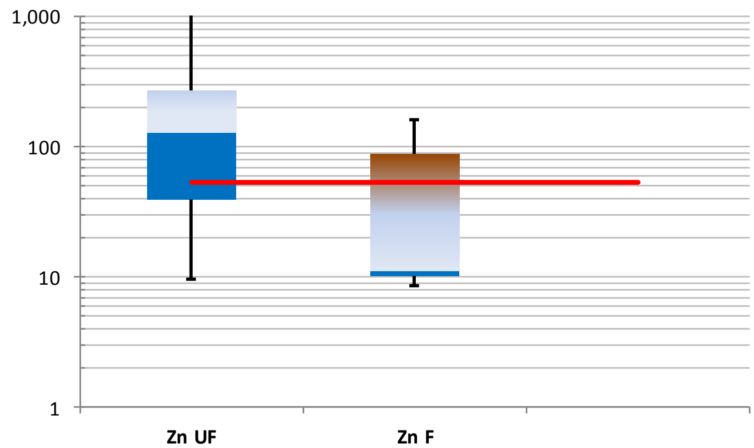


Figure 80. Unfiltered and filtered results for Zn.



Max	1,100.0		160.0	
75th	270.0		89.5	
Median	130.0		11.0	
25th	39.5		10.1	
Min	9.7		8.6	

A few concentrations of unfiltered samples exceeded the RG background, and a few filtered samples exceeded the NM WQCC standards. The concentrations of filtered samples were one order of magnitude less than unfiltered samples implying affinity to solid particles and preferential sediment transport. The high coefficient of determination in the storm water concentration vs SSC results suggests naturally occurring source(s) of Zn along the RG.

VI.4 Results for PCBs, Dioxins and Furans, and Perchlorate

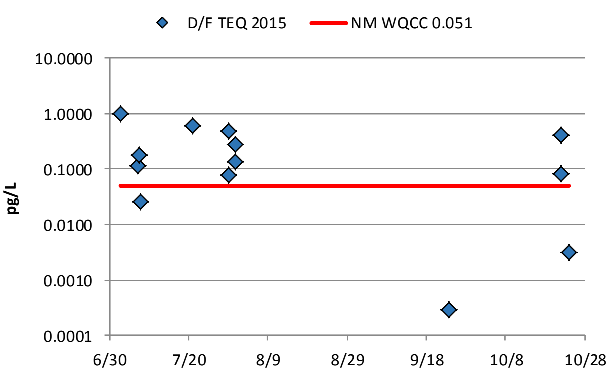
The table below summarizes the results for Total PCBs, Dioxins/Furans (D/F), and Perchlorate.

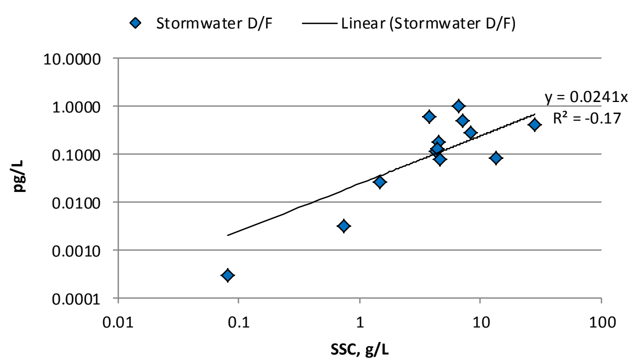
Table 47. 2015 total PCBs, D/F TEQ, and Perchlorate sampling and results.

Date&Time	Total PCBs ng/L	D/F TEQ pg/L	ClO^{4-} ug/L
7/2/15 17:41	0.009	ND	NS
7/2/15 18:41	27.100	1.0084	NS
7/7/15 7:09	0.150	0.1173	NS
7/7/15 8:09	0.730	0.1773	NS
7/7/15 22:29	0.160	0.0255	NS
7/20/15 21:48	5.500	0.5995	NS
7/20/15 22:48	0.950	NS	NS
7/30/15 2:22	1.100	0.4882	NS
7/30/15 3:22	0.700	0.0779	NS
7/31/15 17:53	2.630	0.2753	NS
7/31/15 18:52	0.400	0.1334	NS
9/23/15 13:34	0.007	0.0003	NS
10/21/15 18:42	16.000	NS	0.310
10/21/15 20:12	NS	NS	0.340
10/21/15 20:42	NS	0.4057	NS
10/21/15 22:42	0.970	0.0833	NS
10/24/15 0:11	0.220	NS	0.061 J
10/24/15 1:11	NS	0.0032	ND
10/24/15 4:11	0.110	NS	ND
	NM WQCC 0.64 ng/L	NM WQCC 0.051 pg/L	NMED UTL 0.4 ug/L

Most concentrations of D/F exceeded the NM WQCC standard throughout the season as shown below, and these constituents did not have any suspended sediment transport properties.

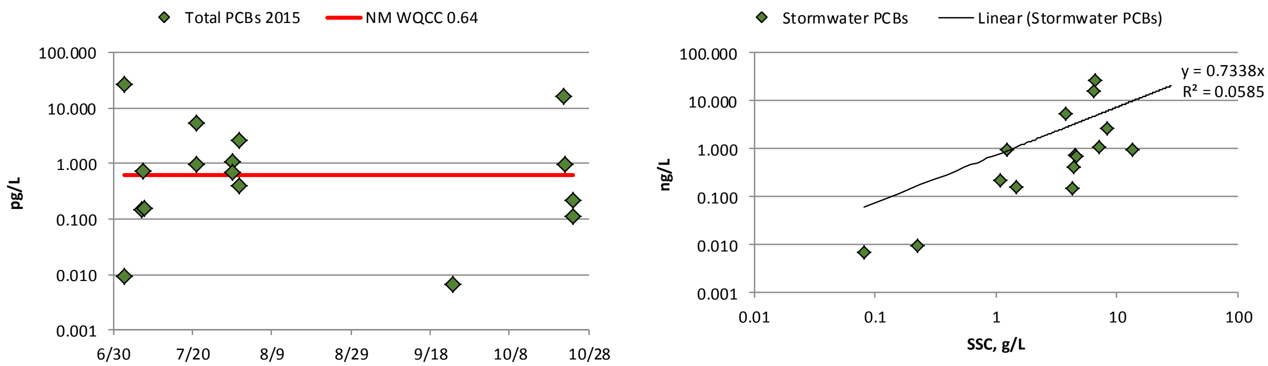
Figure 81. Storm water concentration plots for Dioxins/Furans.





Similarly, to D/F, concentrations of total PCBs exceeded the NM WQCC standard on a regular basis and their transport was not influenced by the suspended sediment flow.

Figure 82. Storm water concentration plots for total PCBs.



VII. TREAT STUDY

VII.1 Objective

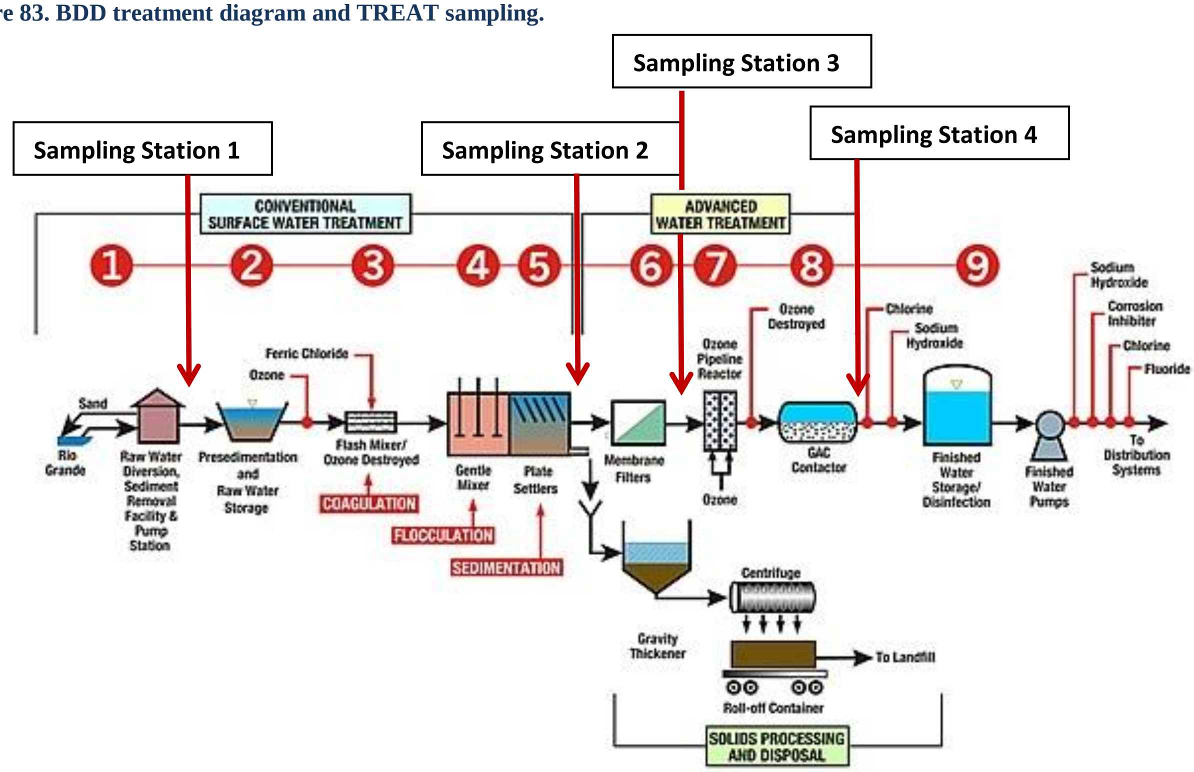
The purpose of the proposed study is to investigate the efficiency of the treatments at the BRWTP with respect to contaminants that may occur in the Rio Grande upgradient from the Buckman Direct Diversion (BDD). There have been many theoretical evaluations of the separate treatment technologies applied at BRWTP. Most of these technologies have been applied throughout the US successfully to treat drinking water. BRWTP is of no exception to this practice. Surface water diverted from the Rio Grande has been treated successfully at the plant for 4 years, and the produced drinking water has met all EPA standards.

The purpose, as described, would practically confirm all theoretical evaluations of the efficiency of plant. The intended duration of the study is three years, and BDD would run the study at different seasons and under different source conditions (high turbidity vs low turbidity), in an attempt to explore the limits of its treatments.

VII.2 Design of TREAT

A treatment diagram of the BRWTP is provided in Figure 83. At BRWTP, conventional and advanced treatment technologies are applied. The design of TREAT consists of investigating the concentrations of certain contaminants before any treatment (Sampling Station 1), after conventional treatment (Sampling Station 2), after membranes (Sampling Station 3), and after Ozone/BAC treatment (Sampling Station 4). At the time of each run, samples from the Rio Grande (pumping cell 5 of Diversion) would be collected as well.

Figure 83. BDD treatment diagram and TREAT sampling.



Each run of TREAT study would be for the duration of 4 hours, during normal shift and during continuous treatment of the plant. Before, during, and after each TREAT run, operational parameters demonstrating the treatment is conducted at normal conditions would be monitored. Grab samples will be collected throughout the duration at specified times (every 30 min). Those grab samples would be composited into one volume to simulate mixing of treated water throughout the treatment processes. To account for the seasonal variability of the source, runs at different times of the year would be conducted as well.

VII.3 Analytes

Each sampling station and the Rio Grande would be sampled and analyzed for the following constituents. A certified laboratory except for SSC would perform the analyses, and submit the results to BDD.

Table 48. Analytes for TREAT study.

Constituent	Analysis	Basis
Gross alpha/beta	EPA 900.0	SWDA, LACW
Sr-90 – low RL	ASTM 5811	SWDA, LACW
Iso U – low RL	HASL-300	LACW
Iso Pu – low RL	HASL-300	LACW
Am-241 – low RL	HASL-300	LACW
Gamma Spec	EPA 901.1	SWDA, LACW
Tritium	EPA 906.0	LACW
Radium 226/228	EPA 903.1/904	LACW
Metals Primary	EPA 200.7	SWDA, LACW
Metals Secondary	EPA 200.8	SWDA
Mercury	EPA 245.1	SWDA
SSC in house	ASTM 3977-97	RG occurrence
PCB	EPA 1668A	LACW, RG occurrence
Nitrate/Nitrite	EPA 353.	RG occurrence
Sulfate	EPA 375.	RG occurrence
Chloride	EPA 375.	RG occurrence
Fluoride	EPA 375.	RG occurrence
TOC	SW-846 9060	Operational Parameter
Turbidity		Operational Parameter
TDS	EPA 160.1	Operational Parameter
Conductivity		RG occurrence

VII.4 Results of March 22, 2016 Sampling

Table 49. Analytical results for all sampling stations 3/22-23/2016.

Analyte Group	Analyte	units	Rio Grande RG 3/22/16 0800		Raw Water 2A SS1 3/22/16 1400		Before Filters SS2 3/23/16 2200		Before GAC SS3 3/23/16 2222		After GAC SS4 3/23/16 2226	
Miscellaneous	TOC	mg/L		2.5		2.5		1.9		1.8		1.6
	Conductivity	µmhos/cm		230		220		240		240		240
	TDS	mg/L		162		164		160		154		153
	Chloride	mg/L		4.5		4.5		19		19		19
	Fluoride	mg/L		0.26		0.25		0.25		0.27		0.26
	Sulfate	mg/L		22		22		23		23		23
	Nitrate/Nitrite	mg/L	<	1.0	<	1.0	<	1.0	<	1.0	<	1.0
Metals	Antimony	mg/L	<	0.0010	<	0.0010	<	0.0010	<	0.0010	<	0.0010
	Arsenic	mg/L		0.0016		0.0016	<	0.0010	<	0.0010	<	0.0010
	Copper	mg/L		0.0029		0.0029		0.0012		0.0014	<	0.0010
	Lead	mg/L		0.0026		0.0024	<	0.00050	<	0.00050	<	0.00050
	Selenium	mg/L	<	0.0010	<	0.0010	<	0.0010	<	0.0010	<	0.0010
	Thallium	mg/L	<	0.00050	<	0.00050	<	0.00050	<	0.00050	<	0.00050
	Uranium	mg/L		0.0019		0.0018		0.0012		0.0011	<	0.00050
	Aluminum	mg/L		0.56		0.50		0.040	<	0.020	<	0.020
	Barium	mg/L		0.049		0.046		0.031		0.030		0.033
	Beryllium	mg/L	<	0.0020	<	0.0020	<	0.0020	<	0.0020	<	0.0020
	Boron	mg/L	<	0.040	<	0.040	<	0.040	<	0.040		0.040
	Cadmium	mg/L	<	0.0020	<	0.0020	<	0.0020	<	0.0020	<	0.0020
	Calcium	mg/L		25		25		27		27		26
	Chromium	mg/L	<	0.0060	<	0.0060	<	0.0060	<	0.0060	<	0.0060
	Cobalt	mg/L	<	0.0060	<	0.0060	<	0.0060	<	0.0060	<	0.0060
	Iron	mg/L		0.77		0.73		0.88	<	0.020	<	0.020
	Magnesium	mg/L		5.0		5.0		5.1		5.0		5.0
	Manganese	mg/L		0.11		0.093		0.039		0.035	<	0.0020
	Nickel	mg/L	<	0.010	<	0.010	<	0.010	<	0.010	<	0.010
	Potassium	mg/L		2.4		2.3		2.5		2.5		2.5
	Silver	mg/L	<	0.0050	<	0.0050	<	0.0050	<	0.0050	<	0.0050
	Sodium	mg/L		12		12		13		13		13
	Vanadium	mg/L	<	0.050	<	0.050	<	0.050	<	0.050	<	0.050
	Zinc	mg/L		0.012		0.023	<	0.010	<	0.010	<	0.010
	Mercury	mg/L	<	0.00020	<	0.00020	<	0.00020	<	0.00020	<	0.00020
SSC	SSC Coarse	mg/L	<	1.00		1.45	<	1.00	<	1.00	<	1.00
	SSC Fine	mg/L		28.3		45.8		2.68	<	1.00	<	1.00
	SSC Total	mg/L		28.3		47.3		2.68	<	1.00	<	1.00
PCBs	PCBs (total congeners)	pg/L	<	20.1	<	20.4	<	20.2	<	20.1	<	20.2

Analyte Group	Analyte	units	Rio Grande RG 3/22/16 0800	Raw Water 2A SS1 3/22/16 1400	Before Filters SS2 3/23/16 2200	Before GAC SS3 3/23/16 2222	After GAC SS4 3/23/16 2226
Radiologicals	Gross alpha	pCi/L	< 2.80	3.99	< 2.86	< 2.17	< 2.60
	Gross beta	pCi/L	5.58	7.17	2.45	< 2.95	< 2.89
	Ra-226	pCi/L	0.265	0.490	0.216	0.296	0.285
	Ra-228	pCi/L	< 0.467	< 0.459	< 0.475	< 0.471	< 0.481
	Am-241 (alpha spec)	pCi/L	< 0.040	< 0.0679	< 0.0722	< 0.0401	< 0.0376
	Pu-238	pCi/L	< 0.0797	< 0.0542	< 0.0179	< 0.0582	< 0.0162
	Pu-239/240	pCi/L	< 0.086	< 0.0723	< 0.0521	< 0.0456	< 0.0472
	Pu-244	pCi/L	< 0.0625	< 0.0723	< 0.0521	< 0.0286	< 0.0162
	U-233/234	pCi/L	1.06	0.967	0.620	0.617	0.331
	U-235/236 (alpha spec	pCi/L	0.120	0.0405	0.0529	< 0.0601	0.0585
	U-238 (alpha spec)	pCi/L	0.702	0.629	0.326	0.373	0.215
	Ac-228	pCi/L	< 11.3	< 13.0	< 16.5	< 12.0	< 12.9
	Am-241 (gamma spec)	pCi/L	< 18.8	< 20.8	< 6.09	< 10.5	< 34.1
	Sb-124	pCi/L	< 9.35	< 7.89	< 9.56	< 8.46	< 8.11
	Sb-125	pCi/L	< 9.11	< 8.18	< 10.5	< 8.43	< 9.70
	Ba-133	pCi/L	< 4.23	< 4.01	< 4.19	< 4.46	< 4.16
	Ba-140	pCi/L	< 25.2	< 20.9	< 25.7	< 22.7	< 21.4
	Be-7	pCi/L	< 27.8	< 31.8	< 33.5	< 27.4	< 32.6
	Bi-212	pCi/L	< 43.5	< 44.1	< 48.1	< 42.6	< 50.4
	Bi-214	pCi/L	< 7.95	< 7.05	< 7.70	< 7.39	< 8.17
	Ce-139	pCi/L	< 3.06	< 3.30	< 3.36	< 2.95	< 3.35
	Ce-141	pCi/L	< 6.63	< 6.79	< 6.47	< 5.44	< 7.09
	Ce-144	pCi/L	< 21.6	< 21.6	< 20.7	< 18.3	< 23.4
	Cs-134	pCi/L	< 3.77	< 3.57	< 4.10	< 3.40	< 3.66
	Cs-136	pCi/L	< 8.37	< 9.47	< 8.34	< 7.50	< 8.90
	Cs-137	pCi/L	< 3.27	< 3.00	< 3.73	< 2.91	< 3.54
	Cr-51	pCi/L	< 40.9	< 37.6	< 37.6	< 31.6	< 39.3
	Co-56	pCi/L	< 3.13	< 3.70	< 4.42	< 3.42	< 3.27
	Co-57	pCi/L	< 2.86	< 3.07	< 2.63	< 2.58	< 3.26
	Co-58	pCi/L	< 3.34	< 3.34	< 3.78	< 2.91	< 3.46
	Co-60	pCi/L	< 4.16	< 3.59	< 4.45	< 3.29	< 3.00
	Eu-152	pCi/L	< 9.57	< 9.55	< 10.5	< 8.81	< 10.2
	Eu-154	pCi/L	< 9.49	< 8.72	< 11.4	< 9.12	< 9.87
	Eu-155	pCi/L	< 12.1	< 11.0	< 10.2	< 9.85	< 14.2
	Ir-192	pCi/L	< 4.00	< 3.51	< 3.63	< 3.19	< 3.59
	Fe-59	pCi/L	< 7.57	< 7.47	< 8.28	< 7.11	< 6.53
	Pb-210	pCi/L	< 467	< 572	< 51.9	< 208	< 1290
	Pb-212	pCi/L	< 7.27	< 7.03	< 6.88	< 6.07	< 7.22
	Pb-214	pCi/L	< 7.81	< 7.79	< 8.35	< 7.35	< 8.89
	Mn-54	pCi/L	< 3.09	< 2.94	< 3.53	< 2.80	< 3.04
	Hg-203	pCi/L	< 3.68	< 3.83	< 3.91	< 3.70	< 4.08
	Nd-147	pCi/L	< 47.7	< 51.9	< 50.1	< 46.6	< 45.8
	Np-239	pCi/L	< 29.2	< 29.9	< 28.6	< 26.1	< 33.7
	Nb-94	pCi/L	< 2.96	< 2.88	< 3.77	< 2.86	< 3.01
	Nb-95	pCi/L	< 3.85	< 3.71	< 4.06	< 3.56	< 3.66
	K-40	pCi/L	< 47.8	< 46.4	< 45.7	< 42.7	< 45.7
	Pm-144	pCi/L	< 3.25	< 3.20	< 3.88	< 3.12	< 3.38
	Pm-146	pCi/L	< 3.90	< 4.12	< 4.29	< 3.86	< 4.31
	Ra-228 (gamma spec)	pCi/L	< 11.3	< 13.0	< 16.5	< 12.0	< 12.9
	Ru-106	pCi/L	< 28.2	< 29.1	< 35.6	< 29.2	< 30.5
	Ag-110m	pCi/L	< 4.26	< 4.46	< 4.94	< 4.14	< 4.60
	Na-22	pCi/L	< 3.35	< 3.06	< 3.94	< 3.22	< 3.46
	Tl-208	pCi/L	< 3.30	< 3.55	< 4.05	< 3.06	< 4.11
	Th-234	pCi/L	< 178	< 193	< 85.3	< 94.6	< 295
	Sn-113	pCi/L	< 4.44	< 4.05	< 4.82	< 4.06	< 4.68
	U-235 (gamma spec)	pCi/L	< 21.8	< 22.1	< 21.5	< 18.0	< 24.5
	U-238 (gamma spec)	pCi/L	< 178	< 193	< 85.3	< 94.6	< 295
	Y-88	pCi/L	< 4.30	< 4.22	< 5.63	< 2.66	< 3.97
	Zn-65	pCi/L	< 7.78	< 6.73	< 7.87	< 6.3	< 8.62
	Zr-95	pCi/L	< 6.00	< 6.20	< 6.50	< 6.01	< 6.74
	Sr-90	pCi/L	< 0.483	< 0.672	< 0.310	< 0.471	< 0.477
	Tritium	pCi/L	12.5	10.2	9.40	14.8	12.8

VII.5 Results of May 9-10, 2016 Sampling

Table 50. Analytical results for all sampling stations 5/9-10/2016.

Analyte Group	Analyte	units	**Rio Grande** RG	**Raw Water 2A** SS1	**Before Filters** SS2	**Before GAC** SS3	**After GAC** SS4
			5/9/16 0800	5/9/16 1430	5/10/16 1430	5/10/16 1455	5/10/16 1500
Miscellaneous	TOC	mg/L	4.7	4.1	2.5	2.4	1.9
	Conductivity	µmhos/cm	260	260	280	290	280
	TDS	mg/L	206	196	194	194	192
	Chloride	mg/L	4.1	4.1	24	24	23
	Fluoride	mg/L	0.30	0.26	0.27	0.29	0.27
	Sulfate	mg/L	34	34	34	34	35
	Nitrate/Nitrite	mg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Metals	Antimony	mg/L	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
	Arsenic	mg/L	0.0019	0.0017	< 0.0010	< 0.0010	< 0.0010
	Copper	mg/L	0.0063	0.0049	0.0019	0.0031	0.0010
	Lead	mg/L	0.0036	0.0024	< 0.00050	< 0.00050	< 0.00050
	Selenium	mg/L	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
	Thallium	mg/L	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050
	Uranium	mg/L	0.0019	0.0018	0.00068	0.00052	< 0.00050
	Aluminum	mg/L	2.3	1.5	0.031	< 0.020	< 0.020
	Barium	mg/L	0.083	0.063	0.042	0.041	0.041
	Beryllium	mg/L	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020
	Boron	mg/L	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040
	Cadmium	mg/L	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020
	Calcium	mg/L	32	30	30	30	30
	Chromium	mg/L	< 0.0060	< 0.0060	< 0.0060	< 0.0060	< 0.0060
	Cobalt	mg/L	< 0.0060	< 0.0060	< 0.0060	< 0.0060	< 0.0060
	Iron	mg/L	2.3	1.5	0.92	< 0.020	< 0.020
	Magnesium	mg/L	6.0	5.6	5.5	5.4	5.6
	Manganese	mg/L	0.15	0.10	0.062	0.057	< 0.0020
	Nickel	mg/L	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
	Potassium	mg/L	2.8	2.8	2.4	2.3	2.4
	Silver	mg/L	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
	Sodium	mg/L	13	13	14	14	15
	Vanadium	mg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
	Zinc	mg/L	0.027	0.015	< 0.010	< 0.010	< 0.010
	Mercury	mg/L	< 0.00020	< 0.00020	< 0.00020	< 0.00020	< 0.00020
SSC	SSC Coarse	mg/L	< 1.00	3.33	< 1.00	< 1.00	< 1.00
	SSC Fine	mg/L	59.0	27.9	2.21	2.32	< 1.00
	SSC Total	mg/L	59.0	31.2	2.21	2.32	< 1.00
PCBs	PCBs (total congeners)	pg/L	< 20.4	< 20.2	< 20.9	< 20.7	< 21.0

Analyte Group	Analyte	units	Rio Grande RG 5/9/16 0800	Raw Water 2A SS1 5/9/16 1430	Before Filters SS2 5/10/16 1430	Before GAC SS3 5/10/16 1455	After GAC SS4 5/10/16 1500
Radiologicals	Gross alpha	pCi/L	5.86	3.23	< 2.79	< 2.80	< 1.91
	Gross beta	pCi/L	6.94	5.86	< 2.08	< 3.30	2.65
	Ra-226	pCi/L	0.274	0.401	0.427	< 0.249	< 0.234
	Ra-228	pCi/L	0.731	0.570	0.382	< 0.326	< 0.467
	Am-241 (alpha spec)	pCi/L	< 0.0816	< 0.0519	< 0.0675	< 0.0644	< 0.0847
	Pu-238	pCi/L	< 0.0843	< 0.127	< 0.0809	< 0.114	< 0.0578
	Pu-239/240	pCi/L	< 0.136	< 0.117	< 0.0721	< 0.125	< 0.107
	Pu-244	pCi/L	< 0.0973	< 0.0577	< 0.0524	< 0.114	< 0.0578
	U-233/234	pCi/L	1.120	0.564	0.435	0.439	0.157
	U-235/236 (alpha spec	pCi/L	< 0.111	0.0709	< 0.124	< 0.127	< 0.0581
	U-238 (alpha spec)	pCi/L	0.432	0.613	0.286	0.228	0.137
	Ac-228	pCi/L	< 14.8	< 14.2	< 17.1	< 13.9	< 13.9
	Am-241 (gamma spec)	pCi/L	< 15.0	< 10.9	< 6.53	< 11.3	< 33.9
	Sb-124	pCi/L	< 10.3	< 9.29	< 11.9	< 10.6	< 11.7
	Sb-125	pCi/L	< 8.44	< 8.73	< 10.1	< 8.26	< 8.71
	Ba-133	pCi/L	< 4.11	< 4.20	< 4.94	< 4.34	< 4.32
	Ba-140	pCi/L	< 40.9	< 31.0	< 42.1	< 32.7	< 34.6
	Be-7	pCi/L	< 33.2	< 32.4	< 36.9	< 33.9	< 36.1
	Bi-212	pCi/L	< 44.8	< 43.9	< 56.1	< 48.2	< 42.8
	Bi-214	pCi/L	< 8.23	< 6.00	< 9.06	< 5.91	< 8.31
	Ce-139	pCi/L	< 3.23	< 2.80	< 3.81	< 2.98	< 3.65
	Ce-141	pCi/L	< 7.41	< 7.23	< 8.22	< 7.85	< 8.81
	Ce-144	pCi/L	< 21.0	< 19.5	< 23.3	< 21.1	< 24.2
	Cs-134	pCi/L	< 3.58	< 3.37	< 4.84	< 3.50	< 3.54
	Cs-136	pCi/L	< 13.2	< 11.7	< 16.4	< 11.9	< 12.8
	Cs-137	pCi/L	< 3.47	< 3.16	< 4.44	< 3.21	< 3.56
	Cr-51	pCi/L	< 48.7	< 40.8	< 52.8	< 43.2	< 45.9
	Co-56	pCi/L	< 3.80	< 3.88	< 5.44	< 3.71	< 3.67
	Co-57	pCi/L	< 2.76	< 2.59	< 3.04	< 2.70	< 3.23
	Co-58	pCi/L	< 4.00	< 3.64	< 5.50	< 3.34	< 3.47
	Co-60	pCi/L	< 2.91	< 3.36	< 4.29	< 3.26	< 3.28
	Eu-152	pCi/L	< 9.19	< 8.84	< 11.3	< 9.73	< 10.4
	Eu-154	pCi/L	< 9.76	< 8.97	< 11.5	< 8.69	< 9.36
	Eu-155	pCi/L	< 11.4	< 10.6	< 10.9	< 11.3	< 13.9
	Ir-192	pCi/L	< 4.00	< 3.31	< 4.46	< 3.66	< 3.96
	Fe-59	pCi/L	< 7.85	< 8.02	< 9.85	< 8.82	< 8.70
	Pb-210	pCi/L	< 372	< 207	< 60.8	< 214	< 1350
	Pb-212	pCi/L	< 7.24	< 6.34	< 7.17	< 6.70	< 7.33
	Pb-214	pCi/L	< 8.48	< 7.49	< 9.14	< 7.87	< 8.20
	Mn-54	pCi/L	< 3.15	< 2.98	< 4.02	< 3.11	< 3.34
	Hg-203	pCi/L	< 4.21	< 4.38	< 4.95	< 3.96	< 4.59
	Nd-147	pCi/L	< 77.2	< 71.2	< 101.0	< 75.1	< 82.1
	Np-239	pCi/L	< 27.1	< 27.3	< 28.3	< 28.2	< 36.1
	Nb-94	pCi/L	< 3.03	< 2.84	< 3.91	< 3.22	< 3.23
	Nb-95	pCi/L	< 4.04	< 3.56	< 4.80	< 3.90	< 3.77
	K-40	pCi/L	41.3	< 29.6	< 57	< 25.6	< 42.6
	Pm-144	pCi/L	< 2.75	< 3.27	< 4.09	< 3.18	< 3.39
	Pm-146	pCi/L	< 4.18	< 3.75	< 4.70	< 4.00	< 3.98
	Ra-228 (gamma spec)	pCi/L	< 14.8	< 14.2	< 17.1	< 13.9	< 13.9
	Ru-106	pCi/L	< 29.6	< 30.7	< 41.4	< 30.2	< 31.6
	Ag-110m	pCi/L	< 3.95	< 4.77	< 5.91	< 4.27	< 5.29
	Na-22	pCi/L	< 3.47	< 3.21	< 4.06	< 3.07	< 3.33
	Tl-208	pCi/L	< 4.22	< 3.34	< 4.52	< 3.96	< 3.71
	Th-234	pCi/L	< 128	< 100	< 86.8	< 126	< 254
	Sn-113	pCi/L	< 4.78	< 4.31	< 5.28	< 4.60	< 4.94
	U-235 (gamma spec)	pCi/L	< 21.1	< 20.1	< 23.3	< 21.8	< 25.2
	U-238 (gamma spec)	pCi/L	< 128	< 100	< 89.8	< 126	< 254
	Y-88	pCi/L	< 5.33	< 3.76	< 6.85	< 4.69	< 4.64
	Zn-65	pCi/L	< 6.61	< 6.67	< 9.12	< 7.13	< 6.55
	Zr-95	pCi/L	< 6.53	< 6.57	< 8.43	< 7.03	< 7.04
	Sr-90	pCi/L	< 0.484	< 0.474	< 0.490	< 0.488	< 0.475
	Tritium	pCi/L	13.1	17.3	16.6	15.7	16.6

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