

Rocky Flats, Colorado, Site

**Surface Water Configuration
Adaptive Management Plan
Annual Report**

Calendar Year 2011

February 2012



U.S. DEPARTMENT OF
ENERGY

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Management

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**U.S. Department of Energy
Office of Legacy Management**

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Abbreviations

AMP	Adaptive Management Plan
AOC	area-of-concern
COU	Central Operable Unit
CY	calendar year
DOE	U.S. Department of Energy
EA	<i>Rocky Flats Surface Water Configuration Environmental Assessment</i>
POC	point of compliance
RFLMA	<i>Rocky Flats Legacy Management Agreement</i>
RFSOG	<i>Rocky Flats Site Operations Guide</i>
Site	Rocky Flats Site
SPPTS	Solar Ponds Plume Treatment System

1.0 Introduction

The Proposed Action assessed in the *Rocky Flats Site, Colorado, Surface Water Configuration Environmental Assessment* (EA) (DOE 2011a) is to breach the remaining retention pond dams at the Rocky Flats, Colorado, Site (Site) to allow surface water flow to return to the approximate conditions before the retention ponds were constructed. As stated in the EA, based on extensive water quality monitoring data and thorough environmental review, the U.S. Department of Energy (DOE) Office of Legacy Management has determined that the Proposed Action does not present a significant impact on the environment under the National Environmental Policy Act evaluation criteria.

Some members of the public have commented that additional information must be collected prior to implementing the final steps of the Proposed Action to help reduce uncertainty as to whether completion of the Proposed Action will adversely impact the quality of water flowing from the Site and into downstream communities. In response to the requests, DOE initiated a cooperative effort with neighboring community representatives and other interested stakeholders to develop and implement an Adaptive Management Plan (AMP) (DOE 2011b) to provide additional information. The AMP group is composed of these representatives and stakeholders. The resulting AMP reflects DOE's long-term commitment to implementing the activities this plan describes.

The AMP provides for a monitoring and data evaluation program to assist in deciding whether to implement the final steps of the Proposed Action by breaching the terminal dams during the planned timeframe of 2018–2020, or to delay the completion of the Proposed Action to gather additional information for evaluation. The terminal dams will be operated in a flow-through condition during the period leading up to the completion of the Proposed Action, which will provide data similar to what can be expected post-breach. In addition to the AMP monitoring program, the AMP identifies certain performance indicators that DOE will consider in deciding whether to adjust the timeframe for completing the Proposed Action.

This AMP Annual Report for calendar year (CY) 2011 is provided according to AMP Section 5.0., The data table in Appendix A includes all validated analytical data available as of December 31, 2011, that have not been tabulated in previous AMP reports.

However, to make data exchange as timely as possible, the monitoring summary sections below include all data available as of February 14, 2012, which includes unvalidated data (preliminary and subject to revision); evaluation is not limited to the validated data tabulated in Appendix A. The following monitoring objectives are included in this report:

- Pre-Discharge
- Targeted Groundwater Monitoring
- Monitoring to Evaluate Flow-Through Operations at Terminal Ponds A-4, B-5, and C-2
- Storm Event Monitoring
- Continuous Flow-Paced Composite Sampling to Evaluate Uranium Transport
- Grab Sampling for Uranium in North and South Walnut Creeks
- Grab Sampling for Nitrate + Nitrite as N in Walnut Creek

2.0 AMP Highlights: Fourth Quarter CY 2011

- An informal e-mail was transmitted to AMP participants providing notification of individual analytical results from a Point of Evaluation (POE) that was above the applicable *Rocky Flats Legacy Management Agreement* (RFLMA) (DOE 2007) surface-water standard (RFLMA Attachment 2, Table 1). The notification was for POE GS10 americium-241 results. The monitoring results constituted a Reportable Condition on November 22, 2011.
- A meeting was held on December 5, 2011, at the request of several AMP participants to discuss various details of the AMP sampling program and the August 2011 *Additional Field Implementation Detail for Selected Non-RFLMA Monitoring Objectives*, which is Attachment F4 to the *Rocky Flats Site Operations Guide* (RFSOG) (DOE 2011c). The meeting was also used as an opportunity to provide an update on sampling results for the evaluation plan related to the reportable condition for uranium at GS10, and to discuss the recent reportable condition for americium-241 at GS10.
- Three informal e-mails were transmitted to AMP participants, providing notification of a Geospatial Environmental Mapping System posting of validated analytical results for the downstream-most Points of Compliance (POCs) (GS01 - Woman Cr. @ Indiana St. and GS03 - Walnut Cr. @ Indiana St.).
- Two informal e-mails were transmitted to AMP participants, providing notification that composite samples from downstream-most POCs have been retrieved from the field (GS01 - Woman Cr. @ Indiana St. and GS03 - Walnut Cr. @ Indiana St.).
- During the quarter, 100 samples were collected in support of AMP monitoring objectives.

3.0 Water Quality Monitoring

AMP monitoring objectives, locations, and sampling criteria are itemized in Table 2 of the AMP. Additional field implementation for the AMP monitoring objectives can be found in Attachment F4 to the RFSOG (DOE 2011c).

3.1 Pre-Discharge Monitoring

This monitoring objective is intended to evaluate whether pond water from Ponds A-4, B-5, or C-2, is expected to meet water-quality standards at downstream AMP monitoring locations prior to opening a valve to initiate flow-through discharge. Pre-discharge samples are collected at A4 POND on North Walnut Creek, B5 POND on South Walnut Creek, and C2 POND on Woman Creek. These locations are shown in Figure 1.

Pre-discharge samples were collected at Ponds A-4 and B-5 prior to batch discharge in March 2011. Pre-discharge samples were again collected at Ponds A-4, B-5, and C-2 prior to the initiation of flow-through operations that began in fall 2011. All results (Table 1) indicated that water quality standards at downstream points of compliance (POCs) would be met during discharge.

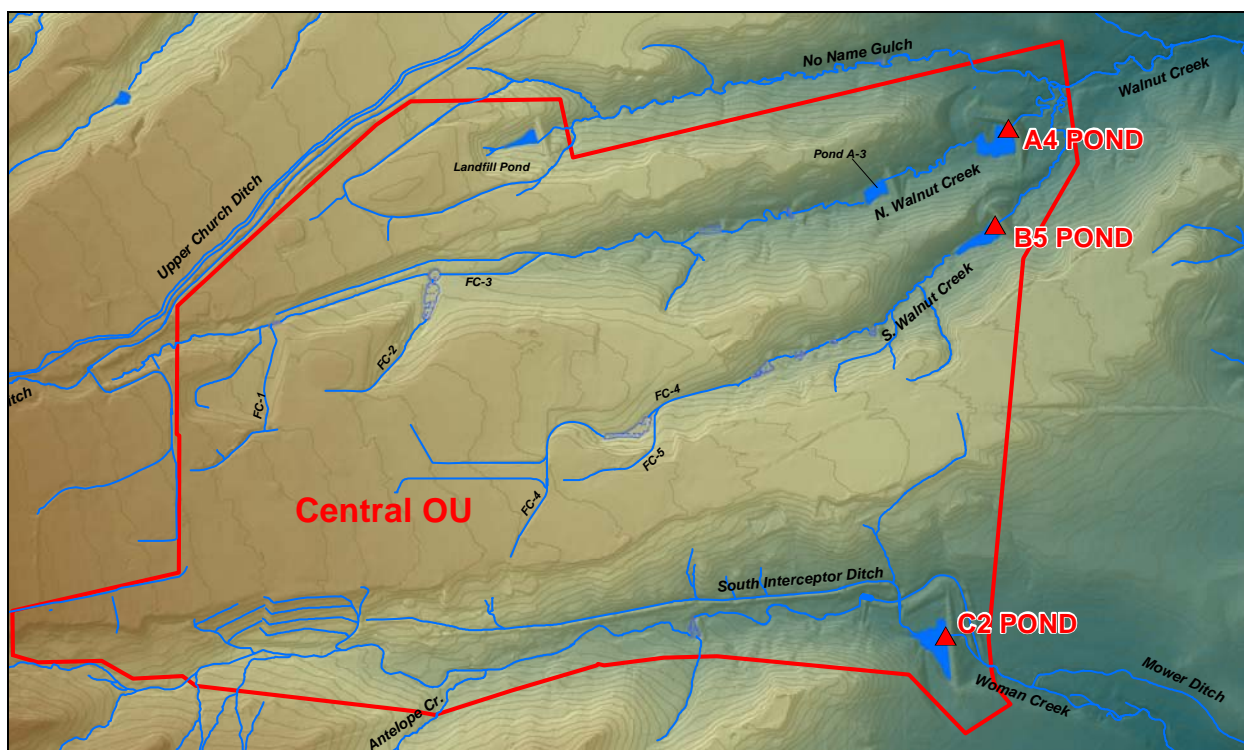


Figure 1. Pre-Discharge Monitoring Locations

Table 1. Pre-Discharge Sample Results for CY 2011

Location	Sample Date	Analyte Result			
		Pu-239,240 (pCi/L)	Am-241 (pCi/L)	Uranium (µg/L)	NO ₂ +NO ₃ as N (mg/L)
A4 POND	3/3/11	0.000	-0.005	7.34	0.375
B5 POND	3/3/11	-0.001	-0.002	7.05	Undetect
A4 POND	8/15/11	0.000	-0.001	7.12	Undetect
B5 POND	8/15/11	0.005	0.003	5.50	NA
C2 POND	9/15/11	0.017	0.008	9.09	NA

Notes: Results are rounded to 3 significant figures. The Colorado Department of Public Health and Environment split results are not presented but were comparable in all cases.

µg/L = micrograms per liter

mg/L = milligrams per liter

NA = not analyzed

pCi/L = picocuries per liter

3.2 Targeted Groundwater Monitoring

The AMP targeted groundwater monitoring wells are the same as the RFLMA (DOE 2007) area-of-concern (AOC) wells (Figure 2) and are located within a drainage and downgradient of a contaminant plume or group of contaminant plumes. Water quality data are collected to determine whether plumes may be discharging to surface water. These AOC wells are sampled semiannually in the second and fourth calendar quarters.

Data from these wells are evaluated in the RFLMA Annual Report according to the Figure 7 flowchart in Attachment 2 to RFLMA. Analytical data undergo preliminary evaluation as data become available; this is necessary because of the strict timeline attached to “reportable conditions” for AOC wells. In accordance with and as defined in RFLMA, if the data are confirmed to be valid and meet the requirements of a reportable condition, the reporting process under RFLMA is initiated. No reportable conditions were triggered in 2011. The RFLMA Annual Report for 2011 will include results of data evaluations and discussions of groundwater quality in these wells.

These wells were sampled for their routine RFLMA analytes between April 13 and May 31, 2011 (to meet the second-quarter CY 2011 requirements), and between October 12 and November 1, 2011 (to meet the fourth-quarter CY 2011 requirements).

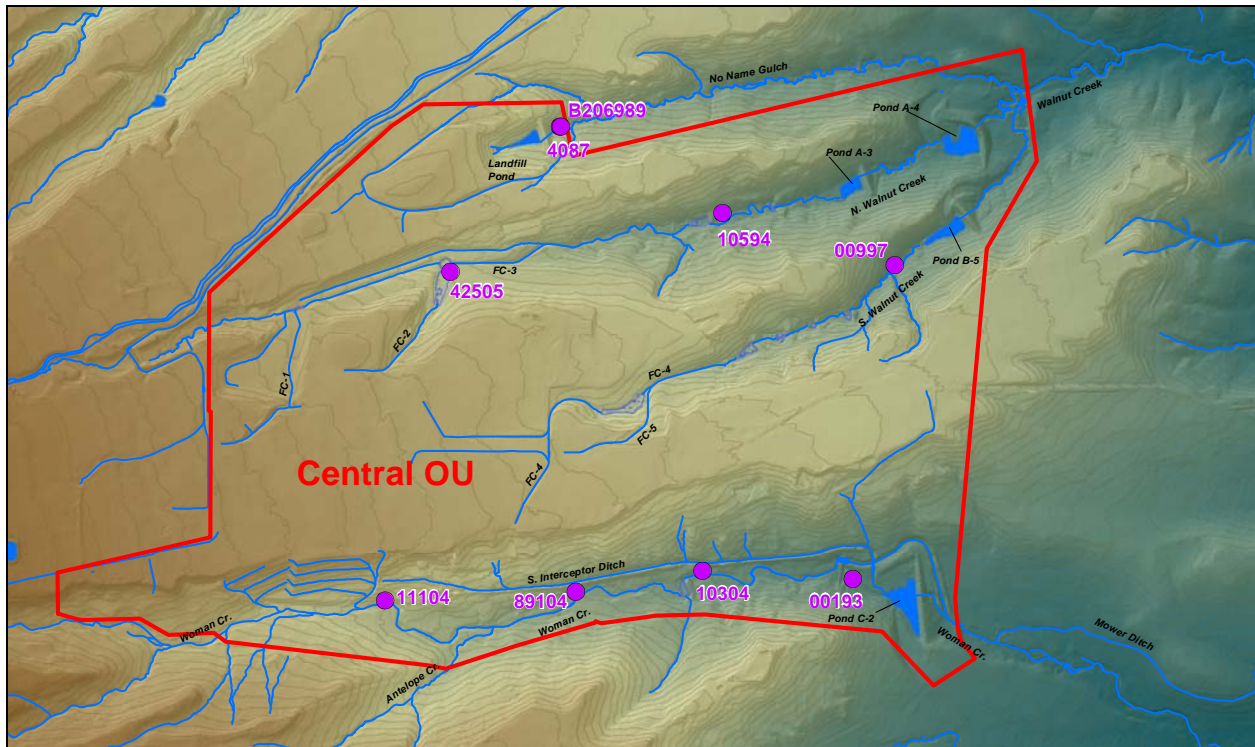


Figure 2. Targeted Groundwater Monitoring Locations

3.3 Monitoring to Evaluate Flow-Through Operations at Terminal Ponds A-4, B-5, and C-2

This objective is intended to collect water quality data during flow-through operations to simulate post-breach conditions to demonstrate that water leaving the Central Operable Unit (COU) will be in attainment of water quality standards after the terminal dams are breached. The specific locations are shown in Figure 3.

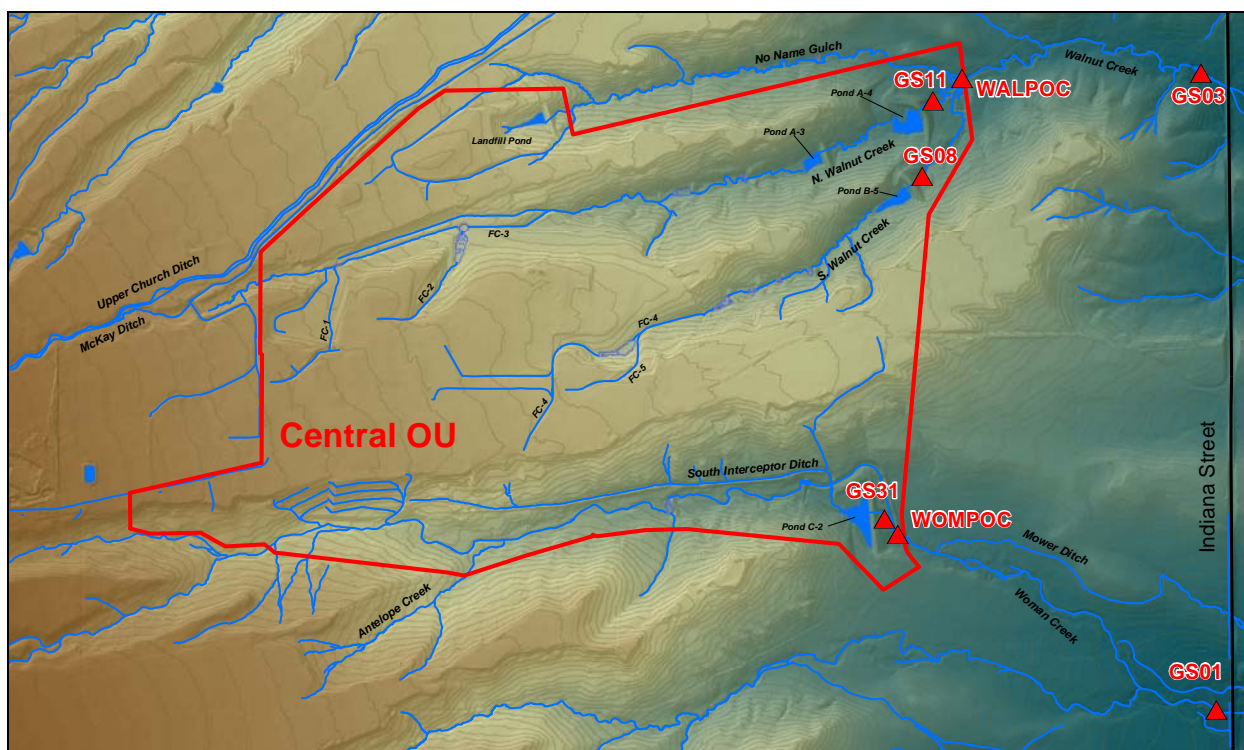


Figure 3. Flow-Through Operations Monitoring Locations

The two new POCs at the COU boundary, WALPOC and WOMPOC, became operational on September 9, 2011, and September 28, 2011, respectively. Flow-through operation of Ponds A-4 and B-5 began on September 12, 2011; this was also the first day of flow at WALPOC. Flow-through operation of Pond C-2 began on November 7, 2011; WOMPOC first began measuring flow from Woman Creek on October 14, 2011.

Table 2 presents long-term volume-weighted averages in Walnut Creek for the entire post-closure period (October 1, 2005, to the present) and the period since flow-through pond operations began (September 12, 2011, to the present). Figure 4 through Figure 11 present the 30-day and 12-month rolling averages for each location, analyte, and time period.¹ Although flow-through operations have only been ongoing for several months, the plots clearly show that water quality is comparable. Flow-through 12-month rolling averages are expected to show variability comparable to that of batch operations. However, flow-through 30-day averages are expected to show increased variability since water is no longer being batched before discharge.

¹ The RFLMA standards shown on these plots are for reference only. RFLMA-required evaluation is location-specific (i.e., POCs, POEs) and is not part of this AMP report. Evaluation of sampling results as required by RFLMA is routinely presented in other reports according to the RFLMA reporting requirements.

Table 2. Volume-Weighted Averages for Walnut Creek Flow-Through Monitoring Locations

Continuous Flow-Paced Composite Sampling

Walnut Creek: October 2005 - Present (Batch Release and Flow-Through)

	Location Code	Uranium (ug/L)		Pu-239,240 (pCi/L)		Am-241 (pCi/L)		NO2+NO3 as N (mg/L)	
		Volume-Weighted Average	Sample Count	Volume-Weighted Average	Sample Count	Volume-Weighted Average	Sample Count	Volume-Weighted Average	Sample Count
Upstream	GS08 / GS11	8.8 / 7.7	36 / 38	0.004 / 0.004	36 / 38	0.003 / 0.003	36 / 38	2.71 [GS11 only]	39
Downstream	GS03	5.0	69	0.006	69	0.004	69	0.92	45

Walnut Creek: September 2011 - Present (Flow-Through)

	Location Code	Uranium (ug/L)		Pu-239,240 (pCi/L)		Am-241 (pCi/L)		NO2+NO3 as N (mg/L)	
		Volume-Weighted Average	Sample Count	Volume-Weighted Average	Sample Count	Volume-Weighted Average	Sample Count	Volume-Weighted Average	Sample Count
Upstream	GS08 / GS11	6.7 / 8	7 / 6	0.003 / 0.001	7 / 6	0.002 / 0.002	7 / 6	0.19 [GS11 only]	7
↓	WALPOC	8.1	6	0.003	6	0.004	6	0.05	6
Downstream	GS03	7.3	5	0.001	5	0.004	5	0.02	6

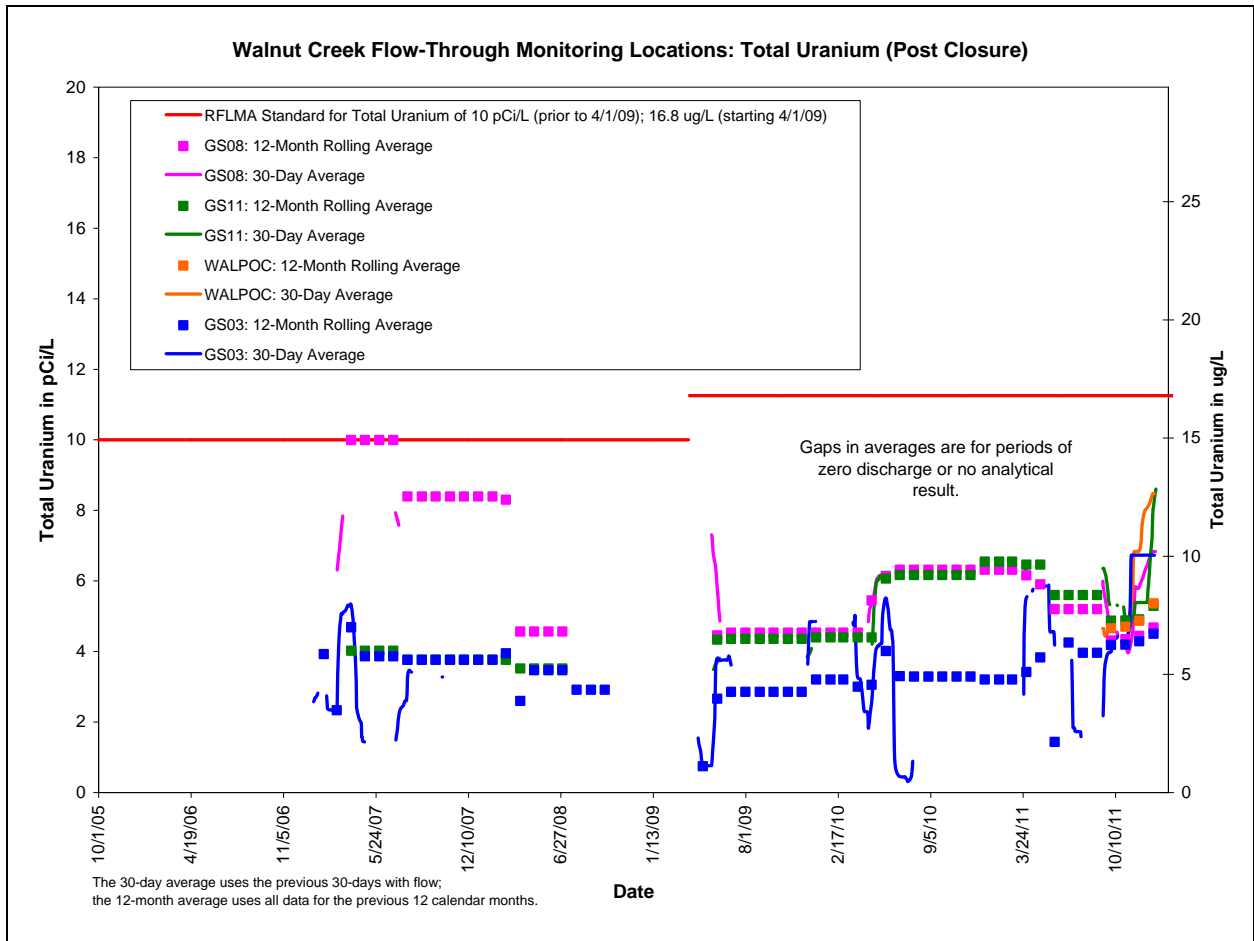
Notes: Sample counts vary because composite sampling periods vary with water availability.

No Name Gulch is a tributary to Walnut Creek, just upstream of WALPOC; any water that flows in No Name Gulch and reaches Walnut Creek could affect water quality downstream.

µg/L = micrograms per liter

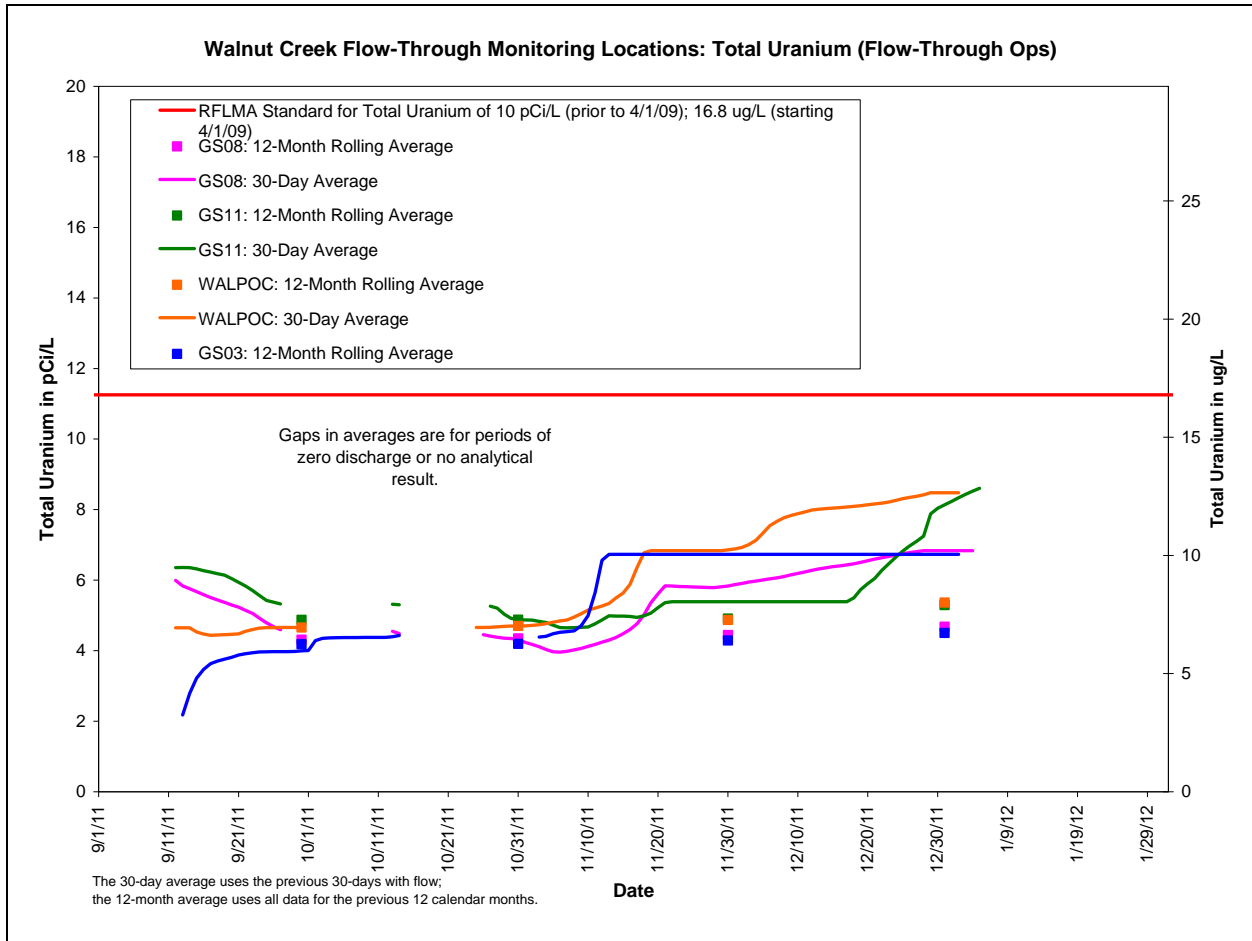
mg/L = milligrams per liter

pCi/L = picocuries per liter



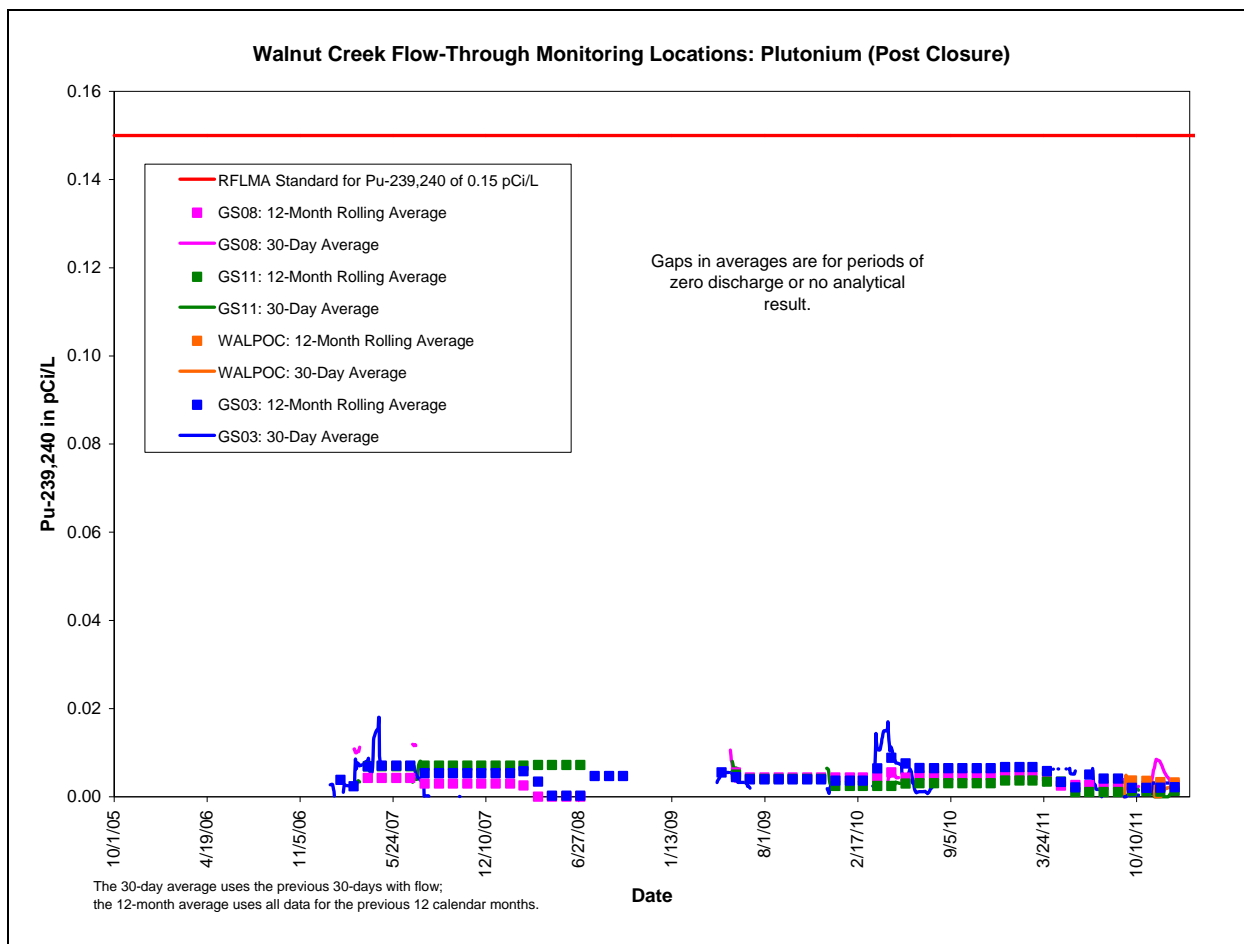
µg/L = micrograms per liter
 pCi/L = picocuries per liter

Figure 4. Running Uranium Averages at Walnut Creek Flow-Through Locations: Post-Closure Period



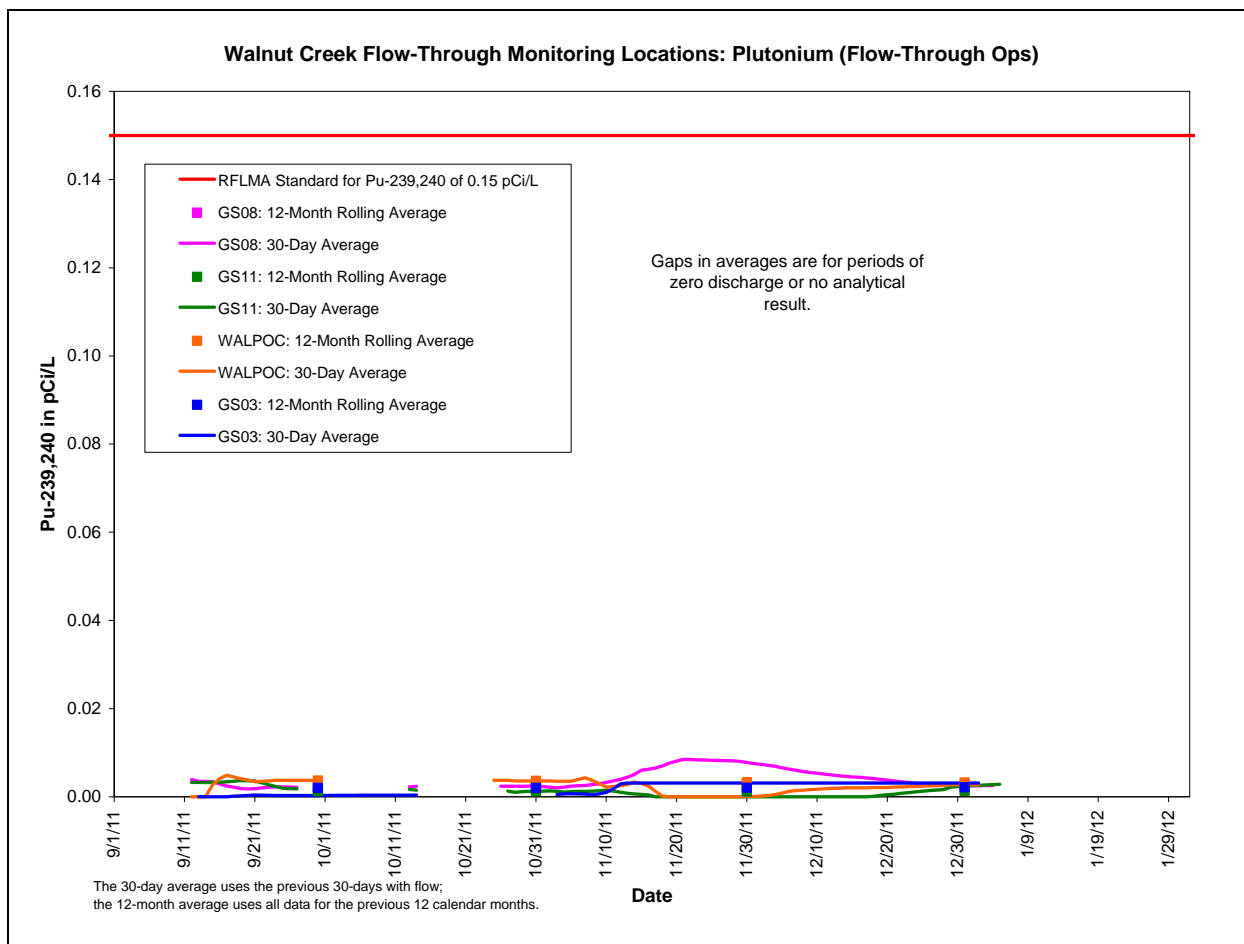
µg/L = micrograms per liter
 pCi/L = picocuries per liter

Figure 5. Running Uranium Averages at Walnut Creek Flow-Through Locations: Flow-Through Period



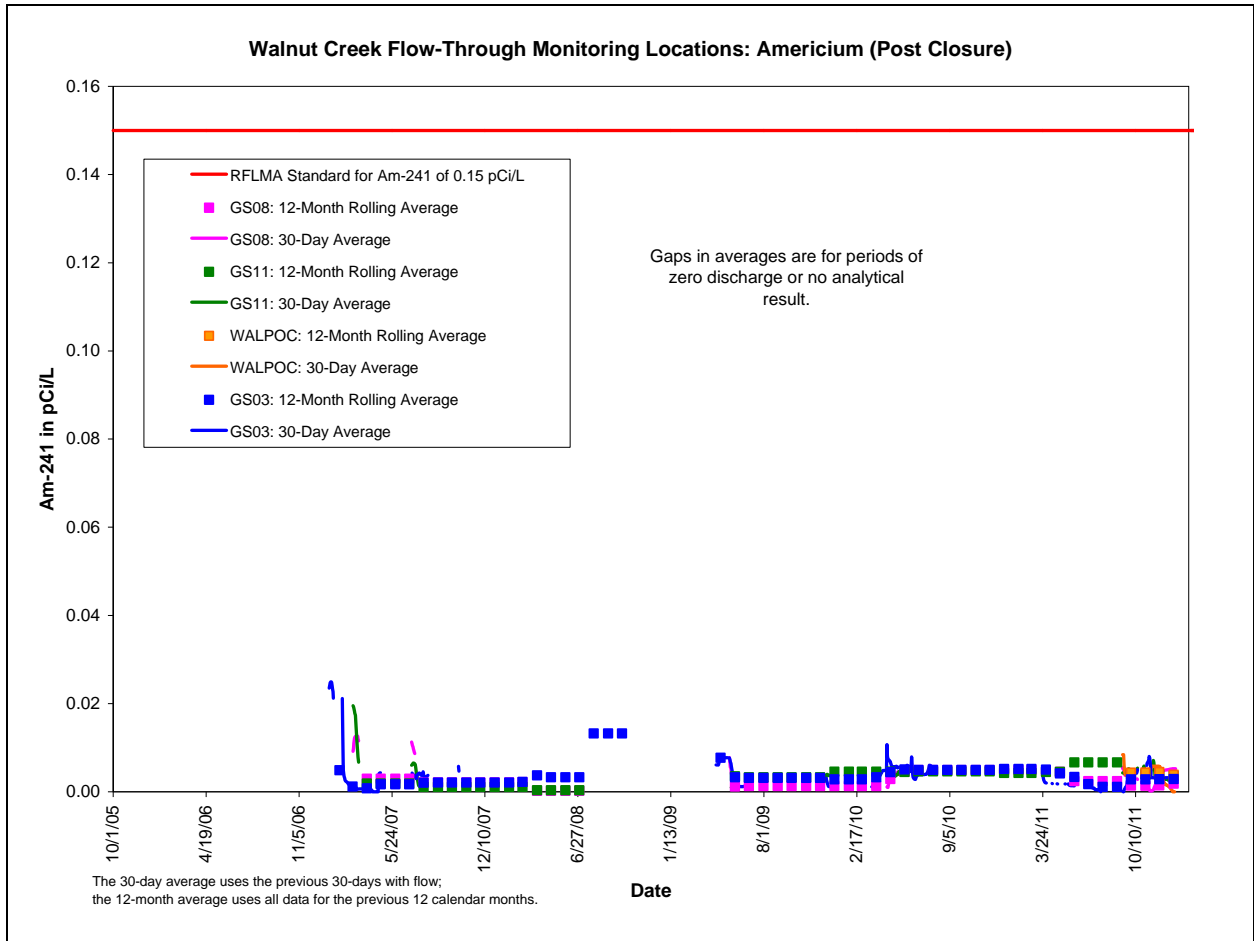
pCi/L = picocuries per liter

Figure 6. Running Plutonium Averages at Walnut Creek Flow-Through Locations: Post-Closure Period



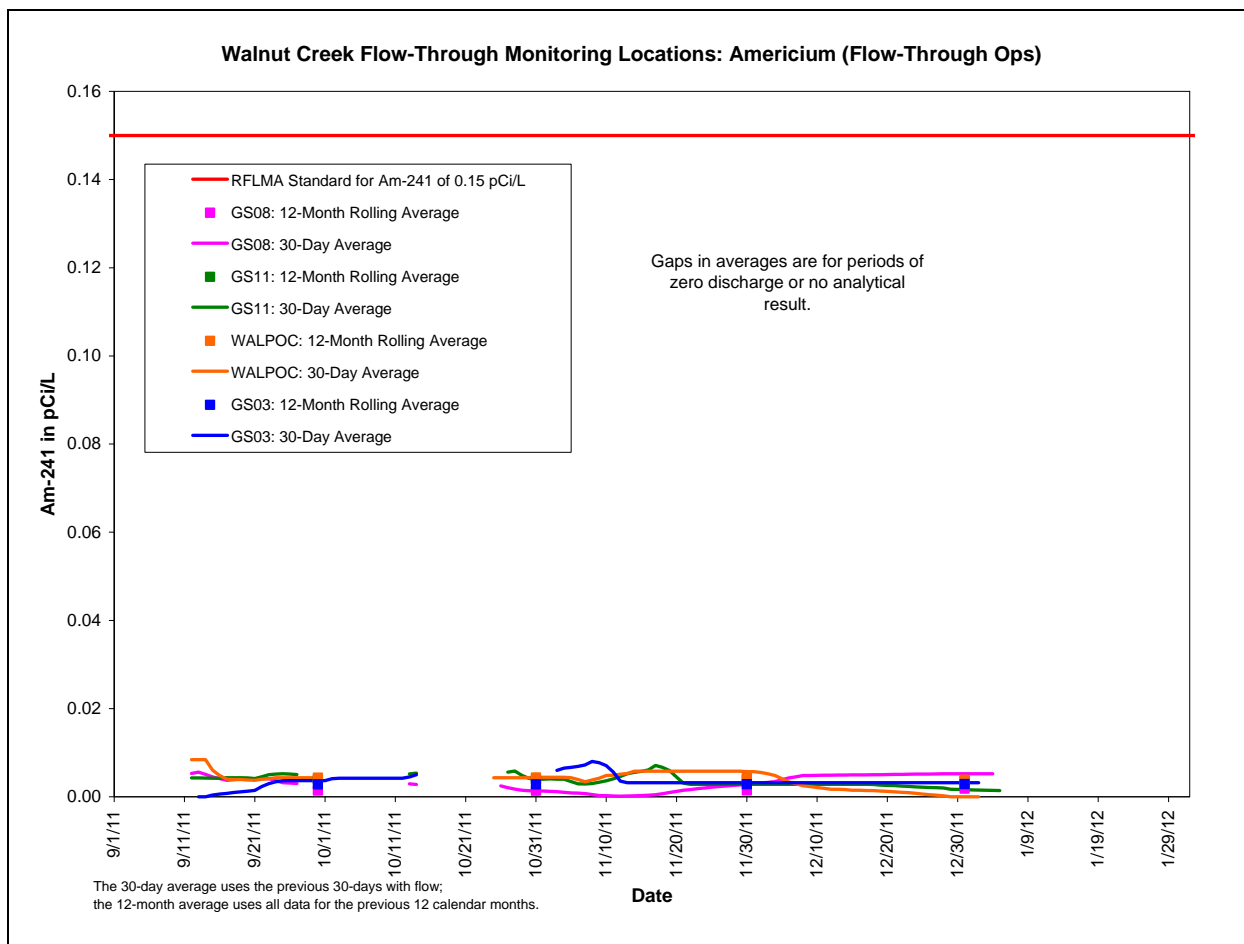
pCi/L = picocuries per liter

Figure 7. Running Plutonium Averages at Walnut Creek Flow-Through Locations: Flow-Through Period



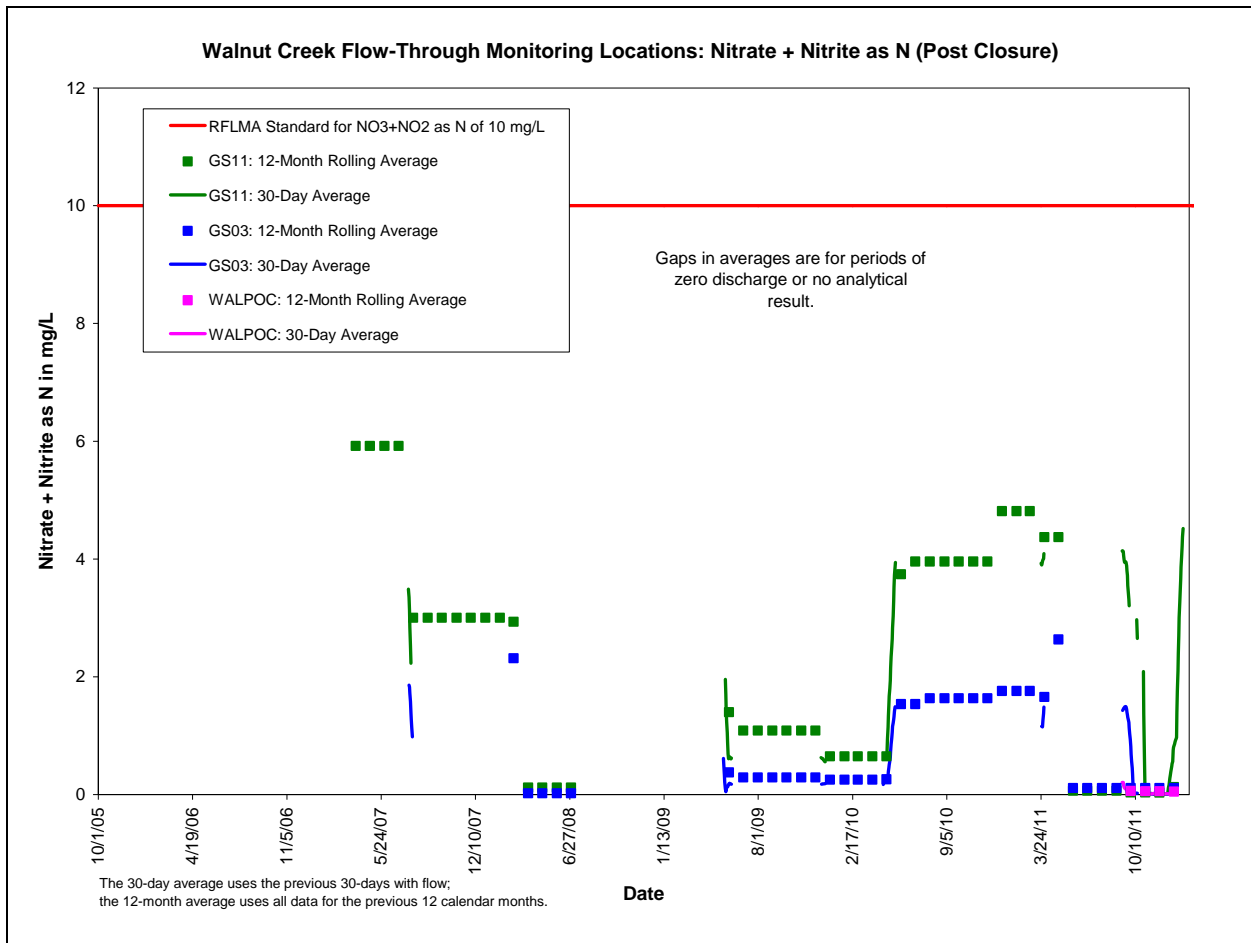
pCi/L = picocuries per liter

Figure 8. Running Americium Averages at Walnut Creek Flow-Through Locations: Post-Closure Period



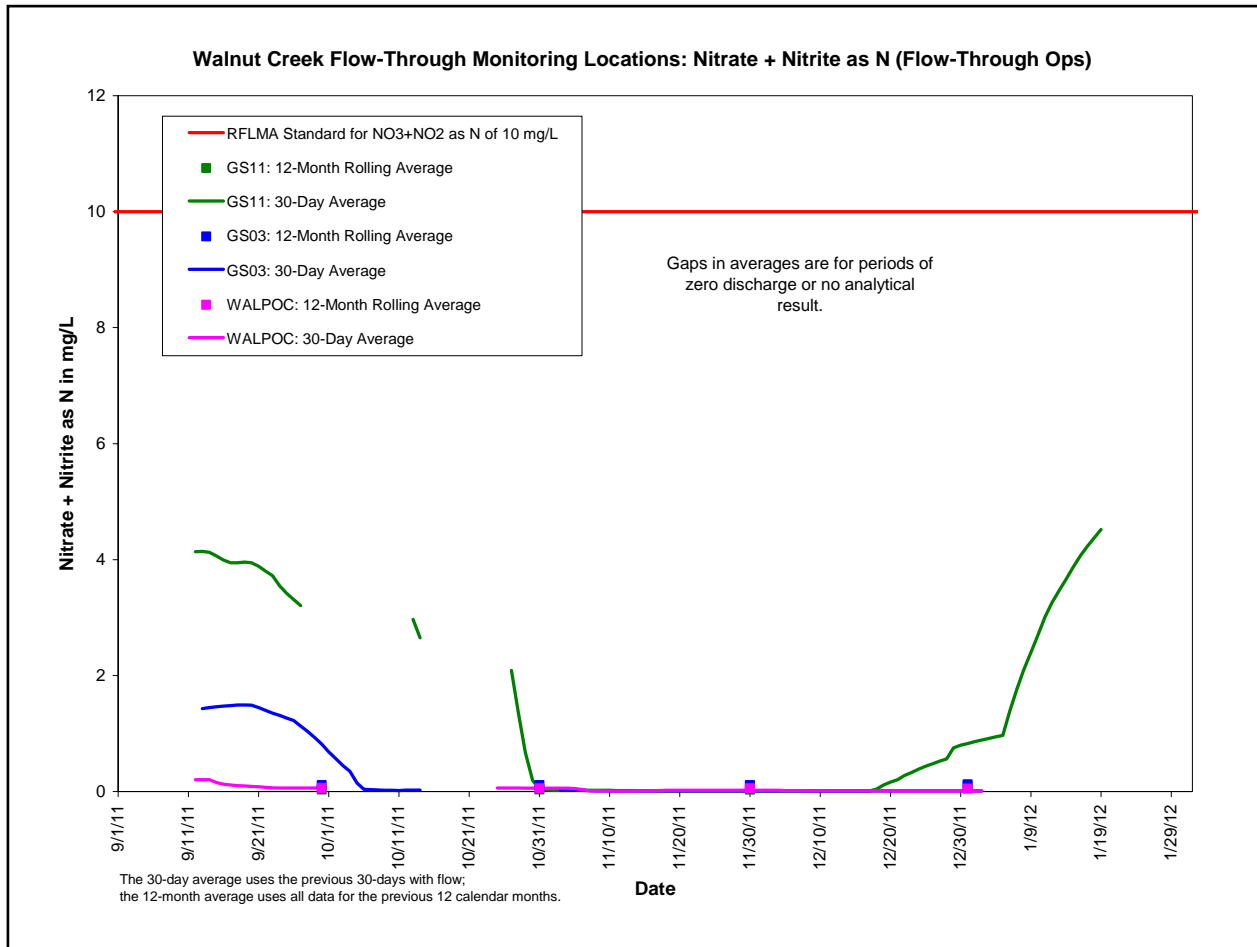
pCi/L = picocuries per liter

Figure 9. Running Americium Averages at Walnut Creek Flow-Through Locations: Flow-Through Period



mg/L = milligrams per liter
 pCi/L = picocuries per liter

Figure 10. Running Nitrate + Nitrite as N Averages at Walnut Creek Flow-Through Locations: Post-Closure Period



mg/L = milligrams per liter
pCi/L = picocuries per liter

Figure 11. Running Nitrate + Nitrite as N Averages at Walnut Creek Flow-Through Locations: Flow-Through Period

Table 3 presents long-term volume-weighted averages in Woman Creek for the entire post-closure period (October 1, 2005, to the present) and the period since flow-through pond operations began (November 7, 2011, to the present). Figure 12 through Figure 17 present the 30-day and 12-month rolling averages for each location, analyte, and time period.² Although flow-through operations have only been ongoing for a few months, the plots clearly show that water quality is comparable. Flow-through 12-month rolling averages are expected to show variability comparable to that of batch operations. However, flow-through 30-day averages are expected to show increased variability since water is no longer being batched before discharge.

² The RFLMA standards shown on these plots are for reference only. RFLMA-required evaluation is location-specific (i.e., POCs, POEs) and is not part of this AMP report. Evaluation of sampling results as required by RFLMA is routinely presented in other reports according to the RFLMA reporting requirements.

Table 3. Volume-Weighted Averages for Woman Creek Flow-Through Monitoring Locations

Continuous Flow-Paced Composite Sampling

Woman Creek: October 2005 - Present (Batch Release and Flow-Through)

	Location Code	Uranium (ug/L)		Pu-239,240 (pCi/L)		Am-241 (pCi/L)	
		Volume-Weighted Average	Sample Count	Volume-Weighted Average	Sample Count	Volume-Weighted Average	Sample Count
Upstream	GS31	4.4	14	0.007	14	0.003	14
Downstream	GS01	2.4	98	0.007	98	0.004	98

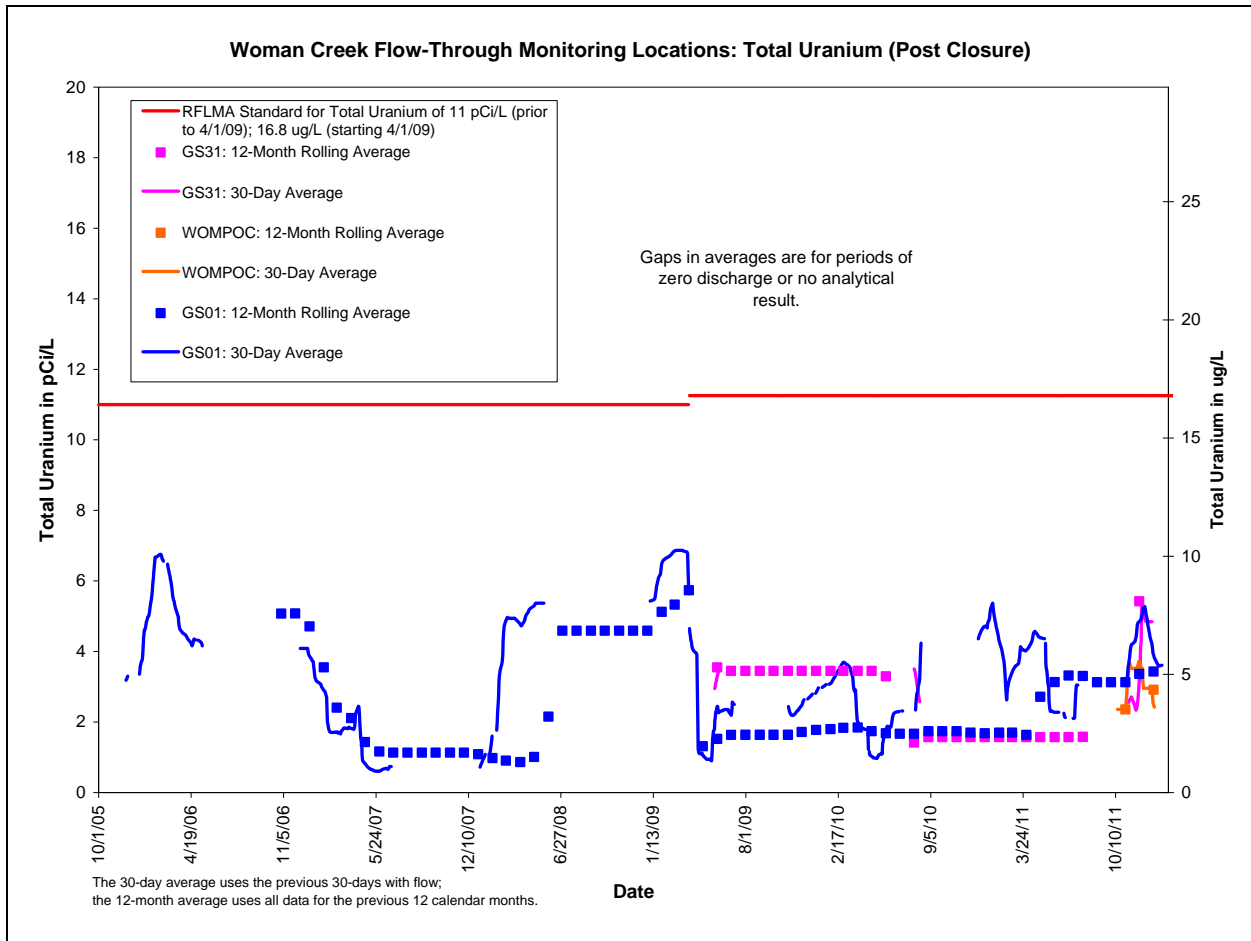
Woman Creek: September 2011 - Present (Flow-Through)

	Location Code	Uranium (ug/L)		Pu-239,240 (pCi/L)		Am-241 (pCi/L)	
		Volume-Weighted Average	Sample Count	Volume-Weighted Average	Sample Count	Volume-Weighted Average	Sample Count
Upstream	GS31	7.7	4	0.005	4	0.002	4
↓	WOMPOC	4.2	3	0.002	3	0.004	3
Downstream	GS01	6.1	4	0.006	4	0.004	4

Notes: Sample counts vary because composite sampling periods vary with water availability.

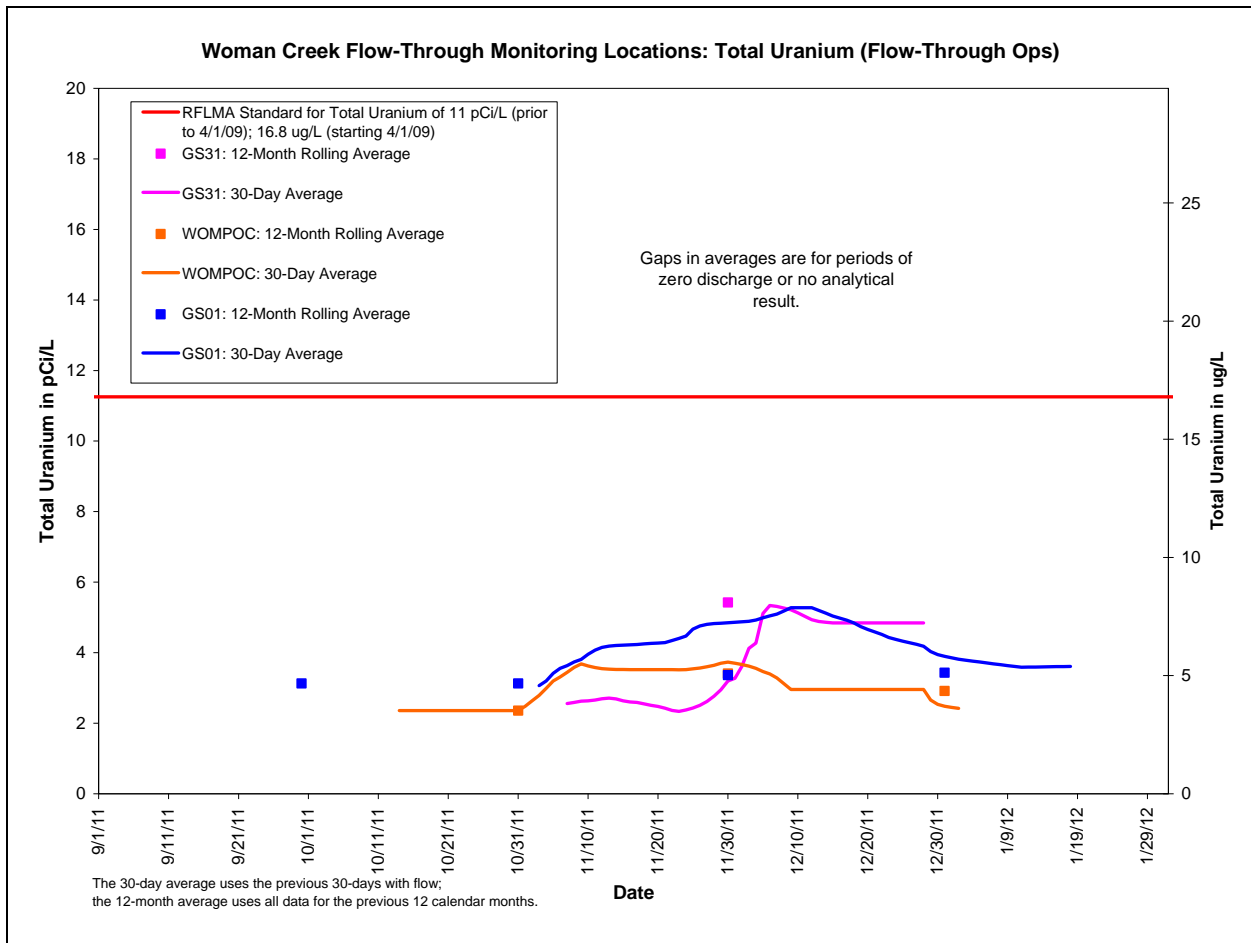
µg/L = micrograms per liter

pCi/L = picocuries per liter



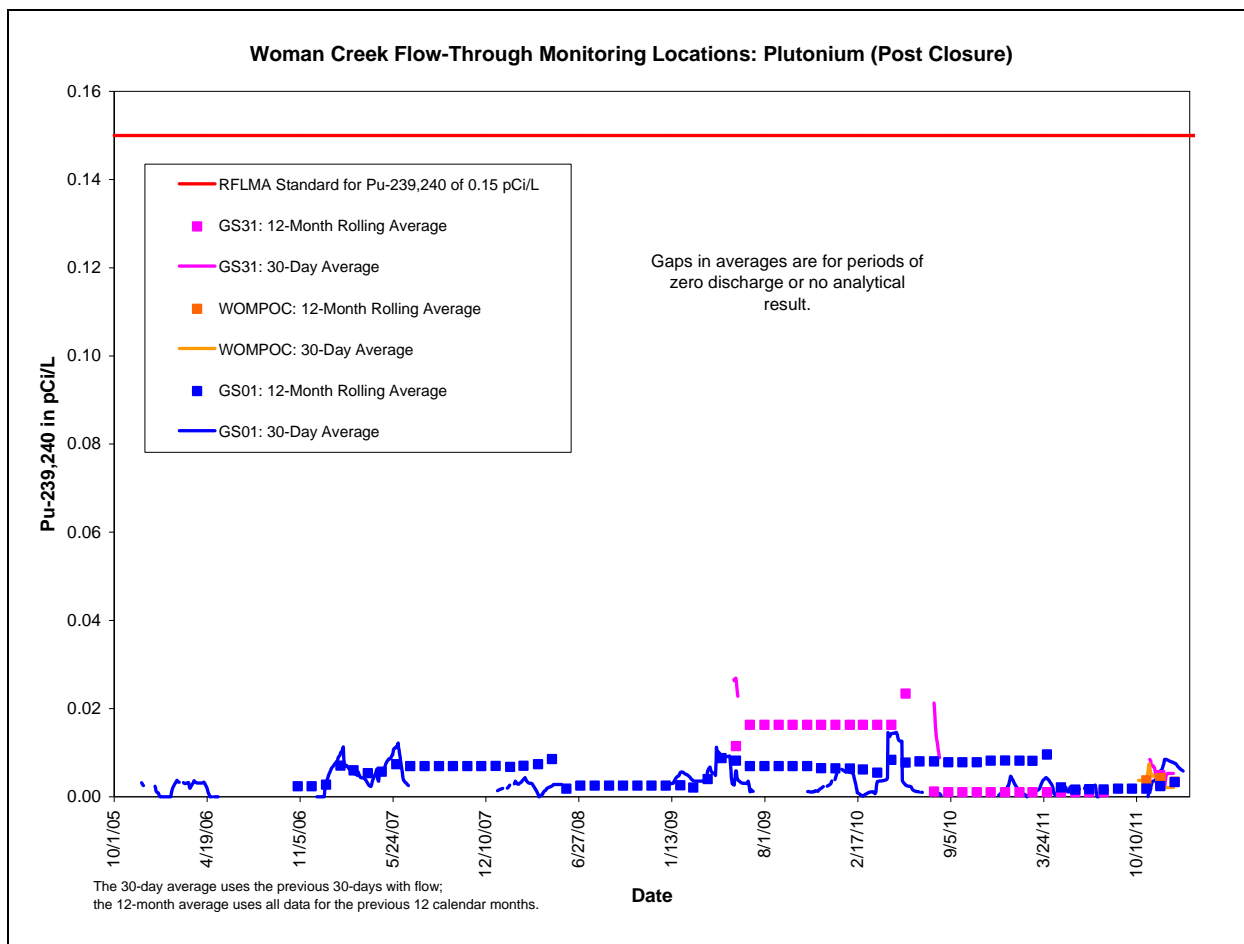
µg/L = micrograms per liter
 pCi/L = picocuries per liter

Figure 12. Running Uranium Averages at Woman Creek Flow-Through Locations: Post-Closure Period



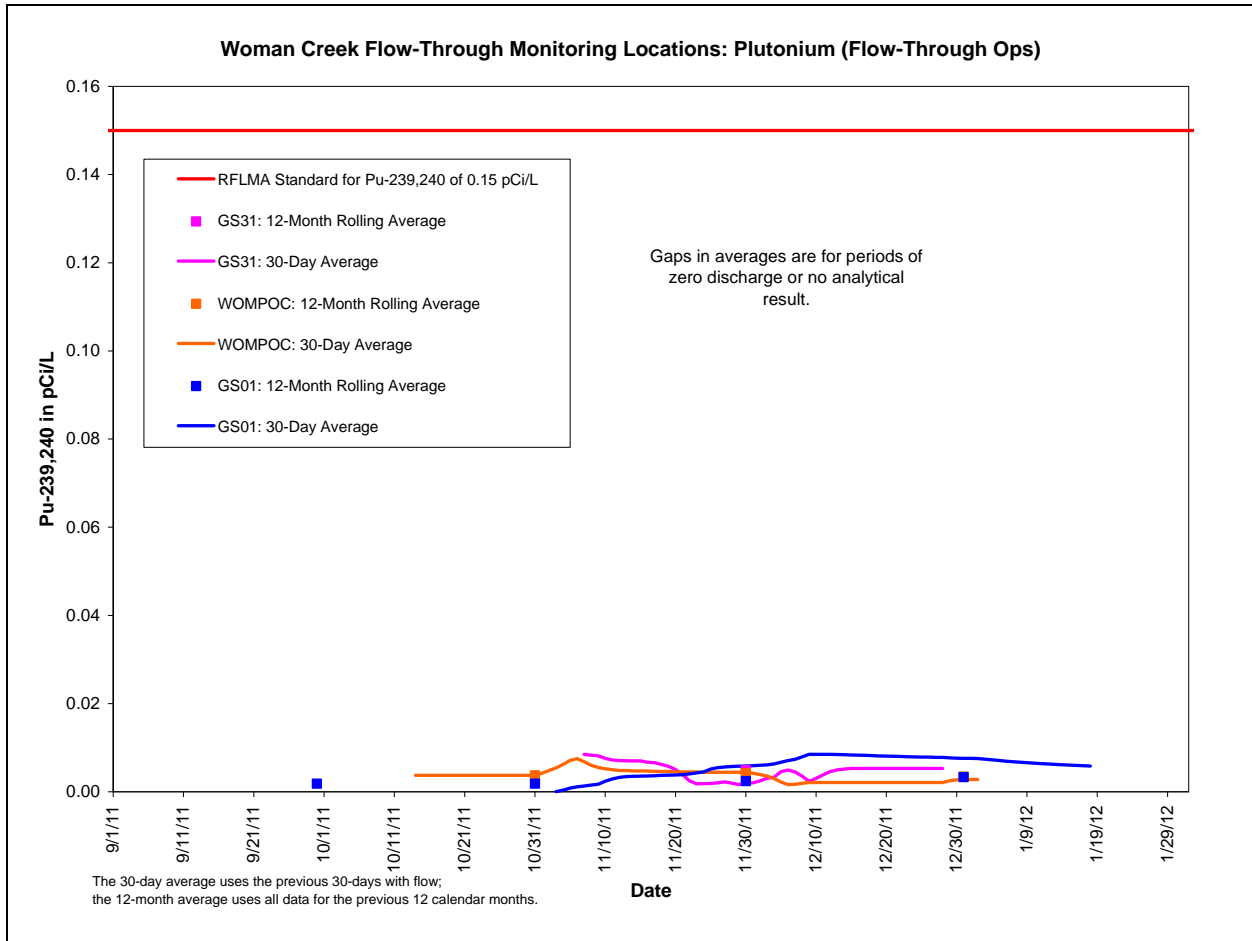
µg/L = micrograms per liter
pCi/L = picocuries per liter

Figure 13. Running Uranium Averages at Woman Creek Flow-Through Locations: Flow-Through Period



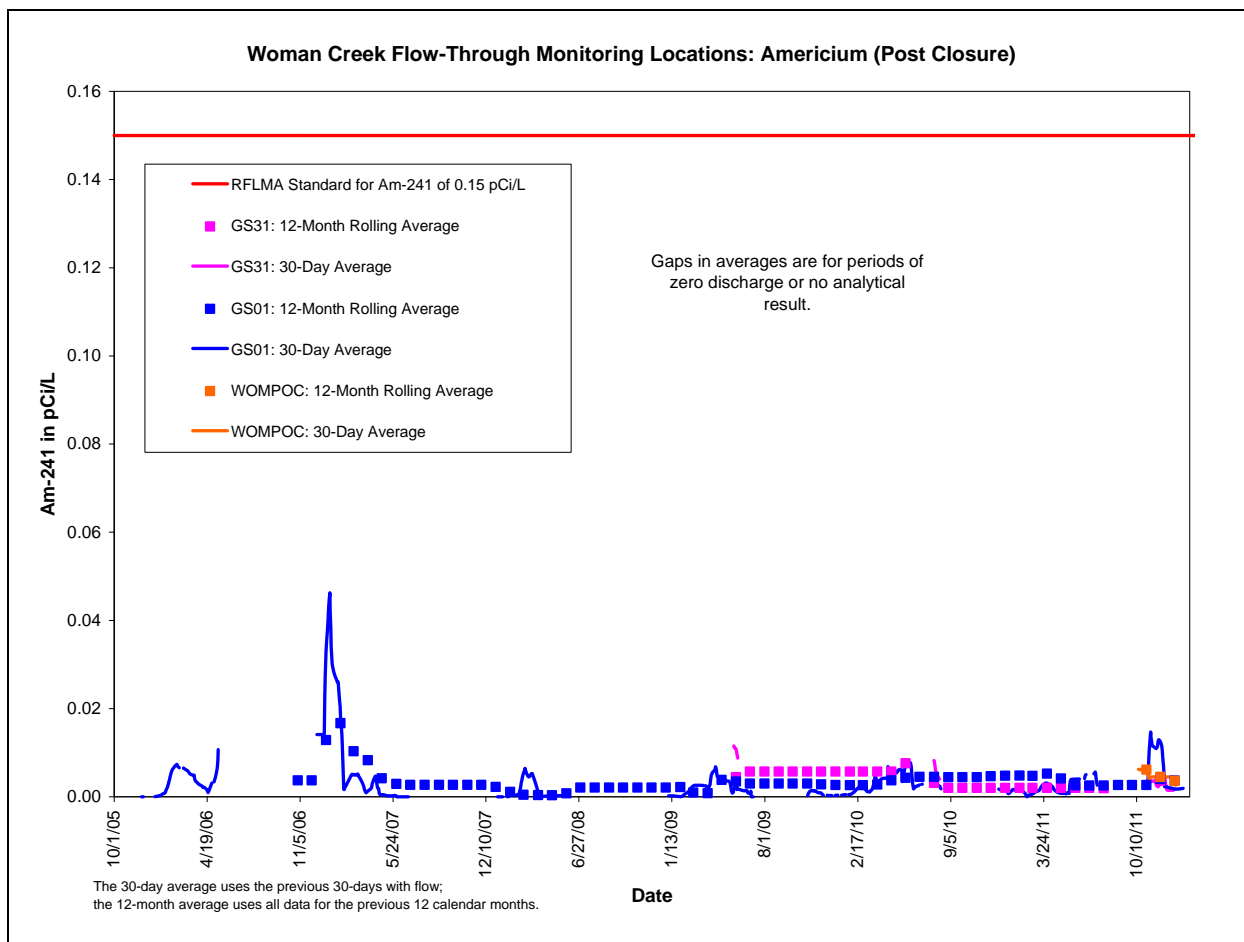
pCi/L = picocuries per liter

Figure 14. Running Plutonium Averages at Woman Creek Flow-Through Locations: Post-Closure Period



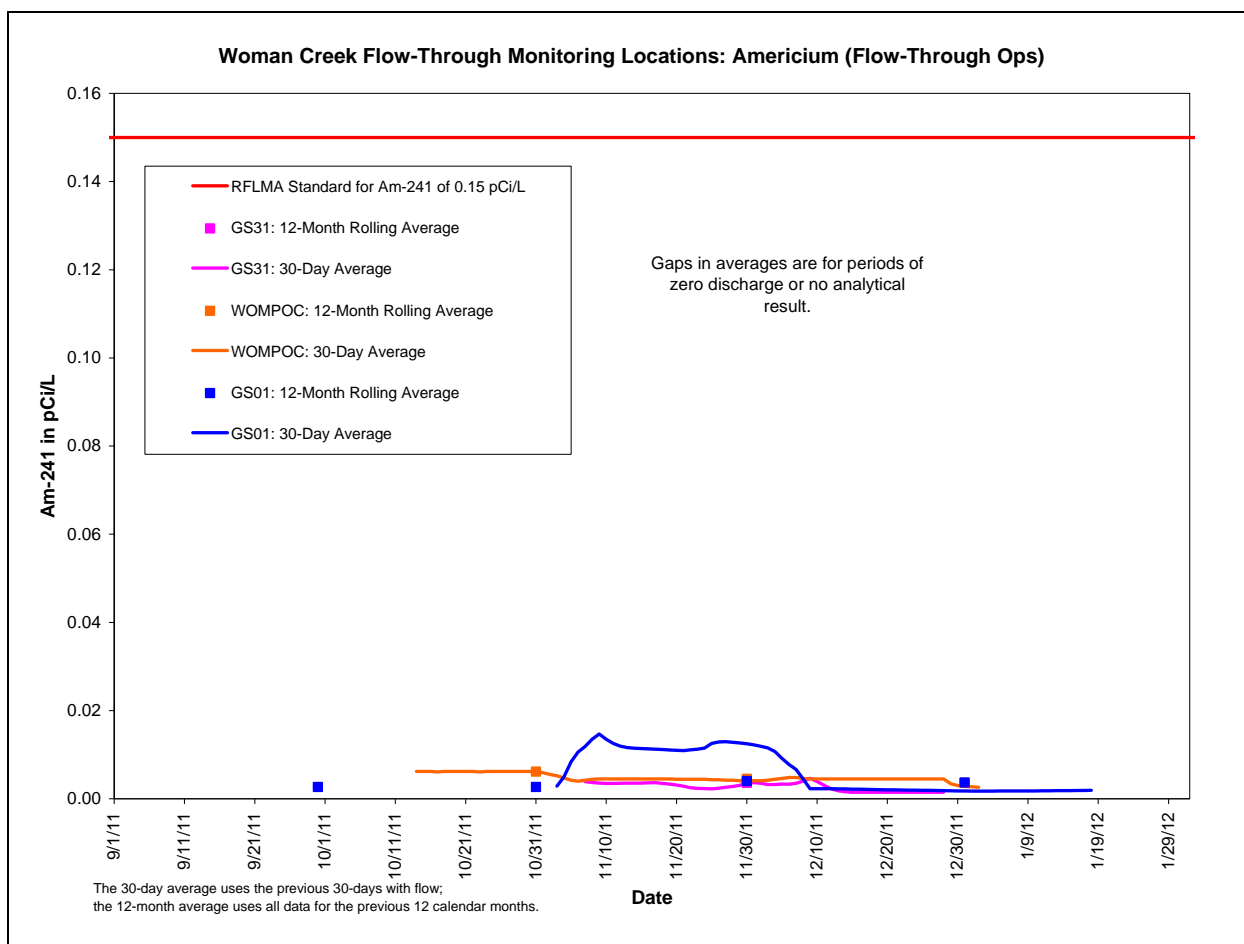
pCi/L = picocuries per liter

Figure 15. Running Plutonium Averages at Woman Creek Flow-Through Locations: Flow-Through Period



pCi/L = picocuries per liter

Figure 16. Running Americium Averages at Woman Creek Flow-Through Locations: Post-Closure Period



pCi/L = picocuries per liter

Figure 17. Running Americium Averages at Woman Creek Flow-Through Locations: Flow-Through Period

3.4 Storm Event Monitoring

This objective is intended to collect water quality data during runoff periods to assess actinide and solids transport. The intent is to develop correlations between flow rate and actinide concentrations, and to further describe short-term, event-driven variability. In addition, these data can be used to assess the effectiveness of ongoing revegetation and erosion control practices. The specific locations are shown in Figure 18.

Storm event monitoring equipment at the five locations in North and South Walnut Creeks was initially installed in spring 2010 to specifically evaluate water quality as water was routed through the breached A- and B-Series Dams. These locations are not planned to be operated in 2012.

Storm event monitoring equipment at location GS31, just downstream of the outlet of Dam C-2, will be installed in spring 2012 to monitor runoff events as they pass through Pond C-2.

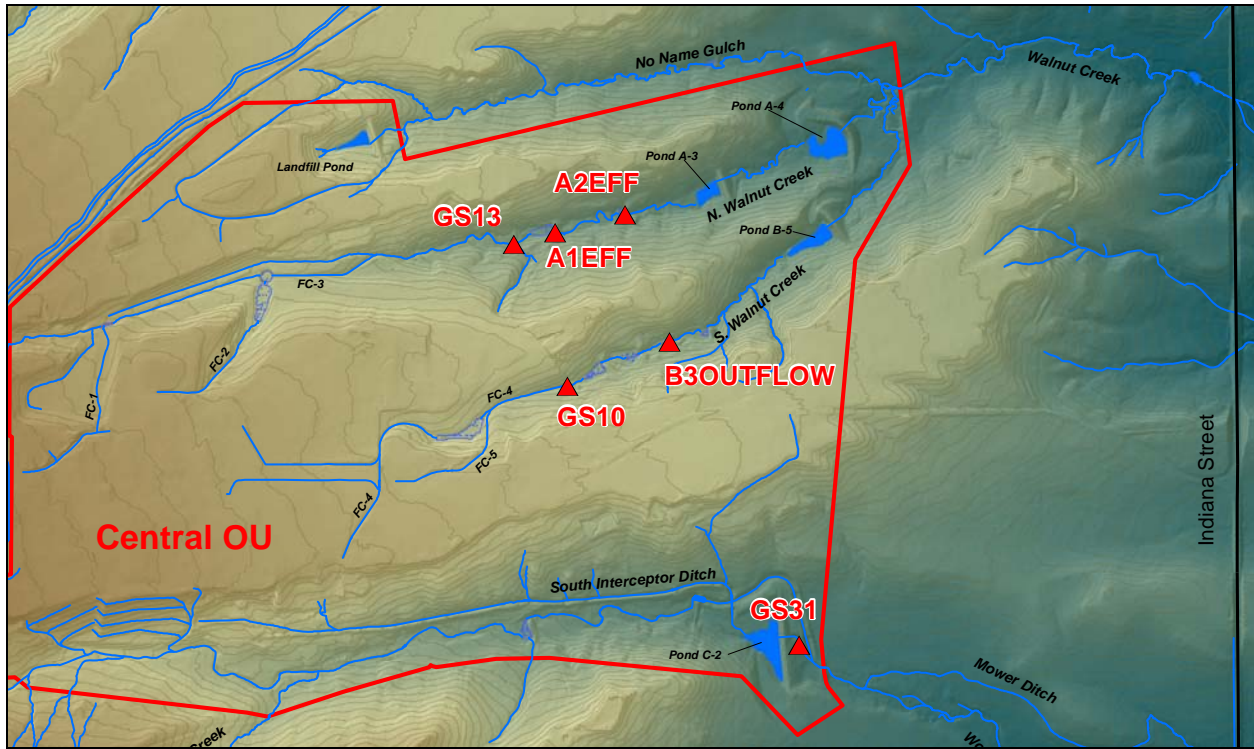
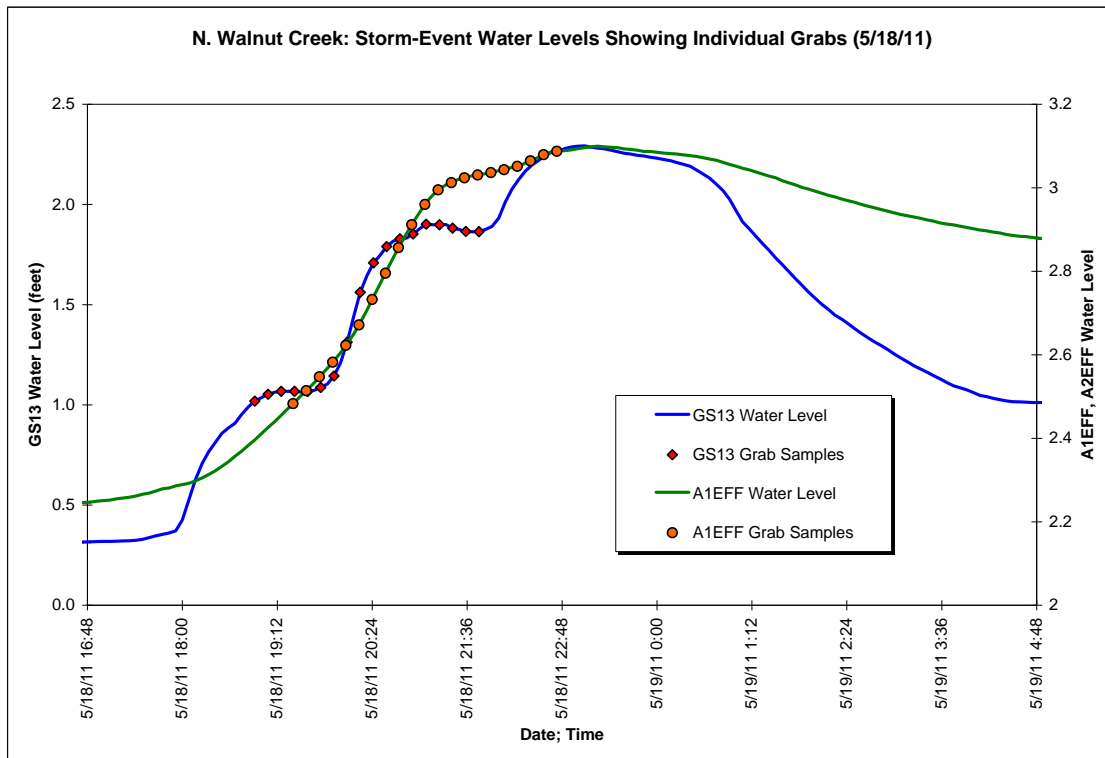


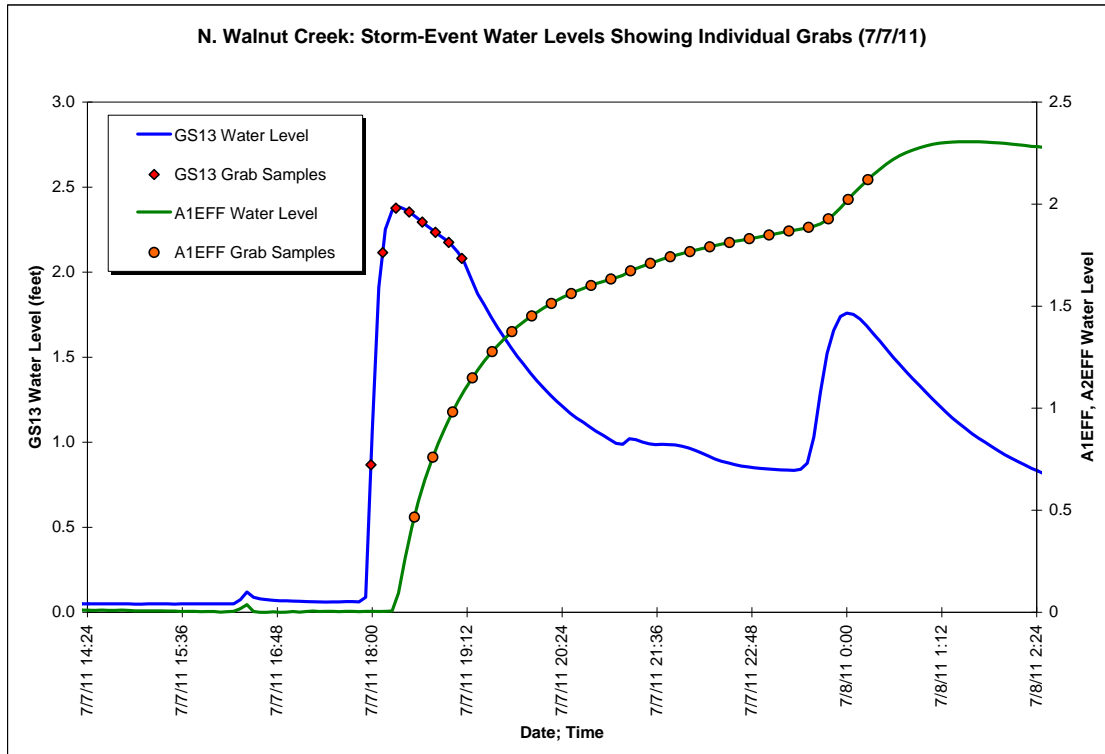
Figure 18. Storm Event Monitoring Locations

Figure 19 through Figure 25 show the sampling events in North and South Walnut Creeks during CY 2011. Each plot shows the water level at the location and markers to designate each grab aliquot that made up the composite submitted for analysis. Details regarding sample collection methods can be found in Attachment F4 of the RFSOG (DOE 2011c).



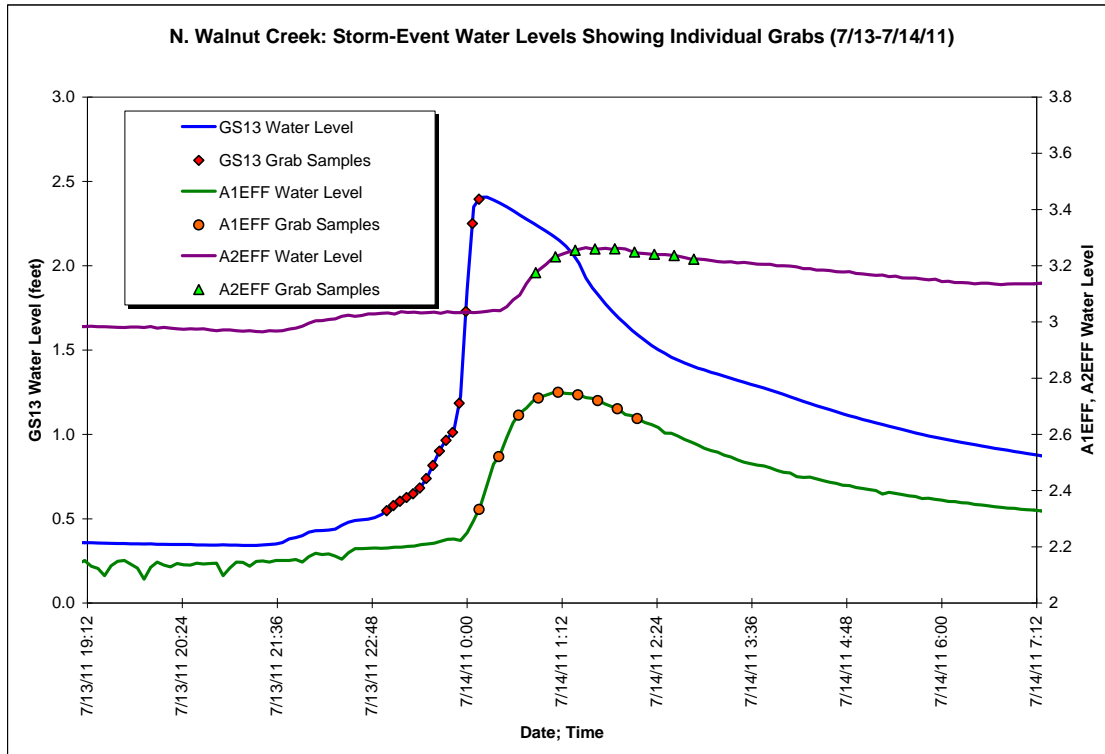
Note: Sampling equipment at A2EFF failed to successfully sample this event.
Composite aliquots collected at 10-minute intervals.

Figure 19. North Walnut Creek Storm Event Water Levels and Grab Samples: May 18, 2011



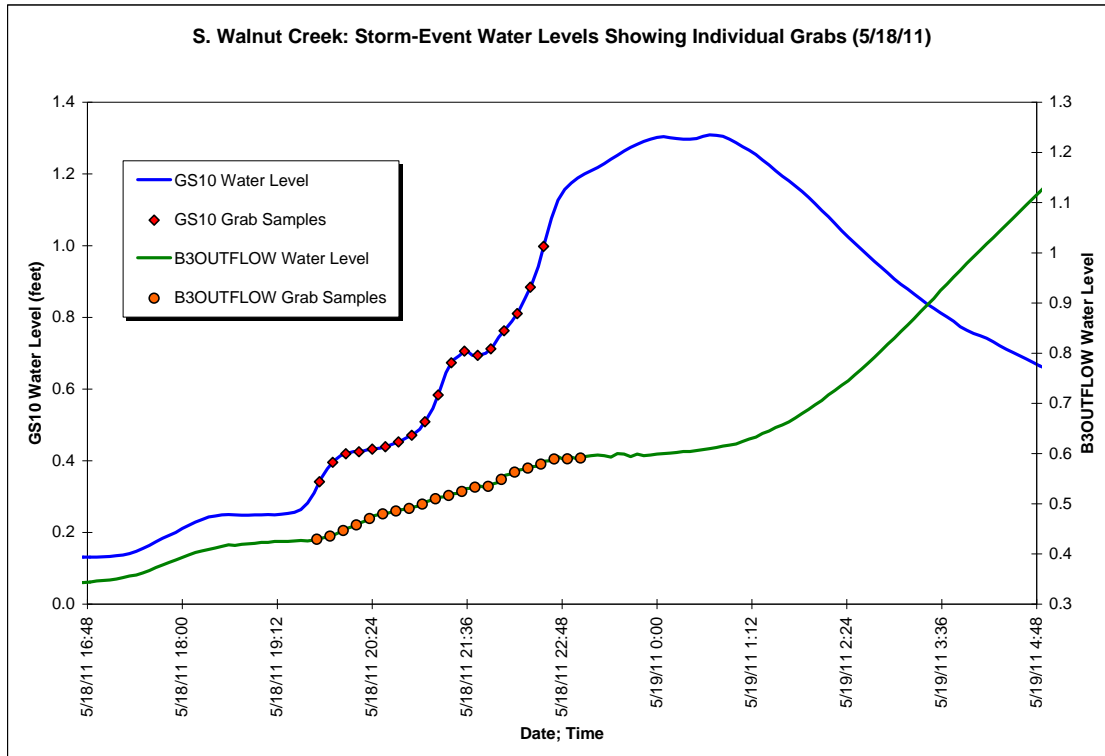
Note: Sampling equipment at A2EFF failed to successfully sample this event.
 GS13 composite aliquots collected at 10-minute intervals; A1EFF collected at 15-minute intervals.

Figure 20. North Walnut Creek Storm Event Water Levels and Grab Samples: July 7, 2011



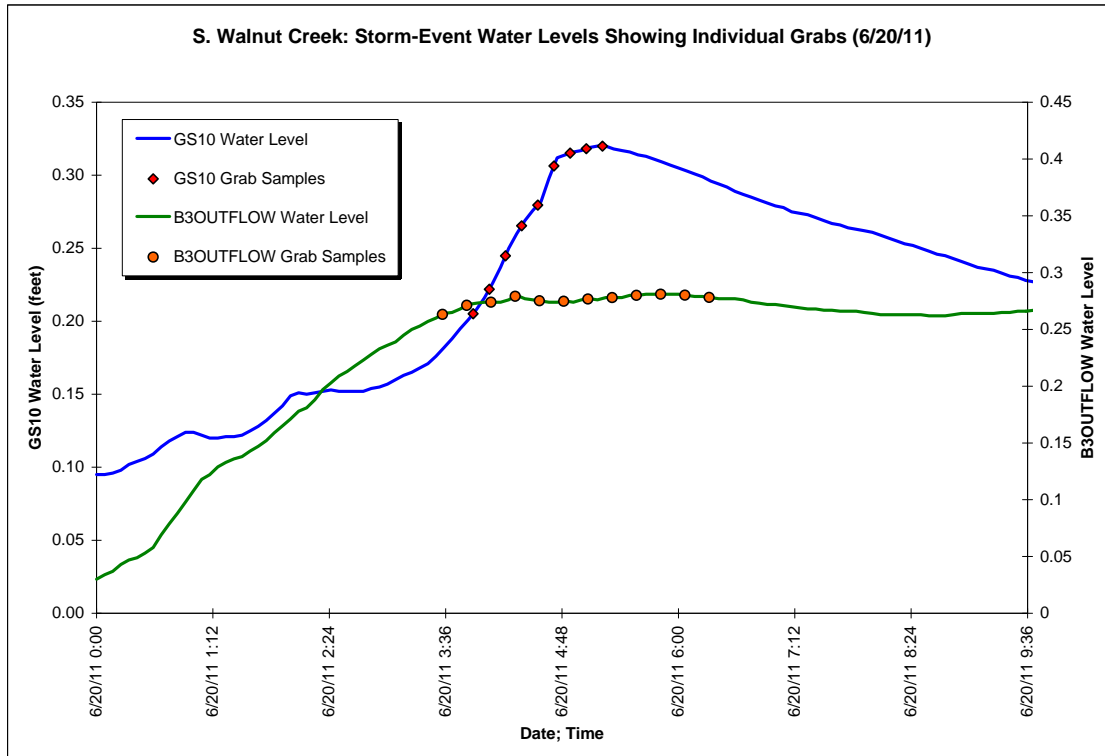
Note: GS13 composite aliquots collected at 5-minute intervals; A1EFF and A2EFF collected at 15-minute intervals.

Figure 21. North Walnut Creek Storm Event Water Levels and Grab Samples: July 13 and 14, 2011



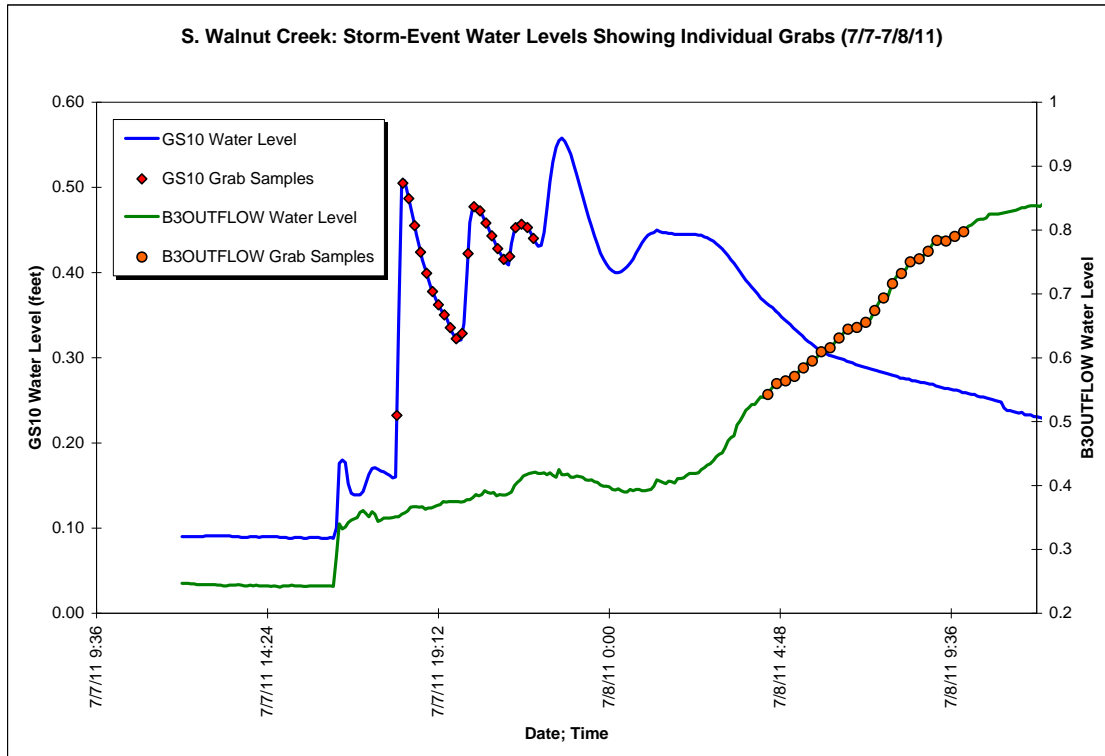
Note: Composite aliquots collected at 10-minute intervals.

Figure 22. South Walnut Creek Storm Event Water Levels and Grab Samples: May 18, 2011



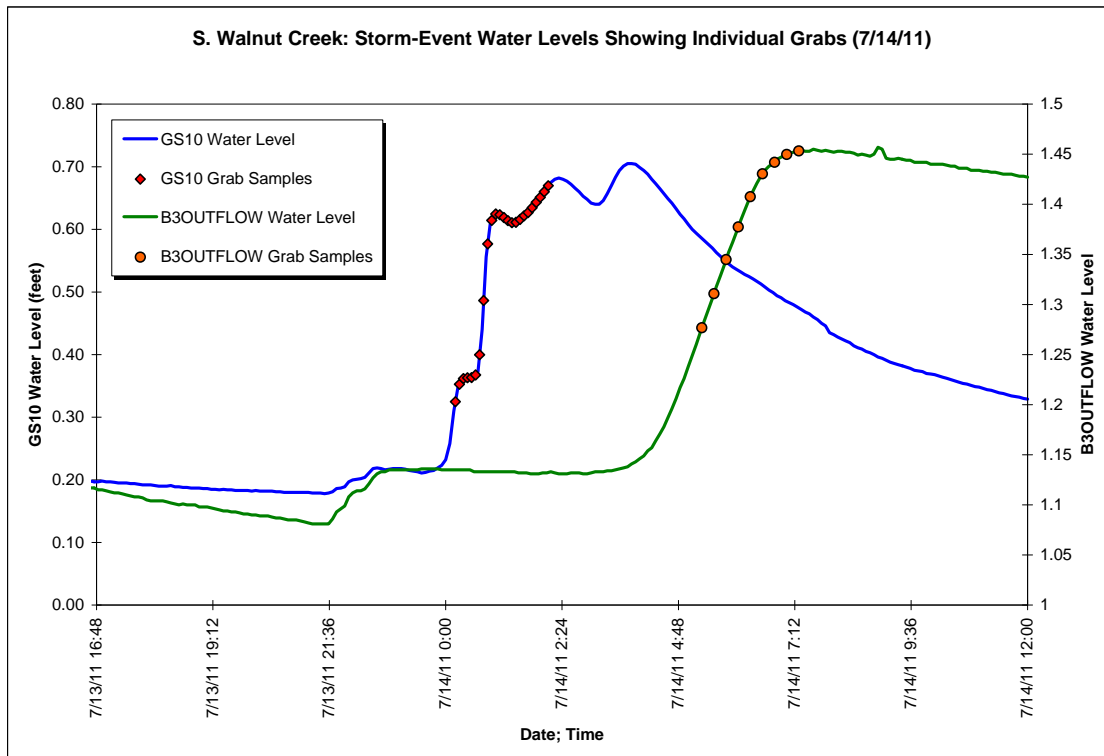
Note: GS10 composite aliquots collected at 10-minute intervals; B3OUTFLOW collected at 15-minute intervals.

Figure 23. South Walnut Creek Storm Event Water Levels and Grab Samples: June 20, 2011



Note: GS10 composite aliquots collected at 10-minute intervals; B3OUTFLOW collected at 15-minute intervals.

Figure 24. South Walnut Creek Storm Event Water Levels and Grab Samples: July 7 and 8, 2011

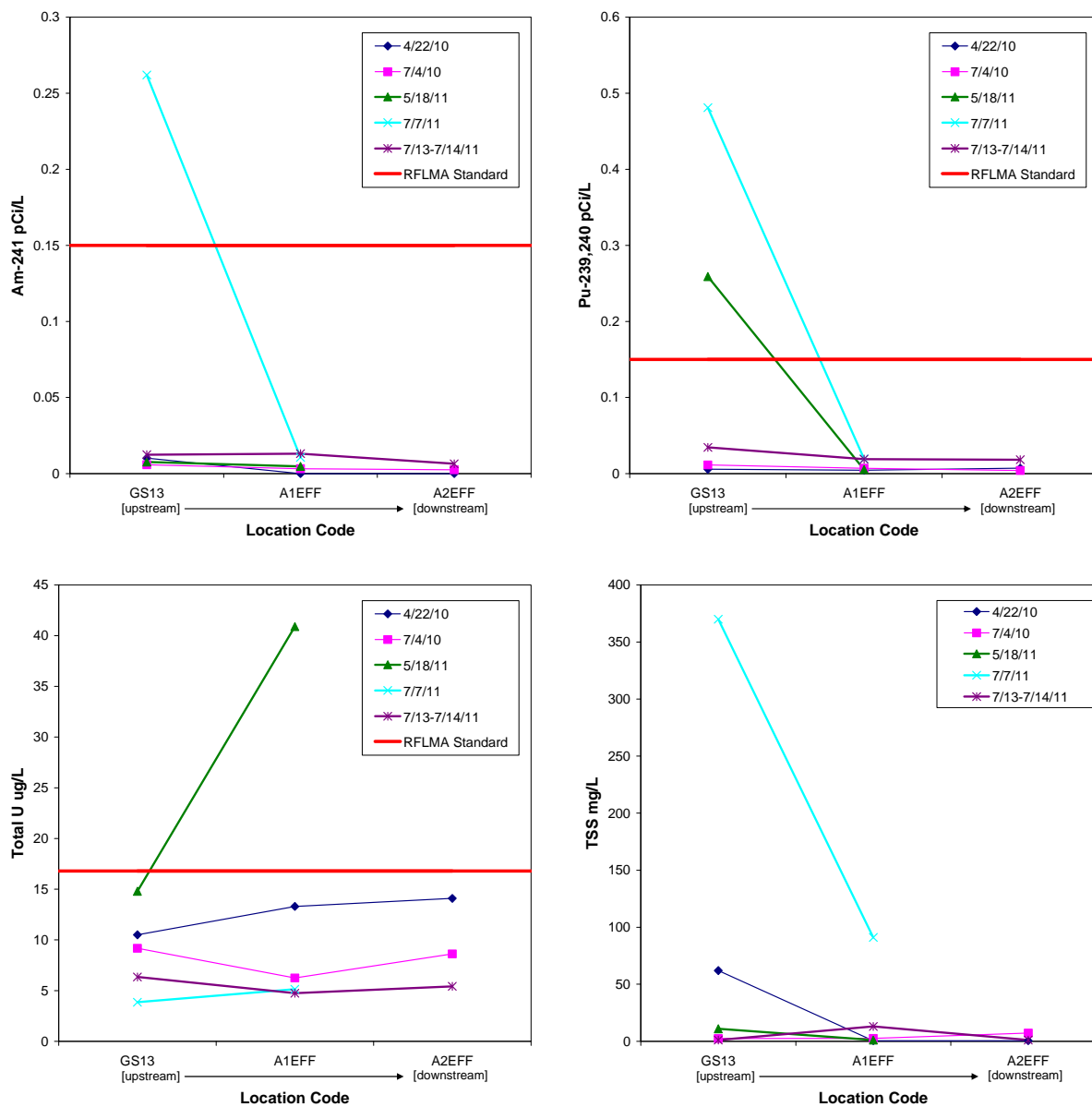


Note: GS10 composite aliquots collected at 5-minute intervals; B3OUTFLOW collected at 15-minute intervals.

Figure 25. South Walnut Creek Storm Event Water Levels and Grab Samples: July 14, 2011

Figure 26 shows the water quality variation as the runoff volume moves from upstream to downstream in North Walnut Creek for the five runoff events sampled to date. While the data do show measurable variability, they do not show increases for Pu, Am, and total suspended solids as water flows through the newly breached dams at A-1 and A-2. Uranium both increases and decreases.

While the geochemistry of uranium is well understood, LM is interested in increasing its knowledge of the site-specific mechanisms responsible for the significant variability of uranium concentrations. To that end, water monitoring data is also being reviewed and evaluated by a qualified geochemistry support subcontractor for any recommendations regarding possible additional sampling and analysis that could provide useful information.



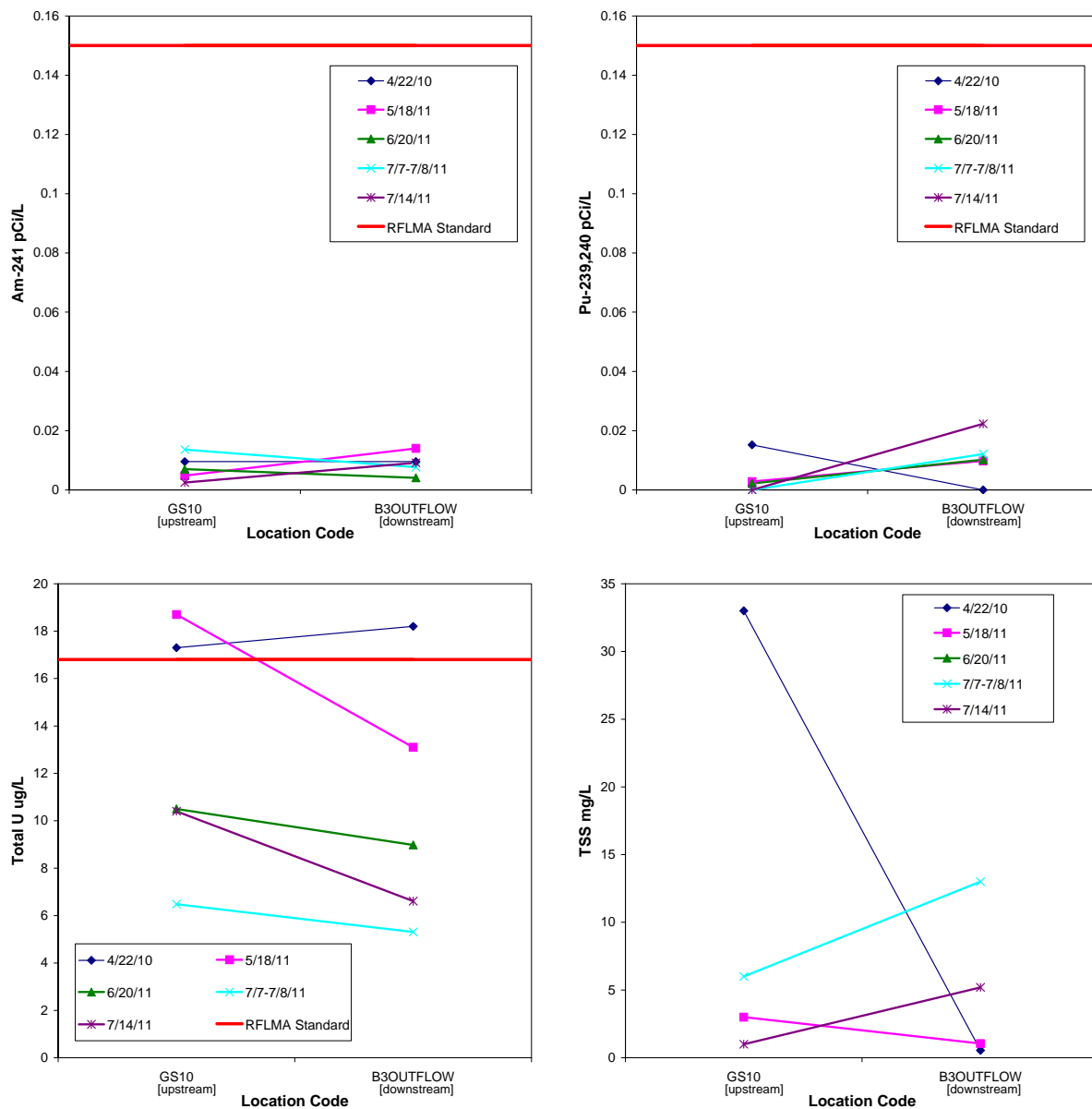
Note: The A2EFF automated sampler did not trigger appropriately during the May 18, 2011, and July 7, 2011, events.
 µg/L = micrograms per liter mg/L = milligrams per liter
 pCi/L = picocuries per liter TSS = total suspended solids

Figure 26. Comparison of Upstream to Downstream Analytical Results for North Walnut Creek Storm Event Samples

Figure 27 shows the water quality variation as the runoff volume moves from upstream to downstream in South Walnut Creek for the five runoff events sampled to date. As for North Walnut, the data show measurable variability but do not show significant increases for Pu, Am, and total suspended solids as water flows through the newly breached dams at B-1, B-2, and B-3. Uranium both increases and decreases.

While the geochemistry of uranium is well understood, LM is interested in increasing its knowledge of the site-specific mechanisms responsible for the significant variability of uranium

concentrations. To that end, water monitoring data is also being reviewed and evaluated by a qualified geochemistry support subcontractor for any recommendations regarding possible additional sampling and analysis that could provide useful information.

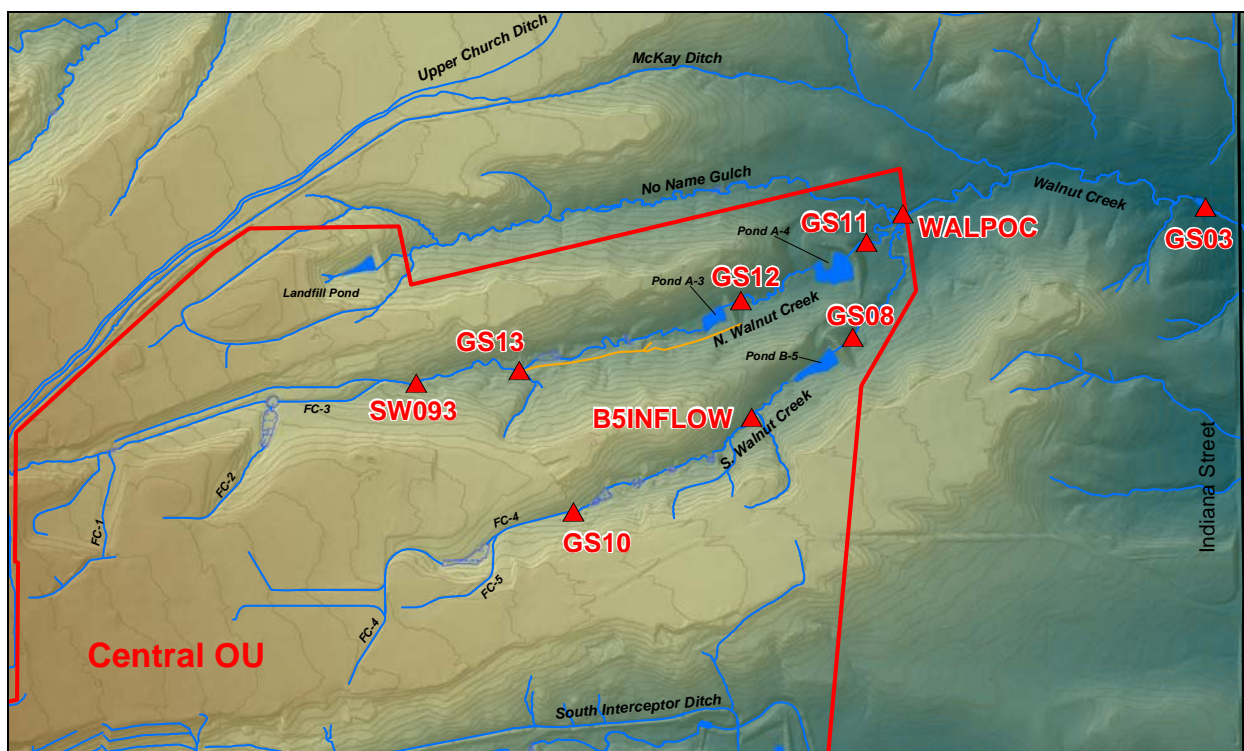


Note: Total suspended solids were not analyzed for the June 20, 2011, event.
 µg/L = micrograms per liter mg/L = milligrams per liter
 pCi/L = picocuries per liter TSS = total suspended solids

Figure 27. Comparison of Upstream to Downstream Analytical Results for South Walnut Creek Storm Event Samples

3.5 Continuous Flow-Paced Composite Sampling to Evaluate Uranium Transport

This monitoring objective is intended to evaluate the in-stream transport of uranium, specifically for Ponds A-4 and B-5, by assessing correlations, patterns, variability, and loading. The monitoring locations currently supporting this objective are shown in Figure 28. Samples are collected as continuous flow-paced composites during all flow conditions. Sampling for this monitoring objective began on March 10, 2010, in North Walnut Creek and on June 16, 2010, in South Walnut Creek. Monitoring location WALPOC began operation on September 9, 2011. Therefore, evaluation will use various periods starting on March 10, 2010, June 16, 2010, and September 9, 2011.



Note: The orange line shows the location of the A-Series Bypass Pipeline.

Figure 28. Continuous Flow-Paced Composite Sampling Locations in Walnut Creek

Starting on October 13, 2011, water in North Walnut Creek was diverted around Pond A-3 and former Ponds A-1 and A-2 to drain Pond A-3 in preparation for the Dam A-3 breach. This diverted water was routed through the A-Series Bypass Pipeline from GS13 to just below Pond A-3 (near GS12). During this period, it is assumed that the quality and quantity of water when it entered the pipeline were the same as when it exited the pipeline.³ Therefore, data collected at both GS13 and GS12 have been combined to effectively summarize water quality *entering* Pond A-4, and not water quality *exiting* Pond A-3.

³ This assumption has been confirmed by grab samples taken at GS13 and A4INFLOW during use of the pipeline; A4INFLOW is located just upstream of Pond A-4.

Table 4 through Table 6 show summary statistics for the three ongoing periods starting March 10, 2010, June 16, 2010, and September 9, 2011. The data clearly show concentrations well below the standard at the locations closest to the Site boundary. In addition, all other locations show concentrations below the 30-microgram-per-liter maximum concentration limit for uranium. Figure 29 uses proportional symbols to map the uranium concentrations since September 9, 2011 (see Table 6 for values).

Table 4. Summary Statistics for Uranium Continuous Flow-Paced Composite Sampling: North Walnut Creek Starting March 10, 2010

South Walnut Creek				North Walnut Creek			Upstream ↓ ↓ Downstream
	Location Code	Volume-Weighted Average	Sample Count	Volume-Weighted Average	Sample Count	Location Code	
Upstream	GS10*	15.8	33	6.4	33	SW093*	
Downstream	GS08	8.6	20	11.2	33	GS13*	
				13.4	32	GS12 (A-4 inflow)	
				9.2	18	GS11	
↓							
Walnut Creek							
	Location Code	Volume-Weighted Average	Sample Count				
	GS03*	5.2	31				

Notes: *Data for GS10, SW093, GS13, and GS03 are currently acquired through the routine RFLMA-required monitoring at these locations. Sample counts vary because composite sampling periods vary with water availability.

Table 5. Summary Statistics for Uranium Continuous Flow-Paced Composite Sampling: South Walnut Creek Starting June 16, 2010

South Walnut Creek				North Walnut Creek			Upstream ↓ ↓ Downstream
	Location Code	Volume-Weighted Average	Sample Count	Volume-Weighted Average	Sample Count	Location Code	
Upstream	GS10*	18.4	24	5.3	20	SW093*	
Downstream	B5INFLOW	8.3	19	14.6	22	GS13*	
	GS08	7.0	10	16.0	20	GS12 (A-4 inflow)	
				8.1	9	GS11	
↓							
Walnut Creek							
	Location Code	Volume-Weighted Average	Sample Count				
	GS03*	3.8	15				

Notes: *Data for GS10, SW093, GS13, and GS03 are currently acquired through the routine RFLMA-required monitoring at these locations. Sample counts vary because composite sampling periods vary with water availability.

Table 6. Summary Statistics for Uranium Continuous Flow-Paced Composite Sampling: Data Starting September 9, 2011

South Walnut Creek				North Walnut Creek			Upstream ↓ ↓ Downstream
	Location Code	Volume-Weighted Average	Sample Count	Volume-Weighted Average	Sample Count	Location Code	
Upstream ↓ Downstream	GS10*	22.7	5	5.3	4	SW093*	
	B5INFLOW	7.4	3	18.8	3	GS13*	
	GS08	6.7	7	19.6	3	GS12 (A-4 inflow)	
				8.0	6	GS11	
Walnut Creek							
	Location Code	Volume-Weighted Average	Sample Count				
Upstream Downstream	WALPOC*	8.1	6				
	GS03*	7.3	5				

Notes: *Data for GS10, SW093, GS13, WALPOC, and GS03 are currently acquired through the routine RFLMA-required monitoring at these locations.
Sample counts vary because composite sampling periods vary with water availability.

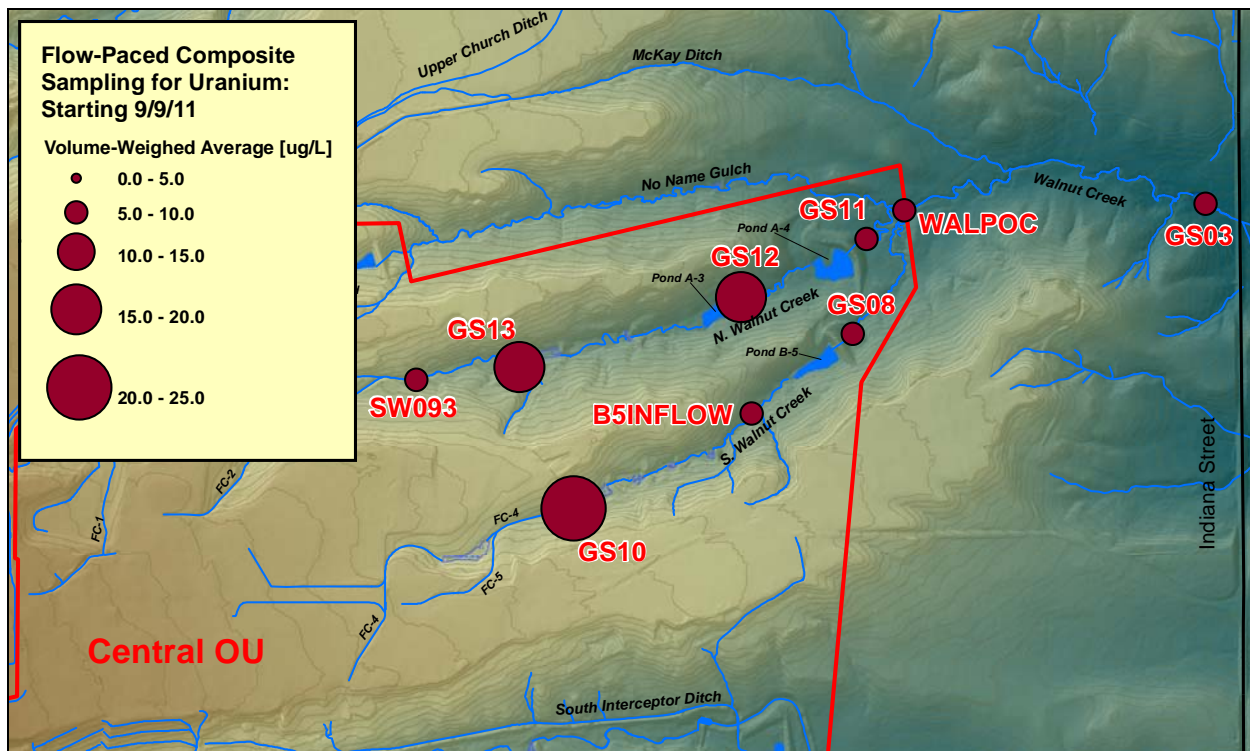
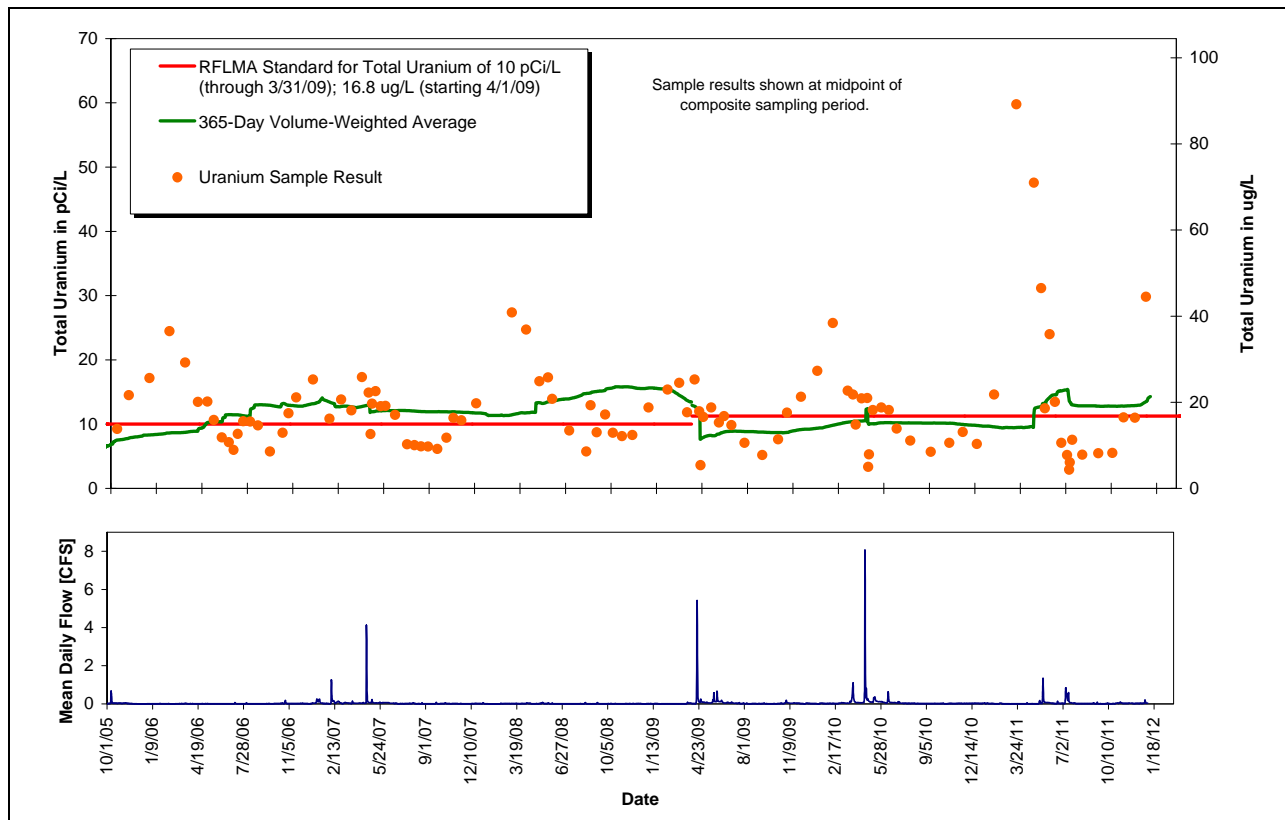
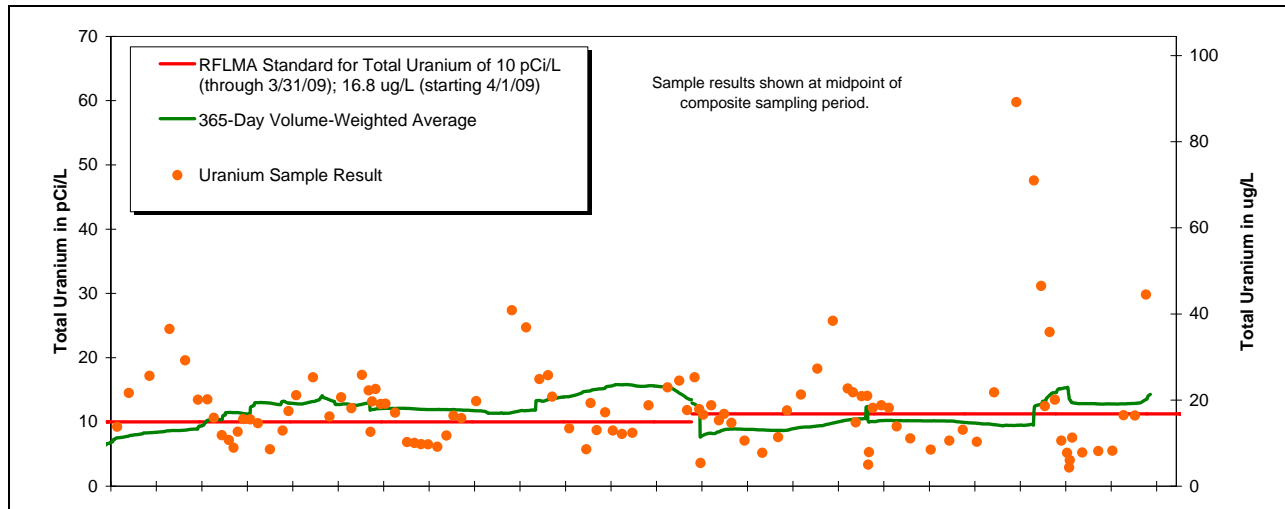


Figure 29. Map Showing Volume-Weighted Average Uranium Concentrations for Samples Collected Since September 9, 2011

Figure 30 through Figure 38 show plots of composite sample results and the 365-day volume-weighted averages at each location.⁴ The 365-day average differs from the 12-month rolling average used for RFLMA evaluation only in that the 365-day average is calculated for every day, while the 12-month rolling average is calculated only on the last day of each month. The plots also show the mean daily flow hydrograph at each location. The plots clearly show the significant variability in sample results. In general, the higher concentrations are during periods of baseflow with very little runoff (especially winter) and immediately following dry periods when there was no flow.

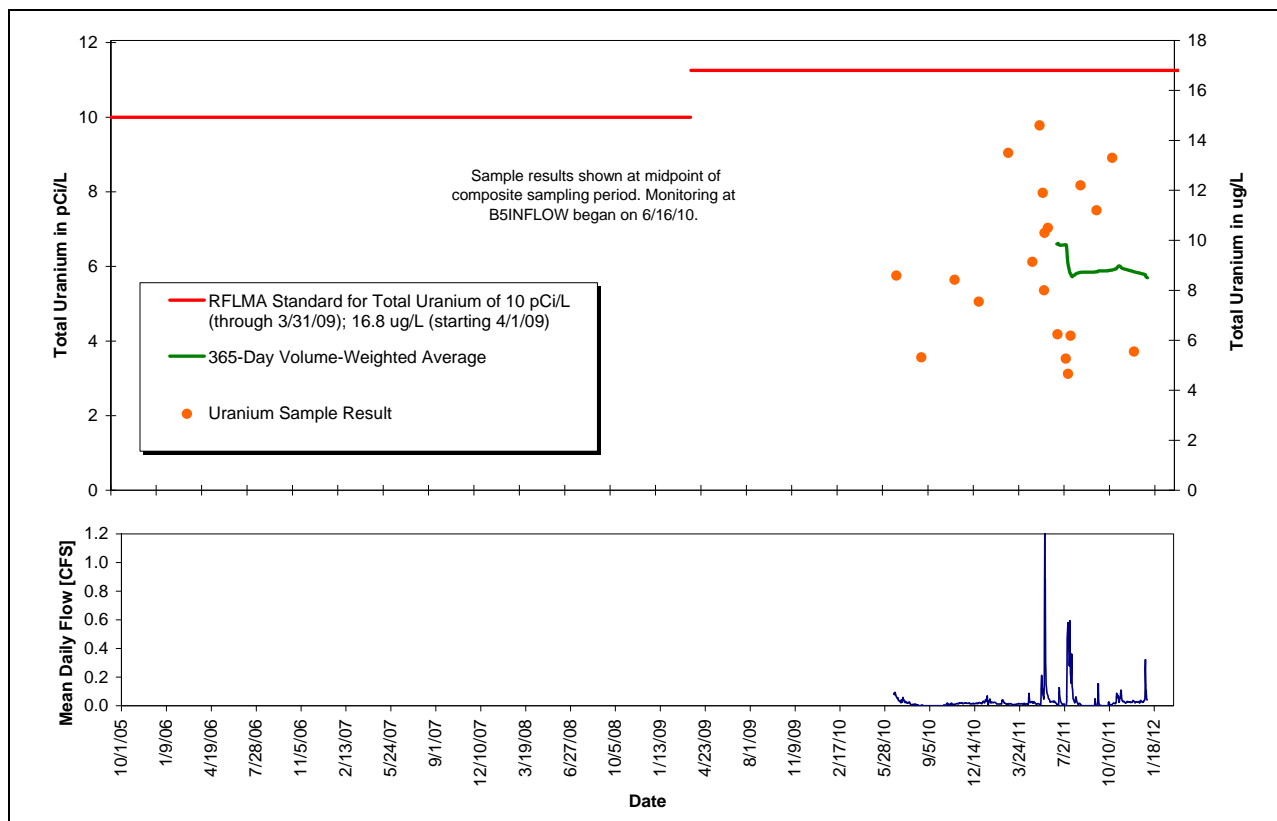
As noted in Section 3.4, water monitoring data is also being reviewed and evaluated by a qualified geochemistry support subcontractor for any recommendations regarding possible additional sampling and analysis that could provide useful information.

⁴ The RFLMA standards shown on these plots are for reference only. RFLMA-required evaluation is location-specific (i.e., POCs, POEs) and is not part of this AMP report. Evaluation of sampling results as required by RFLMA is routinely presented in other reports according to the RFLMA reporting requirements.



CFS = cubic feet per second
 ug/L = micrograms per liter
 pCi/L = picocuries per liter

Figure 30. Composite Sample Uranium Results and Rolling 365-Day Averages at GS10

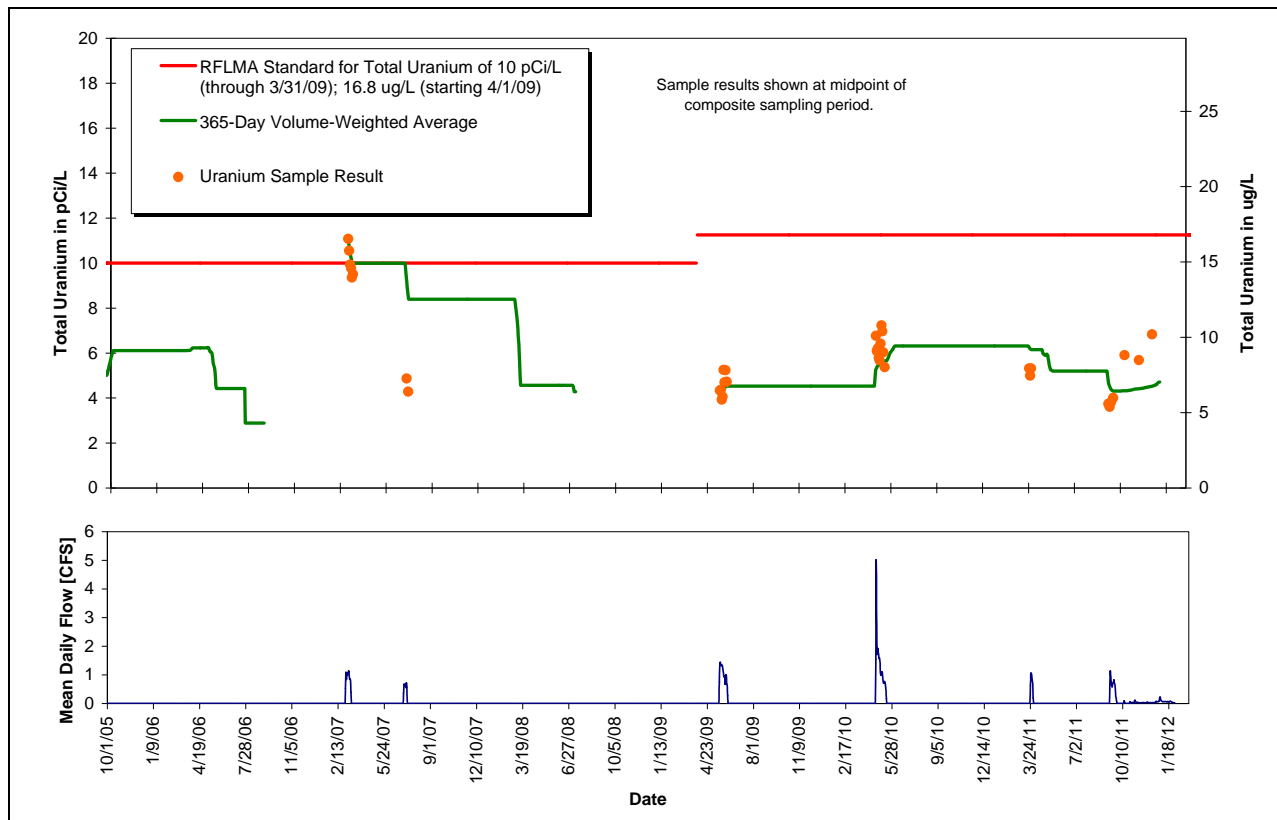


CFS = cubic feet per second

µg/L = micrograms per liter

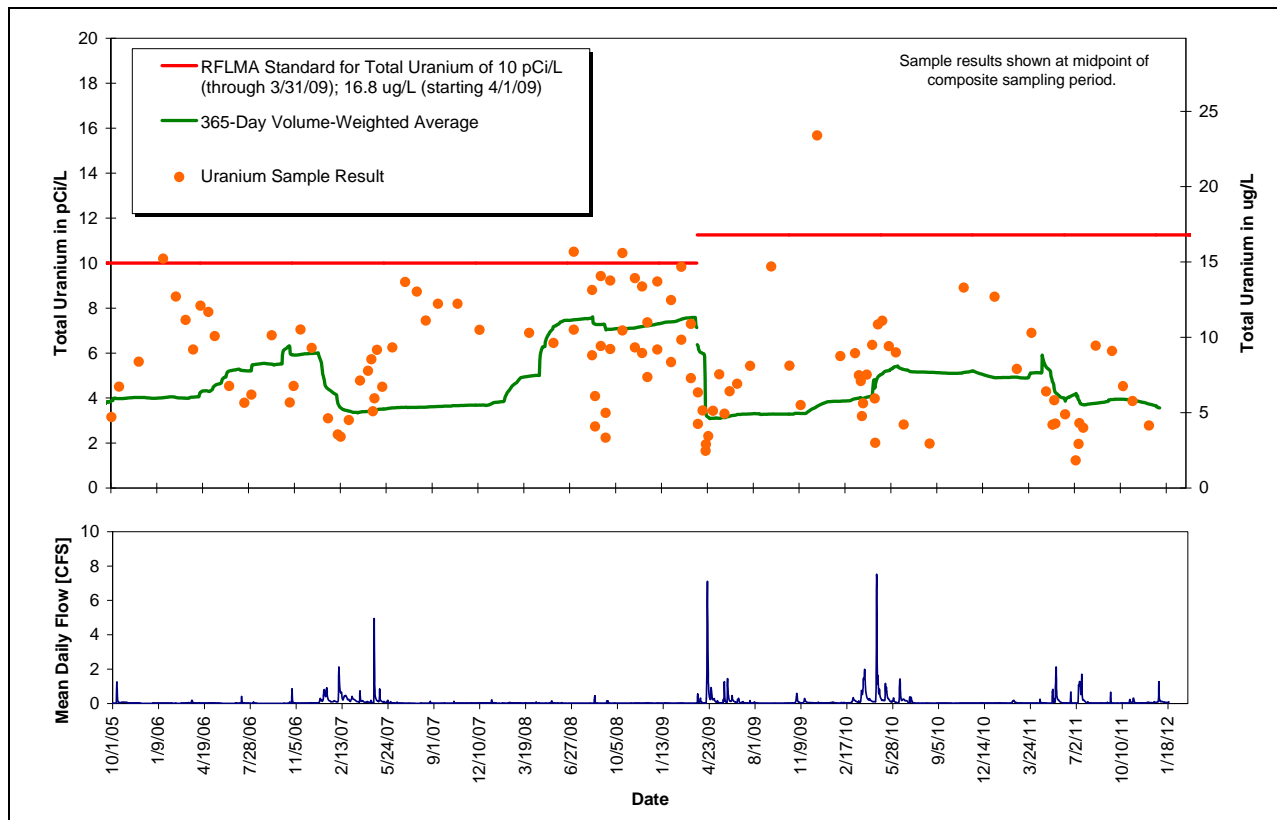
pCi/L = picocuries per liter

Figure 31. Composite Sample Uranium Results and Rolling 365-Day Averages at B5INFLOW



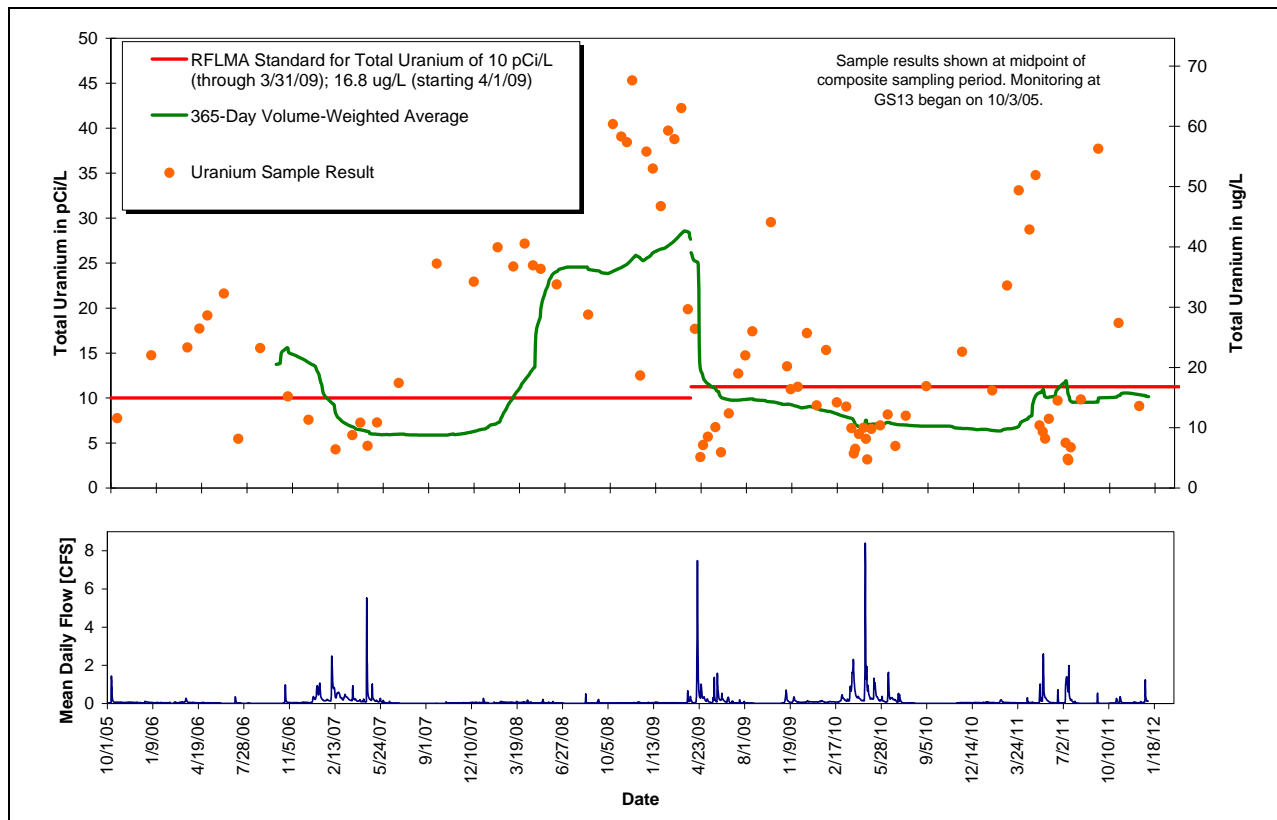
CFS = cubic feet per second
 µg/L = micrograms per liter
 pCi/L = picocuries per liter

Figure 32. Composite Sample Uranium Results and Rolling 365-Day Averages at GS08



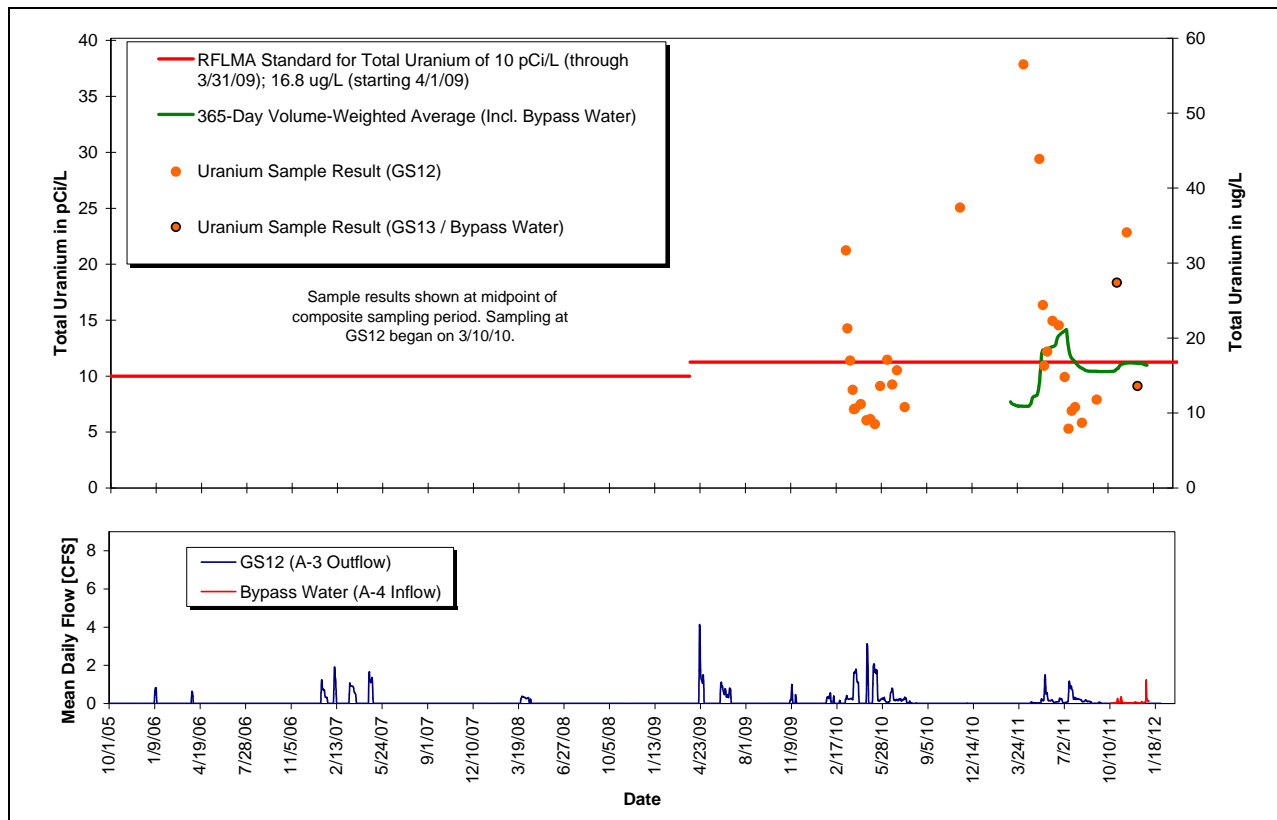
CFS = cubic feet per second
 µg/L = micrograms per liter
 pCi/L = picocuries per liter

Figure 33. Composite Sample Uranium Results and Rolling 365-Day Averages at SW093



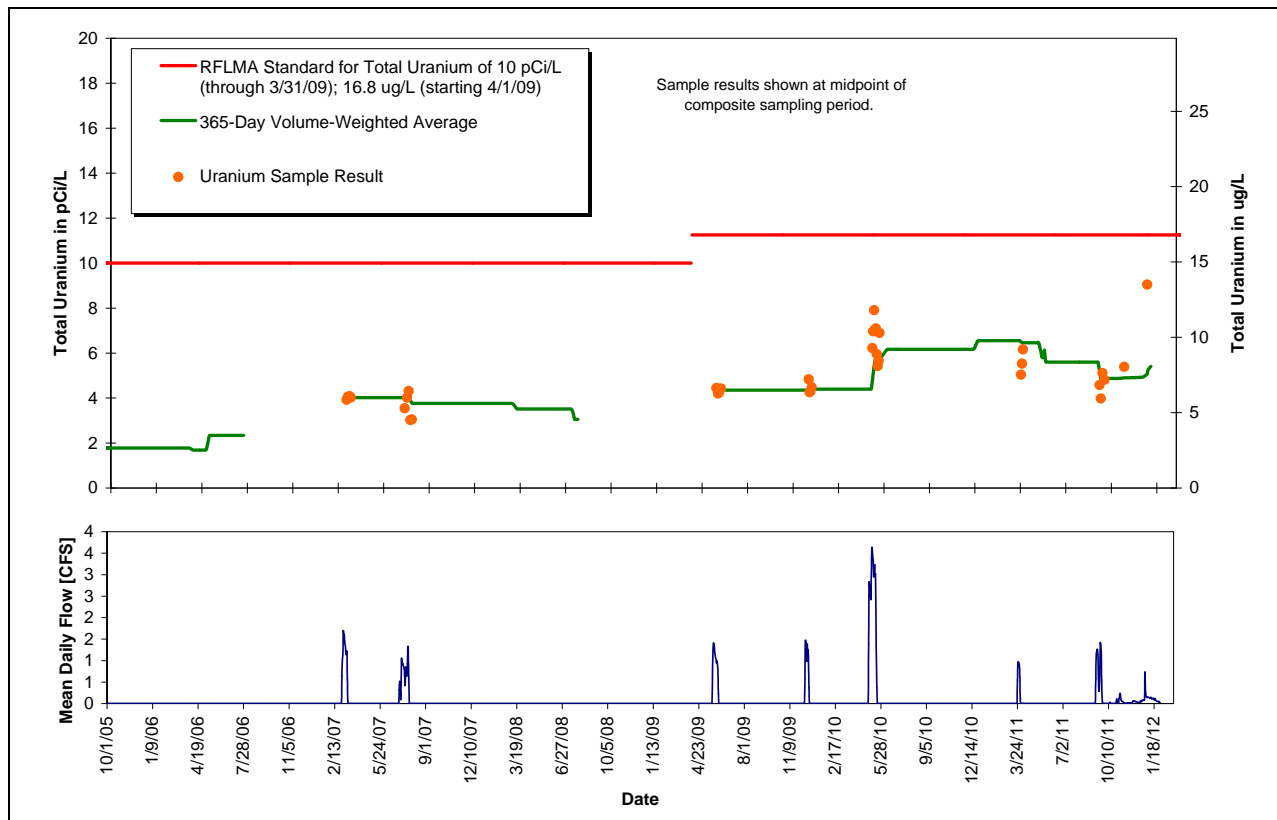
CFS = cubic feet per second
 µg/L = micrograms per liter
 pCi/L = picocuries per liter

Figure 34. Composite Sample Uranium Results and Rolling 365-Day Averages at GS13



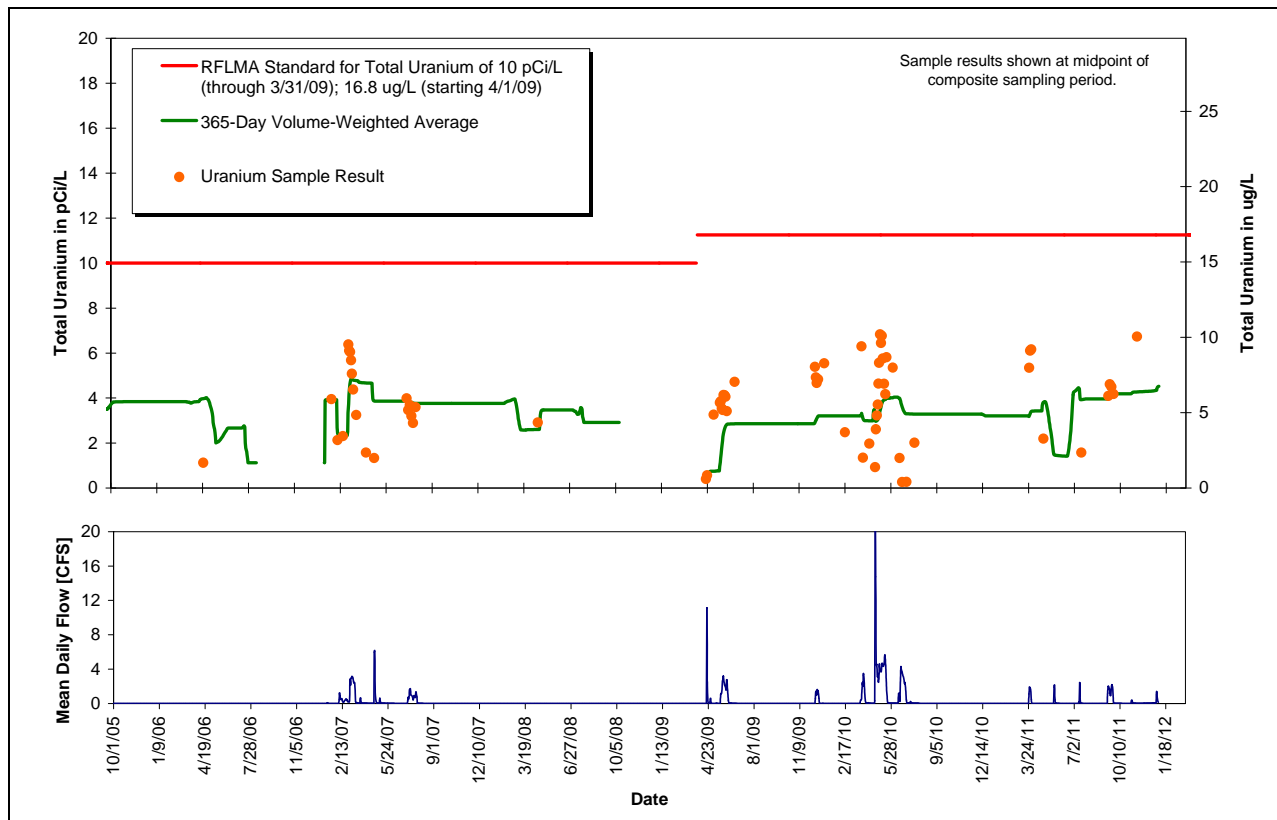
CFS = cubic feet per second
 µg/L = micrograms per liter
 pCi/L = picocuries per liter

Figure 35. Composite Sample Uranium Results and Rolling 365-Day Averages at GS12 (A-4 inflow)



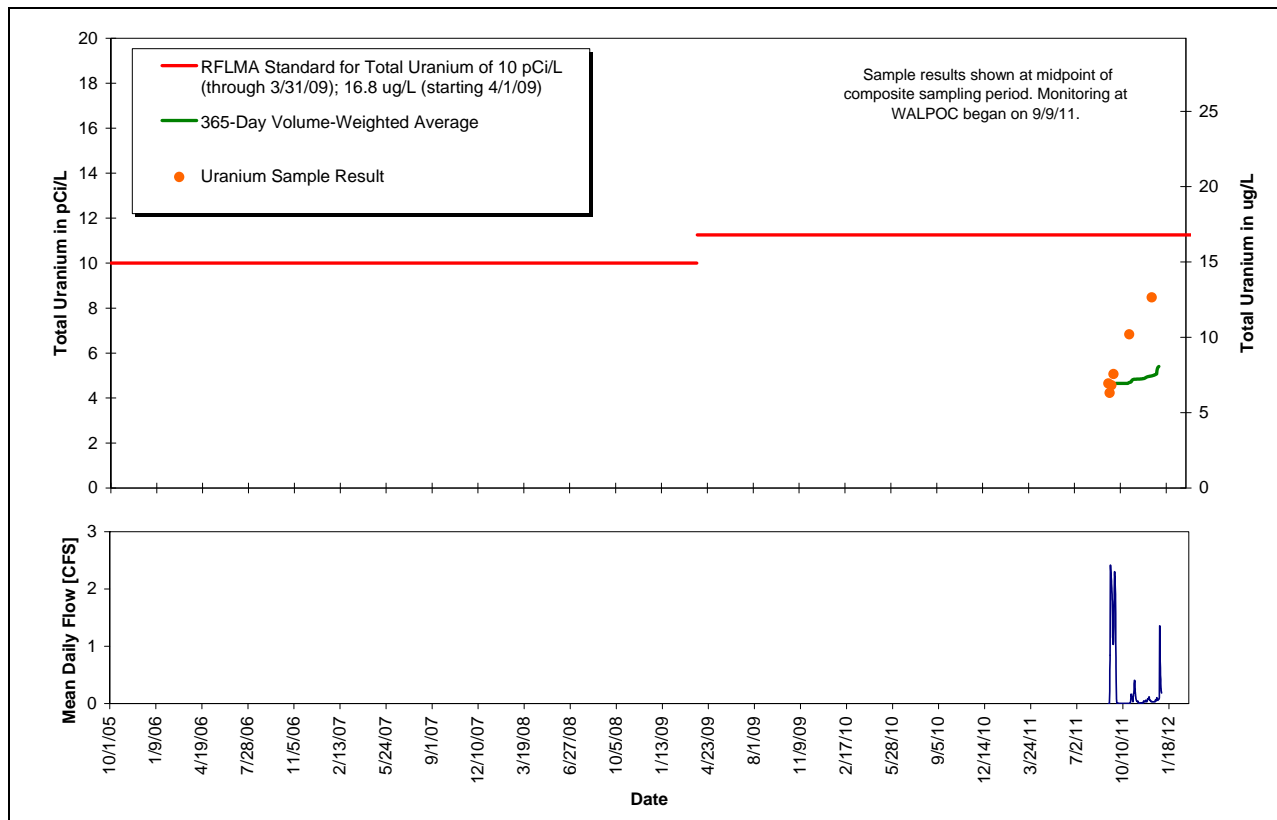
CFS = cubic feet per second
 ug/L = micrograms per liter
 pCi/L = picocuries per liter

Figure 36. Composite Sample Uranium Results and Rolling 365-Day Averages at GS11



CFS = cubic feet per second
 µg/L = micrograms per liter
 pCi/L = picocuries per liter

Figure 37. Composite Sample Uranium Results and Rolling 365-Day Averages at GS03

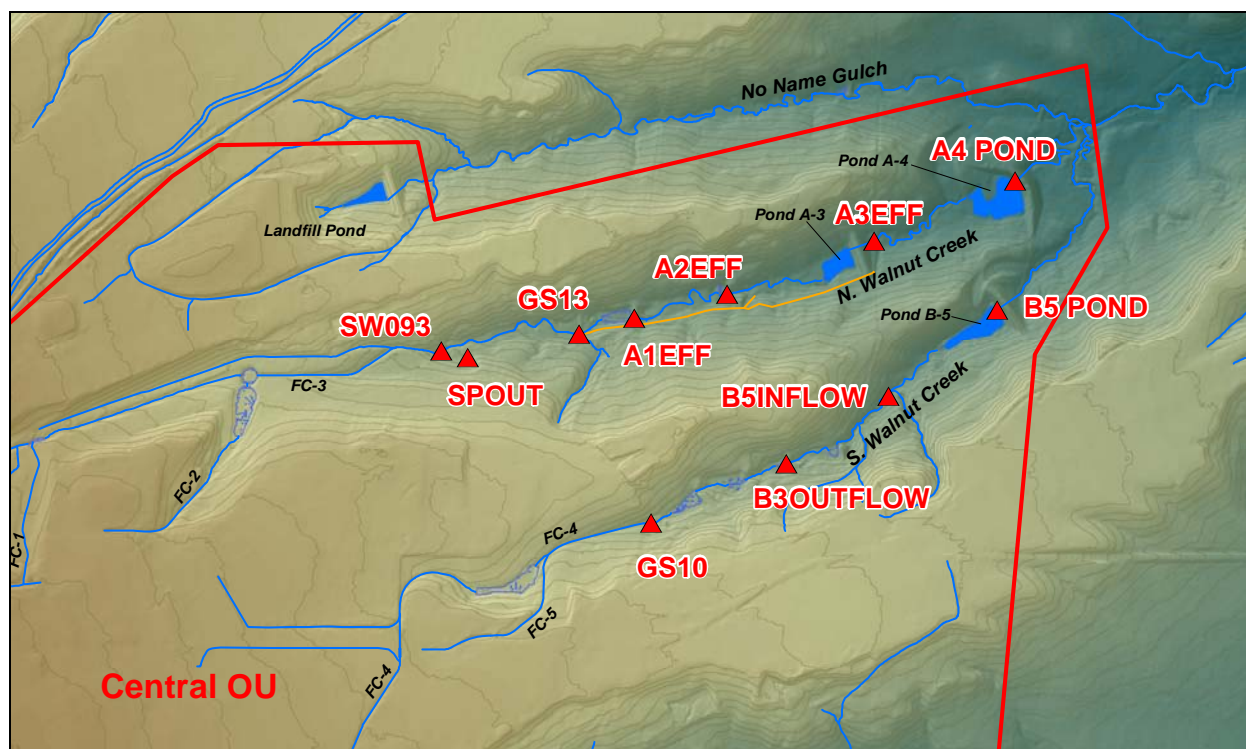


CFS = cubic feet per second
 µg/L = micrograms per liter
 pCi/L = picocuries per liter

Figure 38. Composite Sample Uranium Results and Rolling 365-Day Averages at WALPOC

3.6 Grab Sampling for Uranium in North and South Walnut Creeks

This monitoring objective is primarily intended to evaluate the transport of uranium in North and South Walnut Creeks by assessing correlations, patterns, variability, and loading. This objective is also intended to help define the relative impacts of the Solar Ponds Plume Treatment System (SPPTS) contributions on surface water in North Walnut Creek. Samples are currently collected biweekly as grabs. Figure 39 presents the uranium grab sampling locations in North and South Walnut Creeks. Sampling for this monitoring objective at most locations began on January 27, 2010.



Note: The orange line shows the location of the A-Series Bypass Pipeline. A3EFF is co-located with GS12 (A3EFF is the grab sampling location, while GS12 is the automated composite sampling location).

Figure 39. Uranium Grab Sampling Locations in North and South Walnut Creeks

Starting on October 13, 2011, water in North Walnut Creek was diverted around Pond A-3 and former Ponds A-1 and A-2 to drain Pond A-3 in preparation for the Dam A-3 breach. This diverted water was routed through the A-Series Bypass Pipeline from GS13 to just below Pond A-3 (near A3EFF). During this period, it is assumed that the quality and quantity of water when it entered the pipeline were the same as when it exited the pipeline.⁵ Therefore, data collected at both GS13 and A3EFF have been combined to effectively summarize water quality entering Pond A-4, and not water quality exiting Pond A-3.

⁵ This assumption has been confirmed by grab samples taken at GS13 and A4INFLOW; A4INFLOW is located just upstream of Pond A-4.

Table 7 shows summary statistics for the uranium grab sampling in North and South Walnut Creeks. The grab sample results show even more variability than the flow-paced composite results, as expected. Grab samples are generally collected during fair-weather, baseflow periods, when uranium is more likely to be present. Continuous flow-paced composite sample results are a better representation of actual longer-term uranium concentrations; by design, automated composite sampling collects samples during all flow conditions, including intense, high-volume runoff periods when uranium concentrations are generally lower.

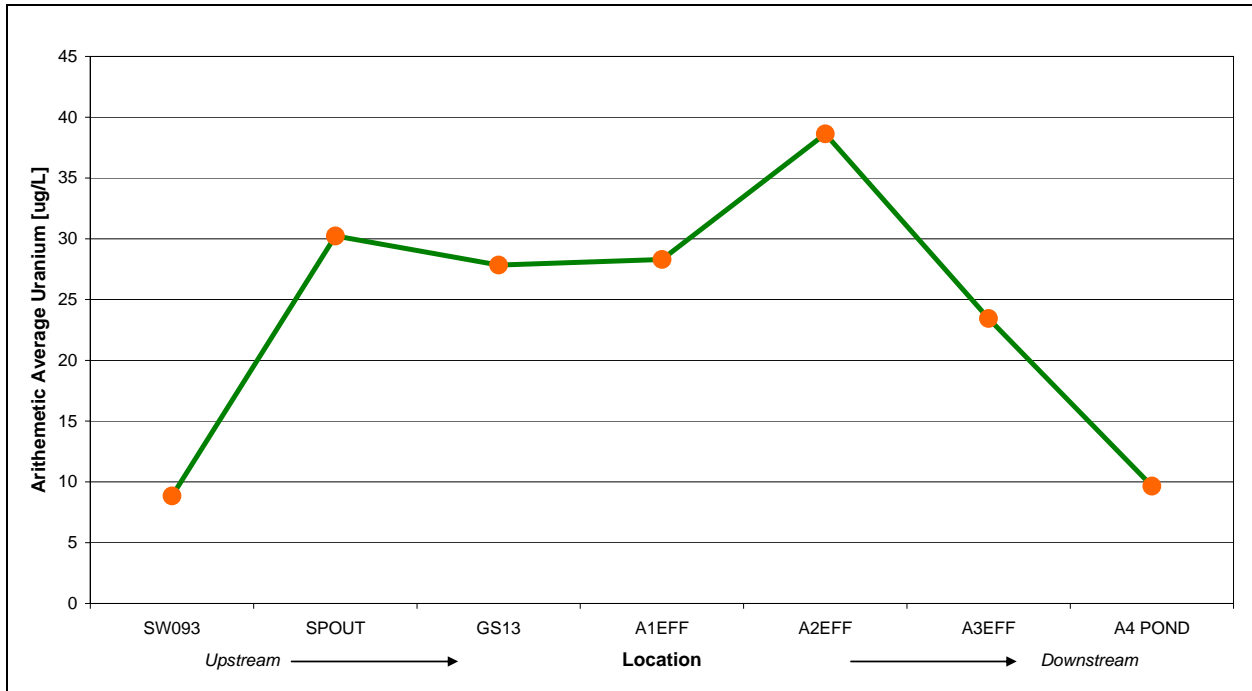
Table 7. Summary Statistics for Uranium Grab Sampling in North and South Walnut Creeks

North Walnut Creek		Uranium (ug/L)			
		Location Code	Average	Sample Count	85th Percentile
Upstream ↓ ↓ ↓ ↓ ↓	SW093	8.85	52	12.0	9.00
	SPOUT*	30.2	54	40.1	29.0
	GS13	27.8	44	50.6	23.0
	A1EFF	28.3	36	54.8	12.0
	A2EFF	38.6	32	73.7	24.5
	A3EFF (A-4 inflow)	23.5	34	36.2	20.5
Downstream	A4 POND	9.65	55	12.0	9.30

South Walnut Creek		Uranium (ug/L)			
		Location Code	Average	Sample Count	85th Percentile
Upstream ↓ ↓	GS10	16.2	53	23.2	15.0
	B3OUTFLOW	15.8	49	23.0	17.0
	B5INFLOW	12.3	45	18.2	11.0
Downstream	B5 POND	8.41	55	10.0	7.30

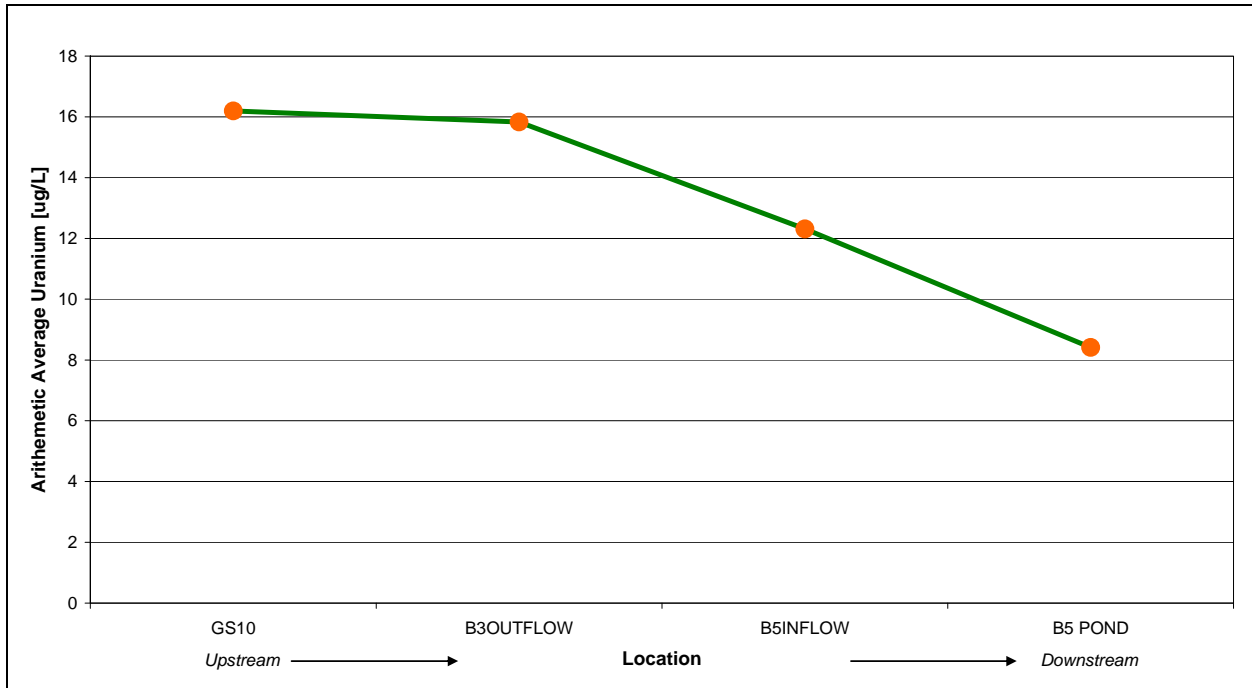
Notes: *SPOUT (SPPTS effluent) is not located along North Walnut Creek; the subsurface discharge gallery is located beside North Walnut between monitoring locations SW093 and GS13.
 Sample counts vary because some locations are periodically dry.
 µg/L = micrograms per liter

Grab samples do, however, give a good portrayal of spatial water quality variation (i.e., upstream to downstream). Figure 40 and Figure 41 show the spatial variation (upstream to downstream) of average uranium concentrations in North and South Walnut Creeks. Both plots show noticeable variation. As stated previously, the Site continues to collect additional information, evaluate data, and consult outside experts to further describe the geochemistry of uranium at Rocky Flats.



Notes: *SPOUT (SPPTS effluent) is not located along North Walnut Creek; the sub-surface discharge gallery is located beside North Walnut between monitoring locations SW093 and GS13.
 µg/L = micrograms per liter

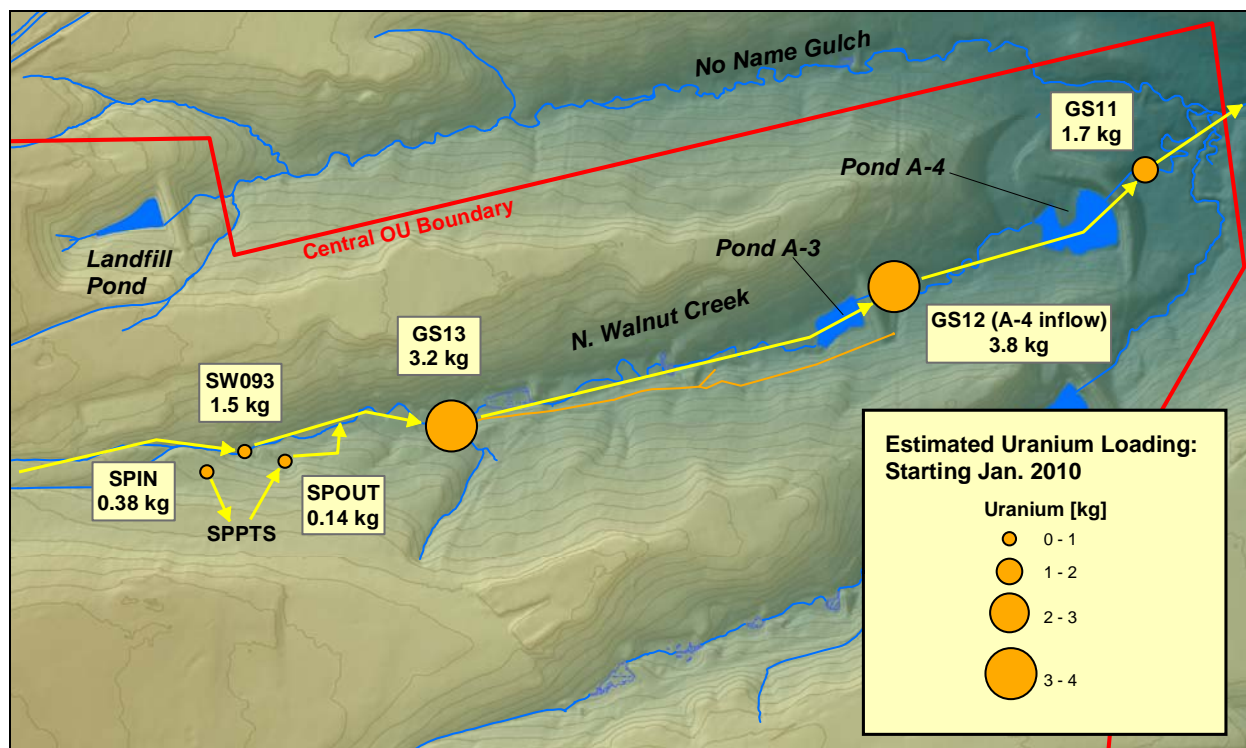
Figure 40. Arithmetic Average Uranium Concentration at North Walnut Creek Grab Locations



µg/L = micrograms per liter

Figure 41. Arithmetic Average Uranium Concentration at South Walnut Creek Grab Locations

The map in Figure 42 shows the estimated total uranium loads in North Walnut Creek since January 2010. While the SPPTS has removed more than 60 percent of the uranium load in the water it collects, the loads at both the system influent (SPIN) and effluent (SPOUT) are small compared to the loads in North Walnut Creek. Even though the SPPTS concentrations are higher than the creek concentrations, the much larger creek flow volumes yield significantly larger loads. In fact, the load at SPOUT is estimated to only be about 4 percent of the load at GS13.



Note: SPIN represents influent to the SPPTS, while SPOUT represents effluent.

Loads at SW093, GS13, GS12, and GS11 are calculated using results from flow-paced composites (Section 3.5). Loads at SPIN and SPOUT are calculated using results from grab sampling related to this AMP objective and other treatment system optimization efforts.

Arrows indicate general flow routing.

kg = kilograms

Figure 42. Map Showing Estimated Uranium Loads in North Walnut Creek: January 2010 to Present

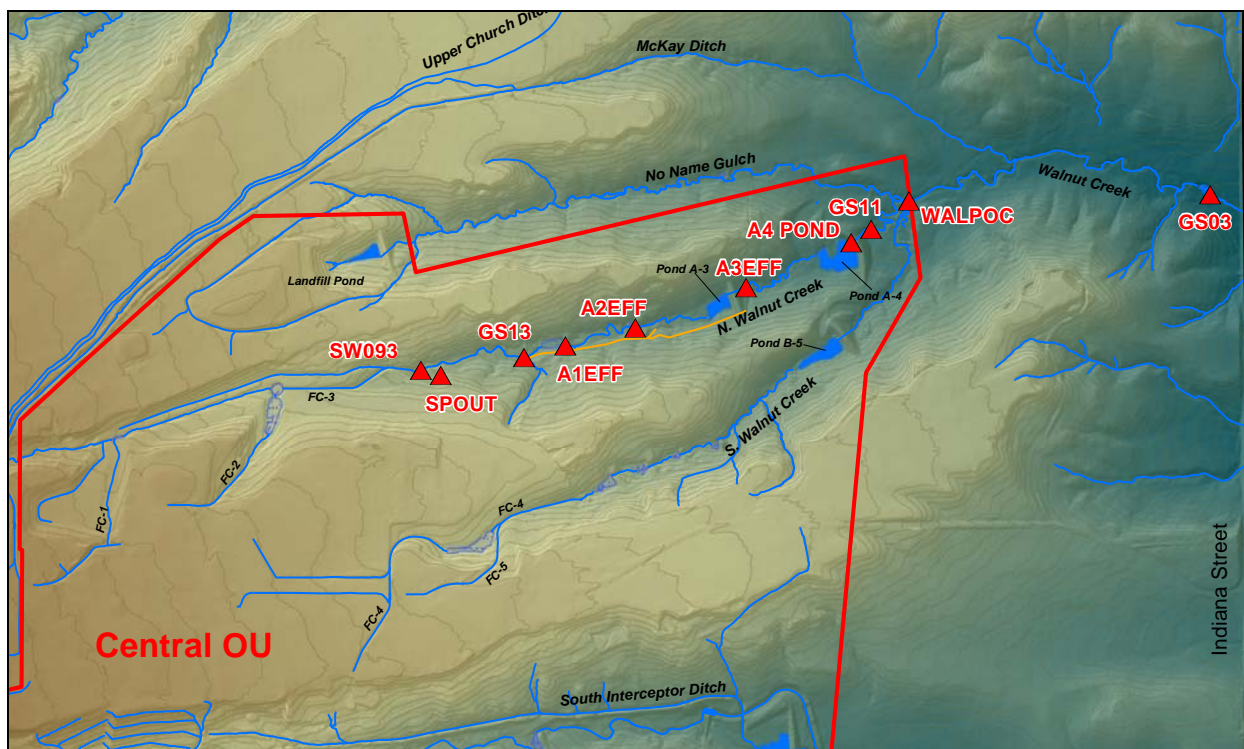
3.7 Grab Sampling for Nitrate + Nitrite as N in Walnut Creek

This monitoring objective is primarily intended to evaluate the transport of nitrate in North Walnut and Walnut Creeks by assessing correlations, patterns, variability, and loading. This objective is also intended to help define the relative impacts of the SPPTS contributions on surface water in North Walnut Creek. Samples are currently collected biweekly as grabs (Figure 43). Sampling for this monitoring objective at most locations began on January 27, 2010. WALPOC started operation on September 9, 2011.

At this time, WALPOC and GS03 are not included in the following evaluation because:

- WALPOC only began collecting samples with the initiation flow-through operations on September 12, 2011.
- Nitrate + nitrite as N analyses were not performed for all samples collected at GS03 prior to flow-through operations. Only samples collected during batch pond discharges were analyzed for nitrate + nitrite as N.

These locations will be included in future evaluation as more data become available.



Note: The orange line shows the location of the A-Series Bypass Pipeline.
A3EFF is co-located with GS12 (A3EFF is the grab sampling location, while GS12 is the automated composite sampling location).

Figure 43. Nitrate + Nitrite as N Grab Sampling Locations in North Walnut and Walnut Creeks

Starting on October 13, 2011, water in North Walnut Creek was diverted around Pond A-3 and former Ponds A-1 and A-2 to drain Pond A-3 in preparation for the Dam A-3 breach. This diverted water was routed through the A-Series Bypass Pipeline from GS13 to just below Pond A-3 (near A3EFF). During this period, it is assumed that the quality and quantity of water when it entered the pipeline were the same as when it exited the pipeline.⁶ Therefore, data collected at both GS13 and A3EFF have been combined to effectively summarize water quality *entering* Pond A-4, and not water quality *exiting* Pond A-3.

Table 8 shows summary statistics for the nitrate + nitrite as N grab sampling in North Walnut Creek. These grab samples are also collected during fair-weather, baseflow periods, when nitrate

⁶ This assumption has been confirmed by grab samples taken at GS13 and A4INFLOW; A4INFLOW is located just upstream of Pond A-4.

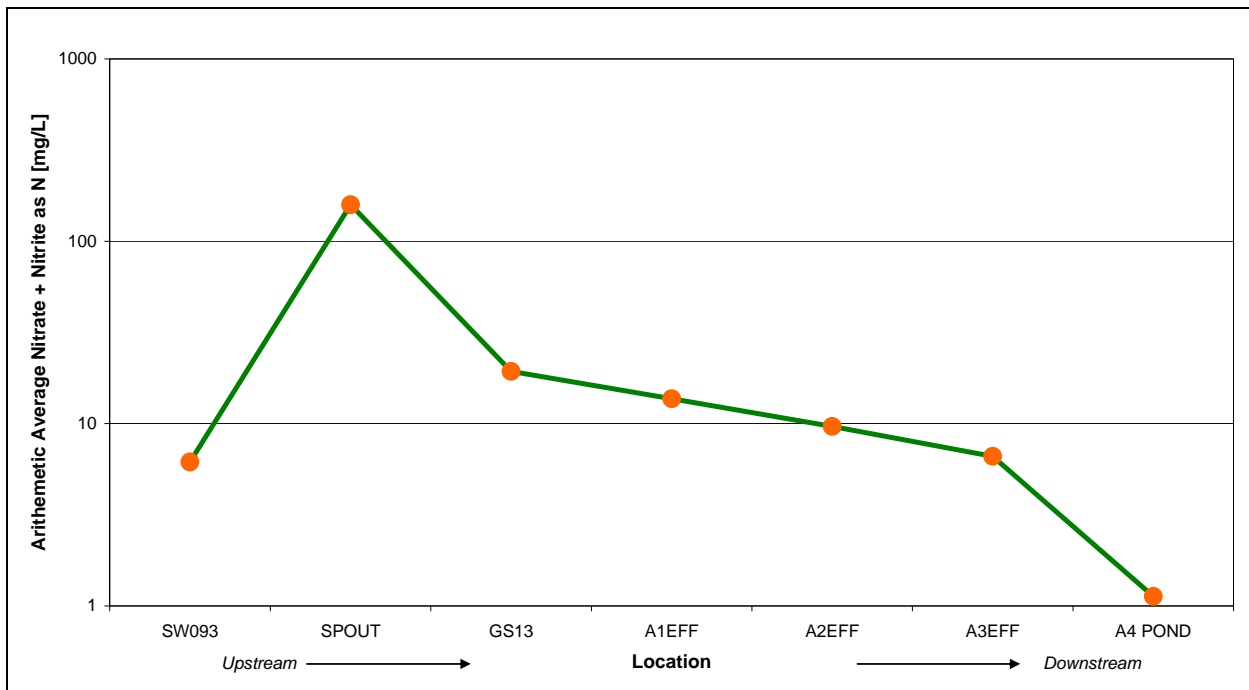
is more likely to be present (due to the source being groundwater). These grab samples also give a good portrayal of spatial nitrate variation (i.e., upstream to downstream). Figure 44 shows the spatial variation (upstream to downstream) of average nitrate concentrations in North Walnut Creek. The plot shows an increase between SW093 (upstream of Solar Ponds influence) and GS13 (downstream of Solar Ponds influence). However, farther downstream the natural biodegradation of nitrate is apparent.

Table 8. Summary Statistics for Nitrate + Nitrite as N Grab Sampling in North Walnut and Walnut Creeks

North Walnut Creek		NO ₃ +NO ₂ as N (mg/L)			
		Location Code	Average	Sample Count	85th Percentile
Upstream ↓ ↓ ↓ ↓ ↓	SW093	6.15	51	7.95	3.60
	SPOUT*	159	54	282	145
	GS13	19.3	44	33.0	19.5
	A1EFF	13.7	35	22.9	15.0
	A2EFF	9.65	30	16.7	7.70
	A3EFF (A-4 inflow)	9.25	33	23.3	6.70
Downstream	A4 POND	1.13	55	3.29	0.05

Notes: *SPOUT (SPPTS effluent) is not located in North Walnut Creek but flows into a below ground discharge gallery south of North Walnut Creek between monitoring locations SW093 and GS13.

Sample counts vary because some locations are periodically dry.
mg/L = milligrams per liter



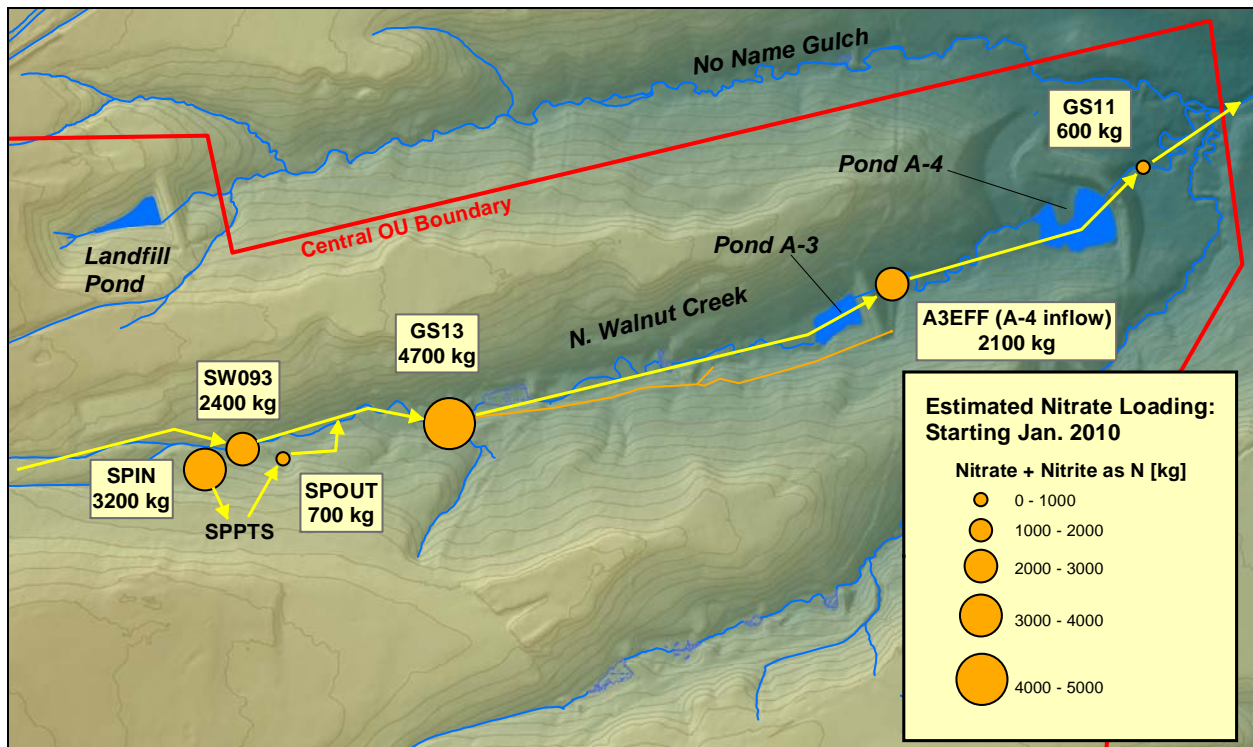
Notes: Concentrations shown on log scale.

*SPOUT (SPPTS effluent) is not located along North Walnut Creek; the subsurface discharge gallery is located beside North Walnut between monitoring locations SW093 and GS13.

mg/L = milligrams per liter

Figure 44. Arithmetic Average Nitrate + Nitrite as N Concentration at North Walnut Creek Grab Locations

The map in Figure 45 shows the estimated total nitrate + nitrite as N loads in North Walnut Creek since January 2010. While the SPPTS has removed nearly 80 percent of the nitrate load in the water it collects, the loads at both the system influent (SPIN) and effluent (SPOUT) are small compared to the loads in North Walnut Creek. As for uranium, the SPPTS concentrations are higher than the creek concentrations, but the much larger creek flow volumes yield significantly larger loads. In fact, the load at SPOUT is estimated to only be about 15 percent of the load at GS13.



Note: SPIN represents influent to the SPPTS, while SPOUT represents effluent.
 Loads at SW093, GS13, GS12, and GS11 are calculated using results from flow-paced composites (Section 3.5). Loads at SPIN and SPOUT are calculated using results from grab sampling related to this AMP objective and other treatment system optimization efforts.
 Arrows indicate general flow routing.
 kg = kilograms

Figure 45. Map Showing Estimated Nitrate + Nitrite as N Loads in North Walnut Creek: January 2010 to Present

4.0 Analytical Data: Fourth Quarter CY 2011

Table 9. Analytical Results for Water Samples

Table 10. Water Sampling Events: Fourth Quarter CY 2011

5.0 References

DOE (U.S. Department of Energy), 2007. *Rocky Flats Legacy Management Agreement*, Rocky Flats Environmental Technology Site, Golden, Colorado, March 14.

DOE (U.S. Department of Energy), 2011a. *Rocky Flats Site, Colorado, Surface Water Configuration Environmental Assessment*, DOE/EA-1747, LMS/RFS/S06335, May.

DOE (U.S. Department of Energy), 2011b. *Surface Water Configuration Adaptive Management Plan for the Rocky Flats, Colorado, Site*, LMS/RFS/S07698, June.

DOE (U.S. Department of Energy), 2011c. *Rocky Flats Site Operations Guide*, Revision 3.0, LMS/RFS/S03037-3.0, Office of Legacy Management, Westminster, Colorado, March.

Table 9. Analytical Results for Water Samples

LOCATION CODE	LOCATION TYPE	DATE SAMPLED	LAB REQUISITION NUMBER	CAS	ANALYTE	SAMPLE ID	RESULT	UNITS	LAB QUALIFIERS	SAMPLE TYPE	DETECTION LIMIT	UNCER-TAINTY	DATA VALIDATION QUALIFIERS	COLLECTION METHOD	LAB CODE
GS03	SL	9/12/2011	11094086	AM-241	Americium-241	N001	-0.00136	pCi/L	U	F	0.0175	0.00462	valid	C	GEN
GS03	SL	9/12/2011	11094086	PU-239,240	Plutonium-239, 240	N001	0	pCi/L	U	F	0.024	0.00456	valid	C	GEN
GS03	SL	9/12/2011	11094086	07440-61-1	Uranium	N001	6.11	ug/L		F	0.067		valid	C	GEN
GS03	SL	9/13/2011	11094086	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.05	mg/L	U	F	0.05		J	G	GEN
GS03	SL	9/15/2011	11094086	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N002	0.05	mg/L	U	F	0.05		J	G	GEN
GS03	SL	9/15/2011	11094091	AM-241	Americium-241	N001	0.00166	pCi/L	U	F	0.0214	0.00861	valid	C	GEN
GS03	SL	9/15/2011	11094091	PU-239,240	Plutonium-239, 240	N001	-0.00443	pCi/L	U	F	0.0216	0.00765	valid	C	GEN
GS03	SL	9/15/2011	11094091	07440-61-1	Uranium	N001	6.89	ug/L		F	0.067		valid	C	GEN
GS03	SL	9/18/2011	11094102	AM-241	Americium-241	N002	0.00323	pCi/L	U	F	0.0205	0.00634	valid	C	GEN
GS03	SL	9/18/2011	11094102	PU-239,240	Plutonium-239, 240	N002	0.00133	pCi/L	U	F	0.0174	0.00784	valid	C	GEN
GS03	SL	9/18/2011	11094102	07440-61-1	Uranium	N002	6.72	ug/L		F	0.067		valid	C	GEN
GS03	SL	9/18/2011	11094093	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.052	mg/L		F	0.019		valid	G	STD
GS03	SL	9/22/2011	11104123	AM-241	Americium-241	N001	0.00887	pCi/L	U	F	0.0188	0.00824	valid	C	GEN
GS03	SL	9/22/2011	11104123	PU-239,240	Plutonium-239, 240	N001	-6.29E-10	pCi/L	U	F	0.0172	0.00634	valid	C	GEN
GS03	SL	9/22/2011	11104123	07440-61-1	Uranium	N001	6.24	ug/L		F	0.067		valid	C	GEN
GS03	SL	9/22/2011	11104113	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N002	0.019	mg/L	U	F	0.019		valid	G	STD
GS03	SL	9/27/2011	11104113	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.019	mg/L	U	F	0.019		valid	G	STD
GS08	SL	9/12/2011	11094092	AM-241	Americium-241	N001	0.0024	pCi/L	U	F	0.0155	0.00577	valid	C	GEN
GS08	SL	9/12/2011	11094092	PU-239,240	Plutonium-239, 240	N001	0.00151	pCi/L	U	F	0.0221	0.00513	valid	C	GEN
GS08	SL	9/12/2011	11094092	07440-61-1	Uranium	N001	5.59	ug/L		F	0.067		valid	C	GEN
GS08	SL	9/15/2011	11094092	AM-241	Americium-241	N001	0.00108	pCi/L	U	F	0.0139	0.00366	valid	C	GEN
GS08	SL	9/15/2011	11094092	PU-239,240	Plutonium-239, 240	N001	3.1E-10	pCi/L	U	F	0.019	0.00624	valid	C	GEN
GS08	SL	9/15/2011	11094092	07440-61-1	Uranium	N001	5.39	ug/L		F	0.067		valid	C	GEN
GS08	SL	9/18/2011	11104117	AM-241	Americium-241	N001	-0.00135	pCi/L	U	F	0.0171	0.007	valid	C	GEN
GS08	SL	9/18/2011	11104117	PU-239,240	Plutonium-239, 240	N001	-0.00109	pCi/L	U	F	0.0142	0.00642	valid	C	GEN
GS08	SL	9/18/2011	11104117	07440-61-1	Uranium	N001	5.7	ug/L		F	0.067		valid	C	GEN
GS08	SL	9/21/2011	11104117	AM-241	Americium-241	N001	3.83E-10	pCi/L	U	F	0.0204	0.00771	valid	C	GEN
GS08	SL	9/21/2011	11104117	PU-239,240	Plutonium-239, 240	N001	0.00511	pCi/L	U	F	0.0167	0.0071	valid	C	GEN
GS08	SL	9/21/2011	11104117	07440-61-1	Uranium	N001	5.99	ug/L		F	0.067		valid	C	GEN
GS10	SL	7/1/2011	11073954	AM-241	Americium-241	N001	0.00818	pCi/L	U	F	0.0125	0.0083	valid	C	GEN
GS10	SL	7/1/2011	11073954	PU-239,240	Plutonium-239, 240	N001	0.00771	pCi/L	U	F	0.0178	0.00602	valid	C	GEN
GS10	SL	7/1/2011	11073954	07440-61-1	Uranium	N001	7.75	ug/L		F	0.067		valid	C	GEN
GS10	SL	7/7/2011	11073954	AM-241	Americium-241	N002	0.0136	pCi/L		F	0.0121	0.00844	J	C	GEN
GS10	SL	7/7/2011	11073954	PU-239,240	Plutonium-239, 240	N002	-0.00218	pCi/L	U	F	0.02	0.00522	valid	C	GEN
GS10	SL	7/7/2011	11073954	07440-61-1	Uranium	N002	6.48	ug/L		F	0.067		valid	C	GEN
GS10	SL	7/8/2011	11073955	AM-241	Americium-241	N004	0.0148	pCi/L		F	0.0121	0.00873	J	C	GEN
GS10	SL	7/8/2011	11073955	AM-241	Americium-241	N003	0.0157	pCi/L		D	0.0129	0.0087	J	C	GEN
GS10	SL	7/8/2011	11073955	PU-239,240	Plutonium-239, 240	N004	0.00841	pCi/L	U	F	0.0194	0.00776	valid	C	GEN
GS10	SL	7/8/2011	11073955	PU-239,240	Plutonium-239, 240	N003	0.002	pCi/L	U	D	0.0185	0.00556	valid	C	GEN
GS10	SL	7/8/2011	11073955	07440-61-1	Uranium	N004	4.4	ug/L		F	0.067		valid	C	GEN
GS10	SL	7/8/2011	11073955	07440-61-1	Uranium	N003	4.31	ug/L		D	0.067		valid	C	GEN
GS10	SL	7/10/2011	11073959	TSS	Total Suspended Solids	N002	4.3	mg/L	J	F	2		valid	C	STD
GS10	SL	7/10/2011	11073955	AM-241	Americium-241	N001	0.0196	pCi/L		F	0.014	0.0113	J	C	GEN
GS10	SL	7/10/2011	11073955	PU-239,240	Plutonium-239, 240	N001	0.0111	pCi/L	U	F	0.0185	0.00664	valid	C	GEN
GS10	SL	7/10/2011	11073955	07440-61-1	Uranium	N001	6.06	ug/L		F	0.067		valid	C	GEN
GS10	SL	7/11/2011	11084062	AM-241	Americium-241	N001	0.0578	pCi/L		F	0.0257	0.0239	J	C	GEN
GS10	SL	7/11/2011	11084062	PU-239,240	Plutonium-239, 240	N001	0.037	pCi/L		F	0.0235	0.0216	J	C	GEN
GS10	SL	7/11/2011	11084062	07440-61-1	Uranium	N001	11.3	ug/L		F	0.067		valid	C	GEN
GS10	SL	7/13/2011	11073959	07440-61-1	Uranium	N001	12	ug/L		F	0.02		valid	G	STD
GS10	SL	7/14/2011	11114168	AM-241	Americium-241	N002	0.00249	pCi/L	U	F	0.015	0.00345	valid	C	GEN
GS10	SL	7/14/2011	11114168	PU-239,240	Plutonium-239, 240	N002	-3.82E-10	pCi/L	U	F	0.014	0.0045	valid	C	GEN
GS10	SL	7/14/2011	11114168	07440-61-1	Uranium	N002	10.4	ug/L		F	0.067		valid	C	GEN
GS10	SL	7/21/2011	11104118	AM-241	Americium-241	N001	2.97	pCi/L		F	0.0177	0.327	J	C	GEN
GS10	SL	7/21/2011	11104118	AM-241	Americium-241	N002	4.01	pCi/L		D	0.0184	0.419	J	C	GEN
GS10	SL	7/21/2011	11104118	PU-239,240	Plutonium-239, 240	N001	0.938	pCi/L		F	0.0109	0.108	R	C	GEN
GS10	SL	7/21/2011	11104118	PU-239,240	Plutonium-239, 240	N002	4.07	pCi/L		D	0.0181	0.443	R	C	GEN
GS10	SL	7/21/2011	11104118	07440-61-1	Uranium	N001	7.82	ug/L		F	0.067		valid	C	GEN
GS10	SL	7/27/2011	11073991	07440-61-1	Uranium	N001	8.7	ug/L		F	0.02		valid	G	STD
GS10	SL	8/10/2011	11084024	07440-61-1	Uranium	N001	6.6	ug/L		F	0.02		valid	G	STD
GS10	SL	8/24/2011	11084051	07440-61-1	Uranium	N001	6.1	ug/L		F	0.02		valid	G	STD
GS10	SL	8/24/2011	11104118	AM-241	Americium-241	N002	0.0443	pCi/L		F	0.0194	0.0167	J	C	GEN
GS10	SL	8/24/2011	11104118	PU-239,240	Plutonium-239, 240	N002	0.0195	pCi/L		F	0.0169	0.0113	valid	C	GEN
GS10	SL	8/24/2011	11104118	07440-61-1	Uranium	N002	8.16	ug/L		F	0.067		valid	C	GEN
GS10	SL	9/7/2011	11094078	07440-61-1	Uranium	N001	5.1	ug/L		F	0.02		valid	G	STD

Table 9. Analytical Results for Water Samples

LOCATION CODE	LOCATION TYPE	DATE SAMPLED	LAB REQUISITION NUMBER	CAS	ANALYTE	SAMPLE ID	RESULT	UNITS	LAB QUALIFIERS	SAMPLE TYPE	DETECTION LIMIT	UNCERTAINTY	DATA VALIDATION QUALIFIERS	COLLECTION METHOD	LAB CODE
GS10	SL	9/20/2011	11094094	07440-61-1	Uranium	N001	6.2	ug/L		F	0.02		valid	G	STD
GS10	SL	9/29/2011	11114168	AM-241	Americium-241	N001	0.877	pCi/L		F	0.0155	0.11	valid	C	GEN
GS10	SL	9/29/2011	11114168	PU-239,240	Plutonium-239, 240	N001	0.658	pCi/L		F	0.0147	0.0882	valid	C	GEN
GS10	SL	9/29/2011	11114168	07440-61-1	Uranium	N001	8.24	ug/L		F	0.067		valid	C	GEN
GS10	SL	9/29/2011	11104113	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N002	0.06	mg/L		F	0.019		valid	G	STD
GS11	SL	9/12/2011	11094086	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N002	0.05	mg/L	U	F	0.05		J	G	GEN
GS11	SL	9/12/2011	11094092	AM-241	Americium-241	N001	1.16E-10	pCi/L		U	0.0251	0.00541	valid	C	GEN
GS11	SL	9/12/2011	11094092	PU-239,240	Plutonium-239, 240	N001	-0.00329	pCi/L		U	0.024	0.00644	valid	C	GEN
GS11	SL	9/12/2011	11094092	07440-61-1	Uranium	N001	6.84	ug/L		F	0.067		valid	C	GEN
GS11	SL	9/15/2011	11094086	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N002	0.05	mg/L	U	F	0.05		J	G	GEN
GS11	SL	9/15/2011	11094092	AM-241	Americium-241	N001	9.14E-11	pCi/L		U	0.0198	0.00425	valid	C	GEN
GS11	SL	9/15/2011	11094092	PU-239,240	Plutonium-239, 240	N001	0.00307	pCi/L		U	0.0224	0.00853	valid	C	GEN
GS11	SL	9/15/2011	11094092	07440-61-1	Uranium	N001	5.94	ug/L		F	0.067		valid	C	GEN
GS11	SL	9/18/2011	11094093	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.041	mg/L	J	F	0.019		valid	G	STD
GS11	SL	9/18/2011	11104117	AM-241	Americium-241	N002	-0.00147	pCi/L		U	0.0186	0.0076	valid	C	GEN
GS11	SL	9/18/2011	11104117	PU-239,240	Plutonium-239, 240	N002	0.00296	pCi/L		U	0.0193	0.0071	valid	C	GEN
GS11	SL	9/18/2011	11104117	07440-61-1	Uranium	N002	7.63	ug/L		F	0.067		valid	C	GEN
GS11	SL	9/22/2011	11104113	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N002	0.019	mg/L	U	F	0.019		valid	G	STD
GS11	SL	9/22/2011	11104117	AM-241	Americium-241	N001	0.00339	pCi/L		U	0.0266	0.013	valid	C	GEN
GS11	SL	9/22/2011	11104117	PU-239,240	Plutonium-239, 240	N001	-0.00271	pCi/L		U	0.0177	0.00651	valid	C	GEN
GS11	SL	9/22/2011	11104117	07440-61-1	Uranium	N001	7.18	ug/L		F	0.067		valid	C	GEN
GS11	SL	9/27/2011	11104113	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.019	mg/L	U	F	0.019		valid	G	STD
GS12	SL	7/1/2011	11073955	07440-61-1	Uranium	N001	14.8	ug/L		F	0.067		valid	C	GEN
GS12	SL	7/11/2011	11084062	07440-61-1	Uranium	N001	7.9	ug/L		F	0.067		valid	C	GEN
GS12	SL	7/18/2011	11084062	07440-61-1	Uranium	N001	10.3	ug/L		F	0.067		valid	C	GEN
GS12	SL	7/25/2011	11084062	07440-61-1	Uranium	N001	10.8	ug/L		F	0.067		valid	C	GEN
GS12	SL	8/2/2011	11104118	07440-61-1	Uranium	N001	8.7	ug/L		F	0.067		valid	C	GEN
GS12	SL	8/24/2011	11104136	07440-61-1	Uranium	N001	11.8	ug/L		F	0.067		valid	C	GEN
GS13	SL	7/1/2011	11073954	07440-61-1	Uranium	N001	7.5	ug/L		F	0.067		valid	C	GEN
GS13	SL	7/7/2011	11073954	AM-241	Americium-241	N002	0.262	pCi/L		F	0.0175	0.049	valid	C	GEN
GS13	SL	7/7/2011	11073954	PU-239,240	Plutonium-239, 240	N002	0.481	pCi/L		F	0.0189	0.0656	valid	C	GEN
GS13	SL	7/7/2011	11073954	07440-61-1	Uranium	N002	3.85	ug/L		F	0.067		valid	C	GEN
GS13	SL	7/8/2011	11073955	07440-61-1	Uranium	N001	4.85	ug/L		F	0.067		valid	C	GEN
GS13	SL	7/10/2011	11073955	07440-61-1	Uranium	N001	4.62	ug/L		F	0.067		valid	C	GEN
GS13	SL	7/11/2011	11084062	07440-61-1	Uranium	N001	6.76	ug/L		F	0.067		valid	C	GEN
GS13	SL	7/13/2011	11073959	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N002	6.7	mg/L		F	0.019		valid	G	STD
GS13	SL	7/13/2011	11073959	07440-61-1	Uranium	N002	6.2	ug/L		F	0.04		valid	G	STD
GS13	SL	7/21/2011	11104118	07440-61-1	Uranium	N001	14.7	ug/L		F	0.067		valid	C	GEN
GS13	SL	7/27/2011	11073991	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	7.1	mg/L		F	0.019		valid	G	STD
GS13	SL	7/27/2011	11073991	07440-61-1	Uranium	N001	8.8	ug/L		F	0.02		valid	G	STD
GS13	SL	8/10/2011	11084024	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.019	mg/L	U	F	0.019		valid	G	STD
GS13	SL	8/10/2011	11084024	07440-61-1	Uranium	N001	21	ug/L		F	0.02		valid	G	STD
GS13	SL	8/24/2011	11104136	07440-61-1	Uranium	N001	56.3	ug/L		F	0.067		valid	C	GEN
GS13	SL	9/20/2011	11094094	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.65	mg/L		F	0.019		valid	G	STD
GS13	SL	9/20/2011	11094094	07440-61-1	Uranium	N001	26	ug/L		F	0.02		valid	G	STD
SW093	SL	7/1/2011	11073954	AM-241	Americium-241	N001	0.0116	pCi/L		U	0.0138	0.00767	valid	C	GEN
SW093	SL	7/1/2011	11073954	PU-239,240	Plutonium-239, 240	N001	1.11E-10	pCi/L		U	0.0171	0.00364	valid	C	GEN
SW093	SL	7/1/2011	11073954	07440-61-1	Uranium	N001	1.84	ug/L		F	0.067		valid	C	GEN
SW093	SL	7/10/2011	11073959	TSS	Total Suspended Solids	N003	56	mg/L		F	2		valid	C	STD
SW093	SL	7/10/2011	11073955	AM-241	Americium-241	N001	-0.00255	pCi/L		U	0.0136	0.00708	valid	C	GEN
SW093	SL	7/10/2011	11073955	AM-241	Americium-241	N002	0.00354	pCi/L		U	0.0126	0.00613	valid	C	GEN
SW093	SL	7/10/2011	11073955	PU-239,240	Plutonium-239, 240	N001	0	pCi/L		U	0.0169	0.0044	valid	C	GEN
SW093	SL	7/10/2011	11073955	PU-239,240	Plutonium-239, 240	N002	0.00588	pCi/L		U	0.0217	0.00695	valid	C	GEN
SW093	SL	7/10/2011	11073955	07440-61-1	Uranium	N001	2.99	ug/L		F	0.067		valid	C	GEN
SW093	SL	7/10/2011	11073955	07440-61-1	Uranium	N002	2.87	ug/L		D	0.067		valid	C	GEN
SW093	SL	7/11/2011	11084062	AM-241	Americium-241	N001	-0.00901	pCi/L		U	0.0233	0.00935	valid	C	GEN
SW093	SL	7/11/2011	11084062	PU-239,240	Plutonium-239, 240	N001	0.00495	pCi/L		U	0.0145	0.00516	valid	C	GEN
SW093	SL	7/11/2011	11084062	07440-61-1	Uranium	N001	4.31	ug/L		F	0.067		valid	C	GEN
SW093	SL	7/13/2011	11073959	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	5.5	mg/L		F	0.019		valid	G	STD
SW093	SL	7/13/2011	11073959	07440-61-1	Uranium	N001	5.2	ug/L		F	0.04		valid	G	STD
SW093	SL	7/14/2011	11084062	AM-241	Americium-241	N001	0.00319	pCi/L		U	0.0206	0.00443	valid	C	GEN
SW093	SL	7/14/2011	11084062	PU-239,240	Plutonium-239, 240	N001	0.00765	pCi/L		U	0.014	0.00598	valid	C	GEN
SW093	SL	7/14/2011	11084062	07440-61-1	Uranium	N001	4	ug/L		F	0.067		valid	C	GEN
SW093	SL	7/27/2011	11073991	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	2.1	mg/L		F	0.019		valid	G	STD
SW093	SL	7/27/2011	11073991	07440-61-1	Uranium	N001	3.8	ug/L		F	0.02		valid	G	STD
SW093	SL	7/27/2011	11104118	AM-241	Americium-241	N002	0.00398	pCi/L		U	0.0252	0.0078	valid	C	GEN

Table 9. Analytical Results for Water Samples

LOCATION CODE	LOCATION TYPE	DATE SAMPLED	LAB REQUISITION NUMBER	CAS	ANALYTE	SAMPLE ID	RESULT	UNITS	LAB QUALIFIERS	SAMPLE TYPE	DETECTION LIMIT	UNCERTAINTY	DATA VALIDATION QUALIFIERS	COLLECTION METHOD	LAB CODE
89104	WL	10/12/2011	11104132	000098-06-6	tert-Butylbenzene	N001	0.16	ug/L	U	F	0.16		F	G	STD
89104	WL	10/12/2011	11104132	000156-60-5	trans-1,2-Dichloroethene	N001	0.15	ug/L	U	F	0.15		F	G	STD
89104	WL	10/12/2011	11104132	010061-02-6	trans-1,3-dichloropropene	N001	0.19	ug/L	U	F	0.19		F	G	STD
A1EFF	SL	7/7/2011	11073954	AM-241	Americium-241	N002	0.0106	pCi/L	U	F	0.0142	0.00828	valid	C	GEN
A1EFF	SL	7/7/2011	11073954	PU-239,240	Plutonium-239, 240	N002	0.0193	pCi/L		F	0.0178	0.00947	J	C	GEN
A1EFF	SL	7/7/2011	11073954	07440-61-1	Uranium	N002	5.13	ug/L		F	0.067		valid	C	GEN
A1EFF	SL	7/13/2011	11073959	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	4	mg/L		F	0.019		valid	G	STD
A1EFF	SL	7/13/2011	11073959	07440-61-1	Uranium	N001	5.2	ug/L		F	0.04		valid	G	STD
A1EFF	SL	7/27/2011	11073991	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.035	mg/L	JB	F	0.019		U	G	STD
A1EFF	SL	7/27/2011	11073991	07440-61-1	Uranium	N001	7	ug/L		F	0.02		valid	G	STD
A2EFF	SL	7/13/2011	11073959	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	3.3	mg/L		F	0.019		valid	G	STD
A2EFF	SL	7/13/2011	11073959	07440-61-1	Uranium	N001	6.2	ug/L		F	0.04		valid	G	STD
A2EFF	SL	7/27/2011	11073991	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.073	mg/L	B	F	0.019		U	G	STD
A2EFF	SL	7/27/2011	11073991	07440-61-1	Uranium	N001	18	ug/L		F	0.02		valid	G	STD
A2EFF	SL	9/20/2011	11094094	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	4.1	mg/L		F	0.019		valid	G	STD
A2EFF	SL	9/20/2011	11094094	07440-61-1	Uranium	N001	49	ug/L		F	0.02		valid	G	STD
A3EFF	SL	7/13/2011	11073959	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	2.8	mg/L		F	0.019		valid	G	STD
A3EFF	SL	7/13/2011	11073959	07440-61-1	Uranium	N001	7.9	ug/L		F	0.04		valid	G	STD
A3EFF	SL	7/27/2011	11073991	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.45	mg/L		F	0.019		valid	G	STD
A3EFF	SL	7/27/2011	11073991	07440-61-1	Uranium	N001	10	ug/L		F	0.02		valid	G	STD
A3EFF	SL	8/10/2011	11084024	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.047	mg/L	J	F	0.019		valid	G	STD
A3EFF	SL	8/10/2011	11084024	07440-61-1	Uranium	N001	9.1	ug/L		F	0.02		valid	G	STD
A3EFF	SL	8/24/2011	11084051	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.019	mg/L	U	F	0.019		valid	G	STD
A3EFF	SL	8/24/2011	11084051	07440-61-1	Uranium	N001	8.8	ug/L		F	0.02		valid	G	STD
A4 POND	SL	7/13/2011	11073959	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.019	mg/L	U	F	0.019		valid	G	STD
A4 POND	SL	7/13/2011	11073959	07440-61-1	Uranium	N001	11	ug/L		F	0.02		valid	G	STD
A4 POND	SL	7/27/2011	11073991	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.039	mg/L	JB	F	0.019		U	G	STD
A4 POND	SL	7/27/2011	11073991	07440-61-1	Uranium	N001	8.8	ug/L		F	0.02		valid	G	STD
A4 POND	SL	8/10/2011	11084024	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.024	mg/L	J	F	0.019		valid	G	STD
A4 POND	SL	8/10/2011	11084024	07440-61-1	Uranium	N001	6.8	ug/L		F	0.02		valid	G	STD
A4 POND	SL	8/15/2011	11084025	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.05	mg/L	U	F	0.05		J	G	GEN
A4 POND	SL	8/15/2011	11084025	AM-241	Americium-241	N001	-0.0014	pCi/L	U	F	0.00878	0.00474	valid	G	GEN
A4 POND	SL	8/15/2011	11084025	PU-239,240	Plutonium-239, 240	N001	-0.00118	pCi/L	U	F	0.0218	0.00613	valid	G	GEN
A4 POND	SL	8/15/2011	11084025	07440-61-1	Uranium	N001	7.12	ug/L		F	0.067		valid	G	GEN
A4 POND	SL	8/24/2011	11084051	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.019	mg/L	U	F	0.019		valid	G	STD
A4 POND	SL	8/24/2011	11084051	07440-61-1	Uranium	N001	7.5	ug/L		F	0.02		valid	G	STD
A4 POND	SL	9/7/2011	11094078	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.019	mg/L	U	F	0.019		valid	G	STD
A4 POND	SL	9/7/2011	11094078	07440-61-1	Uranium	N001	6.7	ug/L		F	0.02		valid	G	STD
A4 POND	SL	9/20/2011	11094094	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.019	mg/L	U	F	0.019		valid	G	STD
A4 POND	SL	9/20/2011	11094094	07440-61-1	Uranium	N001	6.6	ug/L		F	0.02		valid	G	STD
B3OUTFLOW	SL	7/8/2011	11073954	AM-241	Americium-241	N002	0.00765	pCi/L	U	F	0.0163	0.00797	valid	C	GEN
B3OUTFLOW	SL	7/8/2011	11073954	PU-239,240	Plutonium-239, 240	N002	0.0121	pCi/L	U	F	0.0223	0.0107	valid	C	GEN
B3OUTFLOW	SL	7/8/2011	11073954	07440-61-1	Uranium	N002	5.31	ug/L		F	0.067		valid	C	GEN
B3OUTFLOW	SL	7/13/2011	11073959	07440-61-1	Uranium	N001	6.3	ug/L		F	0.04		valid	G	STD
B3OUTFLOW	SL	7/14/2011	11114168	AM-241	Americium-241	N002	0.00913	pCi/L	U	F	0.0138	0.0078	valid	C	GEN
B3OUTFLOW	SL	7/14/2011	11114168	PU-239,240	Plutonium-239, 240	N002	0.0223	pCi/L		F	0.0124	0.0096	J	C	GEN
B3OUTFLOW	SL	7/14/2011	11114168	07440-61-1	Uranium	N002	6.61	ug/L		F	0.067		valid	C	GEN
B3OUTFLOW	SL	7/27/2011	11073991	07440-61-1	Uranium	N001	6.2	ug/L		F	0.02		valid	G	STD
B3OUTFLOW	SL	8/10/2011	11084024	07440-61-1	Uranium	N001	6.5	ug/L		F	0.02		valid	G	STD
B3OUTFLOW	SL	8/24/2011	11084051	07440-61-1	Uranium	N001	6.1	ug/L		F	0.02		valid	G	STD
B3OUTFLOW	SL	9/20/2011	11094094	07440-61-1	Uranium	N001	9.9	ug/L		F	0.02		valid	G	STD
B5 POND	SL	7/13/2011	11073959	07440-61-1	Uranium	N001	6.8	ug/L		F	0.02		valid	G	STD
B5 POND	SL	7/27/2011	11073991	07440-61-1	Uranium	N001	6.5	ug/L		F	0.02		valid	G	STD
B5 POND	SL	8/10/2011	11084024	07440-61-1	Uranium	N001	5.6	ug/L		F	0.02		valid	G	STD
B5 POND	SL	8/15/2011	11084025	AM-241	Americium-241	N001	0.00293	pCi/L	U	F	0.00922	0.00705	valid	G	GEN
B5 POND	SL	8/15/2011	11084025	PU-239,240	Plutonium-239, 240	N001	0.0051	pCi/L	U	F	0.0235	0.00615	valid	G	GEN
B5 POND	SL	8/15/2011	11084025	07440-61-1	Uranium	N001	5.5	ug/L		F	0.067		valid	G	GEN
B5 POND	SL	8/24/2011	11084051	07440-61-1	Uranium	N001	5.6	ug/L		F	0.02		valid	G	STD
B5 POND	SL	9/7/2011	11094078	07440-61-1	Uranium	N001	4.9	ug/L		F	0.02		valid	G	STD
B5 POND	SL	9/20/2011	11094094	07440-61-1	Uranium	N001	5.5	ug/L		F	0.02		valid	G	STD
B5INFLOW	SL	7/1/2011	11084062	07440-61-1	Uranium	N002	7.72	ug/L		F	0.067		valid	C	GEN
B5INFLOW	SL	7/1/2011	11073955	07440-61-1	Uranium	N001	5.27	ug/L		F	0.067		valid	C	GEN
B5INFLOW	SL	7/10/2011	11073955	07440-61-1	Uranium	N001	4.66	ug/L		F	0.067		valid	C	GEN
B5INFLOW	SL	7/11/2011	11084062	07440-61-1	Uranium	N001	6.18	ug/L		F	0.067		valid	C	GEN
B5INFLOW	SL	7/13/2011	11073959	07440-61-1	Uranium	N001	5.5	ug/L		F	0.04		valid	G	STD
B5INFLOW	SL	7/21/2011	11104118	07440-61-1	Uranium	N001	12.2	ug/L		F	0.067		valid	C	GEN

Table 9. Analytical Results for Water Samples

LOCATION CODE	LOCATION TYPE	DATE SAMPLED	LAB REQUISITION NUMBER	CAS	ANALYTE	SAMPLE ID	RESULT	UNITS	LAB QUALIFIERS	SAMPLE TYPE	DETECTION LIMIT	UNCERTAINTY	DATA VALIDATION QUALIFIERS	COLLECTION METHOD	LAB CODE
B5INFLOW	SL	7/27/2011	11073991	07440-61-1	Uranium	N001	3.9	ug/L		F	0.02		valid	G	STD
B5INFLOW	SL	8/24/2011	11104118	07440-61-1	Uranium	N001	11.2	ug/L		F	0.067		valid	C	GEN
C2 POND	SL	9/15/2011	11094086	AM-241	Americium-241	N001	0.00775	pCi/L	U	F	0.0167	0.0072	valid	G	GEN
C2 POND	SL	9/15/2011	11094086	PU-239,240	Plutonium-239, 240	N001	0.0172	pCi/L	U	F	0.0228	0.012	valid	G	GEN
C2 POND	SL	9/15/2011	11094086	07440-61-1	Uranium	N001	9.09	ug/L		F	0.067		valid	G	GEN
SPOUT	TS	7/13/2011	11073959	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	320	mg/L		F	0.95		valid	G	STD
SPOUT	TS	7/13/2011	11073959	07440-61-1	Uranium	N001	39	ug/L		F	0.04		valid	G	STD
SPOUT	TS	7/27/2011	11073991	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	340	mg/L		F	0.76		valid	G	STD
SPOUT	TS	7/27/2011	11073991	07440-61-1	Uranium	N001	29	ug/L		F	0.02		valid	G	STD
SPOUT	TS	8/10/2011	11084024	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	230	mg/L		F	0.76		valid	G	STD
SPOUT	TS	8/10/2011	11084024	07440-61-1	Uranium	N001	39	ug/L		F	0.02		valid	G	STD
SPOUT	TS	8/24/2011	11084051	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	100	mg/L		F	0.38		valid	G	STD
SPOUT	TS	8/24/2011	11084051	07440-61-1	Uranium	N001	45	ug/L		F	0.02		valid	G	STD
SPOUT	TS	9/7/2011	11094078	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	91	mg/L		F	0.38		valid	G	STD
SPOUT	TS	9/7/2011	11094078	07440-61-1	Uranium	N001	40	ug/L		F	0.02		valid	G	STD
SPOUT	TS	9/20/2011	11094094	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	220	mg/L		F	0.95		valid	G	STD
SPOUT	TS	9/20/2011	11094094	07440-61-1	Uranium	N001	38	ug/L		F	0.02		valid	G	STD
WALPOC	SL	9/12/2011	11094086	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N002	0.206	mg/L	J	F	0.05		J	G	GEN
WALPOC	SL	9/12/2011	11094086	AM-241	Americium-241	N001	0.00839	pCi/L	U	F	0.0155	0.00627	valid	C	GEN
WALPOC	SL	9/12/2011	11094086	PU-239,240	Plutonium-239, 240	N001	0	pCi/L	U	F	0.0242	0.00459	valid	C	GEN
WALPOC	SL	9/12/2011	11094086	07440-61-1	Uranium	N001	6.94	ug/L		F	0.067		valid	C	GEN
WALPOC	SL	9/15/2011	11094086	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N002	0.05	mg/L	U	F	0.05		J	G	GEN
WALPOC	SL	9/15/2011	11094091	AM-241	Americium-241	N001	-0.00129	pCi/L	U	F	0.0166	0.00836	valid	C	GEN
WALPOC	SL	9/15/2011	11094091	PU-239,240	Plutonium-239, 240	N001	0.00948	pCi/L	U	F	0.0154	0.00806	valid	C	GEN
WALPOC	SL	9/15/2011	11094091	07440-61-1	Uranium	N001	6.32	ug/L		F	0.067		valid	C	GEN
WALPOC	SL	9/18/2011	11094102	AM-241	Americium-241	N003	0.00297	pCi/L	U	F	0.0188	0.00582	valid	C	GEN
WALPOC	SL	9/18/2011	11094102	PU-239,240	Plutonium-239, 240	N003	-0.00616	pCi/L	U	F	0.0201	0.00676	valid	C	GEN
WALPOC	SL	9/18/2011	11094102	07440-61-1	Uranium	N003	6.82	ug/L		F	0.067		valid	C	GEN
WALPOC	SL	9/18/2011	11094093	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.019	mg/L		F	0.019		valid	G	STD
WALPOC	SL	9/22/2011	11104123	AM-241	Americium-241	N001	0.00284	pCi/L	U	F	0.018	0.00557	valid	C	GEN
WALPOC	SL	9/22/2011	11104123	AM-241	Americium-241	N002	0.00868	pCi/L	U	D	0.0184	0.00807	valid	C	GEN
WALPOC	SL	9/22/2011	11104123	PU-239,240	Plutonium-239, 240	N001	0.00692	pCi/L	U	F	0.0226	0.0118	valid	C	GEN
WALPOC	SL	9/22/2011	11104123	PU-239,240	Plutonium-239, 240	N002	0.00189	pCi/L	U	D	0.0247	0.00372	valid	C	GEN
WALPOC	SL	9/22/2011	11104123	07440-61-1	Uranium	N001	7.52	ug/L		F	0.067		valid	C	GEN
WALPOC	SL	9/22/2011	11104123	07440-61-1	Uranium	N002	7.61	ug/L		D	0.067		valid	C	GEN
WALPOC	SL	9/22/2011	11104113	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N003	0.019	mg/L	U	F	0.019		valid	G	STD
WALPOC	SL	9/27/2011	11104113	NO3+NO2 AS N	Nitrate + Nitrite as Nitrogen	N001	0.023	mg/L	J	F	0.019		J	G	STD

EXPLANATION

SAMPLE_ID

N00x = Sample was not filtered.

000x = Sample was filtered.

WATER_UNIT_OF_MEASURE

mg/L; ppm = milligrams per liter

pCi/L = picocuries per liter

ug/L = micrograms per liter

C = degrees celsius

mS/cm = milliSiemens per centimeter

NTU = normal turbidity units

s.u. = standard pH units

uS/cm = microSiemens per centimeter

umhos/cm = microSiemens per centimeter

SAMPLE_TYPE

F = Field Sample

D = Duplicate

LAB_QUALIFIERS

- * Replicate analysis not within control limits.
- + Correlation coefficient for MSA < 0.995.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic & Radiochemistry: Analyte also found in method blank.
- C Pesticide result confirmed by GC-MS.
- D Analyte determined in diluted sample.
- E Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
- H Holding time expired, value suspect.
- I Increased detection limit due to required dilution.
- J Estimated
- M GFAA duplicate injection precision not met.
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
- P > 25% difference in detected pesticide or Arochlors concentrations between 2 columns.
- S Result determined by method of standard addition (MSA).
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Y Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Z Laboratory defined (USEPA CLP organic) qualifier, see case narrative.

Table 9. Analytical Results for Water Samples

LOCATION CODE	LOCATION TYPE	DATE SAMPLED	LAB REQUISITION NUMBER	CAS	ANALYTE	SAMPLE ID	RESULT	UNITS	LAB QUALIFIERS	SAMPLE TYPE	DETECTION LIMIT	UNCER-TAINTY	DATA VALIDATION QUALIFIERS	COLLECTION METHOD	LAB CODE
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DATA_VALIDATION_QUALIFIERS

valid	Result is valid.														
F	Low flow sampling method used.														
G	Possible grout contamination, pH > 9.														
J	Estimated value.														
L	Less than 3 bore volumes purged prior to sampling.														
Q	Qualitative result due to sampling technique														
R	Unusable result.														
U	Parameter analyzed for but was not detected.														
X	Location is undefined.														
999	Validation not complete														

LOCATION_TYPE

SL	SURFACE LOCATION
TS	TREATMENT SYSTEM
WL	WELL

LAB_CODE

GEN	Gel Laboratories
STD	Test America

COLLECTION_METHOD

G	Grab
C	Composite

Table 10. Water Sampling Events: Fourth Quarter CY 2011

Location Code	Sampling Dates		Sample Info			Analytes					Sample Tracking Info			
	Start	End	Collection Method	Type	Filtered	VOC	D	Nitrate	Pu/Am	SVOC	TSS	Ticket	RIN #	COC Date
SPOUT	10/5/11 9:00	10/5/11 9:00	grab	F	No		X	X				JLZ 337	11104127	10/7/2011
SW093	10/5/11 9:05	10/5/11 9:05	grab	F	No		X	X				JLZ 336	11104127	10/7/2011
GS13	10/5/11 9:10	10/5/11 9:10	grab	F	No		X	X				JLZ 345	11104127	10/7/2011
A4 POND	10/5/11 9:30	10/5/11 9:30	grab	F	No		X	X				JLZ 346	11104127	10/7/2011
B5 POND	10/5/11 9:35	10/5/11 9:35	grab	F	No		X					JLZ 342	11104127	10/7/2011
B3OUTFLOW	10/5/11 9:40	10/5/11 9:40	grab	F	No		X					JLZ 347	11104127	10/7/2011
GS10	10/5/11 9:45	10/5/11 9:45	grab	F	No		X					JLZ 348	11104127	10/7/2011
GS12	10/6/11 9:56	1/4/12 11:08	composite	F	No		X					KCR 932	12014303	1/12/2012
SW093	10/6/11 11:27	10/25/11 9:51	composite	F	No		X		X			JMV 661	11114194	11/22/2011
GS13	10/6/11 11:40	11/21/11 11:41	composite	F	No		X					JNZ 476	11124277	12/29/2011
GS10	10/10/11 12:43	10/10/11 12:43	grab	F	No	X						JLZ 459	11104132	10/14/2011
00997	10/11/11 11:07	10/11/11 11:07	grab	F	No	X		X				JLZ 452	11104132	10/14/2011
00997	10/11/11 11:07	10/11/11 11:07	grab	F	Yes		X					JLZ 452	11104132	10/14/2011
00997	10/11/11 11:07	10/11/11 11:07	grab	D	No	X		X				JLZ 460	11104132	10/14/2011
00997	10/11/11 11:07	10/11/11 11:07	grab	D	Yes		X					JLZ 460	11104132	10/14/2011
89104	10/12/11 10:55	10/12/11 10:55	grab	F	No	X						JLZ 823	11104132	10/14/2011
10304	10/12/11 11:55	10/12/11 11:55	grab	F	No	X		X				JLZ 822	11104132	10/14/2011
10304	10/12/11 11:55	10/12/11 11:55	grab	F	Yes		X					JLZ 822	11104132	10/14/2011
11104	10/12/11 12:04	10/12/11 12:04	grab	F	No	X						JLZ 827	11104132	10/14/2011
11104	10/12/11 12:04	10/12/11 12:04	grab	F	Yes		X					JLZ 827	11104132	10/14/2011
00193	10/13/11 9:45	10/13/11 9:45	grab	F	No	X						JLZ 819	11104132	10/14/2011
00193	10/13/11 9:45	10/13/11 9:45	grab	F	Yes		X					JLZ 819	11104132	10/14/2011
SPOUT	10/19/11 9:00	10/19/11 9:00	grab	F	No		X	X				JLR 072	11104147	10/20/2011
SPOUT	10/19/11 9:00	10/19/11 9:00	grab	D	No		X	X				JLR 095	11104147	10/20/2011
SW093	10/19/11 9:10	10/19/11 9:10	grab	F	No		X	X				JLR 073	11104147	10/20/2011
SW093	10/19/11 9:10	10/19/11 9:10	grab	D	No		X	X				JLR 096	11104147	10/20/2011
GS13	10/19/11 9:15	10/19/11 9:15	grab	F	No		X	X				JLR 074	11104147	10/20/2011
GS13	10/19/11 9:15	10/19/11 9:15	grab	D	No		X	X				JLR 097	11104147	10/20/2011
A4 POND	10/19/11 10:00	10/19/11 10:00	grab	F	No		X	X				JLR 082	11104147	10/20/2011
A4 POND	10/19/11 10:00	10/19/11 10:00	grab	D	No		X	X				JLR 099	11104147	10/20/2011
B5 POND	10/19/11 10:30	10/19/11 10:30	grab	F	No		X					JLR 077	11104147	10/20/2011
B5 POND	10/19/11 10:30	10/19/11 10:30	grab	D	No		X					JLR 100	11104147	10/20/2011
B5INFLOW	10/19/11 10:40	10/19/11 10:40	grab	F	No		X					JLR 080	11104147	10/20/2011
B5INFLOW	10/19/11 10:40	10/19/11 10:40	grab	D	No		X					JLR 101	11104147	10/20/2011
B3OUTFLOW	10/19/11 10:45	10/19/11 10:45	grab	F	No		X					JLR 078	11104147	10/20/2011
B3OUTFLOW	10/19/11 10:45	10/19/11 10:45	grab	D	No		X					JLR 102	11104147	10/20/2011
GS10	10/19/11 11:00	10/19/11 11:00	grab	F	No		X					JLR 079	11104147	10/20/2011
GS10	10/19/11 11:00	10/19/11 11:00	grab	D	No		X					JLR 103	11104147	10/20/2011
42505	10/19/11 11:27	10/19/11 11:27	grab	F	No	X						JLZ 985	11104142	10/20/2011
SPOUT	10/19/11 15:00	10/19/11 15:00	grab	F	No		X	X				JLZ 995	11104142	10/20/2011
GS13	10/19/11 15:28	10/19/11 15:28	grab	F	No			X				JLZ 980	11104142	10/20/2011
10594	10/19/11 15:54	10/19/11 15:54	grab	F	No	X		X				JLZ 981	11104142	10/20/2011
10594	10/19/11 15:54	10/19/11 15:54	grab	F	Yes		X					JLZ 981	11104142	10/20/2011
SW093	10/25/11 9:51	11/16/11 9:36	composite	F	No		X		X			JNX 456	11124260	12/12/2011
GS10	10/25/11 10:27	11/17/11 10:36	composite	F	No		X		X			JMW 175	11114208	11/23/2011
B5INFLOW	11/1/11 12:22	1/3/12 11:26	composite	F	No		X		X			KCR 923	12014302	1/11/2012
WOMPOC	11/1/11 12:55	11/7/11 11:08	composite	F	No		X		X			JMW 177	11114208	11/23/2011
4087	11/1/11 13:30	11/1/11 13:30	grab	F	No	X		X				JLT 718	11104161	11/2/2011
4087	11/1/11 13:30	11/1/11 13:30	grab	F	Yes		X					JLT 718	11104161	11/2/2011

Table 10. Water Sampling Events: Fourth Quarter CY 2011

Location Code	Sampling Dates		Sample Info			Analytes						Sample Tracking Info		
	Start	End	Collection Method	Type	Filtered	VOC	D	Nitrate	Pu/Am	SVOC	TSS	Ticket	RIN #	COC Date
B206989	11/1/11 13:50	11/1/11 13:50	grab	F	No	X		X				JLT 731	11104161	11/2/2011
B206989	11/1/11 13:50	11/1/11 13:50	grab	F	Yes		X					JLT 731	11104161	11/2/2011
A3EFF	11/7/11 8:20	11/7/11 8:20	grab	F	No		X	X				JMV 611	11114188	11/14/2011
SPOUT	11/7/11 8:30	11/7/11 8:30	grab	F	No		X	X				JMV 612	11114188	11/14/2011
SW093	11/7/11 8:35	11/7/11 8:35	grab	F	No		X	X				JMV 613	11114188	11/14/2011
GS13	11/7/11 8:40	11/7/11 8:40	grab	F	No		X	X				JMV 614	11114188	11/14/2011
A2EFF	11/7/11 8:50	11/7/11 8:50	grab	F	No		X	X				JMV 615	11114188	11/14/2011
A4 POND	11/7/11 9:00	11/7/11 9:00	grab	F	No		X	X				JMV 616	11114188	11/14/2011
B5 POND	11/7/11 9:05	11/7/11 9:05	grab	F	No		X					JMV 617	11114188	11/14/2011
B5INFLOW	11/7/11 9:10	11/7/11 9:10	grab	F	No		X					JMV 618	11114188	11/14/2011
B3OUTFLOW	11/7/11 9:20	11/7/11 9:20	grab	F	No		X					JMV 619	11114188	11/14/2011
GS10	11/7/11 9:30	11/7/11 9:30	grab	F	No		X					JMV 620	11114188	11/14/2011
WOMPOC	11/7/11 11:08	11/10/11 10:12	composite	F	No		X		X			JMW 183	11114208	11/23/2011
GS31	11/7/11 12:05	11/10/11 10:01	composite	F	No		X		X			JNX 306	11124240	12/7/2011
GS08	11/9/11 10:14	11/29/11 12:02	composite	F	No		X		X			JNX 679	11124265	12/12/2011
GS01	11/10/11 9:36	12/13/11 12:12	composite	F	No		X		X			JNY 866	11124268	12/16/2011
GS31	11/10/11 10:01	11/16/11 10:48	composite	F	No		X		X			JNX 459	11124260	12/12/2011
WOMPOC	11/10/11 10:12	12/29/11 14:32	composite	F	No		X		X			KCR 922	12014302	1/11/2012
A3EFF	11/16/11 8:15	11/16/11 8:15	grab	F	No		X	X				JNX 291	11124234	12/5/2011
SPOUT	11/16/11 8:30	11/16/11 8:30	grab	F	No		X	X				JNX 244	11124230	12/2/2011
SW093	11/16/11 9:35	11/16/11 9:35	grab	F	No		X	X				JNX 245	11124230	12/2/2011
SW093	11/16/11 9:36	1/5/12 14:26	composite	F	No		X		X			KCQ 632	12014284	1/10/2012
GS13	11/16/11 9:45	11/16/11 9:45	grab	F	No		X	X				JNX 246	11124230	12/2/2011
A4 POND	11/16/11 10:05	11/16/11 10:05	grab	F	No		X	X				JNX 248	11124230	12/2/2011
B5 POND	11/16/11 10:05	11/16/11 10:05	grab	F	No		X					JNX 249	11124230	12/2/2011
B5INFLOW	11/16/11 10:10	11/16/11 10:10	grab	F	No		X					JNX 250	11124230	12/2/2011
GS31	11/16/11 10:48	12/29/11 14:52	composite	F	No		X		X			KCQ 633	12014284	1/10/2012
B3OUTFLOW	11/16/11 10:55	11/16/11 10:55	grab	F	No		X					JNX 251	11124230	12/2/2011
GS10	11/16/11 11:00	11/16/11 11:00	grab	F	No		X					JNX 252	11124230	12/2/2011
GS10	11/17/11 10:36	12/14/11 12:17	composite	F	No		X		X			JNY 865	11124268	12/16/2011
GS13	11/21/11 11:41	1/5/12 14:05	composite	F	No		X					KCR 935	12014303	1/12/2012
B3OUTFLOW	11/25/11 10:40	11/25/11 10:40	grab	F	No				X			JNX 269	11124232	12/2/2011
GS10	11/25/11 10:50	11/25/11 10:50	grab	F	No				X			JNX 267	11124232	12/2/2011
GS08	11/29/11 12:02	1/5/12 13:47	composite	F	No		X		X			KCR 933	12014303	1/12/2012
SPOUT	11/30/11 10:45	11/30/11 10:45	grab	F	No		X	X				JNX 256	11124231	12/2/2011
SW093	11/30/11 10:50	11/30/11 10:50	grab	F	No		X	X				JNX 257	11124231	12/2/2011
GS13	11/30/11 11:00	11/30/11 11:00	grab	F	No		X	X				JNX 258	11124231	12/2/2011
A4 POND	11/30/11 11:30	11/30/11 11:30	grab	F	No		X	X				JNX 259	11124231	12/2/2011
B5 POND	11/30/11 11:40	11/30/11 11:40	grab	F	No		X					JNX 260	11124231	12/2/2011
WALPOC	11/30/11 11:45	11/30/11 11:45	grab	F	No			X				JNX 266	11124231	12/2/2011
B5INFLOW	11/30/11 11:50	11/30/11 11:50	grab	F	No		X					JNX 261	11124231	12/2/2011
B3OUTFLOW	11/30/11 12:25	11/30/11 12:25	grab	F	No		X					JNX 262	11124231	12/2/2011
WALPOC	11/30/11 12:25	1/3/12 11:01	composite	F	No		X		X			KCR 924	12014302	1/11/2012
WALPOC	11/30/11 12:25	1/3/12 11:01	composite	D	No		X		X			KCR 925	12014302	1/11/2012
GS10	11/30/11 12:30	11/30/11 12:30	grab	F	No		X					JNX 263	11124231	12/2/2011
GS01	12/13/11 12:12	1/3/12 14:31	composite	F	No		X		X			KCR 929	12014302	1/11/2012
GS10	12/14/11 12:17	1/5/12 13:19	composite	F	No		X		X			KCR 930	12014303	1/12/2012
SPOUT	12/15/11 8:30	12/15/11 8:30	grab	F	No		X	X				JNY 979	11124275	12/20/2011
SPOUT	12/15/11 8:30	12/15/11 8:30	grab	D	No		X	X				JNY 991	11124275	12/20/2011
SW093	12/15/11 8:35	12/15/11 8:35	grab	F	No		X	X				JNY 980	11124275	12/20/2011

Table 10. Water Sampling Events: Fourth Quarter CY 2011

Location Code	Sampling Dates		Sample Info			Analytes						Sample Tracking Info		
	Start	End	Collection Method	Type	Filtered	VOC	D	Nitrate	Pu/Am	SVOC	TSS	Ticket	RIN #	COC Date
GS13	12/15/11 10:30	12/15/11 10:30	grab	F	No		X	X				JNY 981	11124275	12/20/2011
A4 POND	12/15/11 10:35	12/15/11 10:35	grab	F	No		X	X				JNY 982	11124275	12/20/2011
B5 POND	12/15/11 10:40	12/15/11 10:40	grab	F	No		X					JNY 983	11124275	12/20/2011
B5INFLOW	12/15/11 10:50	12/15/11 10:50	grab	F	No		X					JNY 984	11124275	12/20/2011
B3OUTFLOW	12/15/11 11:15	12/15/11 11:15	grab	F	No		X					JNY 985	11124275	12/20/2011
GS10	12/15/11 11:20	12/15/11 11:20	grab	F	No		X					JNY 986	11124275	12/20/2011
GS11	12/18/11 10:01	1/6/12 10:44	composite	F	No		X		X			KCR 940	12014303	1/12/2012
GS11	12/20/11 9:30	12/20/11 9:30	grab	F	No			X				JNY 989	11124275	12/20/2011
WOMPOC	12/29/11 14:32	1/3/12 11:48	composite	F	No		X		X			KCR 926	12014302	1/11/2012
GS31	12/29/11 14:52	1/6/12 11:41	composite	F	No		X		X			KCR 941	12014303	1/12/2012
A3EFF	12/30/11 10:00	12/30/11 10:00	grab	F	No		X	X				KCQ 625	12014282	1/9/2012
SPOUT	12/30/11 12:00	12/30/11 12:00	grab	F	No		X	X				KCQ 614	12014282	1/9/2012
SW093	12/30/11 13:10	12/30/11 13:10	grab	F	No		X	X				KCQ 615	12014282	1/9/2012
GS13	12/30/11 13:40	12/30/11 13:40	grab	F	No		X	X				KCQ 616	12014282	1/9/2012
A2EFF	12/30/11 14:00	12/30/11 14:00	grab	F	No		X	X				KCQ 627	12014282	1/9/2012
A4 POND	12/30/11 14:10	12/30/11 14:10	grab	F	No		X	X				KCQ 617	12014282	1/9/2012
B5 POND	12/30/11 14:25	12/30/11 14:25	grab	F	No		X					KCQ 626	12014282	1/9/2012
B5INFLOW	12/30/11 14:30	12/30/11 14:30	grab	F	No		X					KCQ 619	12014282	1/9/2012
B3OUTFLOW	12/30/11 14:40	12/30/11 14:40	grab	F	No		X					KCQ 620	12014282	1/9/2012
GS10	12/30/11 15:00	12/30/11 15:00	grab	F	No		X					KCQ 621	12014282	1/9/2012

EXPLANATION

Sample Info: Type

F = Field Sample
D = Duplicate

Analytes

VOC = volatile organic compounds
U = uranium
Nitrate = nitrate + nitrite as N
Pu/Am = plutonium-239,240 and americium-241
SVOC = semi-volatile organic compounds
TSS = total suspended solids

Sample Tracking Info: Ticket

- tracking identifier

Sample Tracking Info: RIN#

- lab requisition number

Sample Tracking Info: COC Date

- Chain of Custody date