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Associate Director for ESH
 Environment, Safety, and Health
 P.O. Box 1663, MS K491
 Los Alamos, New Mexico 87545
 505-667-4218/Fax 505-665-3811

NMED
Hazardous Waste Bureau

Environmental Management
 Los Alamos Field Office, MS A316
 3747 West Jemez Road
 Los Alamos, New Mexico 87544
 (505) 667-4255/FAX (505) 606-2132

Date: **JUN 01 2015**

Refer To: ADESH-15-081

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Locates Action No.: U1500964

John Kieling, Bureau Chief
 Hazardous Waste Bureau
 New Mexico Environment Department
 2905 Rodeo Park Drive East, Building 1
 Santa Fe, NM 87505-6303

Subject: Submittal of the Response to the Approval with Modifications for Storm Water Performance Monitoring in the Los Alamos/Pueblo Watershed during 2013 and Revision 1

Dear Mr. Kieling:

Enclosed please find two hard copies with electronic files of the response to the approval with modifications for Storm Water Performance Monitoring in the Los Alamos/Pueblo Watershed during 2013 and Revision 1.

If you have any questions, please contact Steve Veenis at (505) 667-0013 (veenis@lanl.gov) or Cheryl Rodriguez at (505) 665-5330 (cheryl.rodriguez@em.doe.gov).

Sincerely,

Alison M. Dorries, Division Leader
 Environmental Protection Division
 Los Alamos National Laboratory

Sincerely,

Christine Gelles, Acting Manager
 Environmental Management
 Los Alamos Field Office

AD/CG/DM/SV:sm

Enclosures: Two hard copies with electronic files:

- (1) Response to the Approval with Modifications for the Storm Water Performance Monitoring in the Los Alamos/Pueblo Watershed during 2013 (EP2015-0063)
- (2) Storm Water Performance Monitoring in the Los Alamos/Pueblo Watershed during 2013, Revision 1 (EP2015-0064)
- (3) An electronic copy of the redline-strikeout version of the plan that includes all changes and edits to the document

Cy: (w/enc.)
Cheryl Rodriguez, DOE-EM-LA, MS A316
Steve Veenis, ADEP ER Program, MS M997
Public Reading Room (EPRR)
ADESH Records

Cy: (Letter and CD and/or DVD)
Laurie King, EPA Region 6, Dallas, TX
Raymond Martinez, San Ildefonso Pueblo
Dino Chavarria, Santa Clara Pueblo
Steve Yanicak, NMED-DOE-OB, MS M894
Amanda White, ER Program (w/ MS Word files on CD)
PRS Database

Cy: (w/o enc./date-stamped letter emailed)
lasomailbox@nnsa.doe.gov
Kimberly Davis Lebak, DOE-NA-LA
Peter Maggiore, DOE-NA-LA
Annette Russell, DOE-EM-LA
David Rhodes, DOE-EM-LA
Dave McNroy, ADEP ER Program
Randy Erickson, ADEP
Jocelyn Buckley, ADESH-ENV-CP
Tony Grieggs, ADESH-ENV-CP
Alison Dorries, ADESH-ENV-DO
Michael Brandt, ADESH
Amy De Palma, PADOPS
Michael Lansing, PADOPS

**Response to the Approval with Modifications for the
Storm Water Performance Monitoring in the Los Alamos/Pueblo Watershed during 2013,
Los Alamos National Laboratory, EPA ID No. NM0890010515, HWB-LANL-14-049,
Dated March 18, 2015**

INTRODUCTION

To facilitate review of this response, the New Mexico Environment Department's (NMED's) comments are included verbatim. The comments are divided into general and specific categories, as presented in the approval with modifications. Los Alamos National Laboratory's (LANL's or the Laboratory's) responses follow each NMED comment. Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to NMED in accordance with U.S. Department of Energy (DOE) policy.

MODIFICATIONS

NMED Comment

1. Section 2.3, Sampling at the Gage Stations in the LA/P Watershed, p 4

Permittees' Statement: *"[i]n 2013, the threshold discharge at a station was reached 100 times, and sampling was conducted 50 of these times, resulting in an overall sampling efficiency of 50%."*

NMED's Comment: *While a portion of the inability to collect samples was due to force majeure events such as the September 13, 2013 flood event and restricted access to gage station E109.9, the Permittees provide little explanation as to why 11 samples following the September 13 flood were not collected. For instance, for station E050.1, Table 2.6-2, Gage Station Operational Issues during the 2012 Monitoring Year, indicates that silting was an issue on 9/13/13, but was repaired on 9/20/13. This issue accounts for the reason that samples were missed on 9/13/13 and 9/14/13. But, samples also were not collected on 9/21/13 and 9/22-23/13. No explanation is provided for why these samples were not collected. This applies to many other missed sampling opportunities following the flooding.*

In addition, while the Permittees' access to E109.9 was restricted on 8/12/13, Table 2.3-1 indicates that discharge data and at least one sample were collected from this station from 8/20/13 through the flood event on 9/13/13. The Permittees provide no explanation regarding their ability to continue to collect data and samples from this station following the access restrictions.

The Permittees must revise the Report to provide detailed information regarding missed sampling opportunities. This information should be included in Table 2.6-2 for each missed sampling event. Tabulation of the factors contributing to the reduced sampling efficiency will assist the Permittees in proposing action to correct or mitigate these factors in the future. The Permittees must submit replacement pages that include discussions of these issues and a replacement Table 2.6-2 that includes all missed sampling opportunities. Also, the title of Table 2.6-2 must be corrected to state that the data is for 2013 instead of 2012.

LANL Response

1. The detailed information regarding missed sampling and analysis opportunities from each storm event is categorized and presented in a new table, Table 2.3-2, Sampling Operational Issues during the Monitoring Year. Table 2.6-2, Gage Station Operational Issues during the Monitoring Year, is not a good fit for describing the reasons and categorizing missed sampling opportunities. The title of Table 2.6-2 will be corrected to state the data are for 2013, not 2012.

NMED Comment

2. Section 2.4, Samples Collected in LA/P Watershed, p 5, #4

Permittees' Statement: “[s]everal samplers were programmed incorrectly, causing incomplete sample collection during several storm events”.

NMED's Comment: *It is unclear from this statement how the samplers were programmed incorrectly and how many samplers were affected. In this and all future monitoring reports, the Permittees must provide a more detailed description of sampling errors including the error type, location affected, number of samples affected, and actions taken to prevent and correct these sampling errors. For the current report, include this information in the revised Table 2.6-2 discussed in the previous comment.*

LANL Response

2. In 2012, 12-bottle ISCO samplers at E042.1, E059, E050.1, E060.1, and E109.9 were programmed to collect the first 8 samples at 1-min intervals, then pairs of samples at 60- and 105-min intervals. Depending on the height of the sampler above the storm discharge the 1-min interval between samples could be insufficient. The effect was to cause the 7th and/or 8th sample not to be collected. The solution implemented during the 2013 monitoring year was to increase the time between samples to 2 min at the 12-bottle ISCO at these stations.

In 2013, the 12-bottle ISCO sampler at E109.9 was programmed to collect the first eight samples at 2-min intervals, then pairs of samples at 60- and 105-min intervals. At E109.9, the 2-min interval between samples was not sufficient on several occasions. The effect was to cause the 7th and/or 8th sample not to be collected. Access to the sampler was restricted and the gage was destroyed before a solution could be implemented at E109.9. Table 2.3-2 includes a description of each case where programming was suspected of causing incomplete sample collection.

In 2014, the programming error was resolved, and thus is not an issue.

NMED Comment

3. Section 2.5, Operational Issues, p 5

NMED's Comment: *NMED understands that access to gage station E109.9 has been denied by the Pueblo of San Ildefonso. NMED is concerned about this issue because sample collection from this station provides important information on water quality prior to entering the Rio Grande, an important source of water for the State of New Mexico. NMED urges the Permittees to make a concerted effort to renew their access agreement to this important gage station.*

LANL Response

3. Comment noted.

NMED Comment

4. Section 3.3, Geomorphic Changes

NMED's Comment: Appendix A demonstrates that large volumes of sediment were eroded during the 2013 storm season (i.e., PU LW-6 reports sediment erosion (cross-sectional area) of -273.3 ft), which is indicative that some damage has occurred to existing grade controls, and their ability to continue to retain sediment. The Permittees state, "[n]o actions are recommended at this time except for continued resurveys".

This statement conflicts with Appendix A of the Report where the Permittees state, "[w]illows have also been replanted in the lower Pueblo willow planting area" and statements made in the 2013 Excavation of the Los Alamos Canyon Low-Head Weir (Report) dated and received December 19, 2013 (referenced by LA-UR-13-28493 and EP2013-0258) which estimates that 6,000 cubic yards of sediment have been removed from behind the Los Alamos Canyon low-head weir and stockpiled in a former borrow pit. In future reports, the Permittees must discuss all actions taken to manage canyon sites and reference the documents that describe those actions.

LANL Response

4. Large volumes of sediment eroding do not necessarily indicate that damage has occurred to existing grade controls, nor reduced the controls' ability to continue to retain sediment. Indeed, the erosion in the Pueblo Wetlands was fairly severe during the September 13, 2013, flood; however, the Pueblo Canyon grade-control structure (GCS) remained intact with little need for maintenance. The September 2013 flood event caused significant erosion, but the erosion at PU LW-6 widened an already existing channel, and the thalweg elevation was maintained before and after the storm. The erosion that occurred at geomorphic cross-section PU LW-6 is over 8500 ft upgradient of the Pueblo Canyon GCS; thus, it is not possible for the GCS to prevent erosion in cross-section PU LW-6. However, overall sediment deposition was noted in the geomorphic cross-section surveys directly upgradient of the Pueblo Canyon GCS spanning 400 ft of streambed longitudinally, indicating that the structure retained a large amount of sediment.

The 2013 report was revised to remove references to the replanting of willows in the lower Pueblo willow planting area because the replanting did not take place until April 2014. The willow-replanting effort in the lower Pueblo willow planting area is discussed in detail in Appendix B, Pueblo Canyon Wetland Area Mitigation Phase I: Willow Planting, of the 2014 Monitoring Report for the Los Alamos/Pueblo Watershed Sediment Transport Mitigation Project.

A statement regarding the removal of approximately 6000 yd³ of sediment from behind the Los Alamos Canyon low-head weir, and a reference to the May 2013 Excavation of the Los Alamos Canyon Low-Head Weir report, dated December 19, 2013, has been added to the report. In the future, LANL will discuss actions taken to manage canyon sites and reference the documents that describe these actions.

5. Section 4.3 Relationships between Discharge, SSC, and Contaminant Concentrations

NMED's Comment: NMED notes that the Permittees have switched from total suspended solids (TSS) to suspended sediment concentrations (SSC). NMED agrees with the procedural change, since TSS has been shown to be fundamentally unreliable for the analysis of natural-water samples (Comparability of Suspended-Sediment Concentration and Total Suspended Solids Data, USGS August 2000).

The Permittees state, "[w]here analytical results are not bounded by sediment results; the concentration of the nearest sediment result is used as an estimate of the sediment concentration at the time the sample was collected." It is unclear from this statement if the nearest sediment result is similar in discharge rate. The nearest sediment result may exhibit a significant difference in discharge rate from the unbounded sample; therefore, utilization of the nearest sediment result as an estimate for the unbounded sample may be inappropriate.

It is also unclear which samples have used sediment estimates from the nearest sample or the total number of samples requiring sediment concentration estimates. In future reports, the Permittees must indicate which values have been estimated from the nearest sediment result, whether the value used for the sediment concentration is an estimate, and the total number samples affected. The Permittees must also propose a method for selecting a nearest sediment concentration which includes matching similar discharge rates.

LANL Response

5. In future reports, Table 4.3-1 will include information indicating whether the samples were directly analyzed for suspended sediment concentration (SSC) or whether they were estimated using bounding SSC results. Estimates of SSC will be made only for analytical results bounded by SSC results.

Samples were planned and collected in 2014 at the detention basins below LA-2 (CO111041 and CO101038) without bounding SSC analyses. Bounding SSC analyses will be added to the 2015 monitoring plan at these locations. Incomplete samples collected in 2014 at other gaging stations caused chemical and radiochemical analyses to be unbounded by SSC analyses. All samples without SSC estimates are identified as "Not estimated" in Table 4.3-1.

NMED Comment

6. Section 4.4, Storm Water Sampling below SWMU 01-001(f)

NMED's Comment: The Permittees state that the "[t]otal PCB results are within the range of results for samples collected in 2011 and 2012. The higher results suggest the hill slope continues to be source of PCBs even after sediment and rock were removed during corrective action at SWMU 01-001(f) in 2010". NMED agrees with the Permittees' conclusion that the hill slope at SWMU 01-001(f) is still a source of PCBs in storm water runoff. In next year's monitoring report or in the corresponding aggregate area report, if the report will be submitted within the same time frame, the Permittees must provide a discussion of proposed remedial activities for SWMU 01-001(f).

LANL Response

6. The DOE Environmental Management Los Alamos Office (DOE-EM-LA) is moving forward with plans to convey storm water through a pipeline from the storm water culvert outlet above Solid Waste Management Unit (SWMU) 01-001(f) to the bottom of Los Alamos Canyon. With this mitigation in place, storm water runoff will have a minimal impact on affected media on the hillslope associated with SWMU 01-001(f), and substantially reduce migration of polychlorinated biphenyls (PCBs). Currently, a design package (Storm Water Controls at LA-SMA-2.1) is being developed, and the work will be performed under the direction of DOE EM-LA.

NMED Comment

7. **Figure 3.2-2, Box and Whisker Plots of TSS and SSC for all Stations in the Los Alamos and Pueblo Watershed over the last 4 yrs of Monitoring**

NMED's Comment: TSS and SSC are not interchangeable sampling methods and side-by-side comparisons of these two fundamentally different sampling results are not appropriate. In future monitoring reports, provide a footnote stating that TSS and SSC are not directly comparable values and that TSS values are only included for completeness of data. In future reports, TSS and SSC must be displayed on separate plots.

LANL Response

7. LANL agrees that total suspended solids (TSS) and SSC are fundamentally different methods for determining suspended solids concentrations; however, LANL asserts that showing TSS and SSC on the same plots allows for the continuity of data to be presented. In the future, a footnote will be included in these figures stating that TSS and SSC are determined using different methods, and thus are not directly comparable.

NMED Comment

8. **Figures 4.3-1 to 4.3-32 SSC vs. analyte concentration for each gage station**

NMED's Comment: The contaminant Sediment Background values (in mg/kg) depicted on Figure 4.3-1 through Figure 4.3-32 are specific to sediment and are not interchangeable with surface water quality values (in µg/L). Comparing background sediment values is useful as a qualitative indicator of the likelihood of a contaminant being present in water, but cannot be directly compared quantitatively due to physical differences, unpredictable site specific partitioning or leaching of contaminants into water, and interactions by physical agitation specific to surface water.

LANL Response

8. LANL agrees that comparisons of inorganic chemicals and naturally occurring radionuclides in background sediment to their concentrations in storm water are not interchangeable with surface water–quality comparisons. As noted, the comparison is useful as a nonquantitative indicator of the expected presence of background concentrations of constituents in storm water. LANL also asserts that comparison of the concentrations of constituents in sediment with unfiltered storm water provides a method of identifying constituents with background and anthropogenic sources.

NMED Comment

9. Table 2.4-2 Analytical Requirements for Storm Water Samples

NMED's Comment: In NMED's October 24, 2013 Review (2013 Review) of the Permittees' Storm Water Performance Monitoring in the Los Alamos/Pueblo Watershed During 2012, NMED noted that the "reported results for filtered aluminum were obtained using methods which no longer correspond to the methods described in [the New Mexico Water Quality Control Commission (NMWQCC)] 20.4.900(I)(1), NMAC. These methods are also described in the document titled Procedures for Assessing Water Quality Standards Attainment for the State of New Mexico CWA §303(d)/305(b) Integration Report: Assessment Protocol (Procedure Report) submitted by the New Mexico Environment Department Surface Water Quality Bureau (SWQB) and dated August 24, 2012."

According to both the Procedure Report and NMED's 2012 Aluminum Filtration Study, aquatic life criteria for aluminum are based on analysis of samples that are filtered to minimize mineral phase aluminum without restricting amorphous or colloidal phases. The SWQB's study of this issue concluded that a filter of 10 µm pore size is appropriate to accomplish this task.

The 10 µm pore size standard for aluminum was officially adopted as a sampling procedure by NMWQCC on December 1, 2010, and the EPA provided SWA 303 (c) approval for the filtration language on April 12, 2012. NMED's 2013 Review stated that the "Permittees must filter aluminum samples with a pore size of 10 µm prior to performing the analysis." It appears that the Permittees have not filtered aluminum samples with 10 µm pore size and have continued to utilize a 0.45 µm pore size filter based on the EPA method listed in Table 2.4-2.

If the Permittees have used the incorrect filter, the aluminum data submitted in this Report is likely not acceptable for use. If so, the Permittees must revise the Report to remove the aluminum data or provide an explanation for why the data is viable. In the future, the Permittees must filter aluminum samples with a pore size of 10 µm prior to performing the analysis and must reference in Table 2.4-2 the NMWQCC methods used to sample aluminum.

LANL Response

9. LANL understands that NMED has specified the use of a 10-µm pore size filter for total recoverable aluminum analysis and will comply with the request for the 2015 monitoring season. LANL looks forward to further discussions on selecting a more representative filter size with the appropriate degree of protection in the near future. LANL will present aluminum results using a 0.45-µm pore size filter in the 2013 and 2014 reports but will not screen to current water-quality standards as presented in the New Mexico Water Quality Control Commission (NMWQCC) Surface Water Standards.

NMED Comment

10. Table 4.2-2 Maximum Detected Results by Station and Event

NMED's Comment: NMED notes that several analytes (Al, Cu, Gross Alpha, Hg, Ra 226/Ra228, and Se) are in exceedance of the NMWQCC Surface Water Standards (Table 4.2-1) and are not described in Section 5.0, Conclusions. In NMED's 2013 Review, the Permittees were directed to provide a separate table of exceedances with gage station number, analyte, concentration results, and the exceeded water quality standard for that analyte. The Permittees did not provide the required

table in this report. The Permittees must provide replacement pages that include a discussion of exceedances in the conclusion section and a separate table of exceedances as described above.

LANL Response

10. Table 4.2-2, NMWQCC Surface Water Standard Exceedances in 2013, was revised and is provided in the revised report. In Table 4.2-2, samples collected from Acid and Pueblo Canyons are compared with acute and chronic aquatic life standards under their marginal warm water aquatic life designated use as non-perennial, unclassified waters of the state under New Mexico Administrative Code (NMAC) 20.6.4.98. Samples collected from DP and Los Alamos Canyons are compared with acute aquatic life standards under their limited aquatic life designated use as ephemeral and intermittent portions of watercourses within lands managed by DOE within LANL under NMAC 20.6.4.128. Water-quality criteria for cadmium, trivalent chromium, copper, nickel, lead, silver, and zinc are calculated for chronic and acute aquatic life criteria based on the hardness for each sample. Table 4.2-1 has also been revised to include the minimum and maximum water-quality criteria comparison values calculated for each of the seven hardness-dependent dissolved metals based on hardness measurements obtained in 2013.

In analyses conducted in 2013, exceedances of water-quality criteria were observed for copper, total cyanide, lead, total mercury, total selenium, adjusted gross alpha, total PCBs, and dioxins and furans. Tetrachlorodibenzo-p-dioxin(2,3,7,8-) was not detected in samples analyzed in 2013, but the results were retained in Table 4.2-2 because the method detection limit for these parameters was above the minimum water-quality criteria.

The NMWQCC surface water standards for total recoverable aluminum are not applicable to the storm water analyses conducted in the Los Alamos/Pueblo watershed during 2013. The water-quality criterion for total recoverable aluminum requires filtration using a 10- μ m pore size. Aluminum analyses in 2013 were prepared without filtration and with filtration using a 0.45- μ m pore size. The aluminum results obtained in 2013 were improperly compared with water-quality criteria and have been removed from the revised Table 4.2-2.

Exceedances of radium-226+radium-228 were observed at E109.9 on the Pueblo de San Ildefonso. These results were improperly compared with water-quality criteria and have been removed from the revised Table 4.2-2.

LA-UR-15-23613
May 2015
EP2015-0064

Storm Water Performance Monitoring in the Los Alamos/Pueblo Watershed during 2013, Revision 1

Prepared by the Environmental Programs Directorate

Los Alamos National Laboratory, operated by Los Alamos National Security, LLC, for the U.S. Department of Energy under Contract No. DE-AC52-06NA25396, has prepared this document pursuant to the Compliance Order on Consent, signed March 1, 2005. The Compliance Order on Consent contains requirements for the investigation and cleanup, including corrective action, of contamination at Los Alamos National Laboratory. The U.S. government has rights to use, reproduce, and distribute this document. The public may copy and use this document without charge, provided that this notice and any statement of authorship are reproduced on all copies.

Storm Water Performance Monitoring in the Los Alamos/Pueblo Watershed during 2013, Revision 1

May 2015

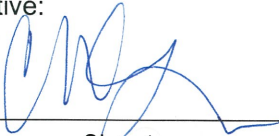
Responsible project manager:

Steve Veenis		Project Manager	Environmental Remediation Program	5.19.15
Printed Name	Signature	Title	Organization	Date

Responsible LANS representative:

Randall Erickson		Acting Associate Director	Environmental Programs	5/19/15
Printed Name	Signature	Title	Organization	Date

Responsible DOE representative:

Christine Gelles		Acting Manager	DOE-EM-LA	5/1/15
Printed Name	Signature	Title	Organization	Date

EXECUTIVE SUMMARY

This fourth annual monitoring report provides a summary of analytical data, discharge measurements, geomorphic changes, and precipitation data associated with storm water samples collected from the Los Alamos and Pueblo (LA/P) watershed from June 2013 to November 2013. Monitoring objectives include collecting data to evaluate the effect of watershed mitigations installed in the LA/P watershed on stream flow and sediment and contaminant transport. Watershed mitigations being evaluated include the DP Canyon grade-control structure (GCS) and associated floodplains; Pueblo Canyon wing ditch, willow planting, wetland, and GCS; the Los Alamos Canyon low-head weir; and the storm water detention basins and associated willow planting below the Los Alamos Canyon Solid Waste Management Unit (SWMU) 01-001(f) drainage. Pursuant to Section VII of the Compliance Order on Consent, Los Alamos National Laboratory (the Laboratory) had implemented interim measures to reduce migration of contaminants within the LA/P watershed. These mitigations have been implemented with the overall goal of working together to minimize the potentially erosive nature of storm water runoff, to enhance deposition of sediment, and to reduce access of contaminated sediments to flood erosion.

Gage and sampling locations are situated within the LA/P watershed to monitor the hydrology and sediment transport along the length of the watershed, including stations that bound the mitigations. However, the topography, geology, geomorphology, and meteorology of the watershed are complex; thus, monitoring runoff and precipitation is also complex and challenging. Stage height, which is then converted to discharge using rating curves developed for each individual gage, is monitored at 5-min intervals at a series of gages using shaft-encoder float sensors, self-contained bubbler pressure sensors, and ultrasonic probe sensors. Precipitation data are collected across the Laboratory by means of five meteorological towers and an extended rain gage network. Sampling for analyte suites specific to each reach of the watershed is conducted using ISCO 3700 portable automated samplers configured to begin sampling routines when a preset stage height or after a discharge peak is recorded at the data logger. Sampling equipment and the extended rain-gage network are deactivated during the winter months (December to March) and reactivated in the spring.

Geomorphic changes were monitored at the nine sediment transport mitigation sites that have been established in the LA/P watershed. Cross-sections upgradient and downgradient and a thalweg profile of each site were surveyed following the summer 2013 monsoon season. Surveys were supplemented with sediment-thickness measurements obtained from hand-dug or hand-augered holes along the survey transect. The net changes in cross-sectional areas from the previous year were calculated and used to estimate total deposition or erosion over the surveyed area.

The Los Alamos Canyon watershed experienced a large number of runoff events in 2013, including runoff from the Las Conchas burn area in the upper watershed of Los Alamos and Guaje Canyons and the 1000-yr precipitation event on September 13. Runoff from the burn area had high concentrations of suspended sediment, which is typical after wildland fires. Pueblo Canyon, not affected by the fire, had 1 runoff event in 2013 beginning in the upper watershed that extended through the length of the wetland, past the GCS, and into lower Los Alamos Canyon. In contrast, Los Alamos Canyon had 6 events that extended through the watershed, past the low-head weir, and into lower Los Alamos Canyon. A large number of events (18) flowed past the DP Canyon GCS because a majority of the watershed is impervious Los Alamos County townsite that drains into the canyon above the GCS. Attenuation of flow and associated sediment transport through the Pueblo Canyon wetland and associated GCS, Los Alamos low-head weir and associated sediment retention basins, and DP Canyon GCS is a primary goal of the sediment transport mitigation activities conducted in LA/P watershed, and all structures performed as designed in 2013, despite damage incurred by flooding on September 13.

The 2013 monitoring data in upper Los Alamos Canyon indicate a substantial reduction in suspended sediment concentration (SSC) as floods passed through the low-head weir and associated sediment retention basins. In fact, approximately 6,000 cubic yards of sediment were removed from the weir in 2013. This structure is, therefore, performing as designed. By contrast, SSC was much higher at gaging station E109.9 in lower Los Alamos Canyon as a result of floods in Guaje Canyon originating from the Las Conchas burn area.

In DP Canyon, which primarily receives runoff from the Los Alamos townsite, direct comparison of runoff and sediment yield above and below the GCS and upstream floodplains was possible in four events in 2013. Sediment yield decreased downstream between bounding stations (E038 and E039.1), which is consistent with the intent of the GCS in this canyon. Peak discharge between these gages also decreased, indicating attenuation of flood energy.

Net sediment deposition occurred in most surveyed areas in the Los Alamos and DP Canyons in 2013, which is consistent with the goal of sediment transport mitigation control. In Pueblo Canyon, net erosion occurred during September 13 flooding. Although the September 2013 flood event resulted in significant erosion in most surveyed areas in Pueblo Canyon, the magnitude of the erosion was likely reduced by the sediment mitigation structures and willow plantings. The upper Los Alamos Canyon sediment detention basins appear to have contained much of the sediment transported by the small drainage below SWMU 01-001(f). The surveys document that the sediment transport mitigation sites are currently operating as desired and are not undergoing net erosion over the period of this monitoring program.

Concentrations of Polychlorinated biphenyls (PCBs) measured at E109.9 in lower Los Alamos Canyon are similar to those measured in upper Los Alamos Canyon above Laboratory sites, at E026, and are consistent with the transport of PCBs from the Las Conchas burn area down Guaje Canyon. PCB in the burn area have a source in atmospheric fallout and were released during the fire. Off-site transport of PCBs with Las Conchas burn area, Los Alamos townsite, and Laboratory sources occurred in 2013. The weir and associated sediment retention basins were effective at substantially reducing this transport. The transport of radionuclides in storm water with a Laboratory source was also substantially reduced by the settling of sediment above the Los Alamos Canyon weir.

Continued monitoring in 2014 is expected to confirm the sediment transport mitigation structures and associated wetlands, and floodplains in the LA/P watershed are performing as intended and document expected recovery of the wetland in Pueblo Canyon.

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Appendixes

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Appendix B	Hydrographs, Hyetographs, and Sedigraphs for Samples Collected
Appendix C	Analytical Results, Analytical Reports, and 5-Minute Discharge Results (on CD included with this document)

Acronyms and Abbreviations

ASTM	American Society for Testing and Materials
BDD	Buckman Direct Diversion
cfs	cubic feet per second
Consent Order	Compliance Order on Consent
DOE	Department of Energy (U.S.)
EPA	Environmental Protection Agency (U.S.)
GCS	grade-control structure
GPS	global positioning system
CVS	cross-vane structure
ICP	inductively coupled plasma
IMWP	interim measures work plan
Laboratory	Los Alamos National Laboratory
LANL	Los Alamos National Laboratory
LA/P	Los Alamos and Pueblo (watershed)
LIDAR	light detecting and ranging
MDL	method detection limit
MSS	Maintenance and Site Services (Laboratory group)
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
PCB	polychlorinated biphenyl
RPD	relative percent difference
RPF	Records Processing Facility
SIMWP	supplemental interim measures work plan
SSC	suspended sediment concentration
SWMU	solid waste management unit
TAL	target analyte list (EPA)
TCDD	tetrachlorodibenzodioxin
TEF	toxicity equivalency factor
TEQ	toxic equivalency quotient
TSS	total suspended solids
UTL	upper tolerance limit
VE	vertical exaggeration
WWTP	wastewater treatment plant

1.0 INTRODUCTION

Los Alamos National Laboratory (LANL or the Laboratory) is a multidisciplinary research facility owned by the U.S. Department of Energy (DOE) that is managed by Los Alamos National Security, LLC. The Laboratory is located in north-central New Mexico approximately 60 mi northeast of Albuquerque and 20 mi northwest of Santa Fe. The Laboratory site comprises an area of 36 mi², mostly on the Pajarito Plateau, which consists of a series of mesas separated by eastward-draining canyons. It also includes part of White Rock Canyon along the Rio Grande to the east.

This fourth annual monitoring report provides a summary of analytical data, discharge measurements, and precipitation data associated with storm water collected from the Los Alamos and Pueblo (LA/P) watershed from June 2013 to November 2013. In addition, the geomorphic changes at the sediment transport mitigation sites in the LA/P watershed are also included in this report as Appendix A. This monitoring was performed pursuant to Section VII of the Compliance Order on Consent (the Consent Order) to reduce migration of contaminants within the LA/P watershed and pursuant to the New Mexico Environment Department– (NMED-) approved “Interim Measure Work Plan to Mitigate Contaminated Sediment Transport in Los Alamos and Pueblo Canyons” (IMWP) (LANL 2008, 101714; NMED 2008, 103007) and the approved “Supplemental Interim Measures Work Plan to Mitigate Contaminated Sediment Transport in Los Alamos and Pueblo Canyons” (SIMWP) (LANL 2008, 105716; NMED 2009, 105014). Hydrologic and geomorphic monitoring in 2013 were performed in accordance with the approved “2013 Monitoring Plan for Los Alamos and Pueblo Canyons Sediment Transport Mitigation Project, Revision 1” (LANL 2013, 243432; NMED 2013, 523106).

Monitoring objectives include collecting data to evaluate the effect of watershed mitigations installed in the LA/P watershed on stream flow and sediment and on contaminant transport. The discussion of flow and analytical results for suspended sediment and constituent concentrations focuses on an evaluation of the overall watershed performance, with specific emphasis on the effects of the mitigations implemented per the IMWP and SIMWP. The discussion of geomorphic stability in Appendix A focuses on sediment stability and mobility in the watershed as a measure of the overall stability of the watershed and the performance of the sediment-mitigation structures.

The NMED approval with modifications for the 2013 monitoring plan for sediment transport mitigation (LANL 2013, 243432; NMED 2013, 523106) also directed the Laboratory to monitor storm water above and below the detention basins below the Solid Waste Management Unit (SWMU) 01-001(f) drainage in upper Los Alamos Canyon. Watershed mitigations evaluated in this report include the DP Canyon grade-control structure (GCS) and associated floodplain; Pueblo Canyon willow planting, wetlands, and GCS; the Los Alamos Canyon low-head weir; and the storm water detention basins and associated vegetative buffer below the SWMU 01-001(f) drainage in Los Alamos Canyon.

The watershed addressed in this monitoring report is potentially contaminated with both hazardous and radioactive components. Corrective actions at the Laboratory are subject to Consent Order. Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to the NMED in accordance with DOE policy.

1.1 Project Goals and Methods

The mitigations specified in the IMWP and SIMWP have been implemented with the overall goal of minimizing the potentially erosive nature of storm water runoff to enhance deposition of sediment and to reduce or eliminate the susceptibility of contaminated sediments to flood erosion. Figure 1.1-1 shows the locations of the mitigations and monitoring stations, including stream gages, in the LA/P watershed. In the

Pueblo Canyon watershed, the central focus of the mitigations is to maintain a physically, hydrologically, and biologically functioning wetland that can reduce peak flows and trap suspended solids because of the presence of thick wetland vegetation. Stabilization and enhancement of the wetland were partially addressed with installation of a GCS designed to inhibit headcutting at the terminus of the wetland and to potentially promote establishment of additional riparian or wetland vegetation beyond the current terminus of the wetland. Mitigations in upper portions of Pueblo Canyon above the wetland are designed primarily to reduce the flood peaks and to enhance channel/floodplain interaction before floods reach the wetland. Gages are situated within the watershed to monitor the overall hydrology and sediment transport along the length of the watershed, including stations that bound the wetland.

In DP and Los Alamos Canyons, mitigations included stabilizing and potentially partially burying the channel and adjacent floodplains in reach DP-2 in DP Canyon, which is a source of contaminants entrained in frequent floods that originate from a portion of the Los Alamos County townsite. A GCS was installed in the lower part of reach DP-2 with a height that may encourage channel aggradation, thus reducing the potential for erosion of contaminated sediment deposits in adjacent banks during floods. Channel aggradation in reach DP-2 should also encourage spreading of floodwaters, thus reducing peak discharge because of transmission loss within the reach and enhancing sediment deposition. Lower flood peaks should also reduce the erosion of contaminated sediment deposits downcanyon of the GCS. Mitigations in Los Alamos Canyon several kilometers below the DP Canyon confluence involved removing accumulated sediment behind the low-head weir to increase the residence time of floodwaters and to enhance settling of suspended solids and associated contaminants.

Additional mitigations were implemented in Los Alamos Canyon under a separate administrative requirement (LANL 2008, 104020; NMED 2009, 105858) to address polychlorinated biphenyl (PCB) contamination associated with SWMU 01-001(f). The mitigation actions at that location involved removing contaminated sediment from the canyon wall and constructing detention basins at the bottom of the associated hillside drainage to promote the settling of contaminated sediments in runoff from the canyon wall.

Between September 10 and 17, 2013, New Mexico and Colorado received a historically large amount of precipitation (Figure 1.1-2). Los Alamos County, New Mexico, received between 200% and 600% of the normal precipitation for this time period (Figure 1.1-3), and the Laboratory received approximately 450% percent of its average precipitation for September (Figure 1.1-4). As a result, the Laboratory was inundated with rain, including the extremely large, greater-than-1000-yr return period precipitation event that occurred between September 12 and 13 (Table 1.1-1). With saturated antecedent soil conditions from the September 10 storm, when the September 12 to September 13 storm hit, the flooding damaged the Laboratory's environmental infrastructure, including access roads, groundwater monitoring wells, gage stations, watershed controls, and control measures installed under the National Pollutant Discharge Elimination System Permit.

2.0 DISCHARGE AND PRECIPITATION MEASUREMENTS AND SAMPLING IN THE LA/P

2.1 Discharge and Precipitation Measurements and Sampling in the LA/P Watershed

Measurements of discharge and surface-water sampling were conducted at 13 gages in the LA/P watershed in 2013. Gages located at five concrete, trapezoidal, supercritical-flow flumes are designated Los Alamos above the Rio Grande (E109.9), Los Alamos below low-head weir (E050.1), Pueblo below grade-control structure (E060.1), DP below grade-control structure (E039.1), and Los Alamos above low-head weir (E042.1). Eight other gages that complete the monitoring network in the LA/P watershed are designated as Pueblo above Acid (E055), South Fork of Acid Canyon (E055.5), Acid above Pueblo (E056), Los Alamos below Ice Rink (E026), Los Alamos above DP Canyon (E030), DP

above Technical Area 21 (E038), Pueblo above the wastewater treatment plant (E059), and DP above Los Alamos Canyon (E040). Although gage station E099 in lower Guaje watershed is not part of the formal Los Alamos/Pueblo monitoring network, post-fire floods emanating from burn scars in the Guaje watershed consistently impact E109.9, and thus E099 is discussed in this report. Figure 1.1-1 shows the locations of stream gages and watershed mitigations within the Laboratory's property boundary and on adjacent land owned by the County of Los Alamos and Pueblo de San Ildefonso.

Stage height was monitored at each LA/P gage at 5-min intervals in the LA/P watershed. Sutron 9210 data loggers stored each recorded stage-height measurement as it was made. Discharge was computed for each 5-min stage measurement using rating curves for each individual gage. Shaft-encoder float sensors installed in stilling wells were used to measure water levels at E026, E030, E039.1, E042.1, E050.1, E059, E060.1, E099, and E109.9. Self-contained bubbler pressure sensors (Sutron Accubar) were used to measure water levels at E038, E055, E055.5, and E056 and to provide backup sensing at E109.9, E050.1, and E060.1. An ultrasonic probe sensor (Siemens Miltronics "The Probe") was used to measure water levels at E040 and provided additional backup sensing at E109.9. In 2013, approximately 1,000,000 individual stage measurements were recorded at the 13 gage stations monitored within the LA/P watershed.

A complete record of 5-min stage height measurements for the monitoring period from June 1, 2013, to October 31, 2013, exists at E030, E038, E039.1, E050.1, E055, E055.5, and E056. Five-minute stage height measurements are incomplete at seven gage stations damaged by the September 13 high-flow event: E026, E040, E059, E099, and E109.9 incomplete from September 13 to November 30; E042.1 incomplete from September 13 to September 20; and E060.1 incomplete from September 13 to September 19.

Storm water programs at the Laboratory use precipitation data collected at the Laboratory's meteorological towers. In addition, a seasonal, extended rain gage network is deployed during the months from April to November to coincide with storm water monitoring periods. Using a geographic information system, storm water monitoring stations are assigned to an individual rain gage using the method of Thiessen polygons. Rain gages, meteorological towers, Thiessen polygons, and the drainage area for each stream gage associated with the LA/P watershed are presented in Figure 2.1-1.

Sampling was conducted using ISCO 3700 portable automated samplers. At E026, E038, E039.1, E042.1, E050.1, E059, E060.1, and E109.9, two ISCO samplers were installed. At locations where two samplers were installed, one sampler was configured with a 24-bottle carousel to monitor primarily suspended sediment, and the second sampler was configured with a 12-bottle carousel to monitor inorganic and organic chemicals and radionuclides. At locations where a single sampler was installed, the sampler was configured with a 12-bottle carousel to monitor suspended sediment, inorganic and organic chemicals, and radionuclides. Sampler intake lines were set above the bottom of the channel or gage and were placed perpendicularly to the direction of flow. The placement of trip levels and sampler intake lines is presented in Table 2.1-1.

Sampling equipment at gages in LA/P watershed was shut down during the winter months and reactivated in the spring. During the 2013 monitoring period, requests were issued weekly to field personnel to inspect activated gages and sampling equipment. Gaging and sampling equipment at the 13 LA/P gaging stations was connected via telemetry to a base station, allowing real-time access to gage discharge measurements and battery state of charge. Inspectors reviewed telemetry daily to ensure gages were functioning correctly. Inspectors inspected gaging stations and samplers when telemetry readings indicated discharge had occurred or the equipment problems existed.

2.2 Sampling at the Detention Basins below the SWMU 01-001(f) Drainage and in Graduation Canyon

In 2013, nine storm water samples were collected with automated samplers above two constructed detention basins below the SWMU 01-001(f) drainage at location CO111041. Storm water discharge ponded in the detention basins, and sampling was triggered on two occasions at CO101038, at the culvert at the terminus of the vegetative buffer below the lower basin. Sampling locations and storm water control features at the detention basins below the SWMU 01-001(f) drainage are identified in Figure 2.2-1.

2.3 Sampling at the Gage Stations in the LA/P Watershed

During the monitoring period in 2013 (June 1 to October 31), discharge exceeded 5 cubic feet per second (cfs) at E050.1, E060.1, or E109.9; 40 cfs at E038; or 10 cfs at other gage stations during 28 storm events on 30 d. Sampling and analyses of inorganic and organic chemicals, radionuclides, and suspended sediment occurred on 17 d with runoff events from 1 or more of the 13 gage stations in the LA/P watershed. A total of 45 sampling events occurred, with a sampling event defined as the collection of one or more samples from a specific gaging station during a specific runoff event. Several sampling events spanned midnight. Maximum daily discharge at all gages on days when flow reached or exceeded 5 cfs at E050.1, E060.1, or E109.9; 40 cfs at E038; or 10 cfs at the other gages is presented in Table 2.3-1. Table 2.3-1 also summarizes the runoff events sampled at each station. In 2013, the threshold discharge at a station was reached 100 times, and sampling was conducted 50 of these times, resulting in an overall sampling efficiency of 50%. The reasons discharge was not analyzed at each storm event are categorized and presented in Table 2.3-2.

2.4 Samples Collected in the LA/P Watershed

Sample suites presented in the monitoring plan vary according to the monitoring location and are based on key indicator constituents for a given portion of the watershed. Following the Las Conchas fire, americium-241 was added to the analytical suite at E026 and E030, and cyanide was added at all stream gages downstream from the burn area in Los Alamos Canyon (E026, E030, E042.1, E050.1, and E109.9). Analyses were obtained from storm water collected at sampling locations as presented in Table 2.4-1. In cases where insufficient water was collected to perform all planned analyses, analyses were prioritized in the order presented in Table 2.4-1. Up to 24 samples per event were collected for suspended sediment analysis from a single ISCO sampler containing a 24-bottle carousel at the lower watershed gages (E042.1, E050.1, E059, E060.1, and E109.9); gages in upper DP Canyon (E038 and E039.1); and the upstream gage in Los Alamos Canyon, downstream from the Las Conchas burn area (E026) (Figures 1.0-1 and 2.1-1). Suspended sediment analyses at all other locations were obtained from the first and last sample in an ISCO sampler containing a 12-bottle carousel. Suspended sediment analyses when conducted using U.S. Environmental Protection Agency (EPA) Method 160.2, from an aliquot of sample, were reported using the designation "Total Suspended Solids" (TSS). Suspended sediment analyses when conducted using American Society for Testing and Materials method D3977-97, from an entire sample, were reported using the designation "Suspended Sediment Concentration" (SSC).

EPA target analyte list (TAL) metals were analyzed in filtered and unfiltered samples at all locations. When a sufficient sample volume was collected, radionuclides were analyzed in filtered and unfiltered samples at E109.9. Other required analyses were conducted from unfiltered samples. Sample collection times were recorded for each individual sample bottle filled, which allowed more precise estimation of discharge and SSCs at the time samples were collected.

Analyses were conducted using the analytical methods presented in Table 2.4-2. Detection limits are provided for comparison purposes but are affected by sample-specific factors that are not fully known until after the sample is analyzed. Such sample-specific factors can include available sample volume, matrix interferences, and sample dilution. In samples with suspended sediment content of approximately 10% or greater, analyses for selected radionuclides and metals were conducted on separate solid and liquid fractions. The final result reported by the analytical laboratory was a calculated concentration of the recombined solid phase and liquid phase analyses. Table 2.4-3 presents the prioritization matrix that was used to help guide the submission of analyses during 2013. The complete sequence and timing of analyses planned, samples collected, and analyses requested at each gage station are presented in Table 2.4-4.

Analyses planned and analyses performed differ during the year for several reasons including the following:

1. Incomplete sample volumes were collected.
 - a. Minimum volumes are required to obtain specified detection limits.
 - b. Lowest priority analyses are omitted when incomplete volumes are collected.
2. Samples are collected in glass or polyethylene bottles.
 - a. Organic chemical analyses are conducted on samples collected in glass bottles.
 - b. Boron was analyzed as an addition to the TAL metal suite, and samples were collected in polyethylene bottles.
3. The high sediment content of samples collected precluded the analysis of samples using analytical techniques designed for water matrixes; instead, samples with the highest sediment content were separated into solid and liquid fractions, which were analyzed separately and mathematically recombined.
4. The 12-bottle ISCO sampler at E109.9 was programmed incorrectly, causing incomplete sample collection during several storm events. The 12-bottle ISCO sampler was programmed to collect the first eight samples at 2-min intervals, then pairs of samples after 60- and 105-min following the peak of discharge. At E109.9, the 2-min interval between samples was not sufficient on several occasions. The effect of the programming error was to cause the 7th and/or 8th sample not to be collected. Table 2.3-2 includes a description of each case where programming was suspected of causing incomplete sample collection.

2.5 Operational Issues

During 2013, the Laboratory authorized field crews to perform weekly inspections at gages and samplers in the LA/P watershed. Inspections were authorized to occur at sampling and stage measurement equipment following a rain event that resulted in discharge. Additionally, flumes at E039.1, E042.1, E050.1, E060.1, and E109.9 were inspected for sedimentation after each discharge event and cleaned on the first workday after sedimentation occurred. If inspectors were unable to repair damaged equipment at the time of inspection, additional resources were made available as quickly as possible to make repairs.

In a letter dated August 9, 2013, and received by the Laboratory on August 12, 2013, Pueblo de San Ildefonso notified the Laboratory that access to gage station E109.9 was being terminated. Pursuant to Section III.N of the Consent Order, on August 27, 2013, the Laboratory notified NMED of a force majeure event resulting from the termination of access to gaging station E109.9 on Pueblo land (LANL 2013, 249066). NMED responded on October 16, 2013, with a notice of agreement of the force majeure

event (NMED 2013, 523698). The flume and stilling well at E109.9 were cleared of sediment 12 times during the 2013 monitoring season before access restrictions went into effect. The gage and equipment at E109.9 and E099 that had been damaged by flooding on September 13 have not been repaired.

Pursuant to Section III.H.3 of the Consent Order, on September 25, 2013, the Laboratory notified NMED of another force majeure event resulting from flooding on September 13 (LANL 2013, 250037). NMED responded on January 3, 2014, with a notice of agreement that a force majeure event had occurred (NMED 2014, 524130).

The sampling efficiency within the Los Alamos and Pueblo watershed before access restrictions at E099 and E109.9 caused by the August 12 Pueblo de San Ildefonso restrictions and the September 13 flooding was 74%, with 46 samples collected from 62 events. The sampling efficiency after September 13 flooding and after Pueblo de San Ildefonso access restrictions on August 12 was 11%, with 4 samples collected from 38 events.

2.6 Deviations from Work Plan

Gaging equipment at E050.1, E060.1, and E109.9 were to be inspected weekly throughout the year; automated samplers and equipment at other gages were to be inspected weekly from June 1 to October 31 and at least monthly from November 1 to May 31. Equipment found to be damaged or malfunctioning was to be repaired within 5 business days after the problem was discovered. Samples were to be retrieved from the field within 1 business day of sample collection using the following priority order, if necessary:

- Los Alamos above the Rio Grande at E109.9. Before access restrictions, 8 of 8 samples were collected within 1 business day.
- Lower watershed at E042.1, E050.1, E059, and E060.1. Before the September 13 storm, 7 of 7 samples were collected within 1 business day.
- Upper watershed at E026, E030, E055, E055.5, E056, CO101038, and CO111041. Before the September 13 storm, 7 of 15 samples were collected within 1 business day.
- DP Canyon at E038, E039.1, and E040. Before the September 13 storm, 3 of 15 samples were collected within 1 business day.

The duration between sample collection and sample retrieval is documented in Table 2.6-1. In 2013, samples were retrieved from gage stations 58 times. Samples were collected at gages 26 times within the first business day. The 9 samples collected on September 12 and 13 were all retrieved more than 1 d after collection because the Laboratory restricted access to gage stations and samplers to ensure safe working conditions. The sample collected on August 9 at E109.9 was not retrieved until September 11 during a temporary lifting of access restrictions.

Damage occurring to samplers and gage monitoring equipment is documented in Table 2.6-2. In 2013, 10 stations were damaged or malfunctioned a total of 28 times. The stations monitoring and sampling equipment were repaired within 5 business days on 22 of these occasions. Discharge could have exceeded triggering stage heights on 11 d because of silting or damage to gages, as noted in Table 2.6-2.

Battery voltage, stage height, and sensor function at each gage station were remotely monitored daily. An on-site inspection was performed if any malfunction or sample collection event was observed. Samplers and monitoring equipment at E050.1, E060.1, and E109.9 were physically inspected weekly between November 1, 2012, and October 31, 2013, except between December 18, 2012, and January 3, 2014, during Laboratory closure. Also, inspections were performed infrequently at E109.9 after

August 12, 2013. Because gage station functionality was assessed daily using telemetry, physical inspections at other gages were performed on a more varied schedule that ranged from 1 to 23 d between inspections from June 1 to October 31, 2013, and ranged from 1 to 58 d between inspections from November 1, 2012, to May 31, 2013. The dates of each physical inspection at each station are documented in Table 2.6-3.

A lapse in federal appropriations beginning on October 1, 2013, continued for 18 d, until October 18, 2013. Following this programmatic pause, an additional 5 working days were necessary to safely restart field activities to allow subcontractors to return to work. Normal operations resumed on October 28, 2013. With the exception of inspections required at E050.1 and E060.1 to maintain the early notification system for the Buckman Direct Diversion Project, no inspections, maintenance, or repairs were performed between early October and early November (LANL 2013, 250080).

3.0 WATERSHED HYDROLOGY

The topography, geology, geomorphology, and meteorology of the LA/P watershed are quite complex and include mesas, canyons, and large elevation gradients; alluvium, volcanic tuff, pumice, and basalt; ephemeral streams, evolving stream networks (both laterally and vertically), and sediment-laden stream discharge; winter snowfall that can create spring snowmelt, intense summer monsoonal rainfall, and occasional late summer to fall tropical storm activity. Consequently, monitoring of the LA/P watershed runoff is also complex and challenging.

3.1 Drainage Areas and Impermeable Surfaces

Drainage areas unique to each gage station (Figure 2.1-1) were developed using the ArcHydro Data Model in ArcGIS. Model inputs were developed using an elevation grid created from 4-ft light detecting and ranging (LIDAR) images, a digital elevation model from 2000, surface-water drainage culverts from the Laboratory and the County of Los Alamos, and manual site-specific controls based on field assessments. Each drainage area defines the area that drains to the particular gage station from either the next upstream gage station or the headwaters of the watershed, as determined by the model inputs.

The impermeable surface area was derived from the urban-sparse-bare rock land cover type within the taxonomic-level classification system developed in the Land Cover Map for the Eastern Jemez Region (McKown et al. 2003, 087150). The specific grid data set selected to provide the land cover type was the quarter-hectare smoothed taxonomic level. Within each gage station drainage area, the urban-sparse-bare rock land cover type was spatially queried for total acreage based upon the number of 50-ft × 50-ft grid cells that fell within the drainage boundary. This total area was then divided by the total area of the entire drainage area to derive the percent impermeable surface area. The following assumptions were made in determining the percent impermeable surface area: (1) the only available land cover data were from 2002–2003, and therefore newer impermeable surfaces may not be captured; and (2) urban-sparse-bare rock grid cells that may have overlapped two drainage areas were spatially queried based upon where the center of the cell resided rather than the exact amount of each cell that fell within each drainage area.

A significant factor in the frequency of discharge at each gage is the ratio of permeable to impermeable surface area discharging to the gage or within the canyon drainage (Table 3.1-1). The Las Conchas fire affected this relationship because of soil hydrophobicity (infiltration decreases), lack of vegetation (through fall increases and evapotranspiration decreases), and lack of litter (infiltration decreases) following a medium- to high-intensity forest fire, leading to an increase in runoff, as occurred after the Cerro Grande fire (Gallaher and Koch 2004, 088747). The effect of the fire was particularly evident at

E109.9, which measures discharge from a total drainage area of 37,800 acres, with 11% impermeable surface area before the fire and an additional 13% of the watershed experiencing high- or moderate-severity burn during the fire. Gage E109.9 recorded discharge greater than 5 cfs only 4 times during the 2010 monitoring period (pre-fire), 15 times during the 2011 monitoring period (1 yr post-fire), 14 times during the 2012 monitoring period (2 yr post-fire), and 17 times before being destroyed by September 13, 2013, flooding (3 yr post-fire).

3.2 Water and Sediment Transmission

Figure 3.2-1 is a flow diagram of the LA/P watershed displaying each gage station and the location of sediment transport mitigation sites. Figure 3.2-2 shows box and whisker plots of suspended sediment (both TSS and SSC) for DP, Los Alamos, and Pueblo/Acid Canyons from up- to downstream over the past 4 yr of monitoring. September 13, 2013 plots are shown on a different scale. As expected, Los Alamos Canyon had higher concentrations of suspended sediment as a result of the Las Conchas fire (compare the pre-fire year 2010 with the post-fire years 2011, 2012, and 2013). Indeed, the SSCs in DP and Pueblo/Acid Canyons (with the exception of E059) are significantly less than in Los Alamos Canyon. In general, the suspended sediment in Los Alamos Canyon decreases from E026 to E050.1, particularly after crossing the Los Alamos Canyon low-head weir (between E042.1 and E050.1), increases greatly after the Guaje Canyon confluence (E099), and decreases slightly at E109.9. The influence of Guaje Canyon is extreme because 15% of the 21,000-acre watershed experienced moderate- to high-burn severity during the Las Conchas fire.

For runoff events exceeding sampling triggers in 2013, Figure 3.2-3 shows hydrographs for DP, Los Alamos, and Pueblo/Acid Canyons from up to downstream. Figure 3.2-3 also shows separate hydrographs for E099, which is a baseline station in Guaje Canyon not on Laboratory property but upstream of E109.9, along with E050.1, E060.1, and E109.9, which are lower boundary stations in the LA/P watershed. Table 3.2-1 summarizes the flood bore transmission downstream in the lower LA/P watershed, including travel time of flood bore from the upstream to the downstream station, peak discharges of the flood bore at the station, and the percent reduction in peak discharge between the stations for every sampled runoff event in 2013. The flood bore is defined as the leading edge of the storm hydrograph as it transmits downcanyon and peak discharge is the maximum 5-min instantaneous flow rate measured during a flood. The focus was on peak discharge because it is related to stream power, and in ephemeral streams in semiarid climates, the greater the stream power, the greater the erosive force, hence the greater the sediment transport (Bagnold 1977, 111753; Graf 1983, 111754; Lane et al. 1994, 111757).

As flood bores move from up- to downstream, peak discharge can either increase by means of alluvial groundwater and/or tributary contributions or decrease because of transmission losses (infiltration). In some events, downstream stations experienced discharge before upstream stations because of inputs from intermediate tributary drainages or localized storms centered closer to the downstream station. In 2013, this occurred one time between E050.1 and E109.9 because of discharge from Guaje Canyon, four times between E099 and E109.9 because of the close proximity of the two stations (the peaks occur within 10 to 20 min of one another), and one time on September 12, 2013, between E099 and E109.9, possibly because of localized precipitation in the E109.9 area. A summary of the peak discharge increases and decreases (Table 3.2-2) between stations provides insight into the stream network.

In the lower part of Los Alamos Canyon, between E050.1 and E109.9, the peak discharge increased for all 23 runoff events (96% average increase), indicating this section tends to gain rather than lose volume. Discharge above 5 cfs was measured at E050.1 for 11 events, 10 of which may have contributed to discharge at E109.9. Of the 10 events where E050.1 may have contributed to E109.9: during 4 events E099 may also have contributed; during 2 events E099 did not contribute; and during 4 events E099 and

E109.9 were not operational. Discharge above 5 cfs was measured at E060.1 for 2 events, both of which may have contributed to E109.9, 1 of which E099 may also have contributed, and 1 of which E099 and E109.9 were not operational. In the stretch from E060.1 to E109.9, peak discharge increased in all 24 runoff events (99% average increase), indicating this channel section tends to gain rather than lose volume. Gain in this channel comes from tributaries between the confluence of Pueblo and upper Los Alamos Canyon and E109.9 in lower Los Alamos Canyon.

These relationships indicate runoff from Guaje Canyon and localized precipitation contributed to discharge measured at E109.9 in multiple events (also see Figure 3.2-3). The discharge values for E099 are considered estimates because of the wide open channel and the validity of a rating curve for this site; however, when E099 was operational, the peak discharge increased for 17 of 20 runoff events (87% average increase) and decreased for 3 events (43% average decrease), indicating this section tends to gain rather than lose volume. Discharge above 5 cfs was measured at E099 for 14 events, 13 of which may have contributed to discharge at E109.9. Discharge above 5 cfs was measured at E109.9 for 24 events, 10 of which had no or very little discharge at E050.1, E060.1, and E099, indicating a fair number of localized precipitation events occurred.

Figure 3.2-4 shows the hydrograph and sedigraph for each station sampled through all or most of the duration of a runoff event plotted as time since the peak. The SSC data for September 12, 2013, for E026 and E109.9 was not used in calculations or plots because the sampler intake clogged (Figure 3.2-4).

Table 3.2-3 shows the Pearson's correlation coefficients between discharge and SSC for these stations and runoff events. Concurrent times as well as various time lags are displayed. Pearson's correlation coefficients are computed as follows:

$$corr_{Q_t, SSC_t} = \frac{\sum_{t=0}^n (Q_t - \bar{Q})(SSC_t - \overline{SSC})}{\sqrt{\sum_{t=0}^n (Q_t - \bar{Q})^2 \sum_{t=0}^n (SSC_t - \overline{SSC})^2}} \quad \text{Equation 3.2-1}$$

where Q_t is the discharge at time t , SSC_t is the SSC at time t , n is the number of measurements to be correlated ($t = 1, 2, \dots, n$), and

$$\bar{Q} = \frac{\sum_{t=0}^n Q_t}{n} \quad \text{Equation 3.2-2}$$

$$\overline{SSC} = \frac{\sum_{t=0}^n SSC_t}{n} \quad \text{Equation 3.2-3}$$

The peak SSC can occur after the peak discharge; thus, lags between 0 and 30 min are presented with the discharge lagging behind the SSC to align the peaks (after 30 min, the correlations were reduced for all stations and all runoff events). For example, when the Pearson's correlation coefficient between Q_t and SSC_{t+5} is computed, the SSC time series begins 5 min after the discharge time series.

For stations E038, E039.1, E042.1, E050.1, E099, and E109.9, discharge is reasonably positively correlated to SSC with little to no lag. The exceptions are when the sampler intake clogged. Figure 3.2-5 shows the linear relationship between sediment yield and runoff volume for the stations where SSC was measured throughout the runoff event over the past 2 yr of monitoring; Table 3.2-4 presents the 2012 and 2013 values shown in Figure 3.2-5. Although SSC and instantaneous discharge are not always highly correlated as a result of localized precipitation, sediment availability, or antecedent conditions, the linear relationship between sediment yield and runoff volume is well established (Onodera et al. 1993, 111759; Nichols 2006, 111758; Mingguo et al. 2007, 111756). The July 2011 Las Conchas fire greatly affected this relationship during 2011 (LANL 2012, 222836); however, in 2012, and even more so in 2013, the relationship is tighter, perhaps indicating that the LA/P watershed is recovering.

The runoff volume for each event was computed as follows:

$$V = \sum_{i=0}^n Q(t_i)(t_{i+1} - t_i) \quad , \quad \text{Equation 3.2-4}$$

Where n = the number of instantaneous discharge measurements taken throughout the runoff event,

t = the time, i , at which an instantaneous discharge measurement is taken, and

$Q(t_i)$ = the discharge (ft³/s) at time t_i (multiplied by 60 to convert from ft³/s to ft³/min).

The mass of sediment for each runoff event was computed by

$$M = \sum_{j=0}^n Q(t_j)(t_{j+1} - t_j) SSC(t_j) \quad , \quad \text{Equation 3.2-5}$$

Where n = the number of SSC samples taken throughout the storm event,

t_j = the time, j , at which an SSC sample is taken,

$Q(t_j)$ = the discharge (ft³/s) at time t_j interpolated from the instantaneous discharge measurements taken at time t_i (multiplied by 60 to convert from ft³/s to ft³/min), and

$SSC(t_j)$ = SSC (mg/L) at time t_j (multiplied by 28.3×10^{-6} to convert from mg/L to kg/ft³).

Figure 3.2-6, like Figure 3.2-5, shows the linear relationship between sediment yield and peak discharge, which is not as robust as the relationship between sediment yield and runoff volume during the past 2 yr. The effects of the Las Conchas fire can also be seen in the peak discharge relationship, which is tighter in 2012 and 2013 than it was in 2011.

Appendix B presents plots of discharge (hydrographs), precipitation (hyetographs) and SSC (sedigraphs) versus time for each date and station when samples were collected. The precipitation shown is associated with the precipitation-station-based Thiessen polygons that overlay the individual gage's watershed area, thus potentially contributing to the discharge measured at the station. As expected, discharge lags precipitation, and when several pulses occur in the hyetograph, consequential peaks occur in the hydrograph.

3.3 Geomorphic Changes

Topographic surveys to measure sediment deposition and erosion were conducted at the following sediment transport mitigation sites: Pueblo Canyon cross-vane structures, upper Pueblo Canyon willow-planting area, Pueblo Canyon wing ditch, lower Pueblo Canyon willow-planting area, upper Los Alamos Canyon sediment detention basins, DP Canyon GCS, and Los Alamos Canyon low-head weir. A complete summary of the methods and detailed results is provided in Appendix A.

Although the September 2013 flood event resulted in significant erosion in most surveyed areas in Pueblo Canyon, the magnitude of the erosion was likely reduced by the sediment mitigation structures and willow plantings. The engineered structures in Los Alamos and DP Canyons appear to have enhanced sediment deposition in these areas. No actions are recommended at this time, except for continued annual resurveys.

3.3.1 Pueblo Canyon

Net erosion occurred in most surveyed areas in the Pueblo Canyon watershed during monsoonal flood events in 2013. This is in contrast to net deposition measured in most surveyed areas in 2010, 2011, and 2012. The Cross Vane Structure, Upper Pueblo Willow, Lower Pueblo Willow, and Pueblo Canyon GCS sediment mitigation areas all experience net erosion, whereas the Wing Ditch area experienced net deposition. The relatively large magnitude of the September 2013 flood event resulted in significant channel widening and incision in the areas that experienced net erosion. Many previously established willows were uprooted and washed downstream, reducing the density of willows in all willow planting areas. However, in areas with previously established thick willow patches (the upper two-thirds of the upper Pueblo willow planting area), willows that were laid down by monsoonal floods have resprouted and should effectively recolonize the area. The Pueblo Canyon GCS was effective in causing sediment deposition in the lower part of the Pueblo Canyon GCS monitoring area. The survival of thick willow patches and sedimentation above the Pueblo Canyon GCS and in the Wing Ditch area are consistent with the goal of the sediment transport mitigation work plans (LANL 2008, 101714; LANL 2008, 105716). Field observations indicate that much of the eroded sediment in Pueblo Canyon was originally deposited in the floods that occurred after the Cerro Grande fire, which contains relatively low contaminant concentrations. In addition, some of the bank erosion includes uncontaminated pre-1943 sediment, and erosion of these areas does not contribute to the contaminant load in storm water. However, some areas of post-1942, pre-Cerro Grande sediment deposits were also eroded, adding to the contaminant load in storm water.

3.3.2 Los Alamos Canyon

Net sediment deposition occurred in most surveyed areas in the Los Alamos Canyon watershed in 2013, which is consistent with the goal of the sediment transport mitigation work plans (LANL 2008, 101714; LANL 2008, 105716). Net sediment deposition in DP Canyon, the upper Los Alamos Canyon sediment detention basins, and the Los Alamos weir in 2013 is greater than recorded in 2012 (or in previous years). In fact, approximately 6000 yd³ of sediment was removed from the weir in 2013 (LANL 2013, 251741). It appears that sediment deposition behind the engineered structures in the Los Alamos Canyon watershed has been enhanced by the construction of these structures, although how far this effect propagates upstream behind the DP Canyon GCS is uncertain.

3.4 Impact and Efficiency of Watershed Mitigations

The DP and Pueblo Canyon GCSs were constructed to help reduce erosive flood energy and to cause upstream aggradation to bury existing stream channels, potentially to bury existing floodplain deposits, and in Pueblo Canyon, to stabilize an eroding wetland. As a result, the GCSs should help reduce sediment transported during flood events. The Pueblo Canyon wing ditch was designed to divert floodwater from the main channel into an adjacent abandoned channel, spreading water more broadly over a wetland and decreasing surface water flow velocities. Willows were planted in Pueblo Canyon to aid in surface stabilization, flow reduction, and sediment accumulation.

DP Canyon: In 2013, storm water sampling conducted in DP Canyon on June 14, June 30, July 12, and July 28 was performed above (E038) and below (E039.1) the GCS and associated floodplains (Figure 3.4-1). Analyses performed from samples collected during these runoff events allow direct evaluation of changes in discharge and sediment transport through this part of DP Canyon. Sample collection began within 5 min of initial discharge (triggered above 40 cfs for E038 and 10 cfs for E039.1). For E038 and E039.1, respectively, the calculated sediment yield is: June 14, 5.1 and 0.3 yd³; June 30, 5.0 and 0.1 yd³; July 12, 38.8 and 33.7 yd³; and July 28, 2.1 and 0.4 yd³ (Table 3.2-4). Between these two stations, or from above to below the GCS, there is a 178%, 192%, 14%, and 136% relative percent difference (RPD) decrease in sediment yield for these events, respectively.

Decreasing storm water velocity allows for infiltration to be increased. Increasing infiltration reduces the distance that a storm surge travels in the stream channel and decreases the distance that sediment and associated contaminants entrained in the water column travel. Increasing infiltration reduces peak discharge but can also decrease the total volume of storm water passing through a gage station. In 2013, the peak discharge decreased in 12 of 20 runoff events between E038 and E039.1, with an average decrease of 66%, and increased in 8 of 20 events with an average increase of 22% (Table 3.4-1). For the June 14, June 30, July 12, and July 28 events, the runoff volume for E038 and E039.1, respectively, is 3.0 and 1.3 acre-ft; 1.9 and 0.8 acre-ft; 13.7 and 16.3 acre-ft; and 1.6 and 1.2 acre-ft (Table 3.2-4). Between these two stations, or from above to below the GCS, there is a 77%, 82%, and 26% RPD decrease in runoff volume on June 14, June 30, and July 28, and a 17% RPD increase in runoff volume on July 12, most likely caused by additional contributions from local runoff because of the widespread nature of the July 12 storm.

In addition to examining coinciding sampling events, watershed mitigation performance can be assessed by examining overall statistics over time. Figure 3.4-2 shows box and whisker plots for E038 and E039.1 for TSS, SSC, and peak discharge over the past 4 yr of monitoring. These plots indicate overall reductions in TSS and SSC over the 4 yr and minor reductions in mean peak discharge (i.e., erosive force) over the 4 yr through this part of DP Canyon, consistent with the goals of the sediment transport mitigation activities.

Pueblo Canyon: In 2013, no sampling was performed in Pueblo Canyon above (E059) or below (E060.1) the GCS and upstream wetland for the same runoff event because the only event with discharge at both stations was the September 13 event, which destroyed both stations (Table 3.4-1). Therefore, overall statistics over the past 4 yr of monitoring must be used to assess performance. Figure 3.4-2 shows box and whisker plots for E059 and E060.1 for TSS, SSC, and peak discharge. As these plots indicate, peak discharge was effectively attenuated through the Pueblo Canyon wetland in 2010 and 2013, resulting in little to no transport from the upper Pueblo watershed into lower Los Alamos Canyon. This is consistent with the goals of the sediment transport mitigation activities. It should also be noted that discharge was measured at E059 for three events during which no discharge was measured at E060.1, regardless of the tributary from the Los Alamos Airport that regularly discharges storm water runoff into the wetland. Thus, the discharge magnitude is being reduced through this area, which is a primary goal of the mitigation actions. In addition, TSS and SSC magnitude was reduced through the mitigation structures in 2010 (no samples were collected at E060.1 during 2011, 2012, or 2013).

Los Alamos Canyon: Sampling was performed in Los Alamos Canyon on July 12, August 5, and September 10 above (E042.1) and below (E050.1) the low-head weir. Analyses performed from samples collected during these runoff events allow direct evaluation of the effect of the weir and associated basins on flow and sediment transport. Each event had downstream decreases in peak discharge, total runoff volume, and SSC (Figure 3.4-3). More specifically, between E042.1 and E050.1 for the three events sampled at the same time, there is a 182%, 132%, and 144% RPD decrease in sediment yield, respectively, and a 129%, 139%, and 93% RPD decrease in runoff volume, respectively. In addition, in 2013, the peak discharge decreased in 12 of 15 runoff events between E042.1 and E050.1, with an average decrease of 80% (Table 3.4-1). The peak discharge increased in 3 of 15 runoff events between E042.1 and E050.1, with an average increase of 44%; however, these storms occurred after the September 13 event during which the low-head weir was filled and continued to dewater for several months. Sediment trapping efficiency is expected to be higher in smaller events and events early in the season before the retention basins have filled with water. Flow is reduced through the weir and the upstream sediment retention basins, allowing sediment to settle out of suspension; thus, this mitigation feature is performing as designed.

In addition to examining coinciding sampling events, performance of the weir and upstream sediment retention basins can be assessed by examining overall statistics over the past 4 yr of monitoring. Figure 3-4.2 shows box and whisker plots for E042.1 and E050.1 for TSS, SSC, and peak discharge. These plots show major reductions in TSS and SSC, particularly in response to the post-fire years (2011, 2012, and 2013) and minor reductions in mean peak discharge; thus, the weir is performing well.

4.0 ANALYTICAL RESULTS

Appendix C contains all analytical results obtained from storm water runoff samples collected in the LA/P watershed during 2013. Data packages for these analyses are included with this report (on CD).

4.1 Data Exceptions

Storm water samples collected at E109.9 on September 12, 2013, were impacted by flooding on September 13. During September 13 flooding, the Greenlee storage box was filled with flood water and sediment. The ISCO samplers were tipped on edge and sample bottles were filled with flood water. Samples were analyzed despite the loss of integrity to provide insight into water passing the gage during the peak of flooding on September 13. Figures 3.2-4 and 4.1-1 show the lack of correlation between September 12 discharge and SSC of the individual sample bottles.

Low bias of analytical results in high-solid content storm water has been observed in analyses performed by gamma spectroscopy, alpha spectroscopy, inductively coupled plasma (ICP) mass spectroscopy and ICP optical emission spectroscopy. This low bias can be avoided when the solid phase and liquid phase of each biphasic sample are analyzed separately and the results mathematically recombined. Both samples collected at E099 and 7 of 9 samples collected at E109.9 in 2013 contained sufficient sediment to perform biphasic analyses. Calculated biphasic results are reported with an analytical method ending in “_CALC.”

4.2 Analytes Exceeding Comparison Values

As explained in the IMWP, several actions were taken as part of an interim measure under Section VII.B of the Consent Order to mitigate transport of contaminated sediments in the LA/P watershed (LANL 2008, 101714). The analytical results from monitoring are presented and evaluated within this context. The mitigation actions were not undertaken with the objective of reducing concentrations of water-borne contaminants to specific levels, and the analytical results are therefore not compared with water-quality standards or other criteria for that purpose or for the purpose of evaluating compliance with regulatory requirements. For this report, monitoring results are compared with water-quality standards at the request of NMED to provide a basis for potential future revisions to the analytical suites.

The New Mexico Water Quality Control Commission (NMWQCC) Standards for Interstate and Intrastate Surface Waters (New Mexico Administrative Code 20.6.4) establish surface water standards for New Mexico. Surface water within Pueblo and Acid Canyons are unclassified, nonperennial waters of the state under the New Mexico Administrative Code (NMAC) 20.6.4.98, with segment-specific designated uses of livestock watering, wildlife habitat, marginal warm water aquatic life, and primary contact. The criteria applicable to the marginal warm water aquatic life designation include both acute and chronic aquatic life criteria and the human health organism only criteria. Surface water within Los Alamos and DP Canyons is classified as ephemeral and intermittent waters of the state under NMAC 20.6.4.128, with segment-specific designated uses of limited aquatic life, livestock watering, wildlife habitat, and secondary contact. The criteria applicable to the limited aquatic life designation include the acute aquatic

life criteria and the human health-organism only criteria but do not include the chronic aquatic life criteria. In all cases, storm water results are compared with the lowest applicable criteria.

Water-quality criteria for total and total recoverable pollutants are compared with unfiltered surface water sample concentrations. The water-quality criterion for total recoverable aluminum is for filtered storm water samples using a 10- μ m pore size, which were not collected in 2013. Other water-quality criteria are for dissolved concentrations of pollutants, which are compared with filtered storm water samples using a 0.45- μ m pore size. Acute and chronic aquatic life criteria for dissolved cadmium, chromium, copper, lead, manganese, nickel, and zinc; acute aquatic life criteria for dissolved silver are calculated based on the hardness of each sample. Because chromium is not analyzed as separate trivalent chromium and hexavalent chromium species, chromium results are compared with the lowest standard, hexavalent chromium, dissolved. The water-quality criteria for dioxins are the sum of the dioxin toxicity equivalents expressed as 2,3,7,8 tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). Table 4.2-1 presents the NMWQCC standards used as numeric values for comparison with monitoring results for the purposes stated above. When chemicals have comparison values for multiple designated uses, the lowest value was selected to compare with analytical results. Table 4.2-2 presents the comparison of detected analytical results from 2013 with the standards in Table 4.2-1. Analytical constituents detected above these comparison values are copper, total cyanide, lead, total mercury, total selenium, adjusted gross alpha, total PCBs, and dioxins and furans.

Dioxin and furan congeners were detected in 4 of 6 samples analyzed in 2013. TCDD(2,3,7,8-) was not detected in the samples in which it was analyzed. These samples were analyzed for PCBs, including 11 PCB congeners with assigned toxicity equivalency factors (TEFs). PCB and other dioxin congeners with detected concentrations were converted to concentrations equivalent in toxicity (toxic equivalency quotients [TEQs]) to 2,3,7,8-TCDD for comparison with the NMWQCC standard. The TEQs were calculated using the TEFs presented in Table 4.2-3 (Van den Berg et al. 2006, 106990). The detected concentration of each congener was multiplied by its TEF, and these products were summed for each detected congener to obtain the TEQ for a sample. The TEQs for each sample analyzed for dioxins and furans or PCBs are presented in Table 4.2-4, and range over 4 orders of magnitude (1.550×10^{-8} to 4.087×10^{-4} μ g/L).

4.3 Relationships between Discharge, SSC, and Contaminant Concentrations

Discharge was calculated from stage height using a rating curve, which is the relationship between discharge in cubic feet per second and height of the water in feet, developed for each individual gage. Stage height was measured at 5-min interval and logged continuously during each sampled storm event. SSC and particle size were measured during each storm in conjunction with inorganic and organic chemicals and radionuclides. Because of low bias inherent in TSS analyses, TSS was measured less frequently in 2013 than in previous years.

TSS, SSC, and instantaneous discharge estimates were calculated for each sample using a linear relationship between the two corresponding analytically determined TSSs and SSCs or the two corresponding physically measured discharge, as follows:

$$y = mx + b, \quad \text{Equation 4.3-1}$$

where y = the calculated TSS, SSC, or discharge at the time of sample collection,

m = the slope of the line,

x = the time differential in minutes between TSS or SSC sample collection or discharge measurements, and

b = the concentration of analytically determined TSS or SSC before sample analyses or corresponding physically determined discharge.

The slope m is determined by dividing the difference in TSS, SSC, or discharge by the difference in time, in minutes, between TSS or SSC sample collection or discharge measurements before and after analytical sample collection. Using this equation, TSS, SSC, and instantaneous discharge were calculated for samples collected. Where analytical results are not bounded by sediment results, the concentration of the nearest sediment result is used as an estimate of the sediment concentration at the time the sample was collected. If TSS or SSC was not measured during a storm an estimate was not produced. The calculated TSSs, SSCs, and instantaneous discharges are presented in Table 4.3-1.

Relationships between calculated SSC and filtered and unfiltered analytical results can be used to evaluate contaminant sources in the LA/P watershed. This evaluation in turn provides insight into the utility of future monitoring strategies. Background concentrations of inorganic chemicals, naturally occurring radionuclides, and fallout radionuclides within uncontaminated canyon sediments at the Laboratory are presented in a report (LANL 1998, 059730) and accepted by regulatory authorities. In unfiltered storm water with known concentrations of suspended sediment, 95% of individual storm water samples containing only background concentrations of inorganic chemicals, naturally occurring radionuclides, and fallout radionuclides will be below an upper tolerance limit (UTL) for canyon sediments. These background sediment values are not interchangeable with surface water-quality values. Comparing background sediment values with unfiltered storm water is useful as a qualitative indicator of the presence and transport of a contaminant in storm water. Where the concentrations of metals and radionuclides in unfiltered storm water are greater than background concentrations, external contributions to background can be assumed.

Figures 4.3-1 through 4.3-32 present scatterplots of metals and radionuclides analyzed in Los Alamos and Pueblo Canyons with associated American Society for Testing and Materials (ASTM) method C1070-01 suspended sediment measurements collected in 2012 and 2013. Fewer results from 2012 were associated with the ASTM suspended sediment measurement method. Suspended sediment and associated analytical data points were removed from the plots from storm water collected at E038 on July 7, 2012, where suspended sediment was underestimated, from storm water collected at E109.9 on September 12, 2013, where sample integrity was not maintained, and from storm water collected at CO101038 and CO111041 at the detention basins below the SWMU 01-001(f) drainage where canyon sediments are not monitored.

Plots show unfiltered metals concentrations in storm water less than the background UTL for canyon sediments for 10 metals: aluminum (Figure 4.3-1), antimony (Figure 4.3-2), arsenic (Figure 4.3-3), beryllium (Figure 4.3-4), iron (Figure 4.3-5), mercury (Figure 4.3-6), nickel (Figure 4.3-7), selenium (Figure 4.3-8), silver (Figure 4.3-9), and thallium (Figure 4.3-10). Also, activities of unfiltered uranium-234 (Figure 4.3-11), uranium-235 (Figure 4.3-12), and uranium-238 (Figure 4.3-13) in storm water are less than the background UTL for canyon sediments at all LA/P watershed gages. Despite the lack of a source of these metals and radionuclides above background values, dissolved aluminum has concentrations of filtered metals in storm water above applicable water-quality standards.

Barium (Figure 4.3-14), cobalt (Figure 4.3-15), and manganese (Figure 4.3-16) frequently exceed concentrations expected solely from canyon sediment carried in unfiltered LA/P storm water. However, unfiltered barium, cobalt, and manganese concentrations in storm water are strongly correlated across all sediment concentrations and at all Los Alamos and Pueblo gage stations, Figure-4.3-17. The strong correlation indicates canyon sediments are the single naturally occurring background source for barium, cobalt, and manganese in the LA/P watershed. Filtered manganese results are sometimes above the acute aquatic life standard in samples with greater than 10% suspended sediment content. The three largest results for these three metals were obtained at E030 and E042.1 during 2012 and were not repeated during 2013.

Results for unfiltered cadmium (Figure 4.3-18), chromium (Figure 4.3-19), copper (Figure 4.3-20), lead (Figure 4.3-21), vanadium (Figure 4.3-22), and zinc (Figure 4.3-23) show results greater than would be expected of sediment background in low sediment content samples. Filtered zinc and copper results are sometimes above acute aquatic life standards. The "Evaluation of Sediment and Alluvial Groundwater in DP Canyon" (LANL 1999, 063915) showed that in DP Canyon cadmium, chromium, copper, lead, and zinc have a Los Alamos townsite origin. The Los Alamos and Pueblo Canyons investigation report (LANL 2004, 087390), which includes DP Canyon, paints a more complex picture of sources of metals from Los Alamos town site, historical releases from the Laboratory, and ash from wild fire. No metals originating from the Las Conchas fire, Laboratory activity or Los Alamos townsite were above concentrations expected in background canyon sediments at E109.9.

Non-detected metals are reported at the value of the quantitation limit but non-detect is determined to the value of the method detection limit (MDL). Nondetected filtered results for silver (Figure 4.3-9), cadmium (Figure 4.3-18), and thallium (Figure 4.3-10) are greater than their respective water-quality standards. The reported MDL for dissolved silver is 0.2 µg/L, the MDL for dissolved cadmium is 0.11 µg/L, and the MDL for dissolved thallium is 0.45 µg/L. Because the MDLs are below their respective water-quality standards, the analytes, if present, are detected at concentrations below the standards.

The Los Alamos and Pueblo Canyons investigation report (LANL 2004, 087390) identifies americium-241, cesium-137, plutonium-238, plutonium-239/240, and strontium-90 as radionuclide chemicals of potential concern. DP and Los Alamos Canyons downcanyon from SWMU 21-011(k) contain the largest amounts of americium-241, cesium-137, and strontium-90 in the watershed. Acid and Pueblo Canyons downcanyon from the TA-01 and TA-45 outfalls and from SWMU 00-030(g) contain an estimated 86% of the plutonium-239/240 inventory at the Laboratory.

Activities of cesium-137 (Figure 4.3-24) in storm water are detected above UTLs for canyon sediments at E040, E042.1, E050.1, and E109.9. Cesium-137 is below canyon sediment background at E026 and E030 in Los Alamos Canyon, at E038 and E039.1 in DP Canyon, and at all locations in Pueblo Canyon. Normalized concentrations of cesium-137 decrease from E040 downcanyon. This identifies DP canyon, below the gage at E039.1 as the current source of cesium-137 activity in the Los Alamos/Pueblo watershed and is consistent with the findings in the Los Alamos and Pueblo Canyons investigation report.

Activities of strontium-90 (Figure 4.3-25) in storm water are detected above UTLs for canyon sediments at E039.1, E040, E042.1, and E050.1. Strontium-90 is below canyon sediment background at E026, E030, and E109.9 in Los Alamos Canyon, at E038 in DP Canyon, and at all locations in Pueblo Canyon. Normalized concentrations of strontium-90 decrease from E039.1 downcanyon. This identifies DP Canyon, above the gage at E039.1 as the source of strontium-90 activity in the Los Alamos/Pueblo watershed and is consistent the findings in the Los Alamos and Pueblo Canyons investigation report (LANL 2004, 087390).

Activities of americium-241 (Figure 4.3-26) in storm water are detected above UTLs for canyon sediments at E030, E039.1, E040, E042.1, and E050.1. Americium-241 is below canyon sediment background at E026 and E109.9 in Los Alamos Canyon, E038 in DP Canyon, and at all locations in Pueblo Canyon. The largest normalized concentrations of americium-241 are at E040 and E042.1. This is consistent with SWMU 21-011(k) as the source of americium-241 activity in DP and Los Alamos Canyons.

Americium-241 was added to the analytical suite at E026 and E030 following the Los Conchas fire. Concentrations of americium-241 normalized to suspended sediment content increased to levels above canyon sediment background values in 2011 and 2012. In 2013, americium-241 decreased to levels below 0.04 pCi/g expected in canyon sediments not affected by Laboratory activities or ash at E026 and E030. Figure 4.3-27 shows the activities of americium-241 in storm water normalized to SSCs at E026 and E030 since 2000.

Activities of plutonium-239/240 (Figure 4.3-28) in storm water do not exceed background UTLs at E026 in Los Alamos Canyon or at the head of Pueblo Canyon at E055. Other gages in the LA/P watershed are found to contain plutonium-239/240 above canyon sediment background concentrations. The largest exceedances of background UTLs are measured at E055.5 and E056 in Acid Canyon. Exceedances of background UTLs are also observed at E030 in Los Alamos Canyon and at E039.1 and E040 in DP Canyon. Sources of plutonium-239/240 are identified in Los Alamos Canyon above the gage at E030, DP Canyon above the gage at E039.1, and most prominently in Acid Canyon. These observations are consistent with the findings in the Los Alamos and Pueblo Canyons investigation report (LANL 2004, 087390). Plutonium-239/240 normalized to suspended sediment measured at E109.9 was below canyon sediment background before the flooding of September 13. However, the flood carried storm water with sediments containing plutonium-239/240 approximately 10 times background from Pueblo Canyon.

Activities of plutonium-238 (Figure 4.3-29) in storm water do not exceed background UTLs at E026 and E030 in Los Alamos Canyon; at E038, E039.1, or E040 in DP Canyon; or at E055 in upper Pueblo Canyon. The largest exceedances of detected plutonium-238 are at E042.1 and E050.1, indicating a primary source in Los Alamos Canyon above E042.1, which is consistent with a primary source from SWMU 21-011(k) discharges. Activities of plutonium-238 normalized to SSCs in storm water collected on July 8 at E109.9 were 1.2 and 1.4 times the canyon sediment background of 0.006 pCi/g. The September 13 flood also contained storm water with sediments transporting plutonium-238 from Pueblo Canyon that were above canyon sediment background but were not detected.

Concentrations of total PCBs (Figure 4.3-30) in storm water do not correlate with the sediment content of the sample. In the LA/P watershed, the human health organism only standard of 0.00064 µg/L is exceeded at all gages in all samples. The acute aquatic life standard of 2 µg/L is not exceeded in storm water samples at any gage station. The distribution and concentration of PCBs in the LA/P watershed is consistent with a complex mixture of sources, including atmospheric deposition, townsite runoff, and Laboratory sources. The largest concentrations of total PCBs were detected at E030 in Los Alamos Canyon and at E059 in Pueblo Canyon from Laboratory sources.

Cyanide was added to the analytical suite at gages E026, E030, E042.1, E050.1, and E109.9, which were affected by ash after the Los Conchas fire. Concentrations of total cyanide in storm water were detected above the acute aquatic life standard of 22 µg/L twice in 2013 (Figure 4.3-31). Concentrations of cyanide normalized to suspended sediment content increased to levels above canyon sediment background values in 2011 and 2012. In 2013, cyanide decreased to levels below 0.82 mg/kg, as expected in canyon sediments not affected by Laboratory activity or ash. Figure 4.3-32 shows the activities of cyanide in storm water normalized to SSCs at all gage stations since 2000.

4.4 Storm Water Sampling below SWMU 01-001(f)

Results for the five storm water samples analyzed for total PCBs collected at the inlet to the upper detention basin below the SWMU 01-001(f) drainage range from 5.3 µg/L to 21.8 µg/L. Total PCB results for the two storm water samples collected at the culvert at the terminus of the vegetative buffer below the lower basin are 0.108 µg/L and 0.398 µg/L. Total PCB results are within the range of results for samples collected in 2011 and 2012. The higher result suggests the hill slope continues to be a source of PCBs even after sediment and rock were removed during corrective action at SWMU 01-001(f) in 2010. Analytical results from all samples collected at locations CO101038 and CO111041 are presented in Table 4.4-1.

5.0 CONCLUSIONS

The Los Alamos Canyon watershed experienced a large number of runoff events in 2013. Storms from September 10 to September 13, 2013, generated intense flooding, damaging the gaging network and storm water controls in the Los Alamos and Pueblo watershed. The Las Conchas burn area in the upper watersheds of Los Alamos Canyon and Guaje Canyon continue to contribute to increasing storm water discharges, but concentrations of fire-related cyanide and americium-241 have returned to pre-fire levels. Attenuation of flow and associated sediment transport is a primary goal of the sediment transport mitigation activities, and despite erosion through the Pueblo Canyon wetland, controls performed successfully and as intended in 2013. The 2013 monitoring data in upper Los Alamos watershed indicate a substantial reduction in SSC and peak discharge as floods passed through the low-head weir and associated sediment retention basins. These structures are, therefore, performing as designed. By contrast, the SSC was much higher at gaging station E109.9 in lower Los Alamos Canyon as a result of floods in Guaje Canyon from the Las Conchas burn area.

DP Canyon primarily receives runoff from the Los Alamos County townsite. Direct comparison of runoff and sediment yield above and below the GCS and upstream floodplains was possible during four storms. A reduction in sediment yield was observed between bounding stations (E038 and E039.1), and sediments continue to aggrade above the GCS. The DP Canyon mitigations are performing as designed.

Net sediment deposition occurred in most surveyed areas in the Los Alamos and DP Canyons experiencing monsoonal flood events in 2013, which is consistent with the goal of the sediment transport mitigation work plans. Pueblo Canyon experienced net erosion but the GCS and wetlands were effective in decreasing effects of the September 13 flood. Sediments containing plutonium-238 and plutonium-239/240 were transported to the Rio Grande from Pueblo Canyon during the September 13 flood.

Analytical data collected from storm water samples in 2013 indicate that for the 8 analytes exceeding NMWQCC water-quality standards (used as comparison values), total PCBs has a recognized source at Laboratory sites and off-site transport. The weir and associated sediment retention basins were effective at substantially reducing this transport. Concentrations of PCBs measured at E109.9 in lower Los Alamos Canyon are similar to those measured in upper Los Alamos Canyon above Laboratory sites at E026 and are consistent with the transport of PCBs from the Las Conchas burn area down Guaje Canyon. PCBs in the burn area have a global source because of atmospheric deposition and have accumulated in the watershed over time.

6.0 REFERENCES AND MAP DATA SOURCES

6.1 References

The following list includes all documents cited in this report. Parenthetical information following each reference provides the author(s), publication date, and ER ID or ESH ID. This information is also included in text citations. ER IDs were assigned by the Environmental Programs Directorate's Records Processing Facility (IDs through 599999), and ESH IDs are assigned by the Environment, Safety, and Health (ESH) Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the ESH Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

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6.2 Map Data Sources

Paved Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 29 November 2010.

Structures; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 29 November 2010.

Summer/Winter rain gage locations and networks; Los Alamos National Laboratory, Environmental Programs; Unpublished 2010 project data, Project 10-0027.

Gage stations; Los Alamos National Laboratory, Environmental Programs; Unpublished 2011 project data, Project 11-0002; locations based on WQDB data pull from January 5, 2011.

Gage drainage areas; Los Alamos National Laboratory, Environmental Programs; Unpublished 2011 project data, Project 11-0002; areas developed using the ArchHydro data model.

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Los Conchas perimeter; Los Alamos National Laboratory, Environmental Programs; Unpublished 2013 project data, Projects 12-0015.

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Watershed; Los Alamos National Laboratory, Environmental Programs; Unpublished 2013 project data, Projects 11-0002/ merge_watersheds_02_13_2012.shp.

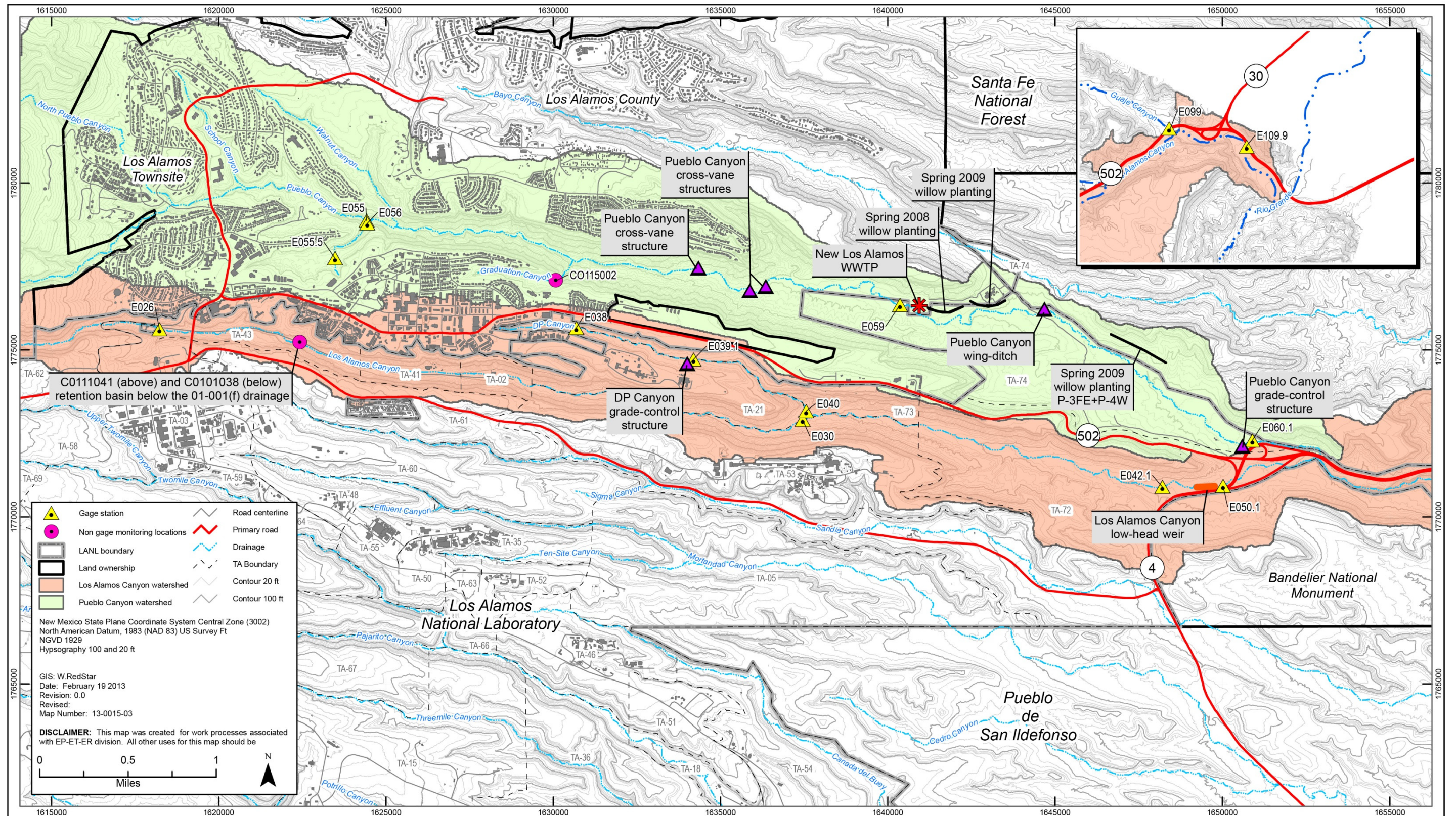


Figure 1.1-1 Los Alamos and Pueblo Canyons showing monitoring locations and sediment transport mitigation sites

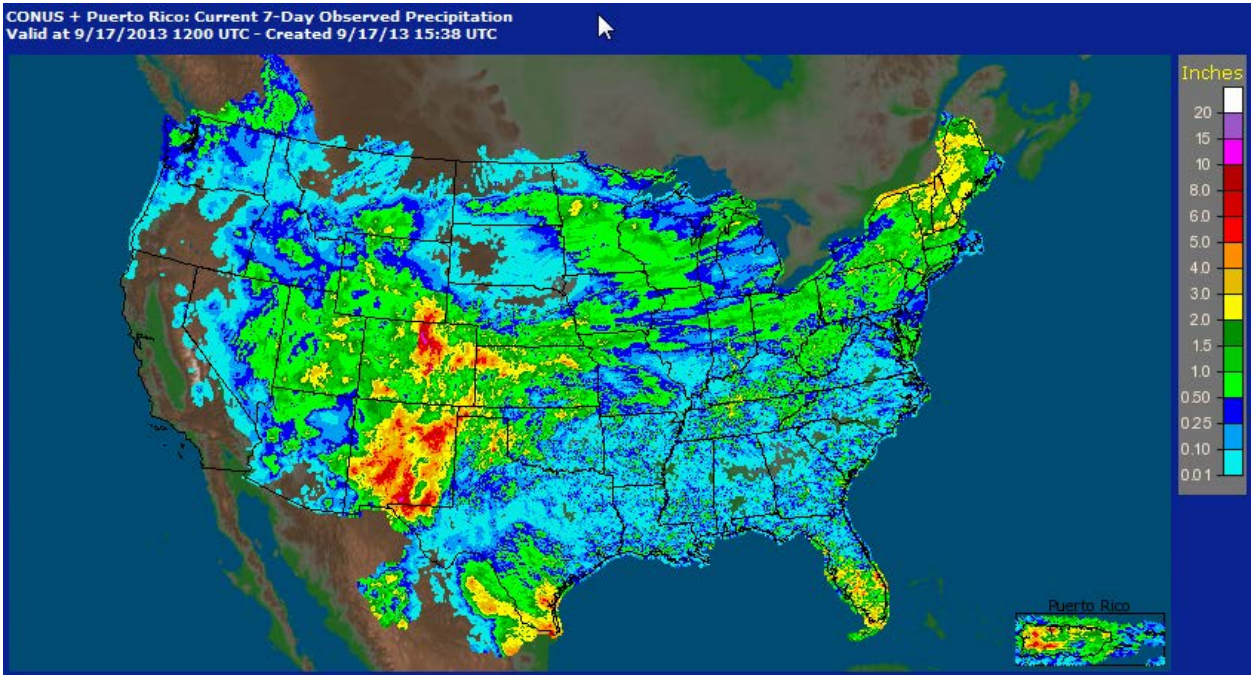


Figure 1.1-2 Radar-observed precipitation for the continental U.S. for 9/10/13 to 9/17/13, courtesy of NOAA

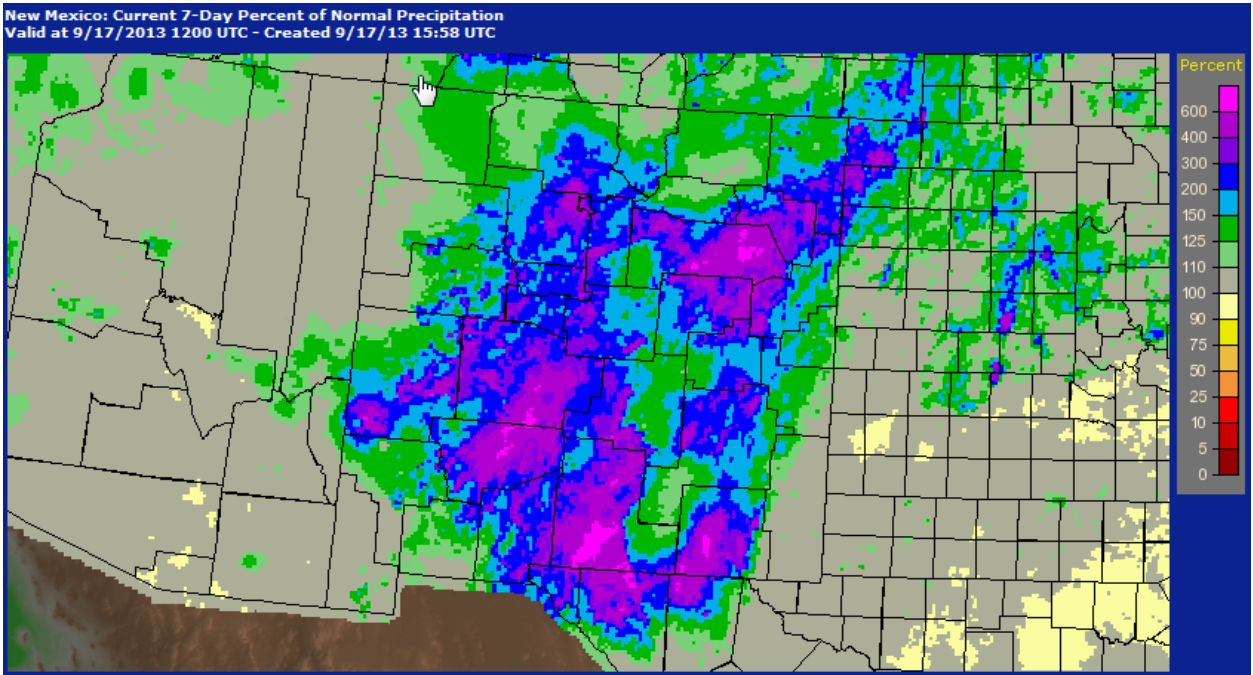


Figure 1.1-3 Percent of normal precipitation for New Mexico for 9/10/13 to 9/17/13, courtesy of NOAA

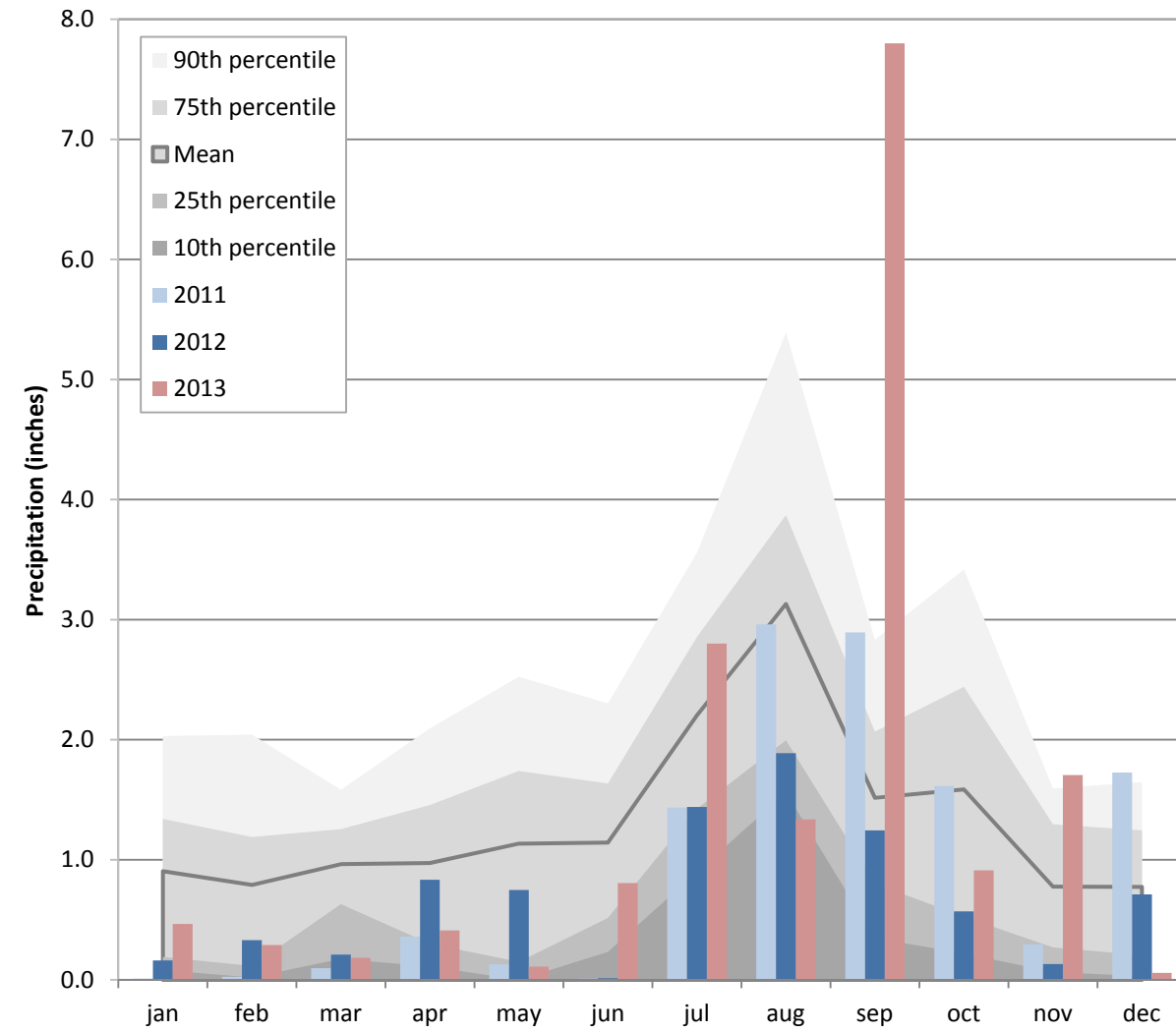


Figure 1.1-4 Total precipitation for each month of 2011, 2012, and 2013 based on meteorological tower data averaged over the Laboratory (mean and percentiles are based on data from 1992 to 2010)

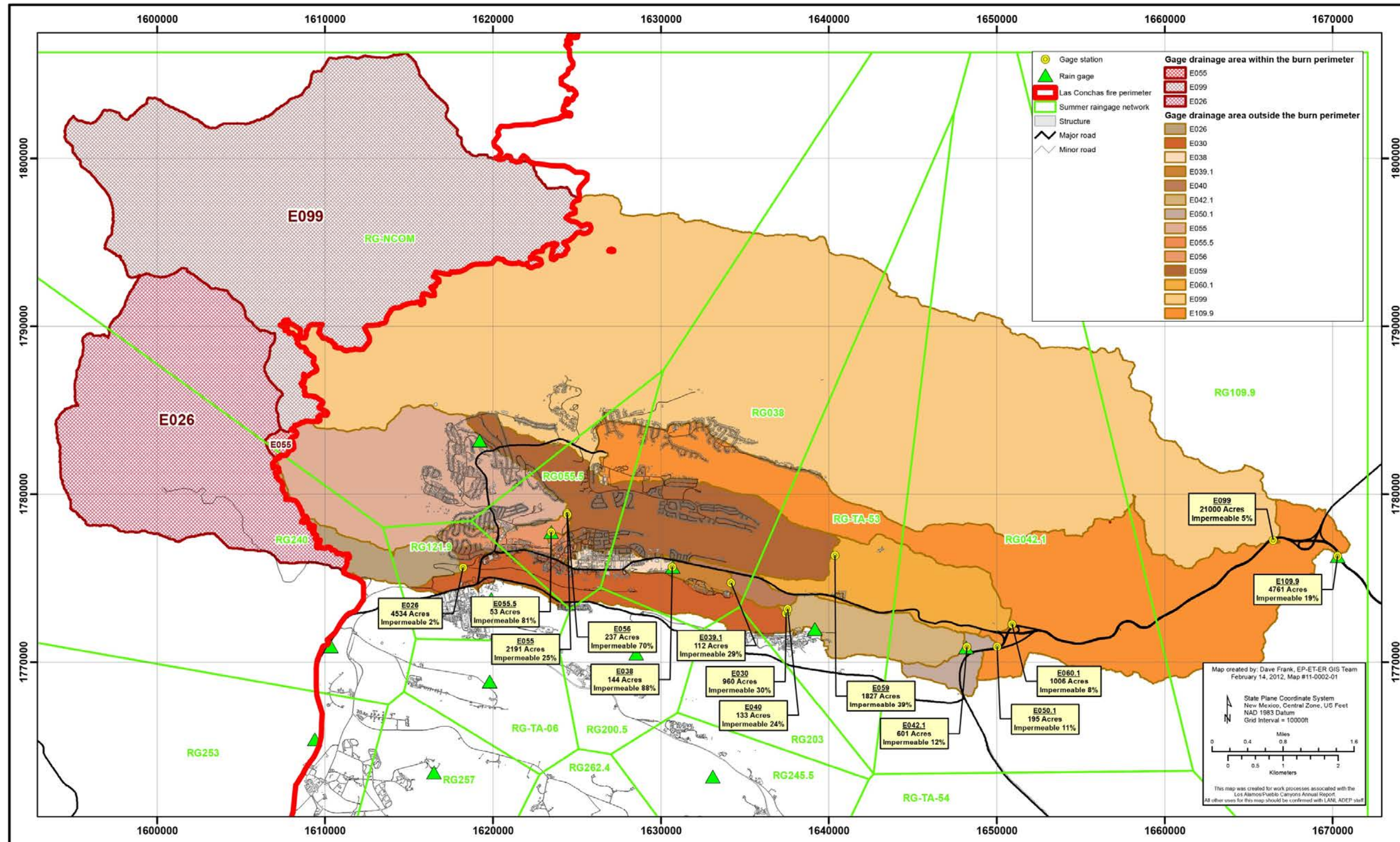


Figure 2.1-1 Los Alamos Canyon watershed showing drainage areas for each stream gage and associated rain gages, Thiessen polygons, and extent of the Las Conchas burn area

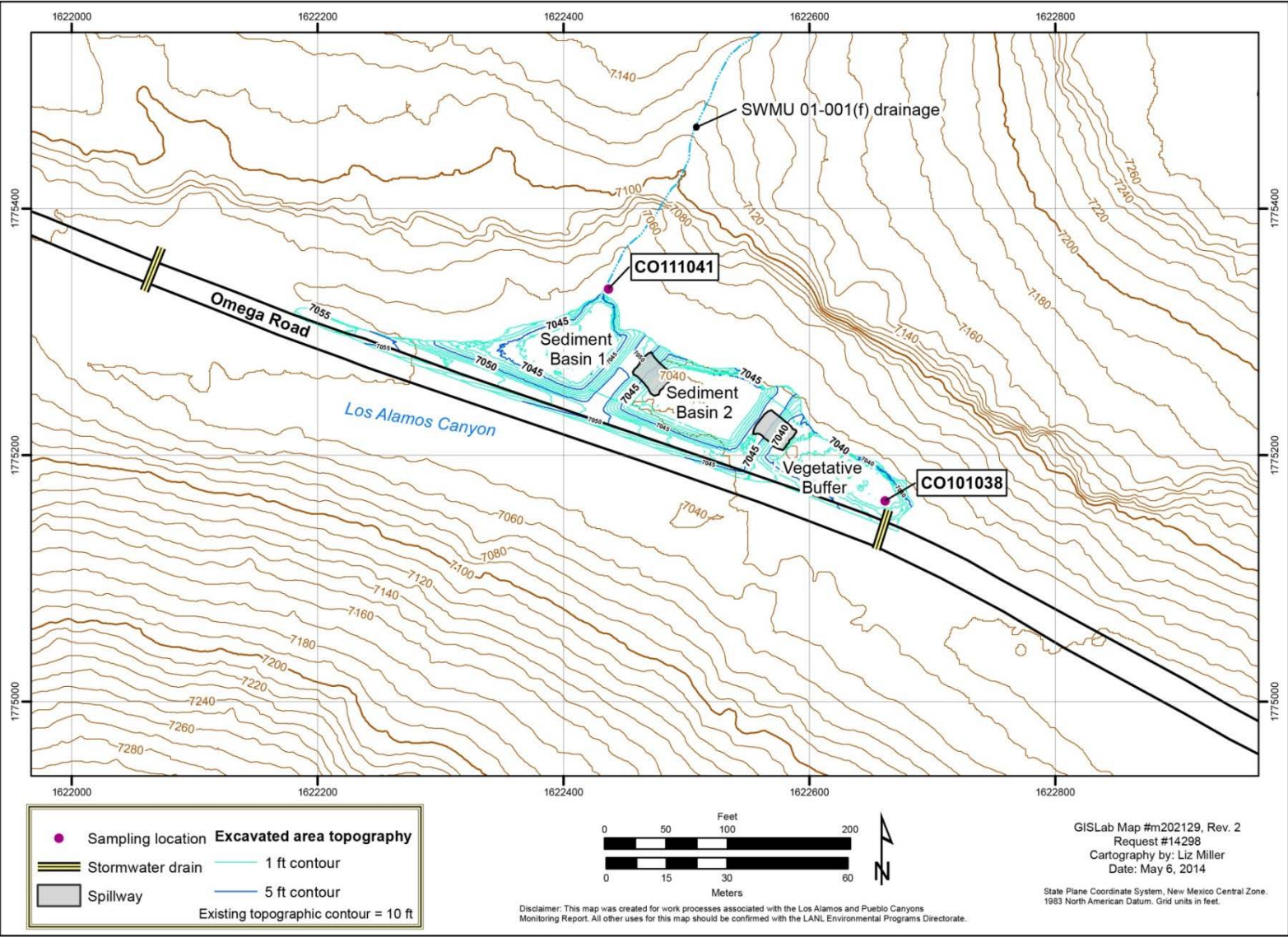


Figure 2.2-1 Sediment detention basins and sampling locations below the SWMU 01-001(f) drainage

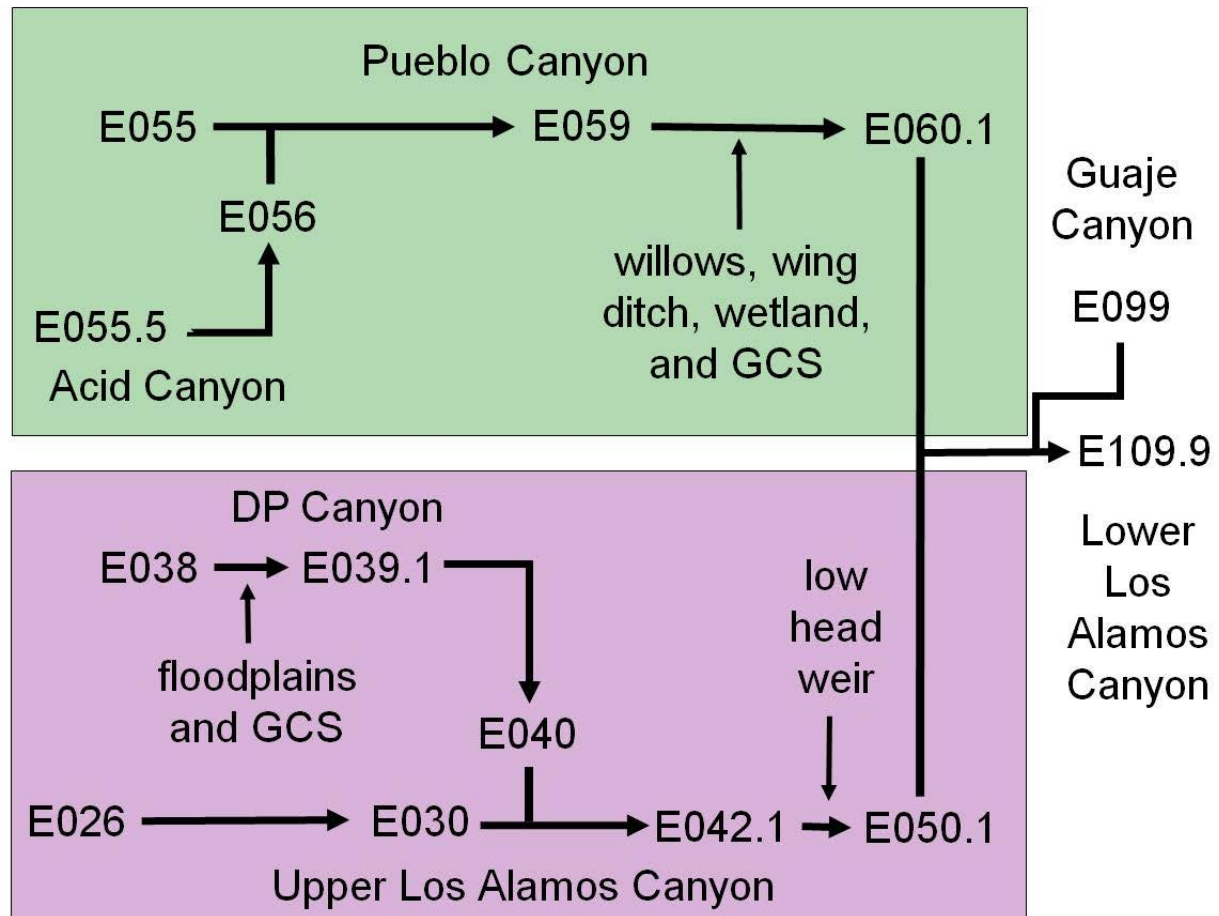


Figure 3.2-1 Flow diagram of gage stations and sediment transport mitigation sites in the LA/P watershed

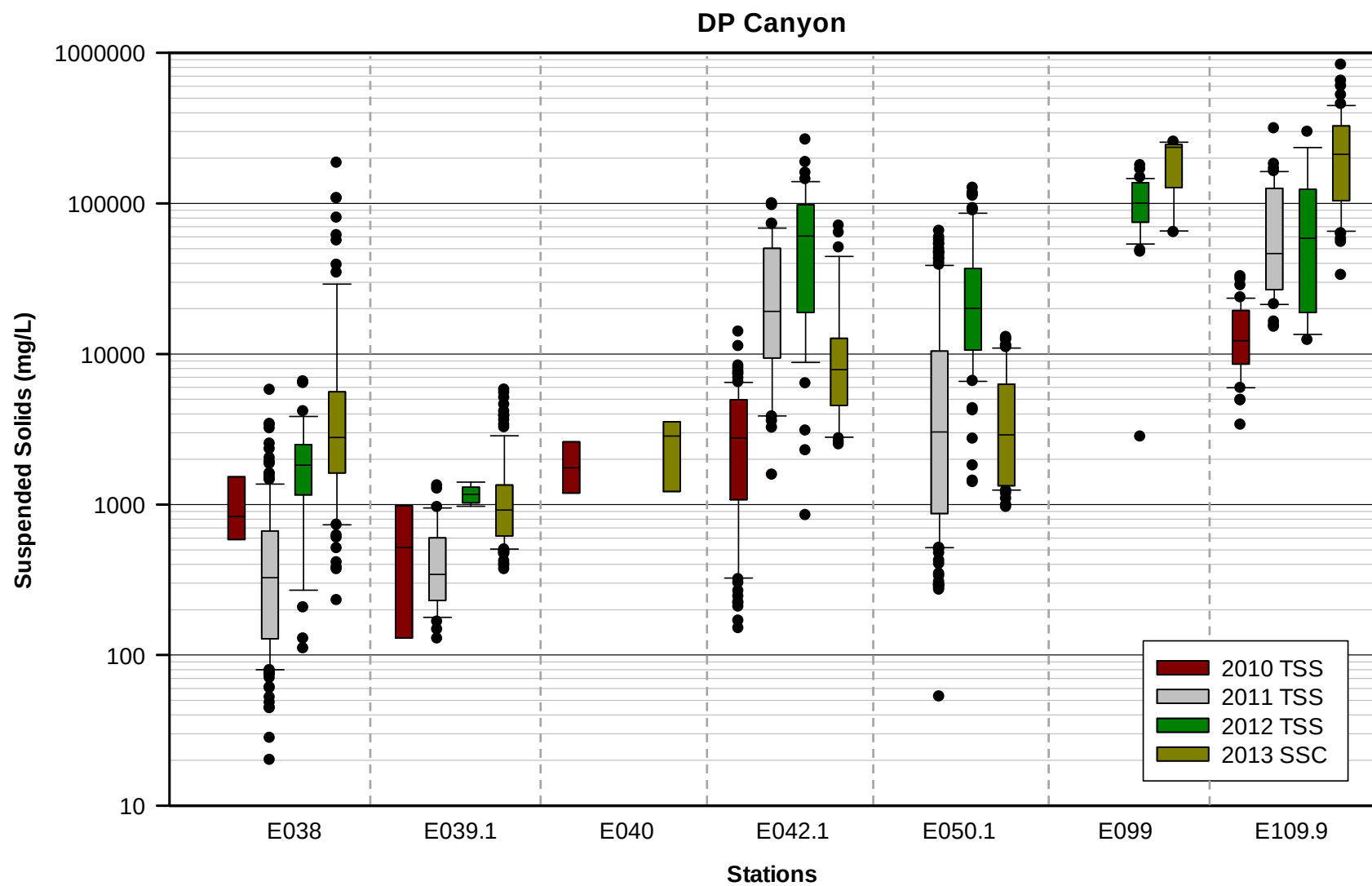


Figure 3.2-2 Box and whisker plots of TSS and SSC for all stations in the Los Alamos and Pueblo watershed over the past 4 yr of monitoring

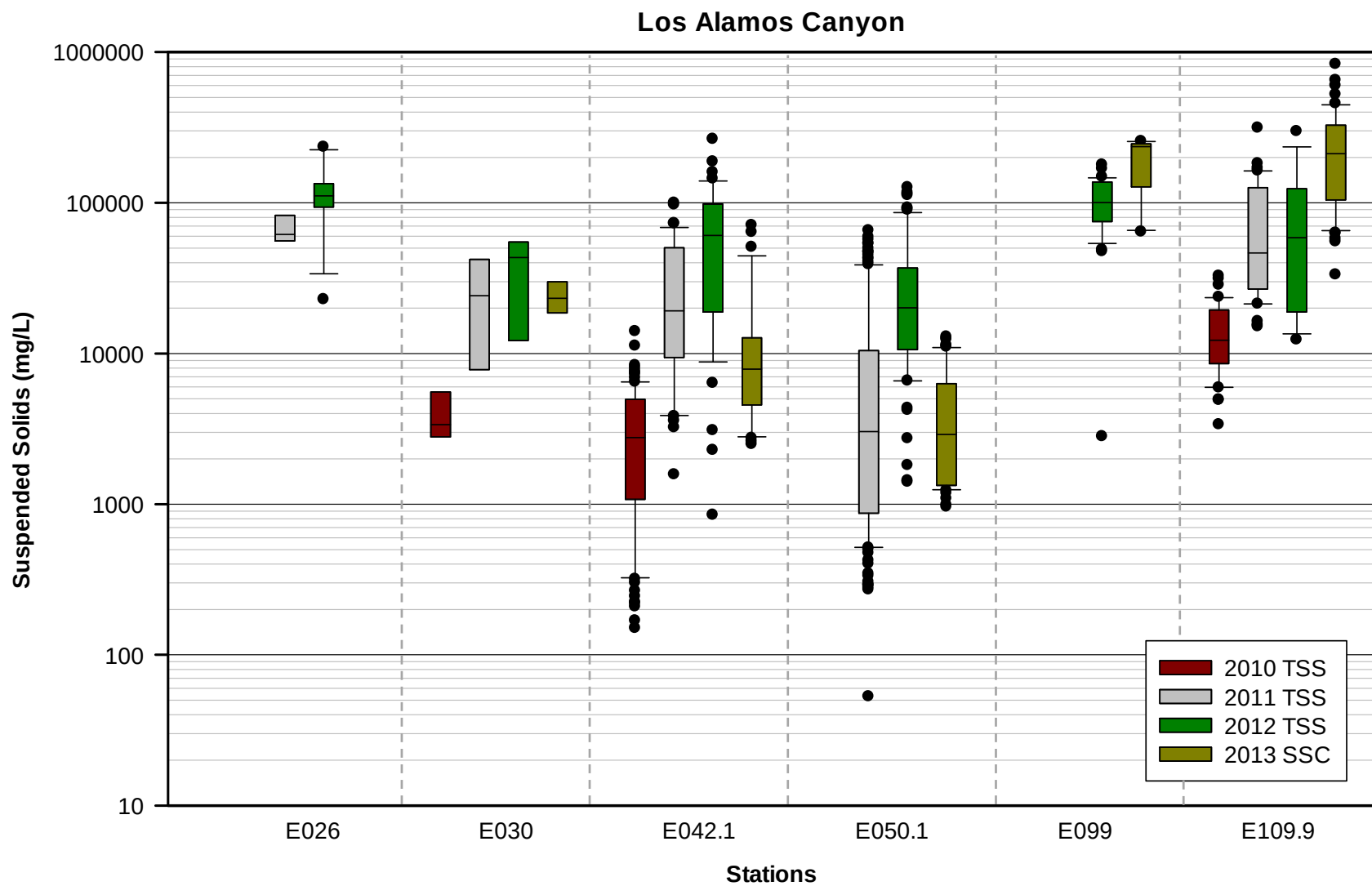


Figure 3.2-2 (continued) Box and whisker plots of TSS and SSC for all stations in the Los Alamos and Pueblo watershed over the past 4 yr of monitoring

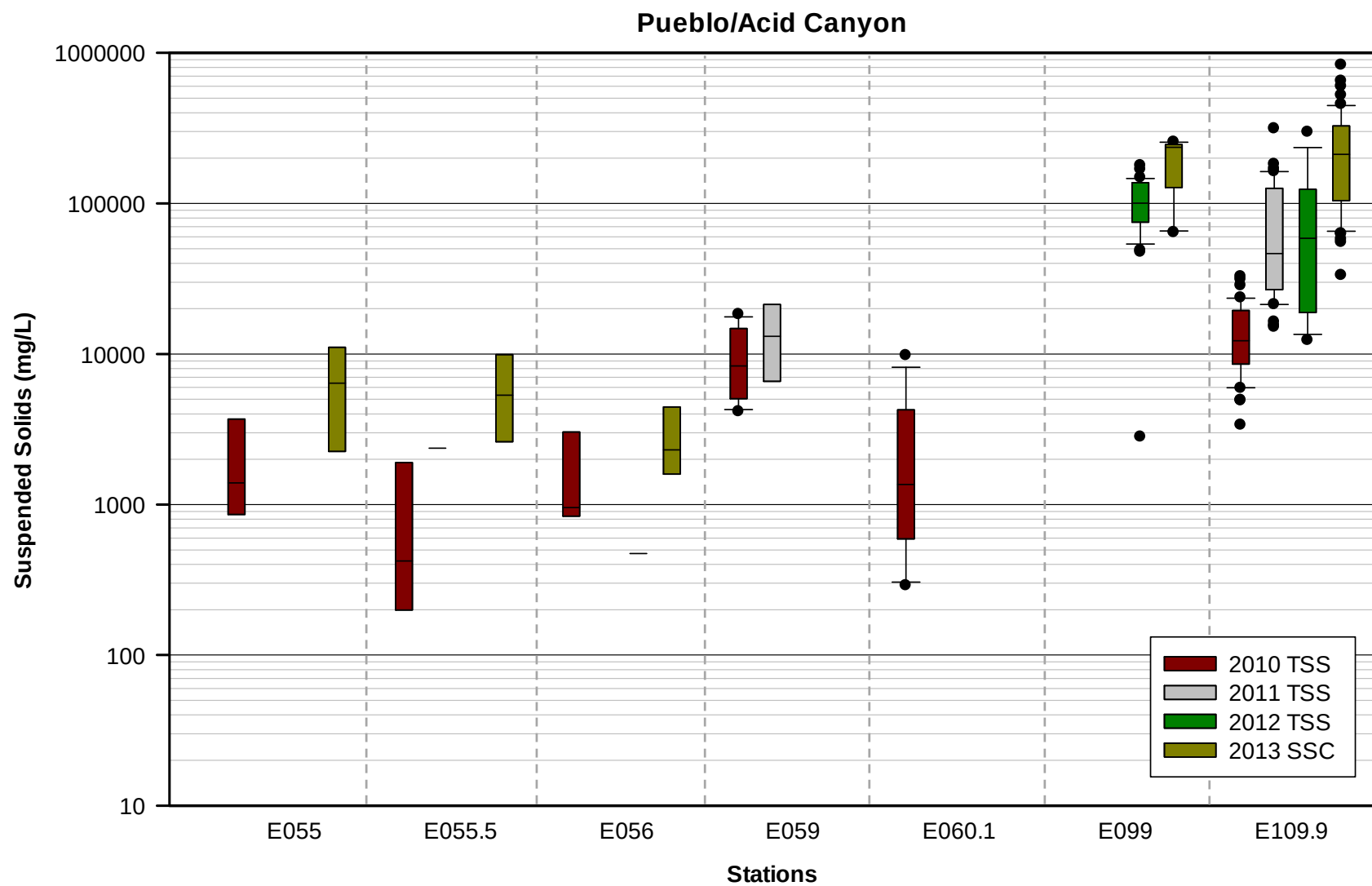


Figure 3.2-2 (continued) Box and whisker plots of TSS and SSC for all stations in the Los Alamos and Pueblo watershed over the past 4 yr of monitoring

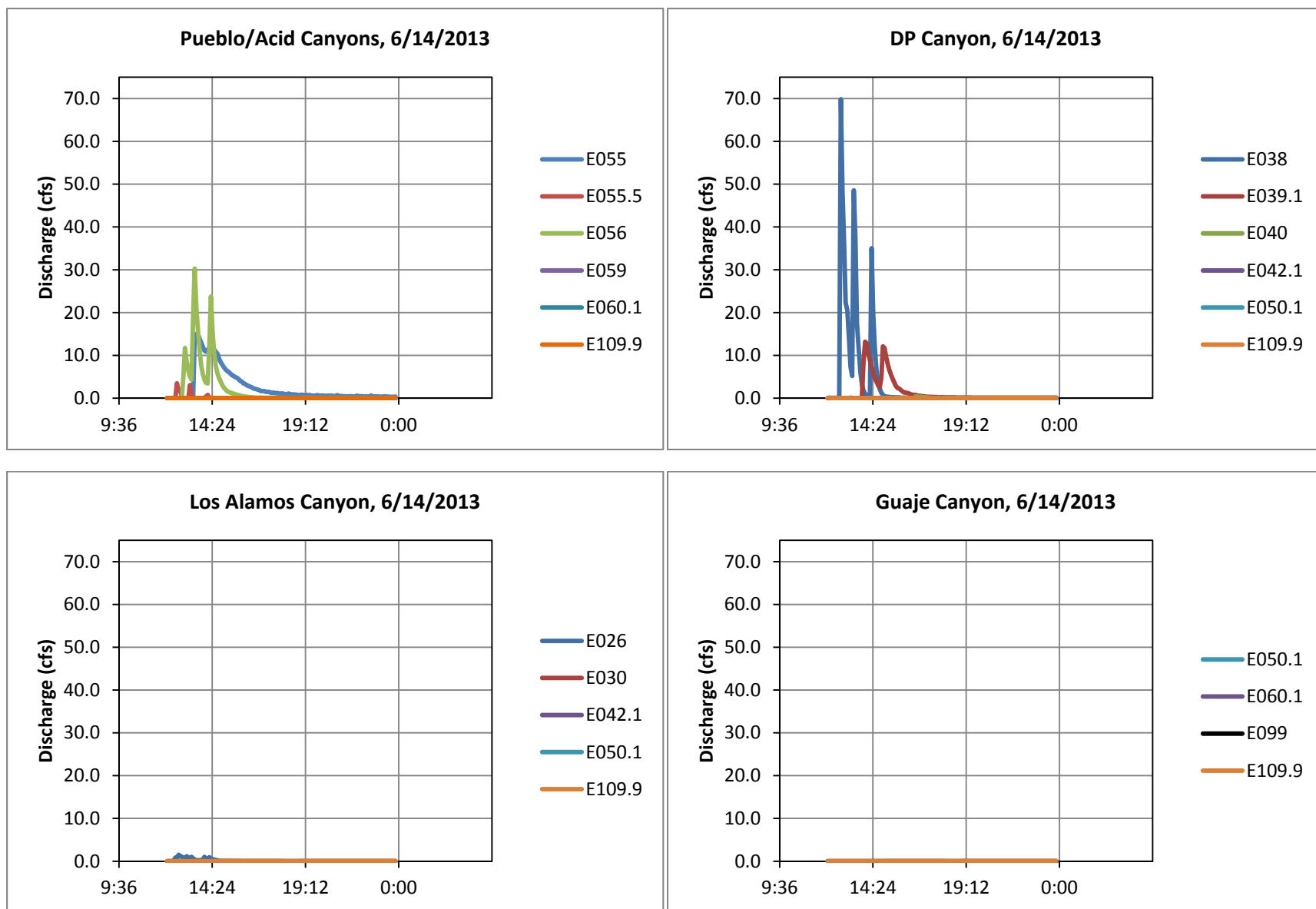


Figure 3.2-3 Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

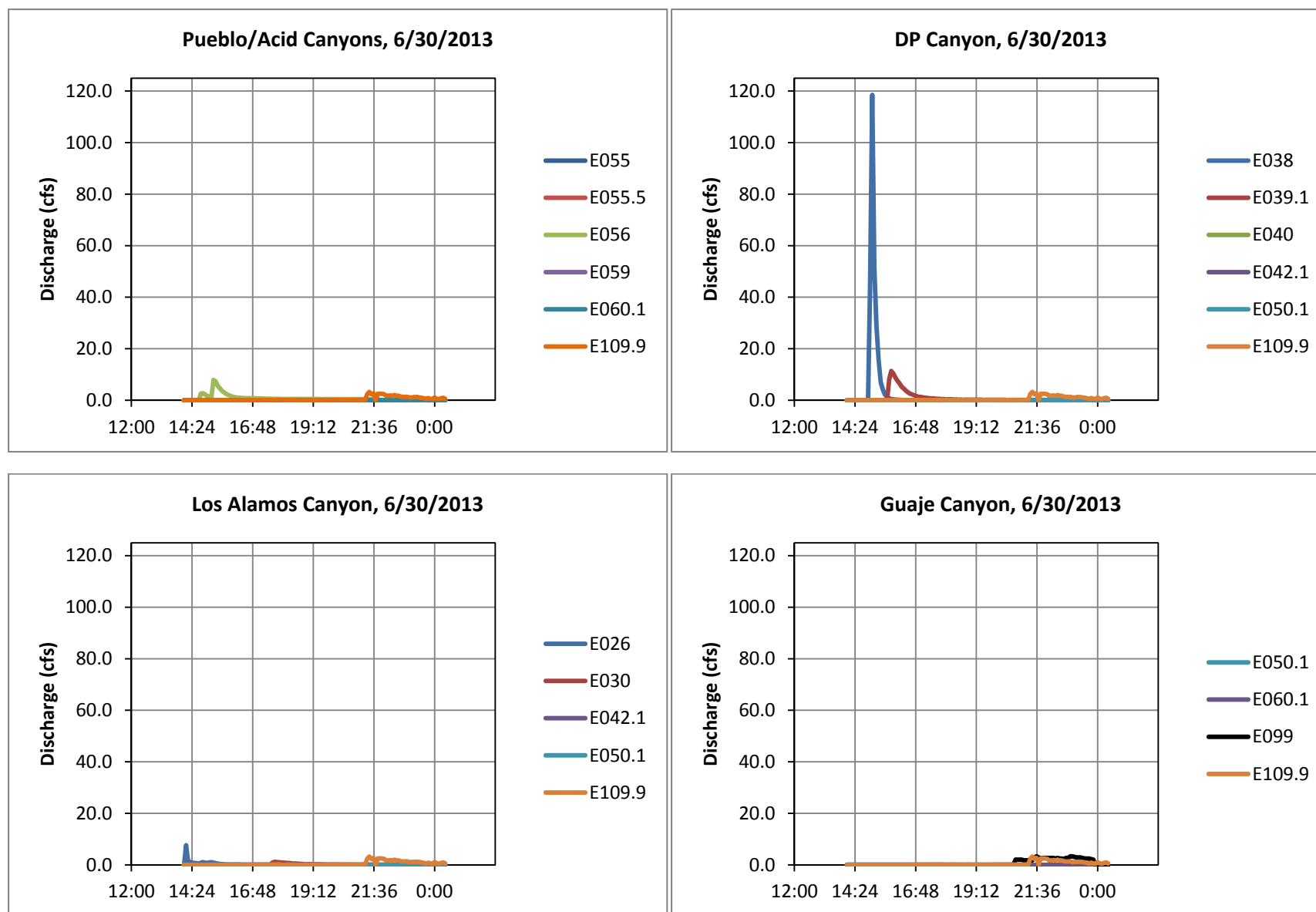


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

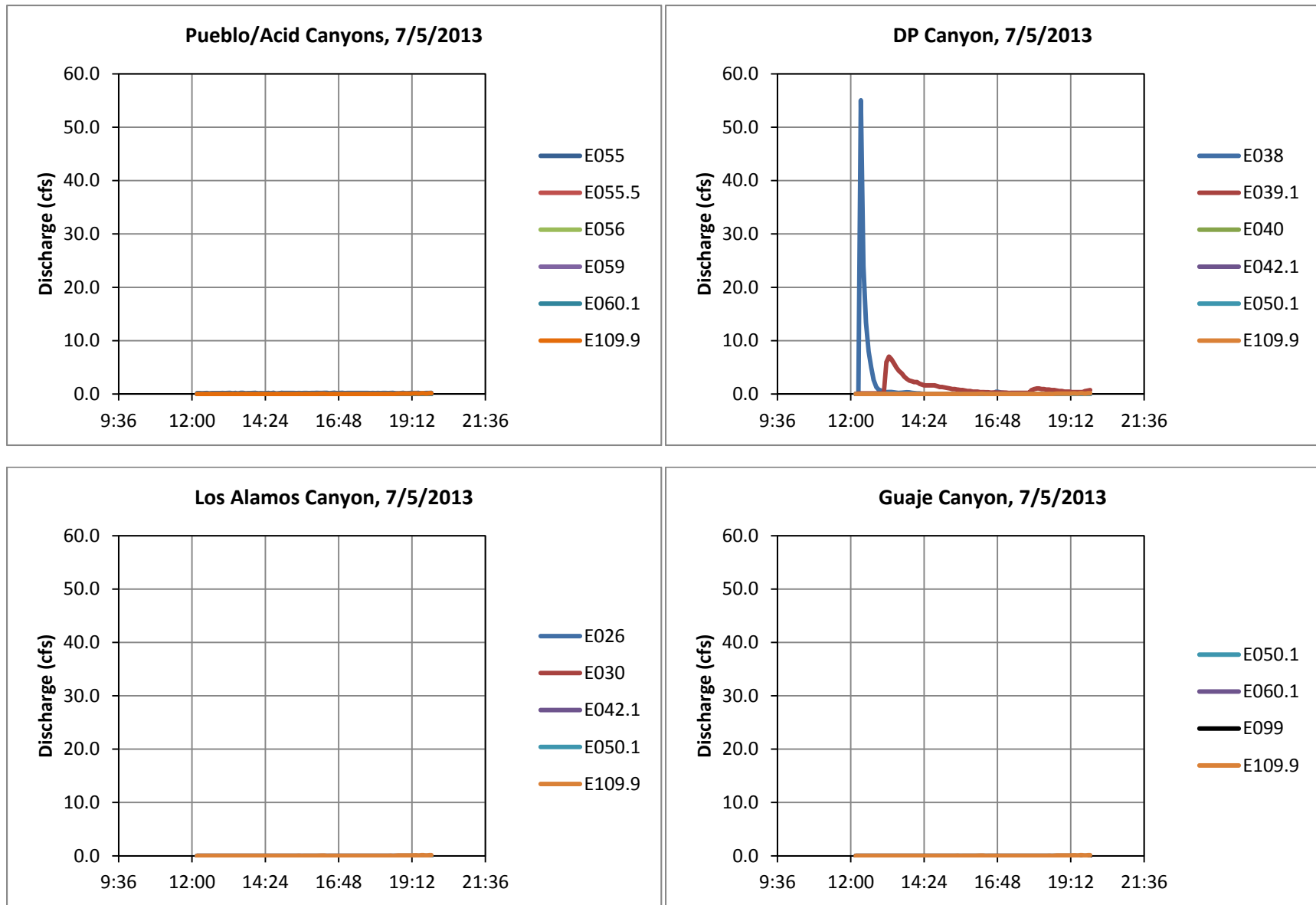


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

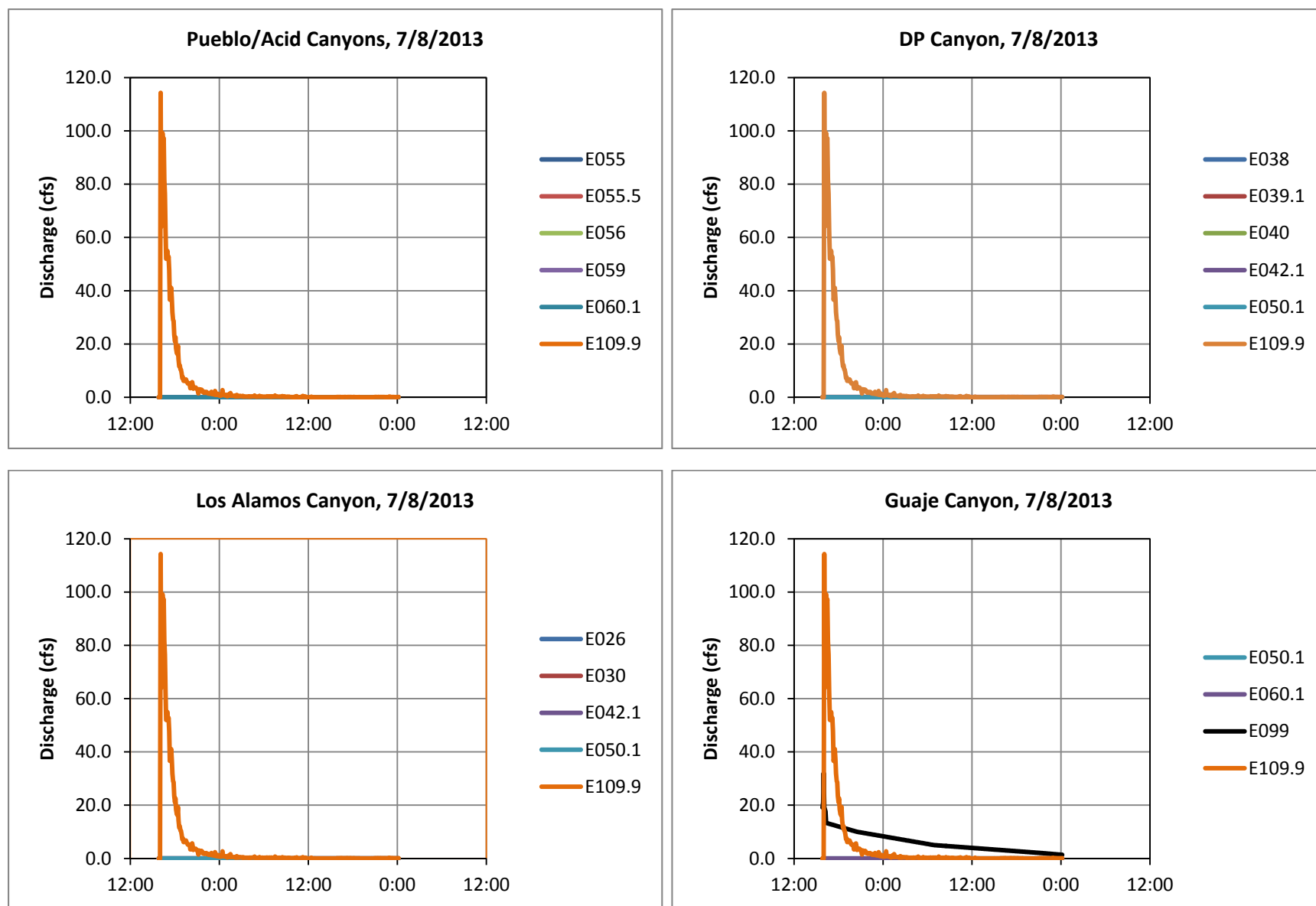


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

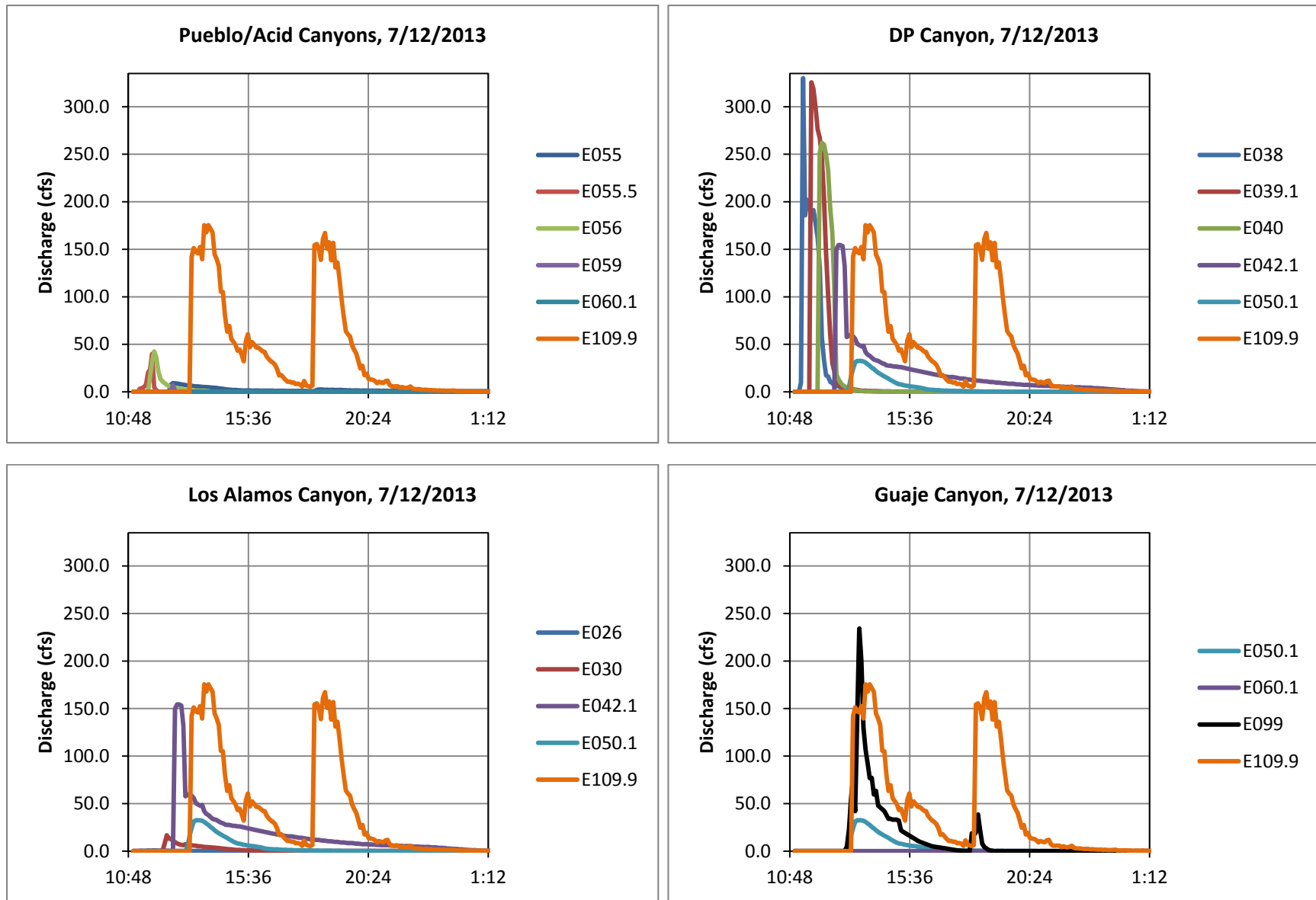


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

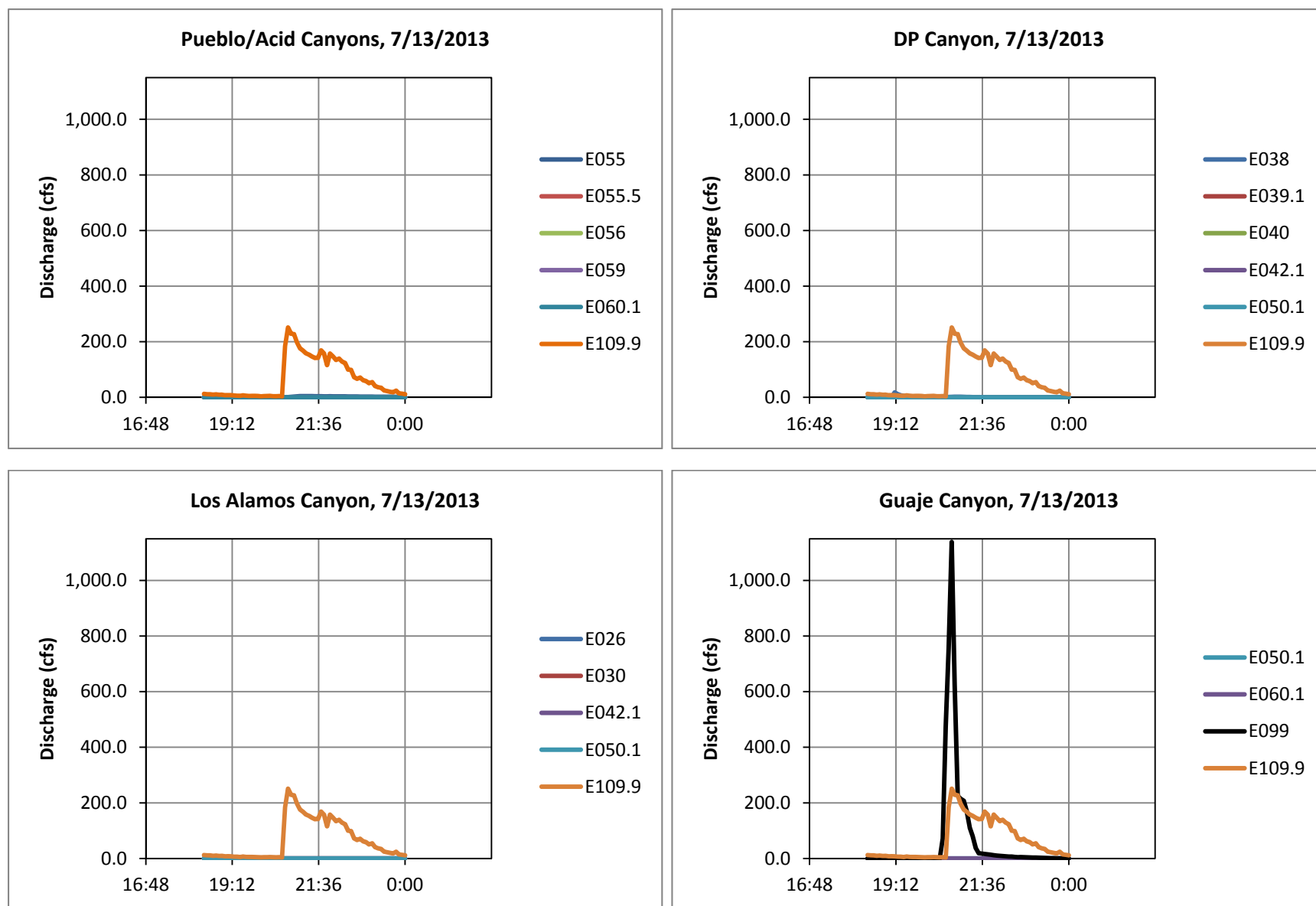


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

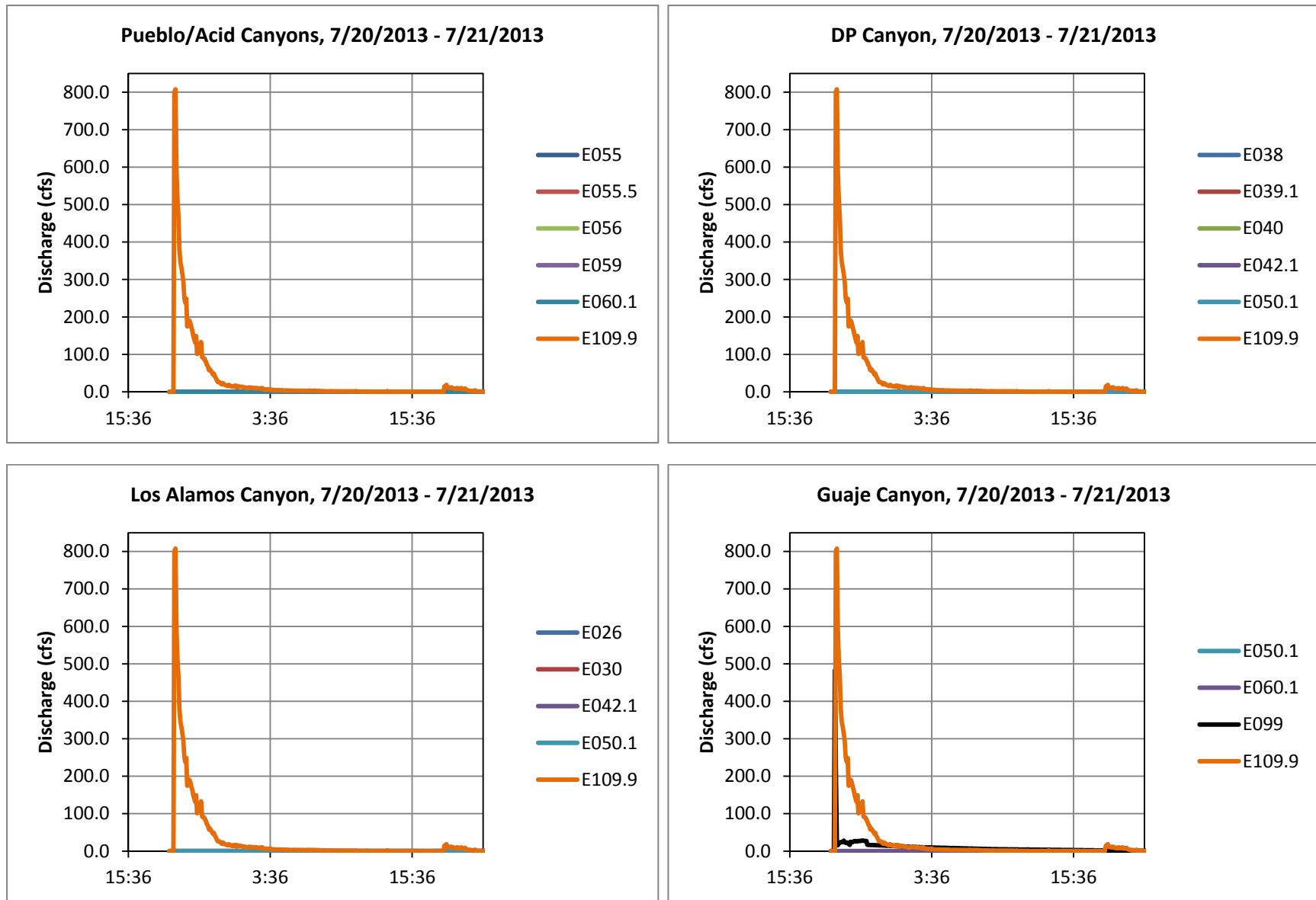


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

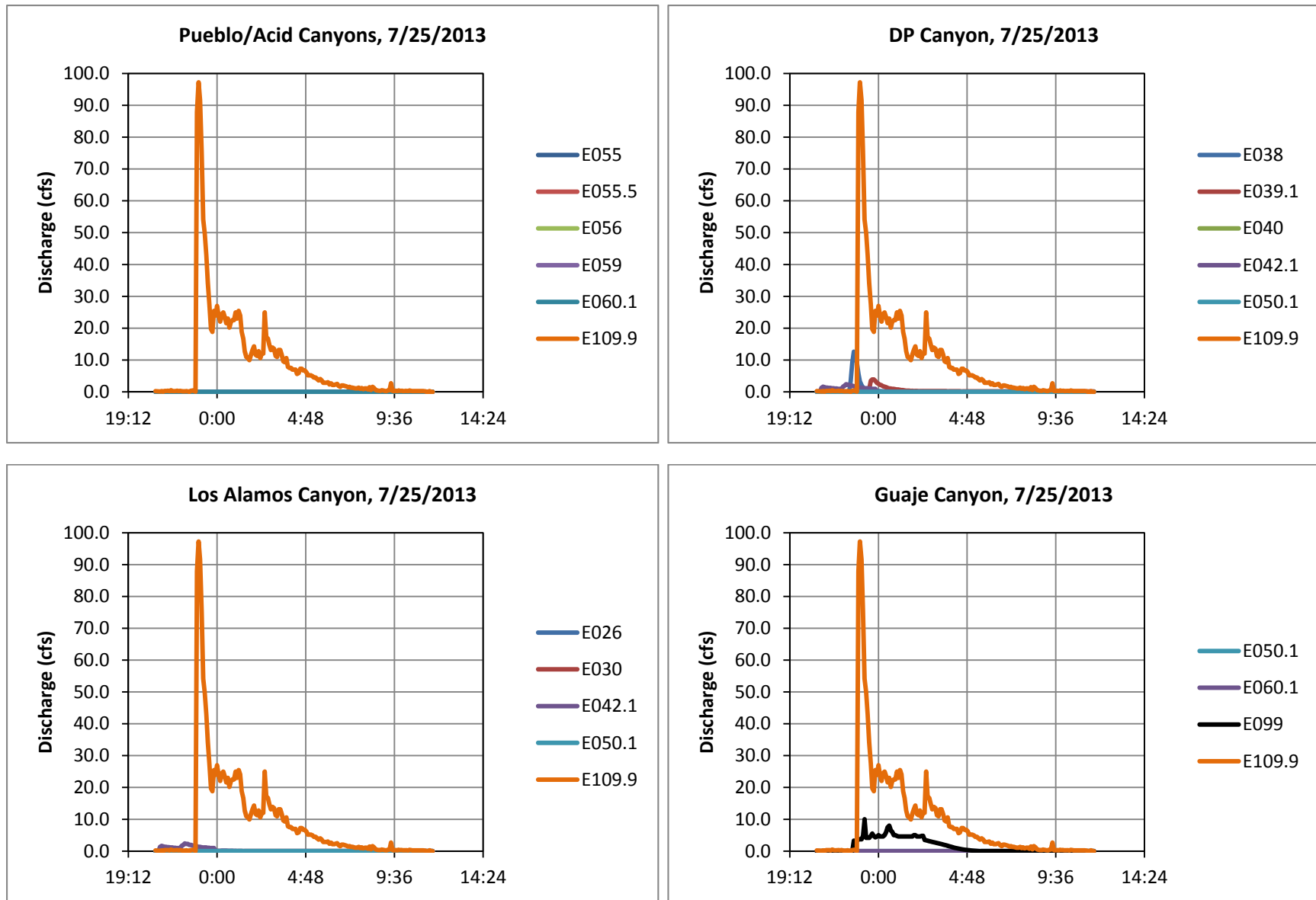


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

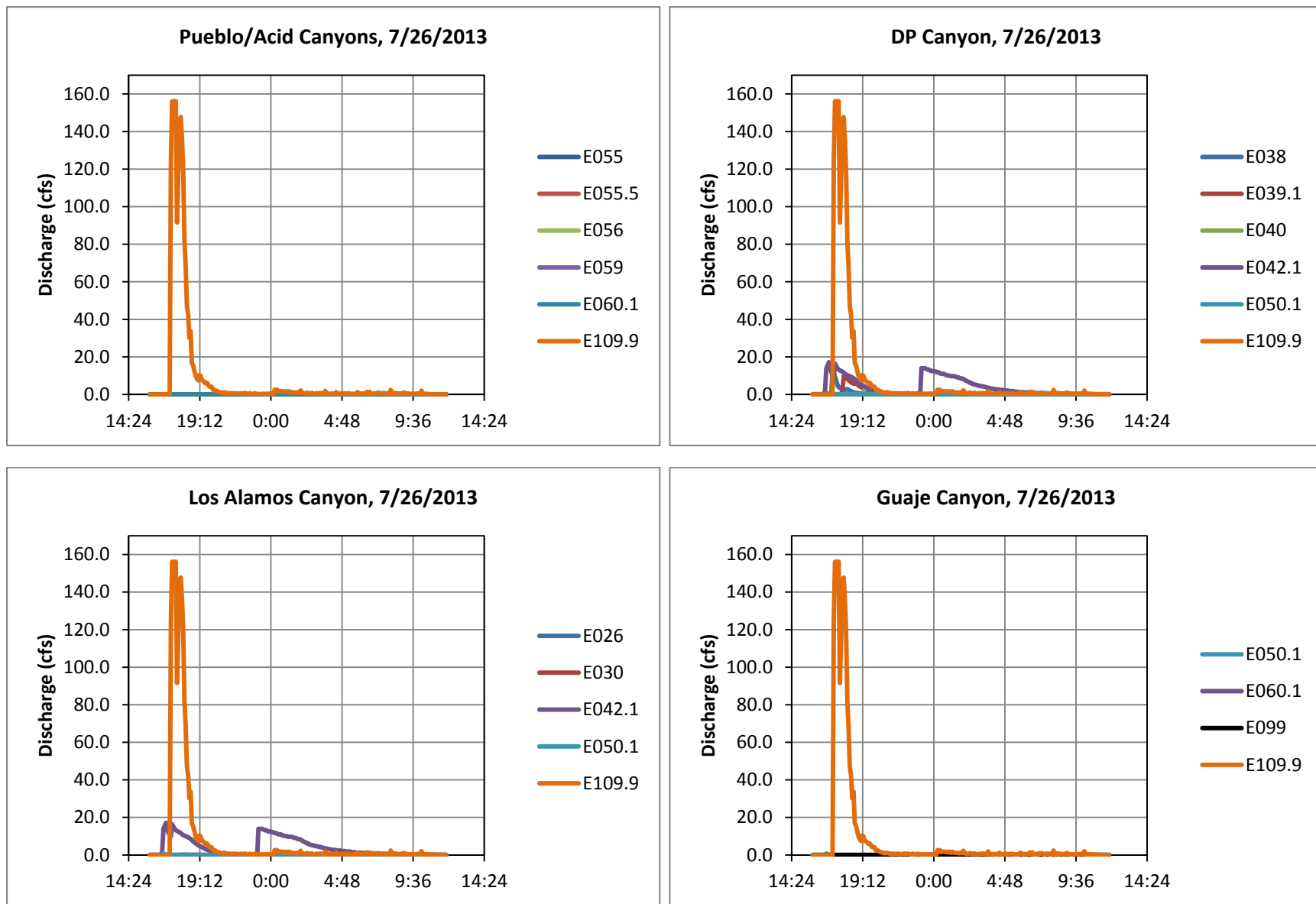


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

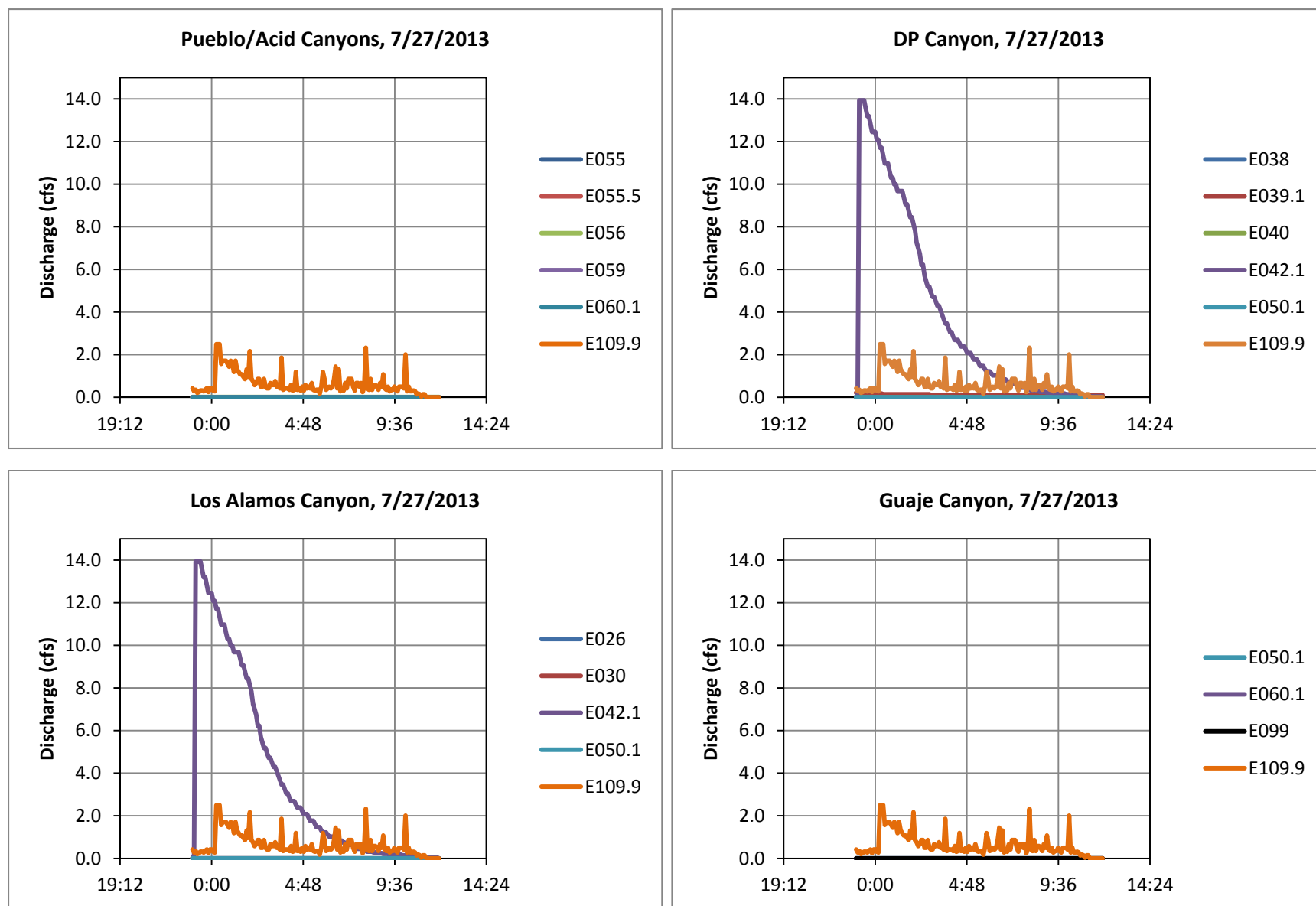


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

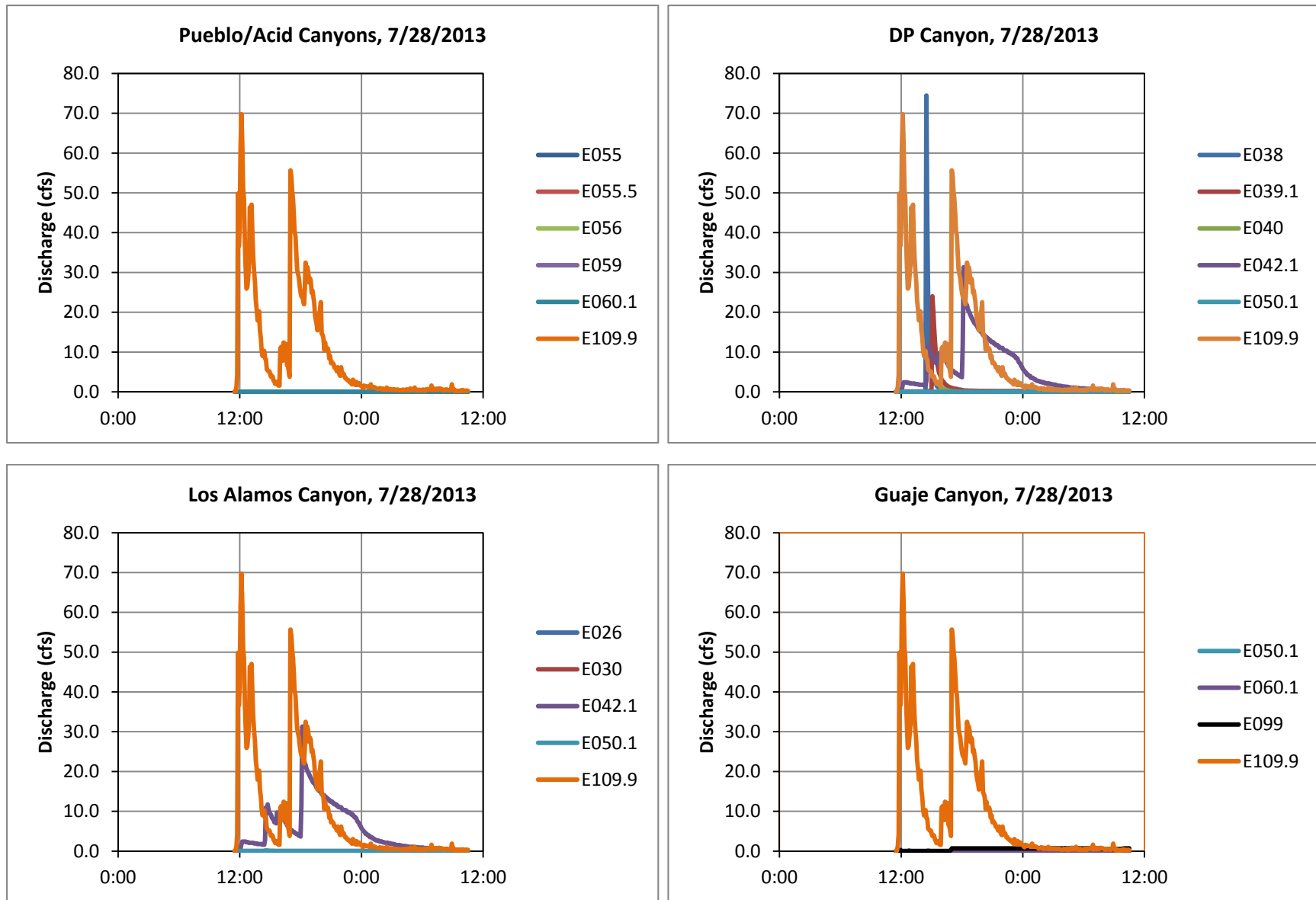


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

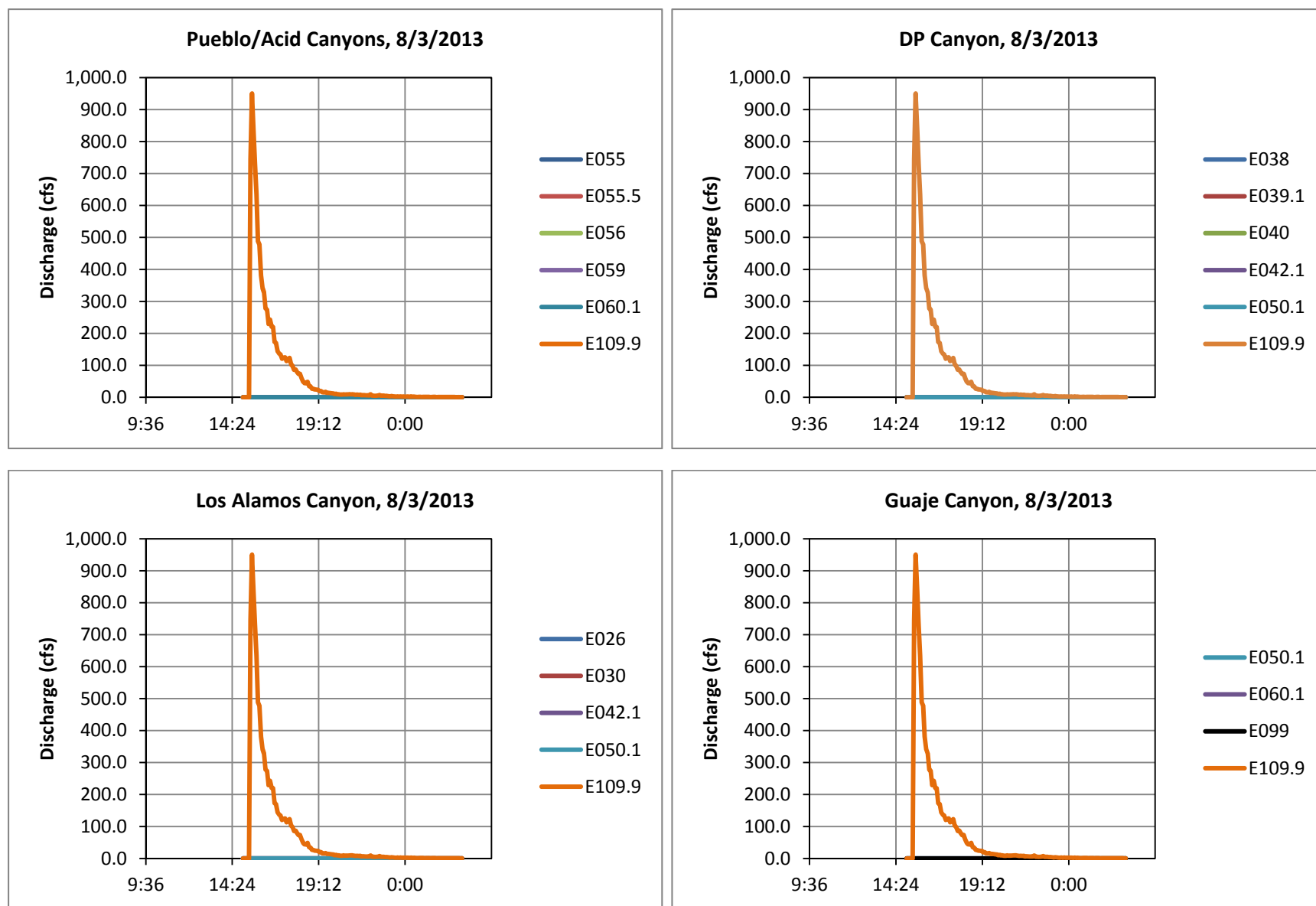


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

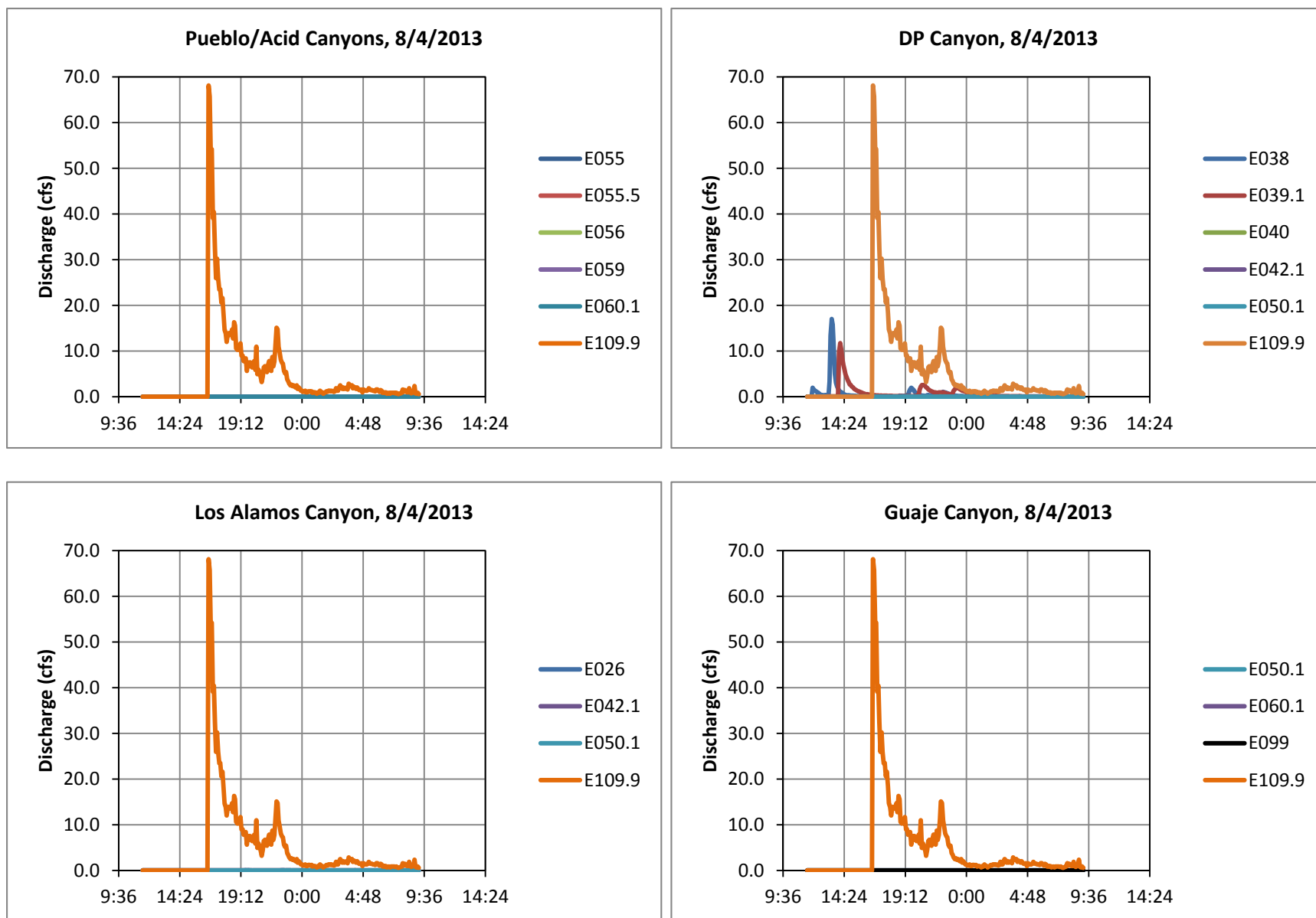


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

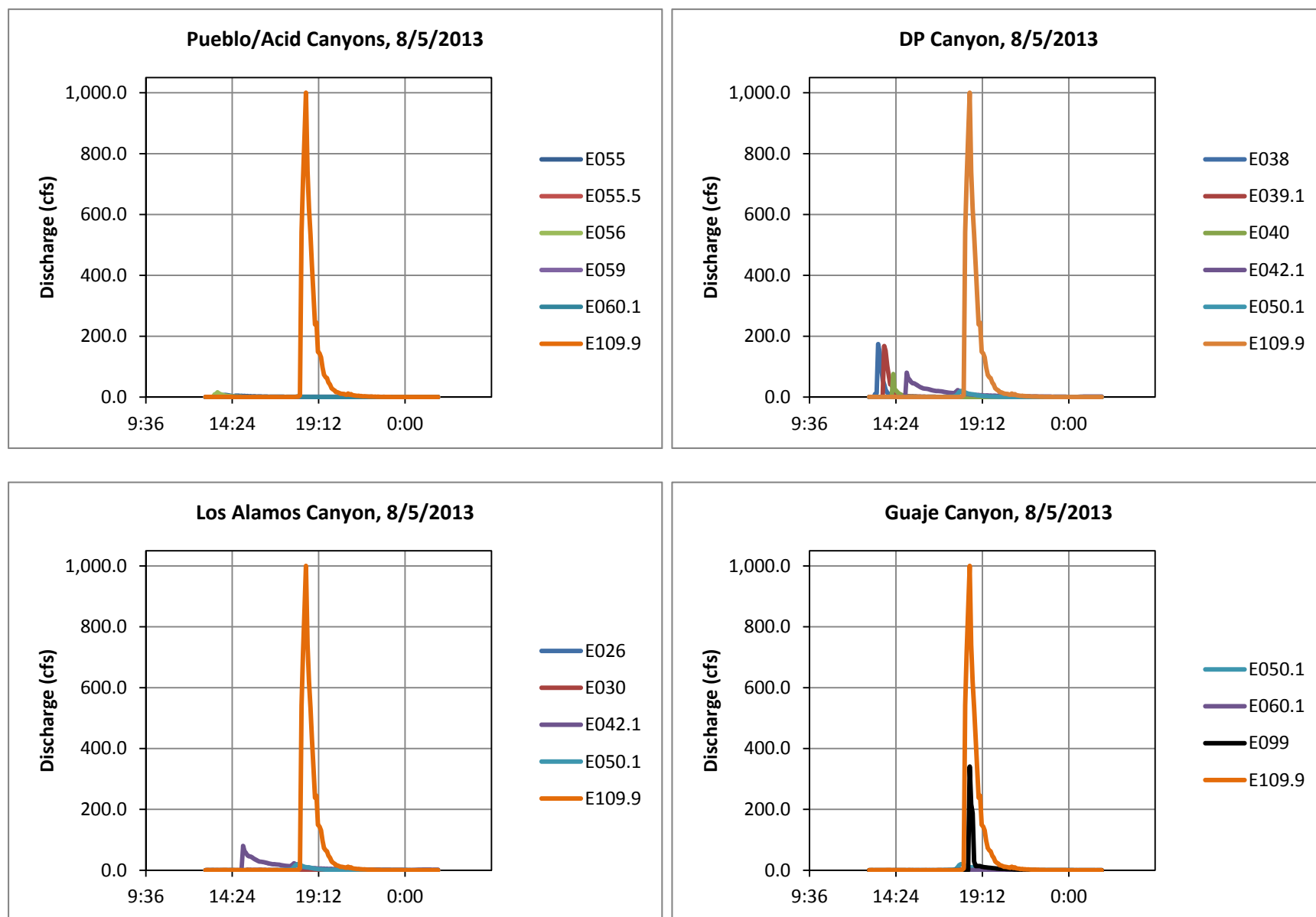


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

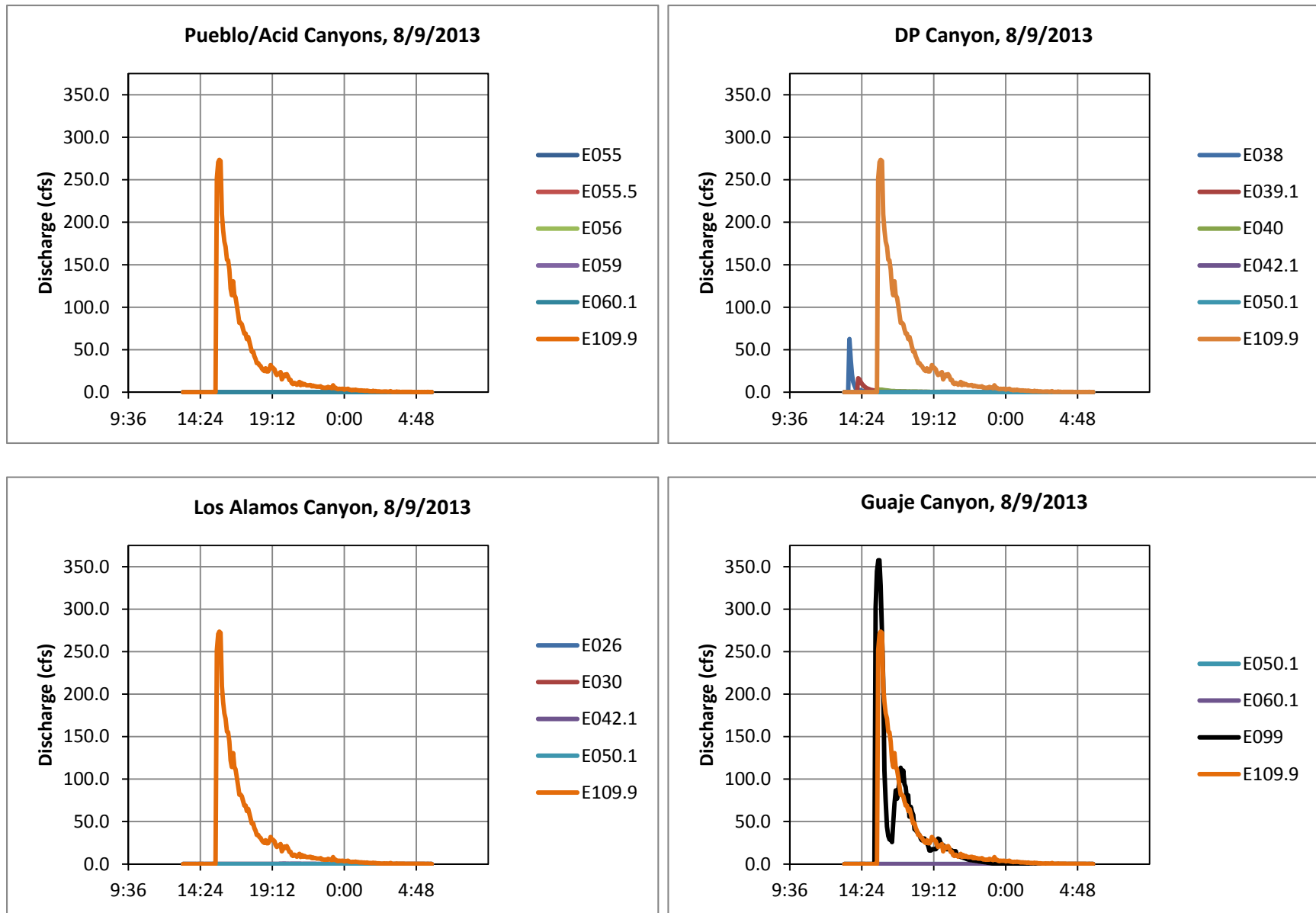


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

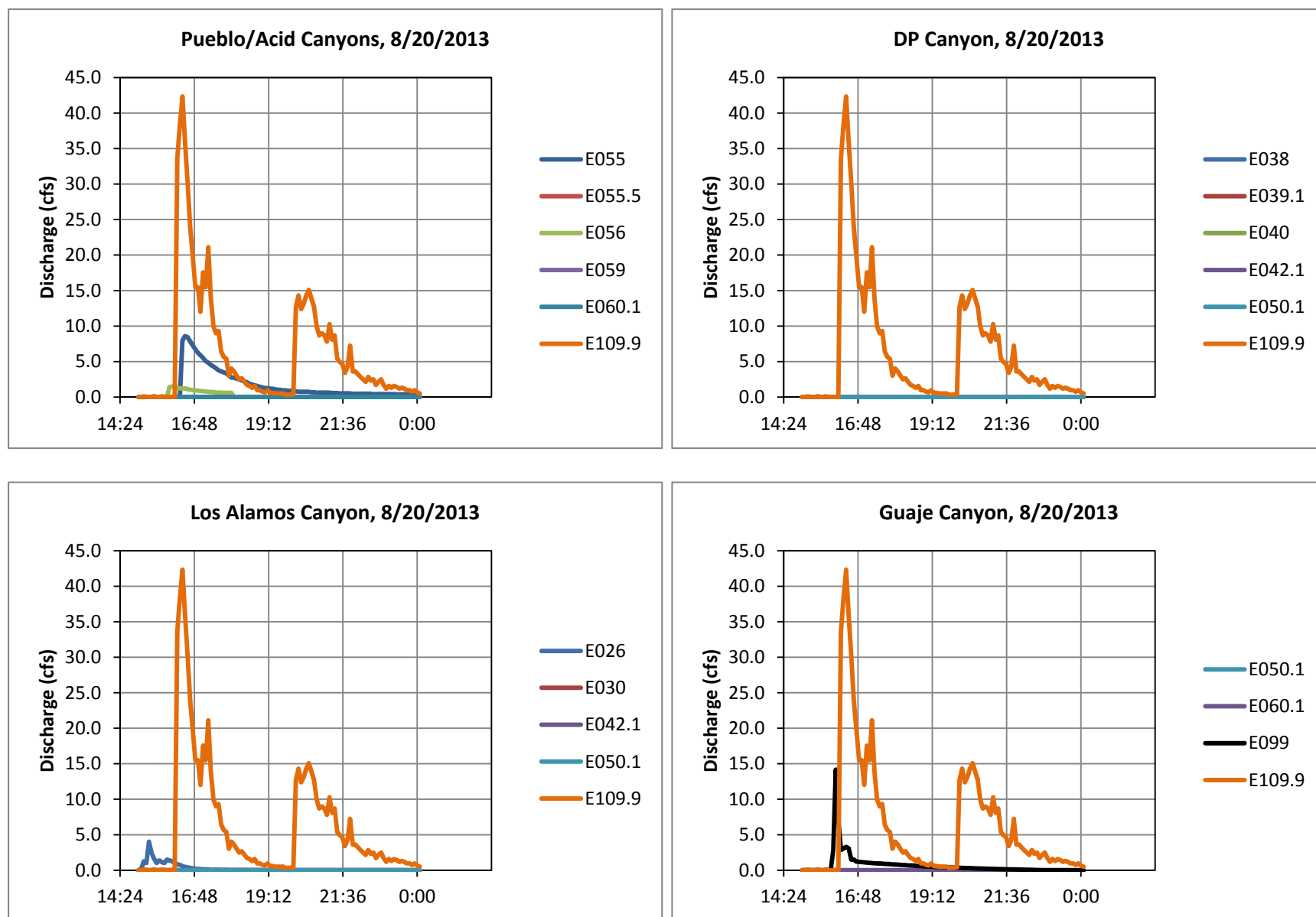


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

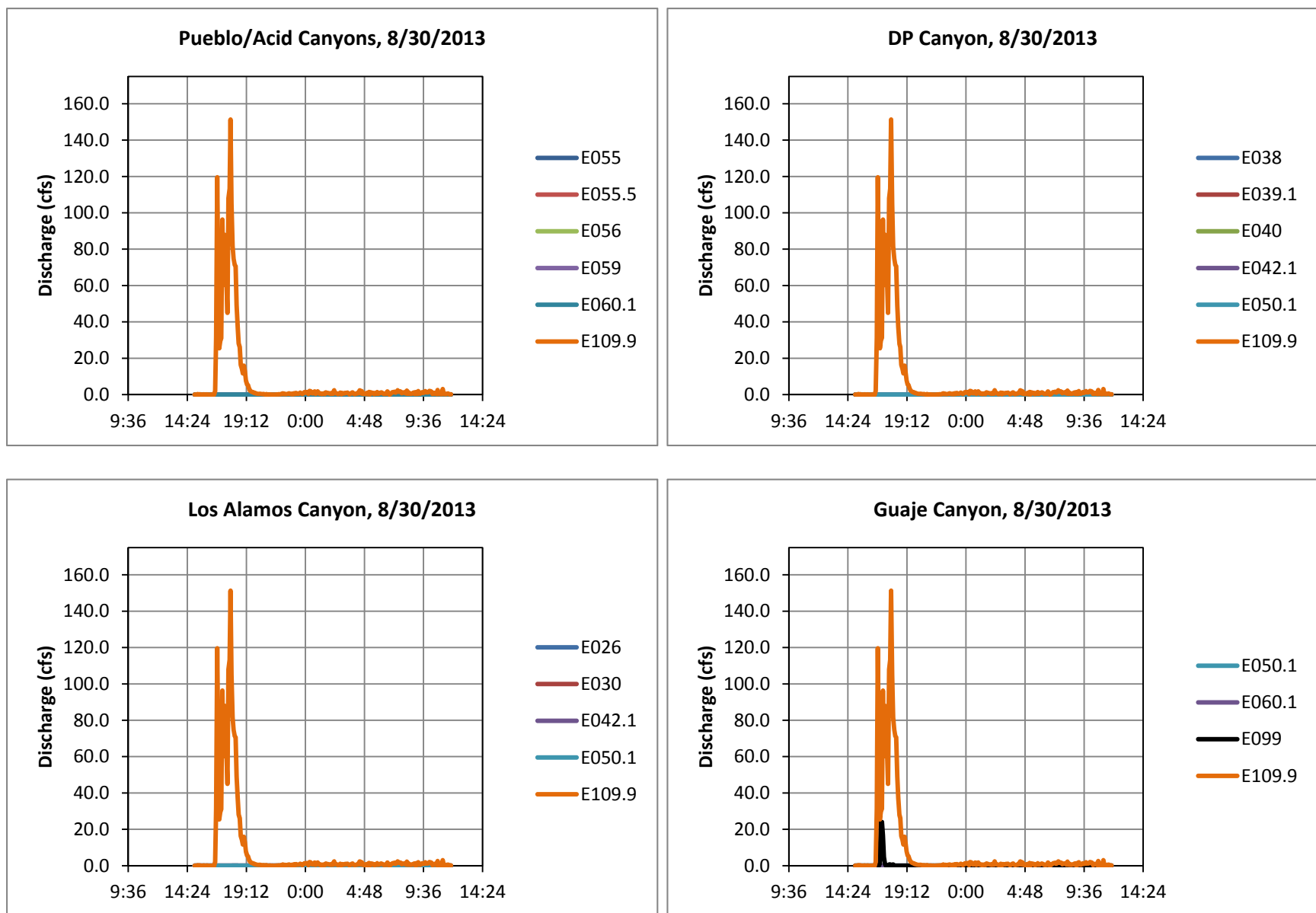


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

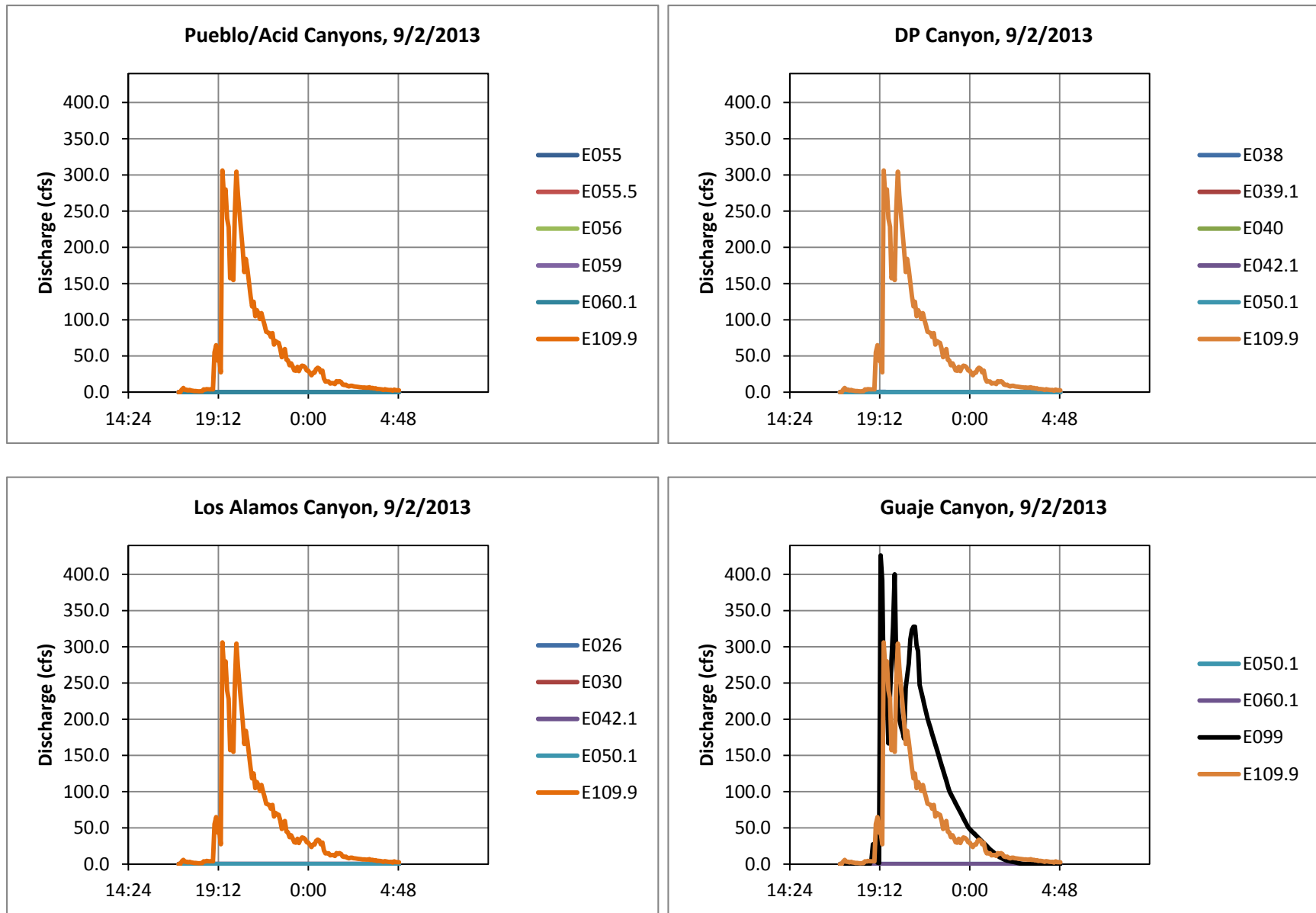


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

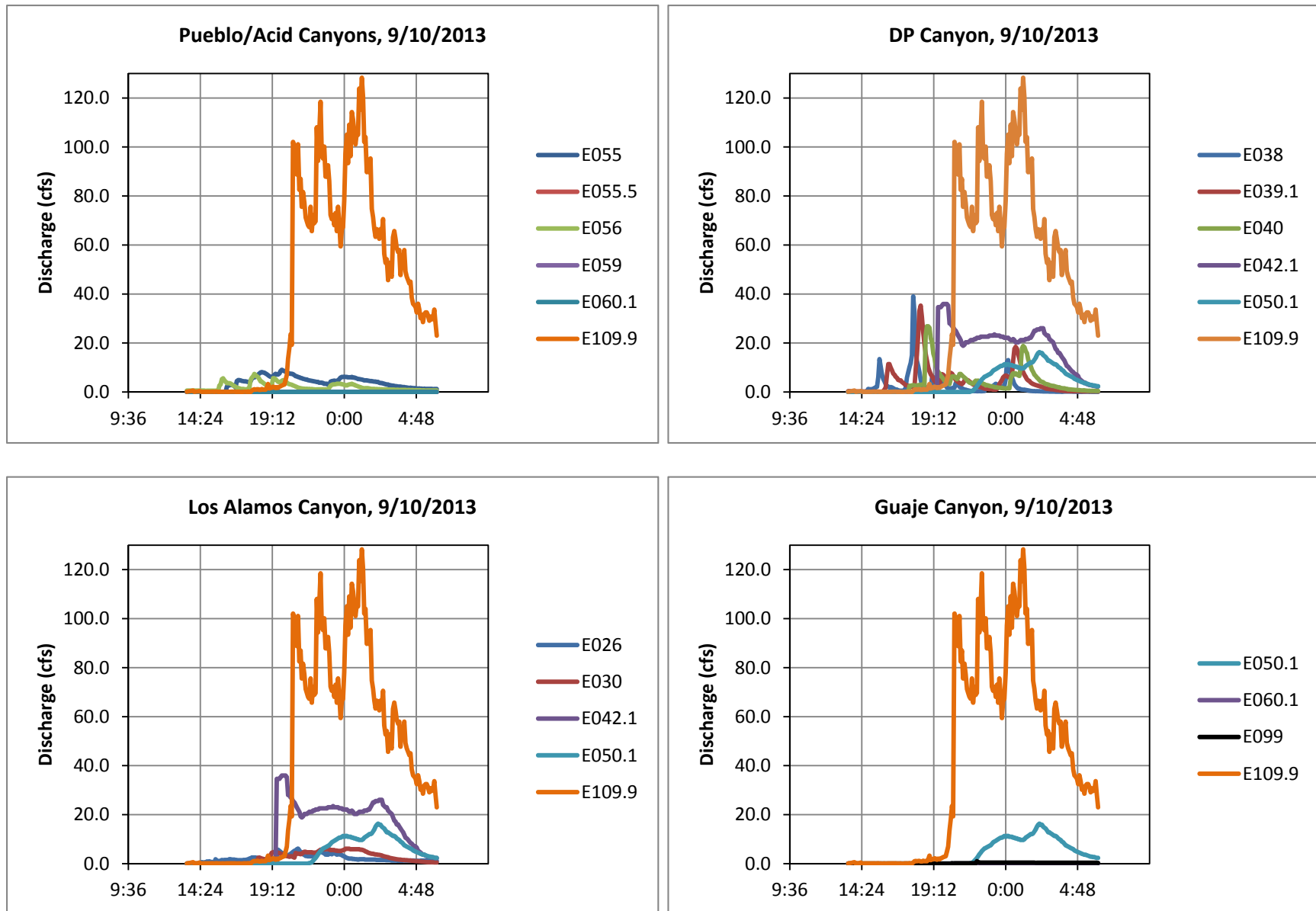


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

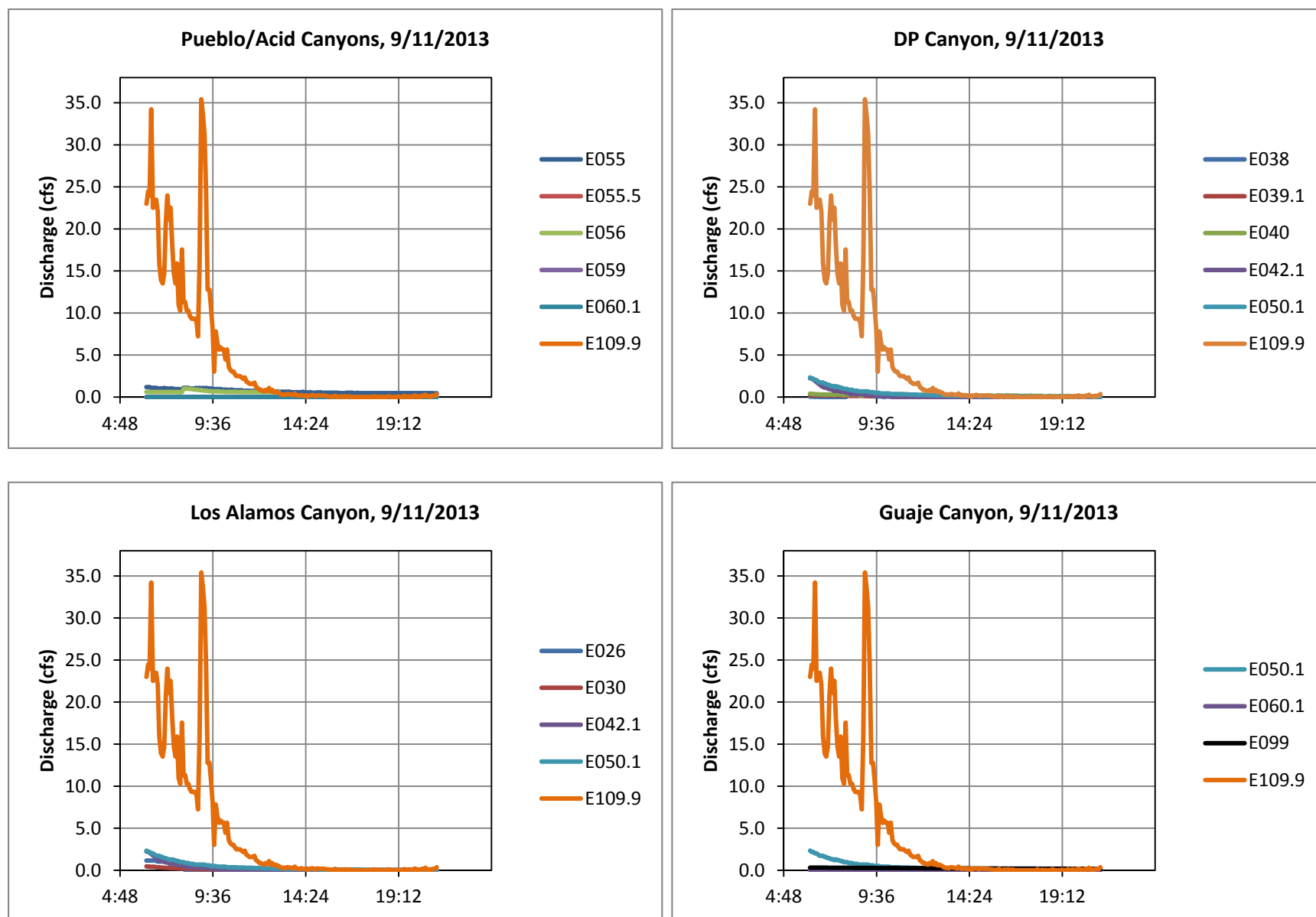


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

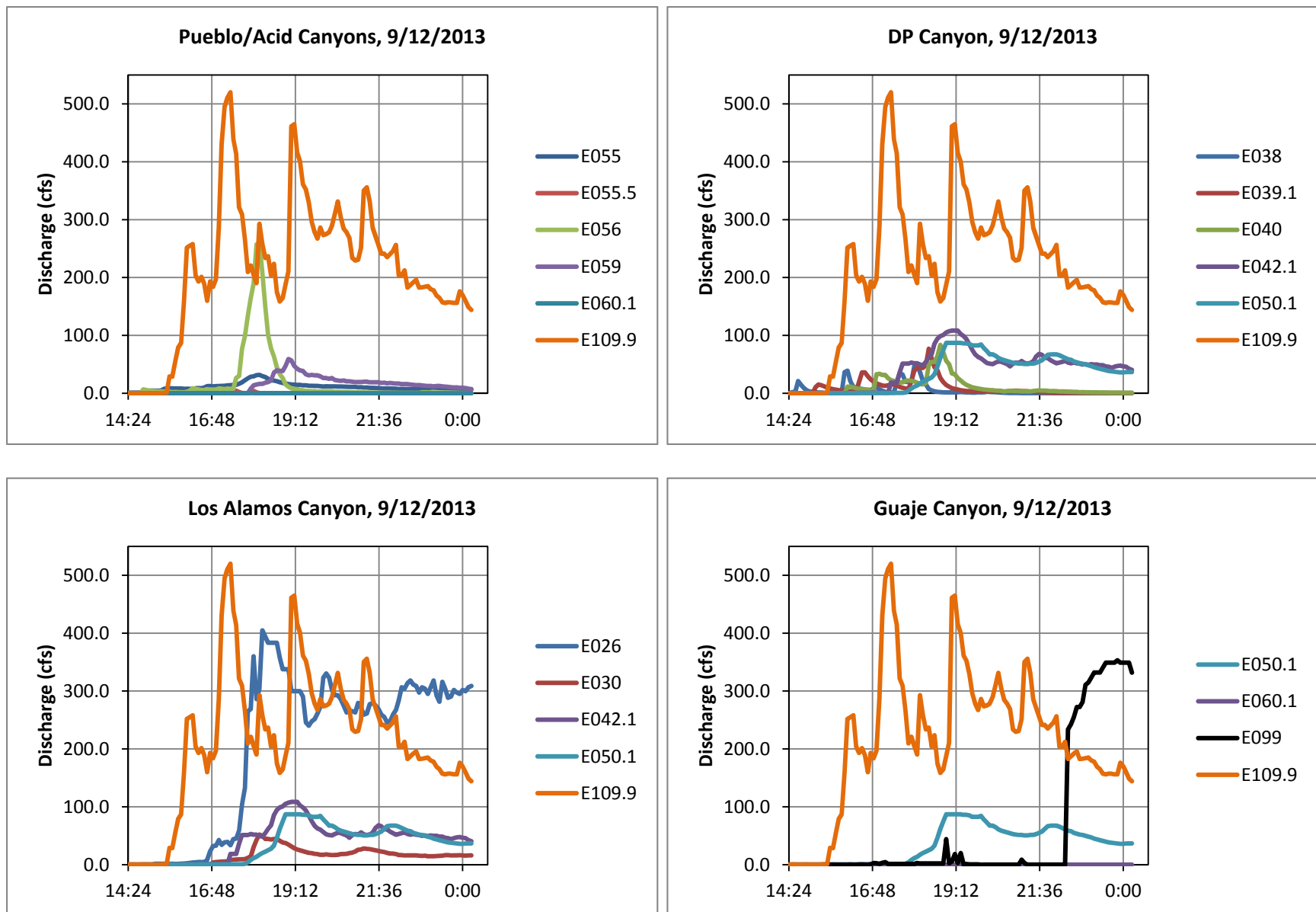


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

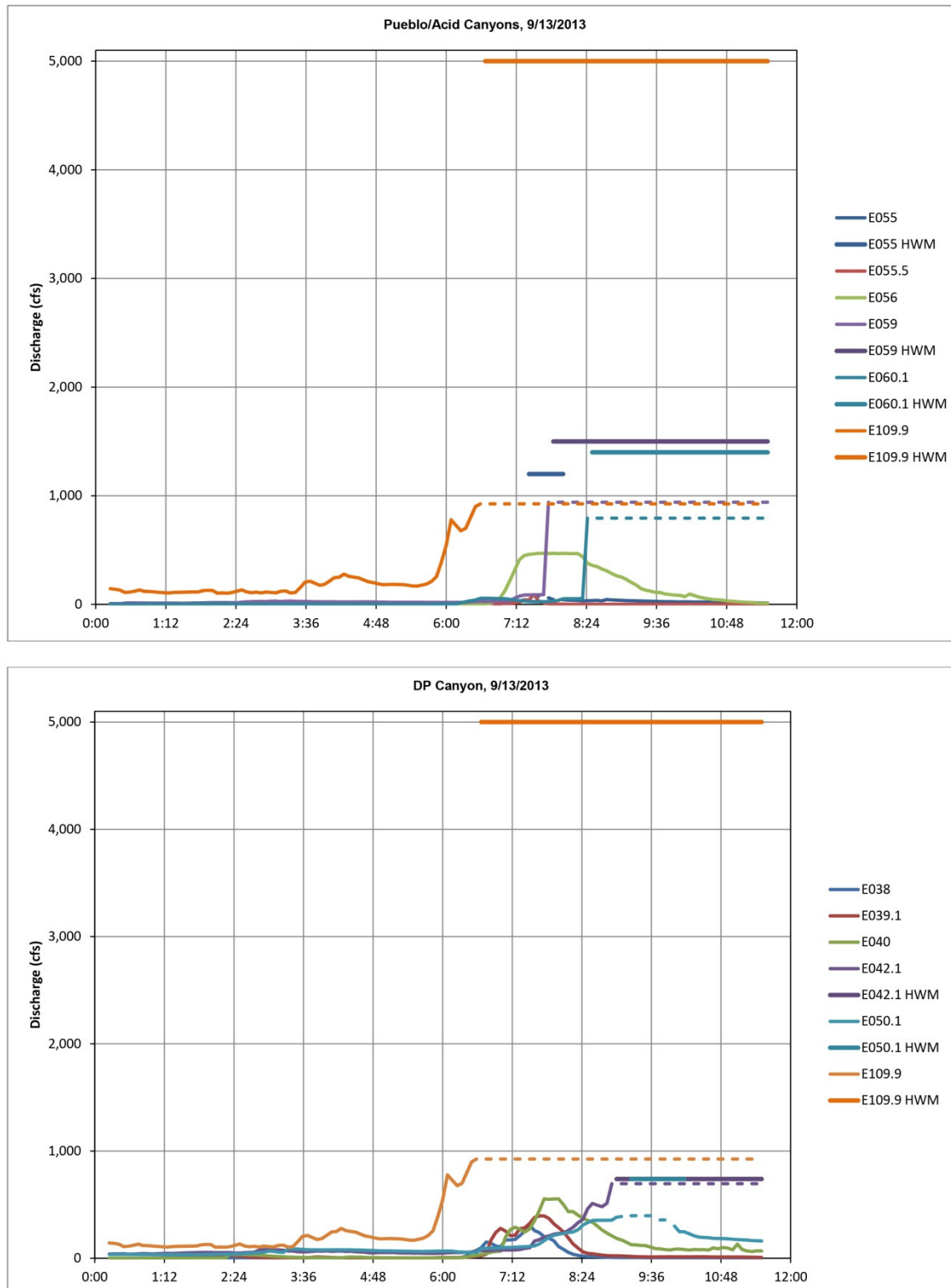


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

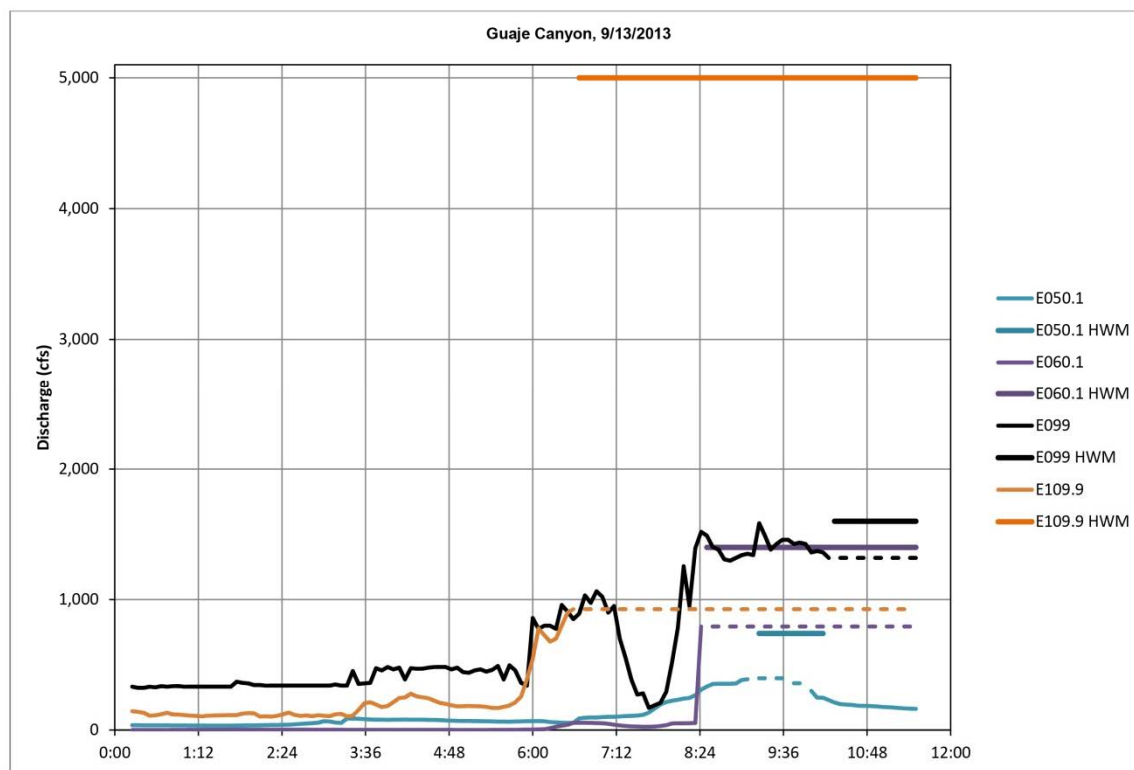
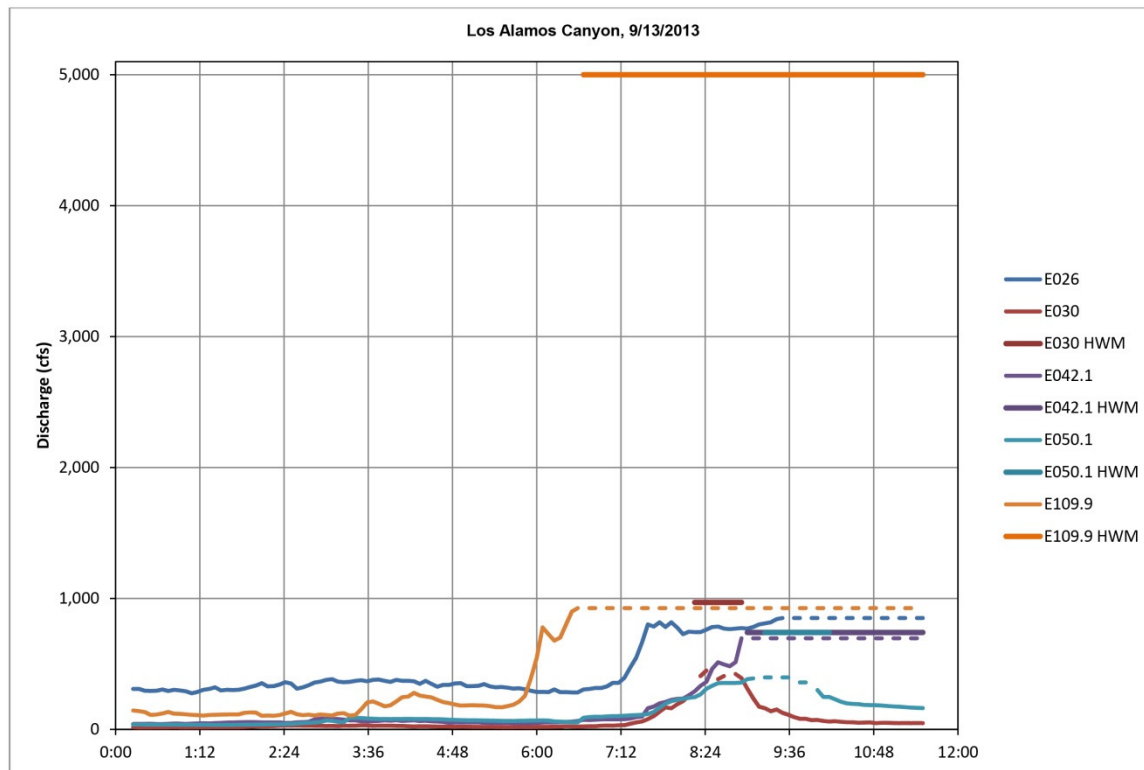


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

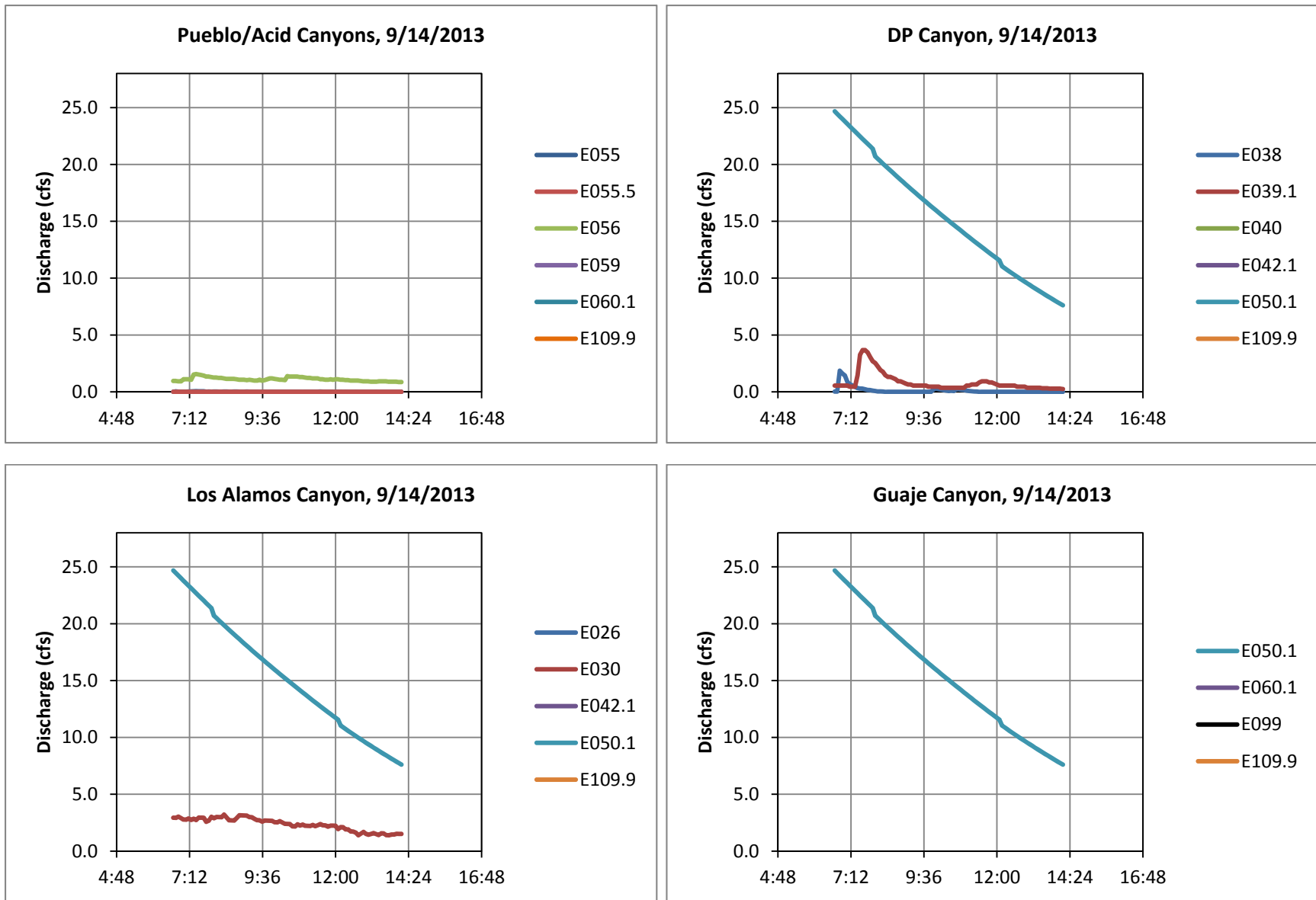


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

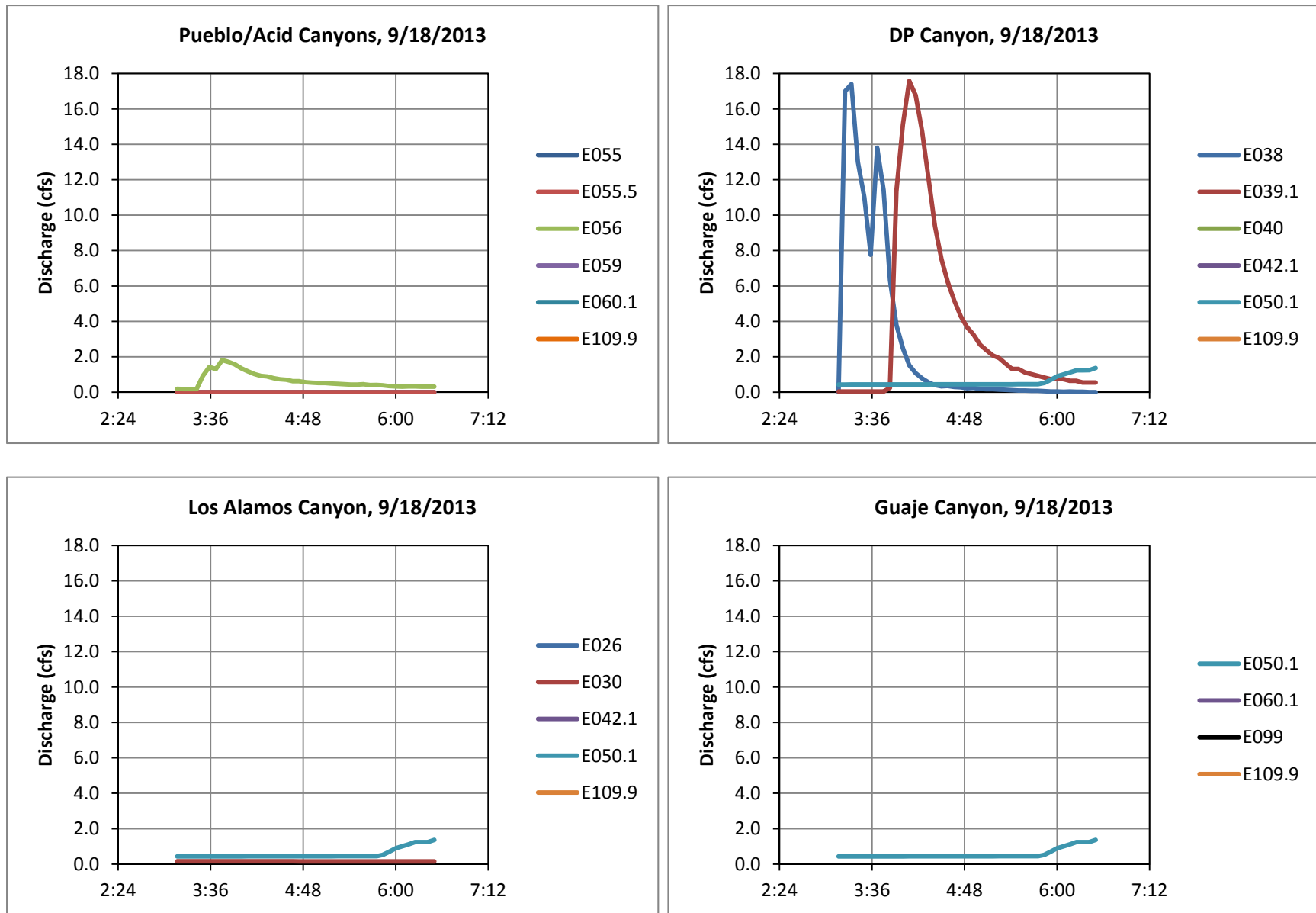


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

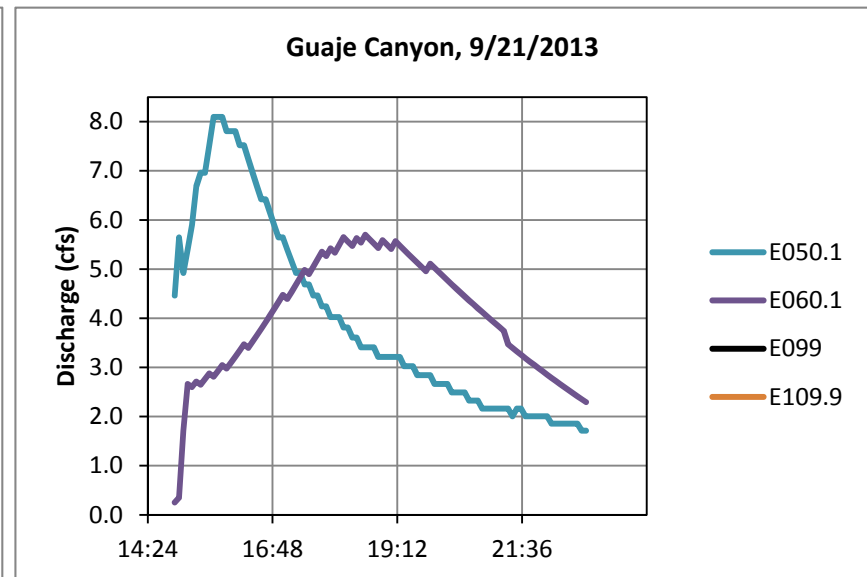
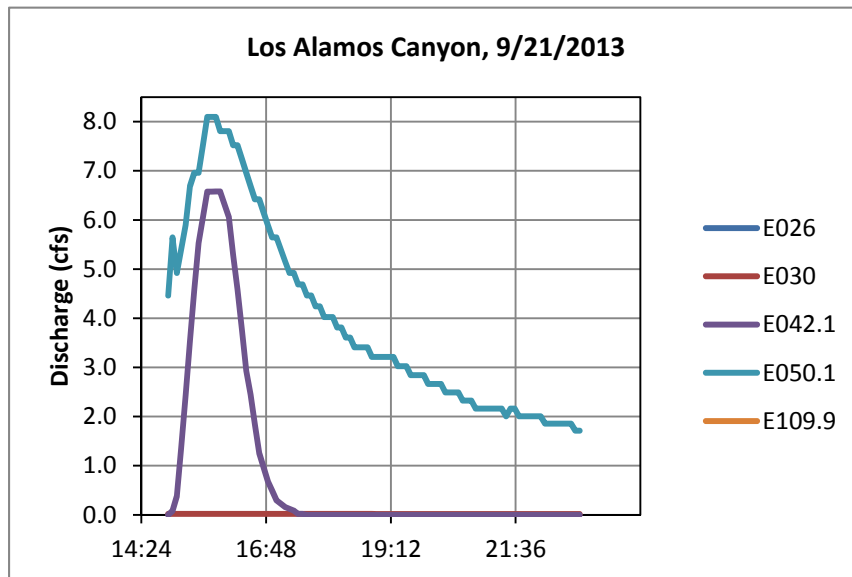
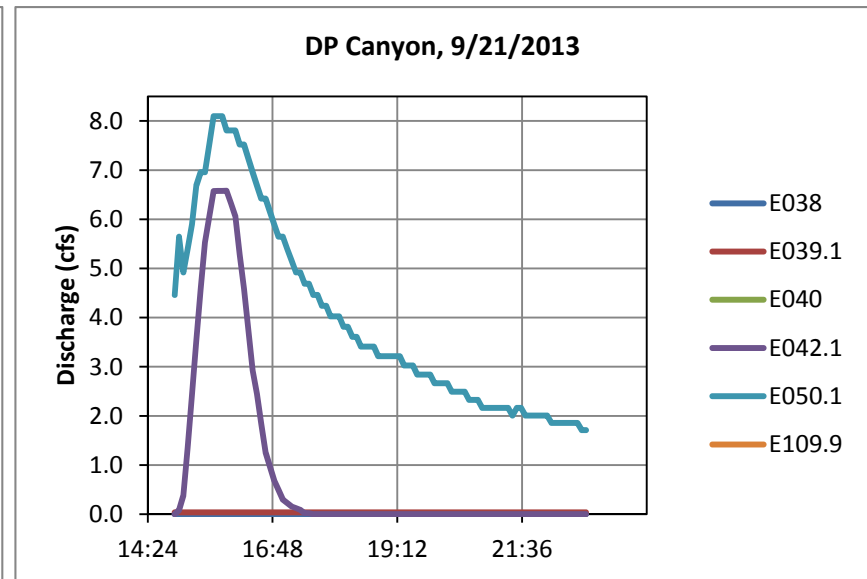
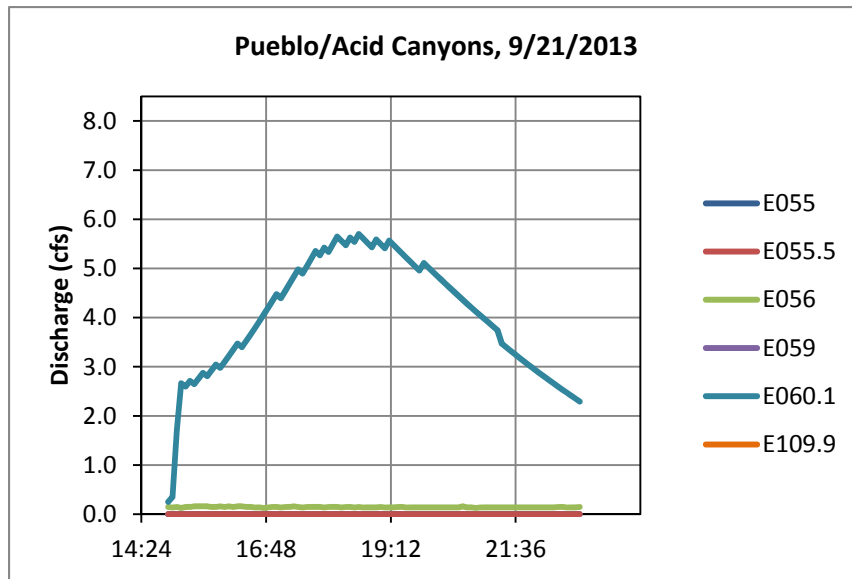


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

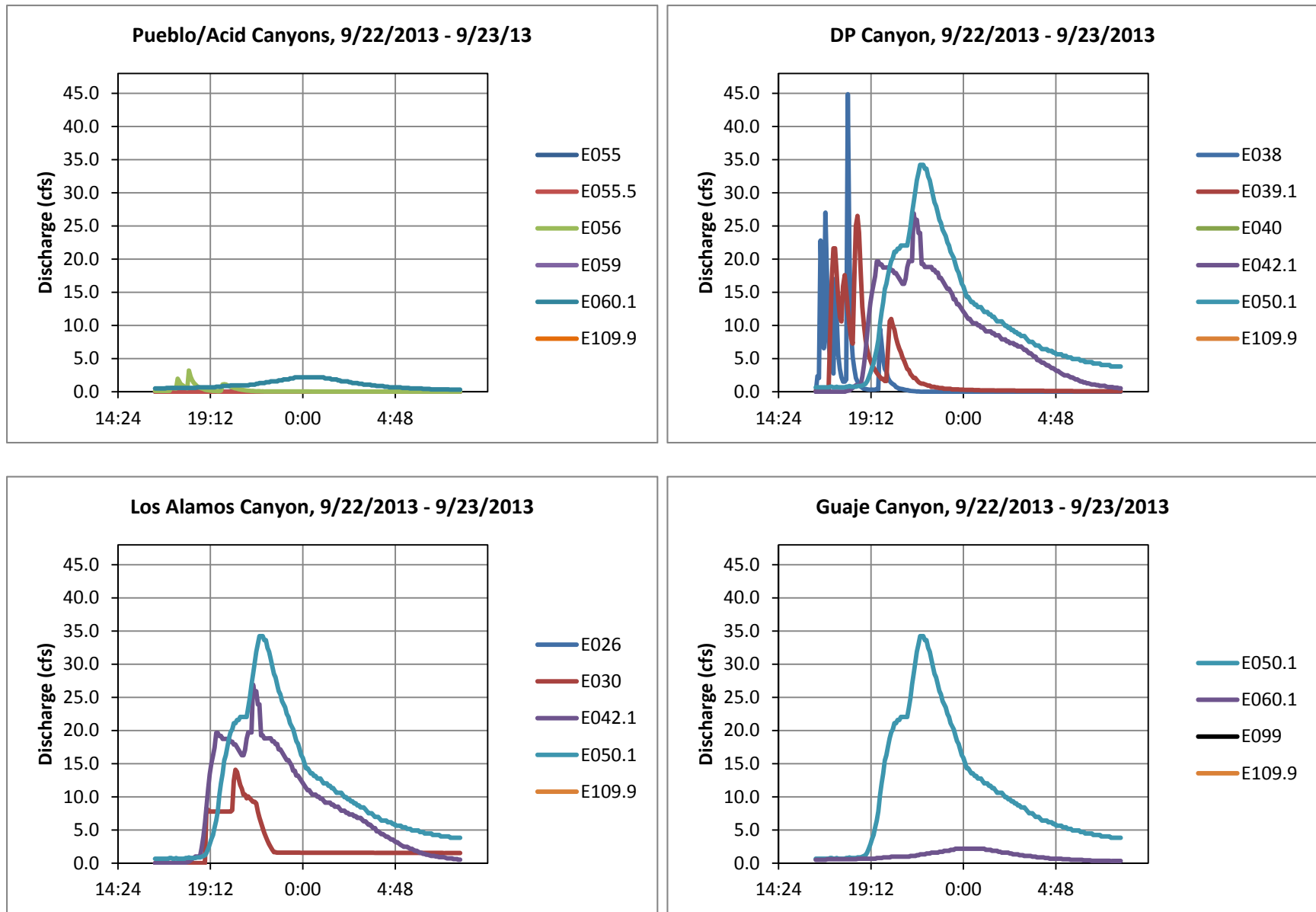


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

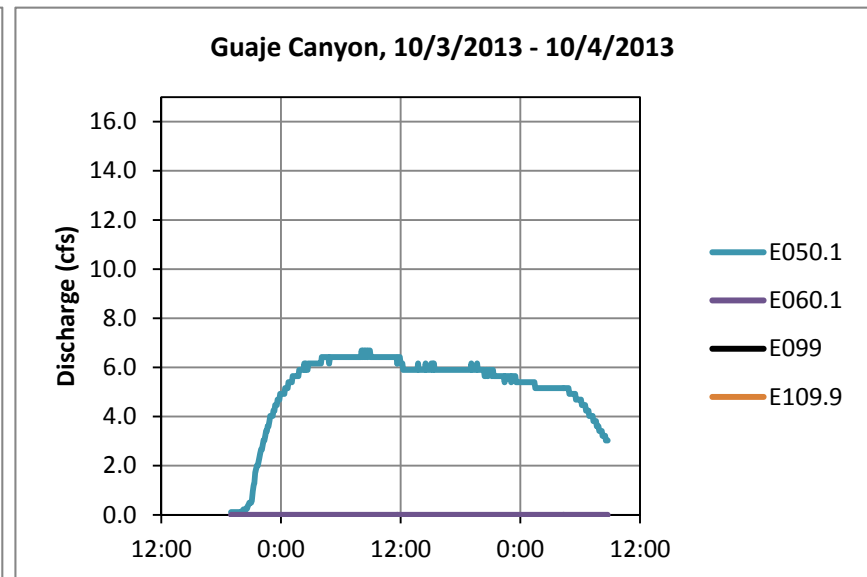
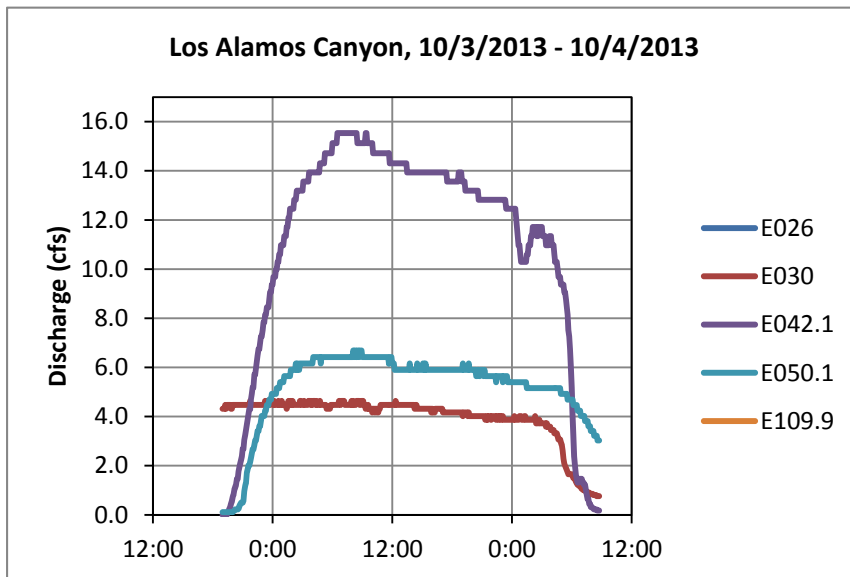
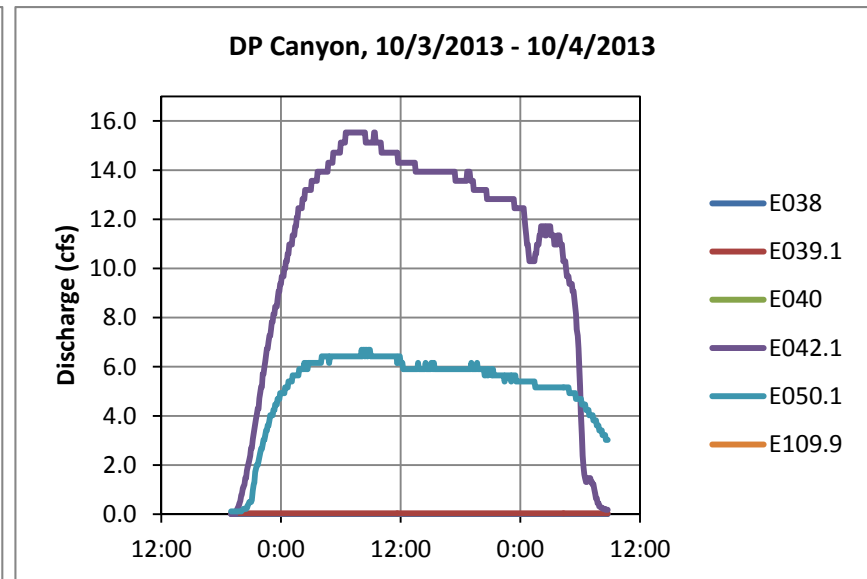
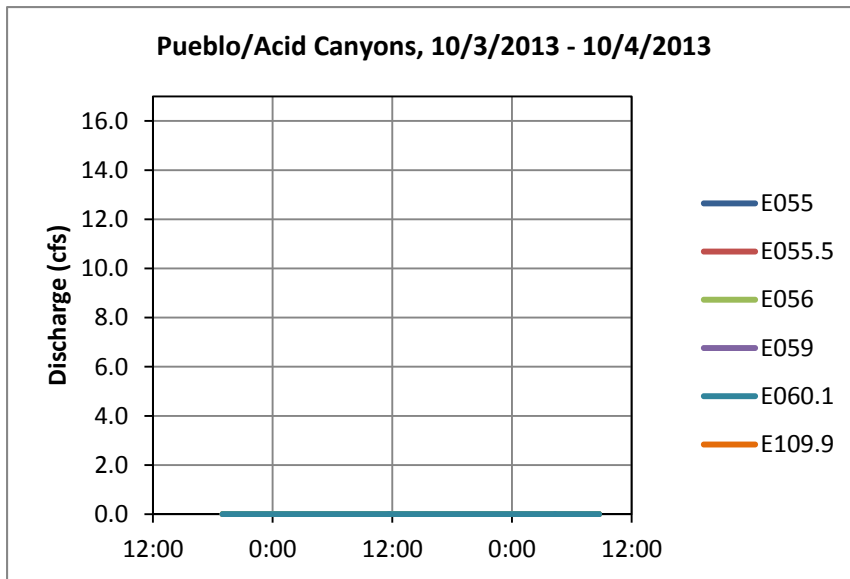


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

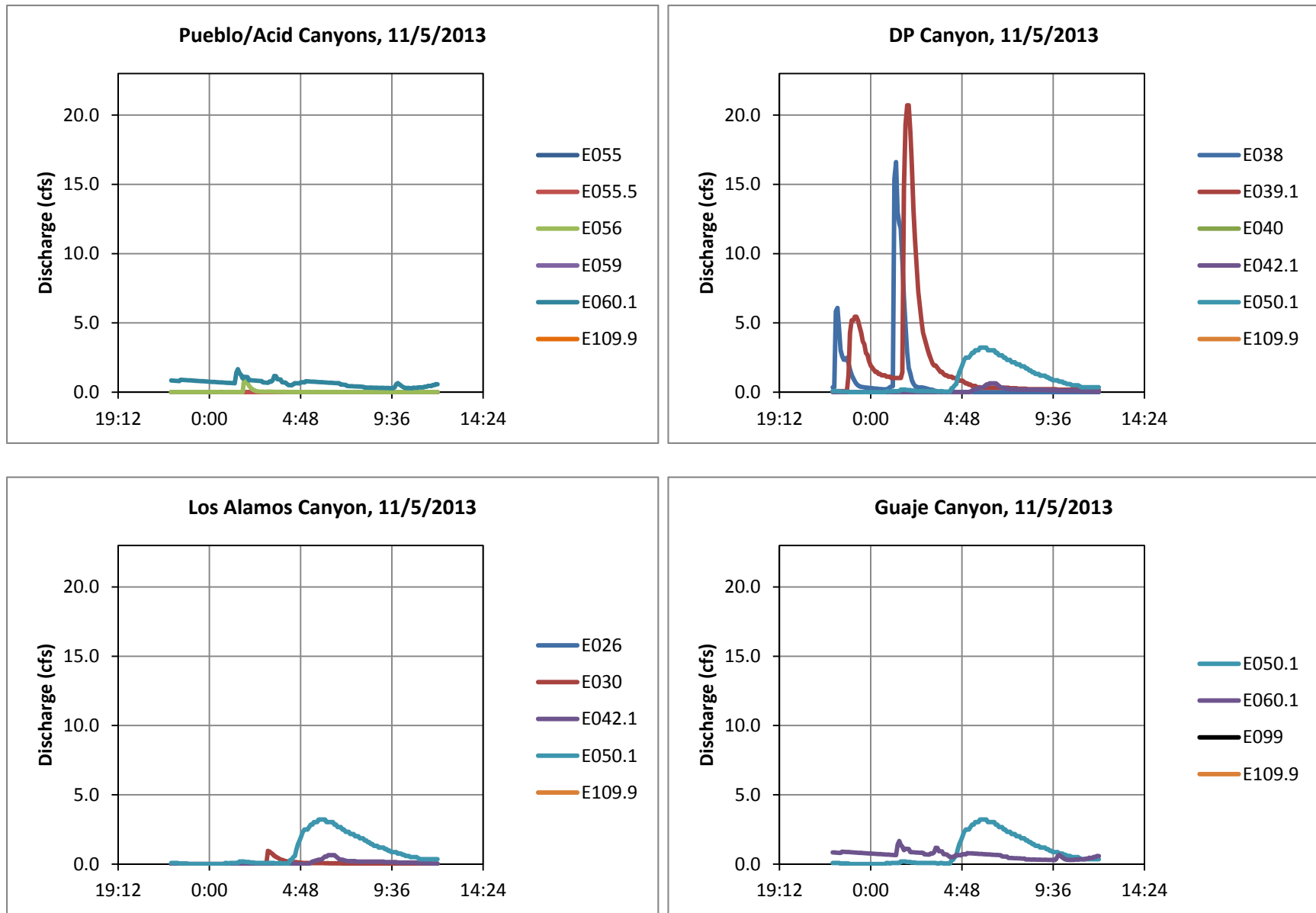


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

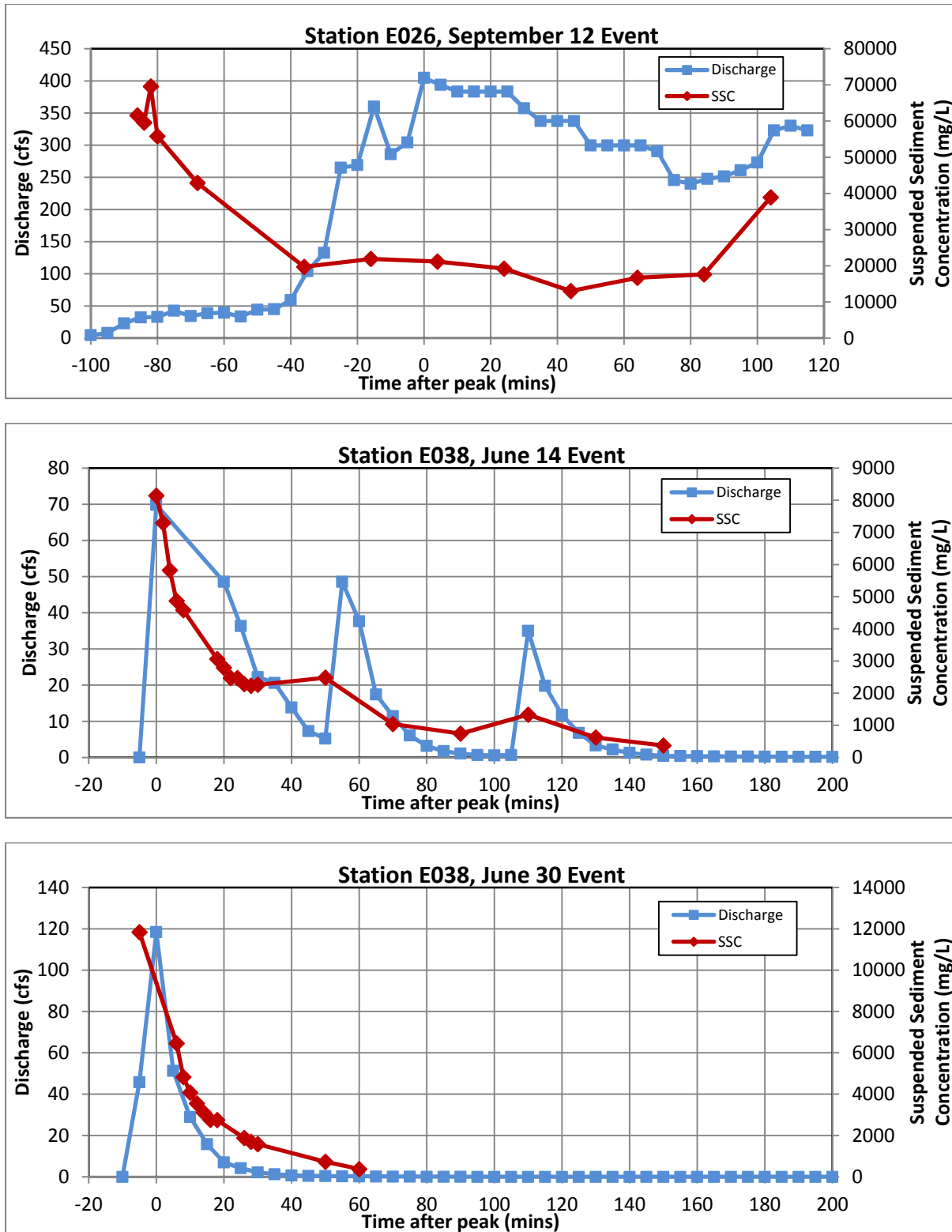


Figure 3.2-4 Discharge and SSC for sampled events at E026, E038, E039.1, E042.1, E050.1, E099, and E109.9

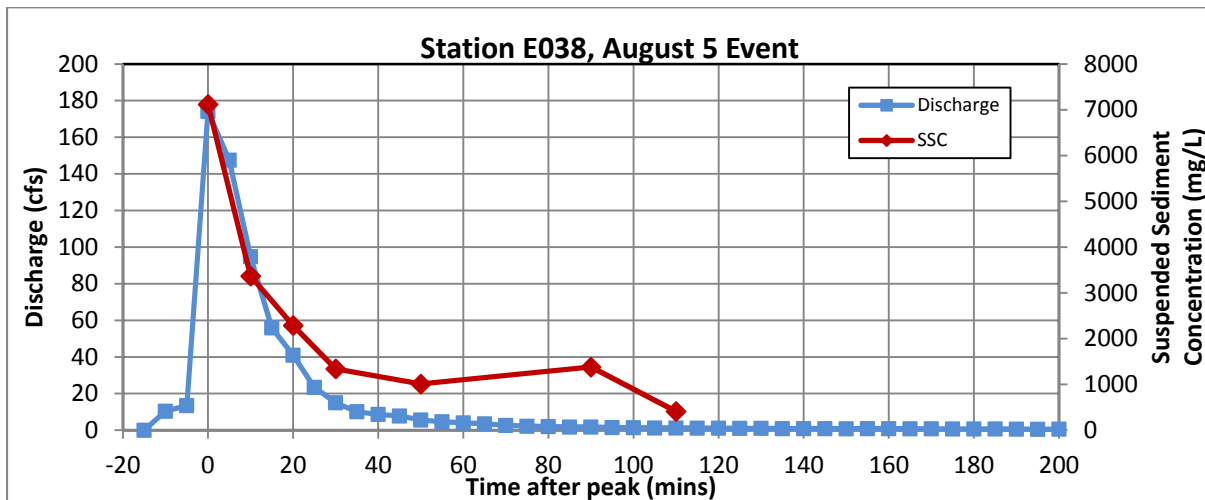
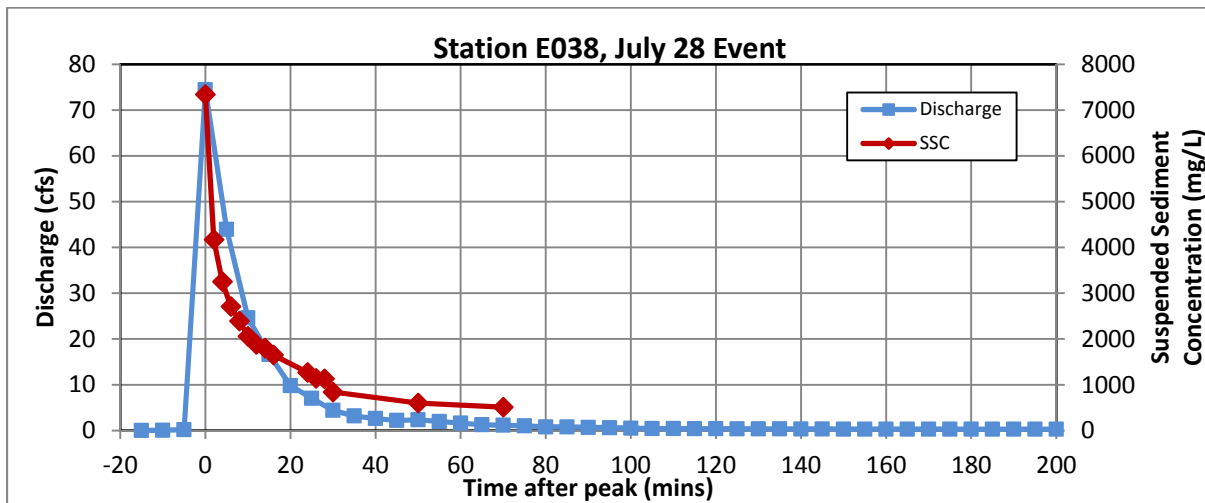
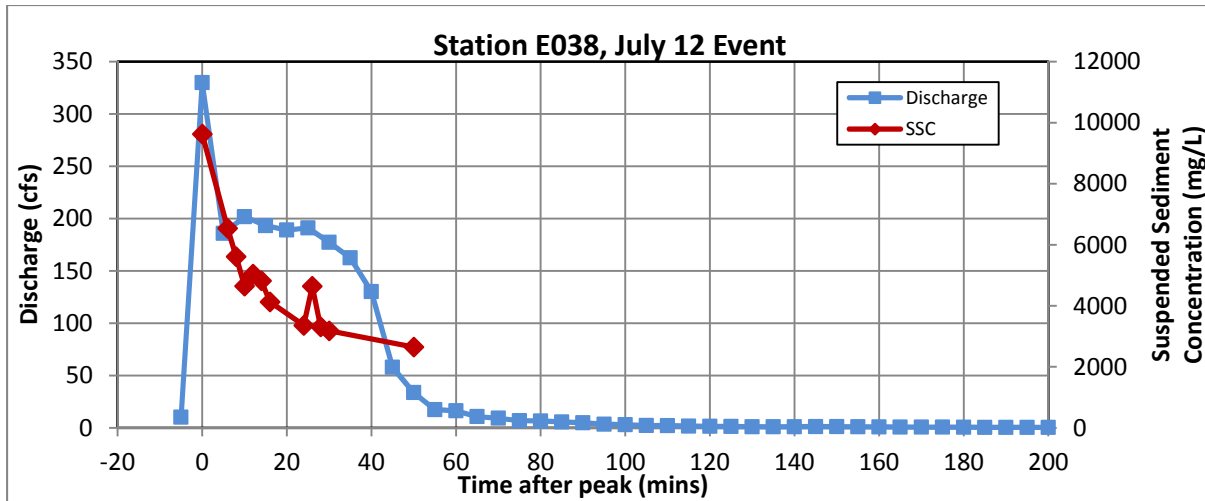


Figure 3.2-4 (continued) Discharge and SSC for sampled events at E026, E038, E039.1, E042.1, E050.1, E099, and E109.9

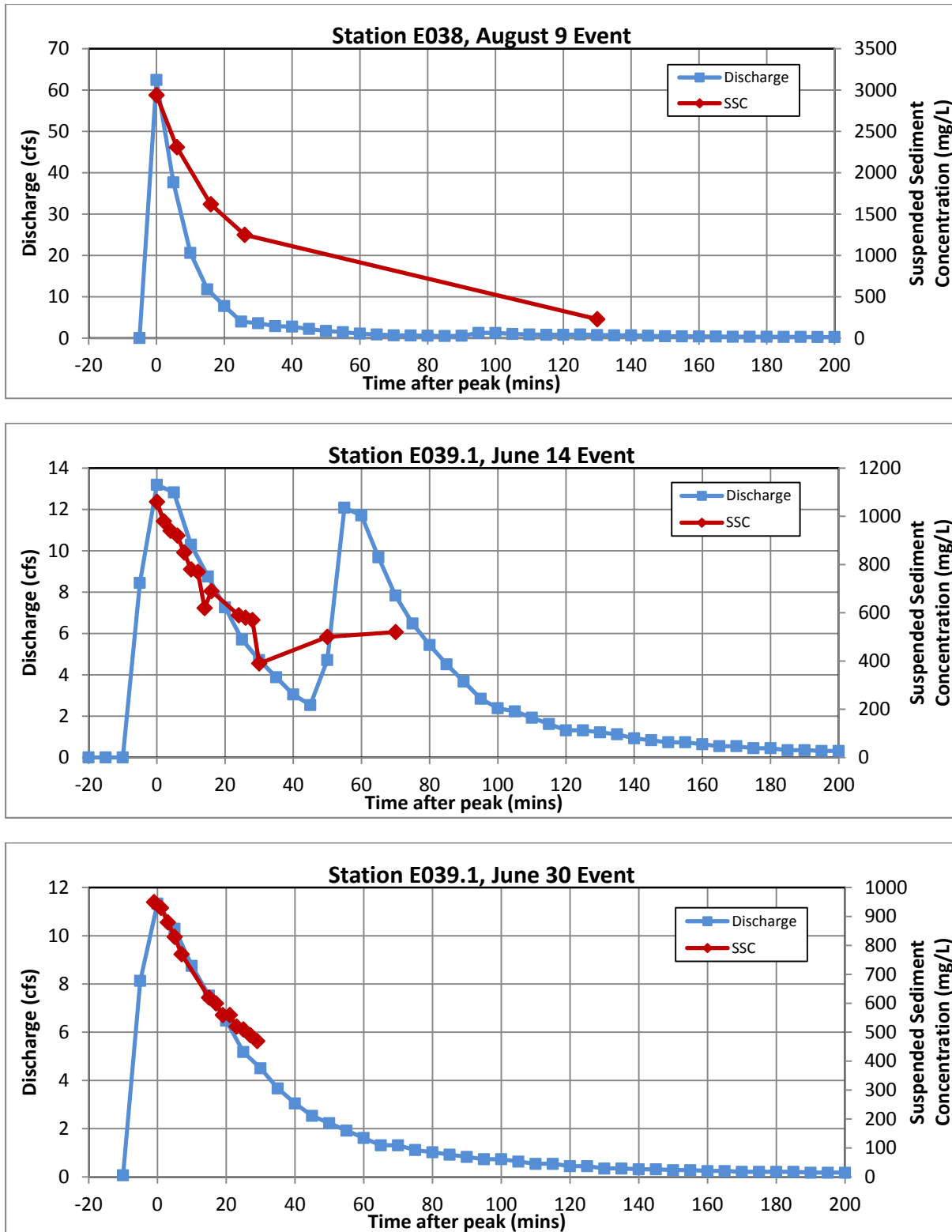


Figure 3.2-4 (continued) Discharge and SSC for sampled events at E026, E038, E039.1, E042.1, E050.1, E099, and E109.9

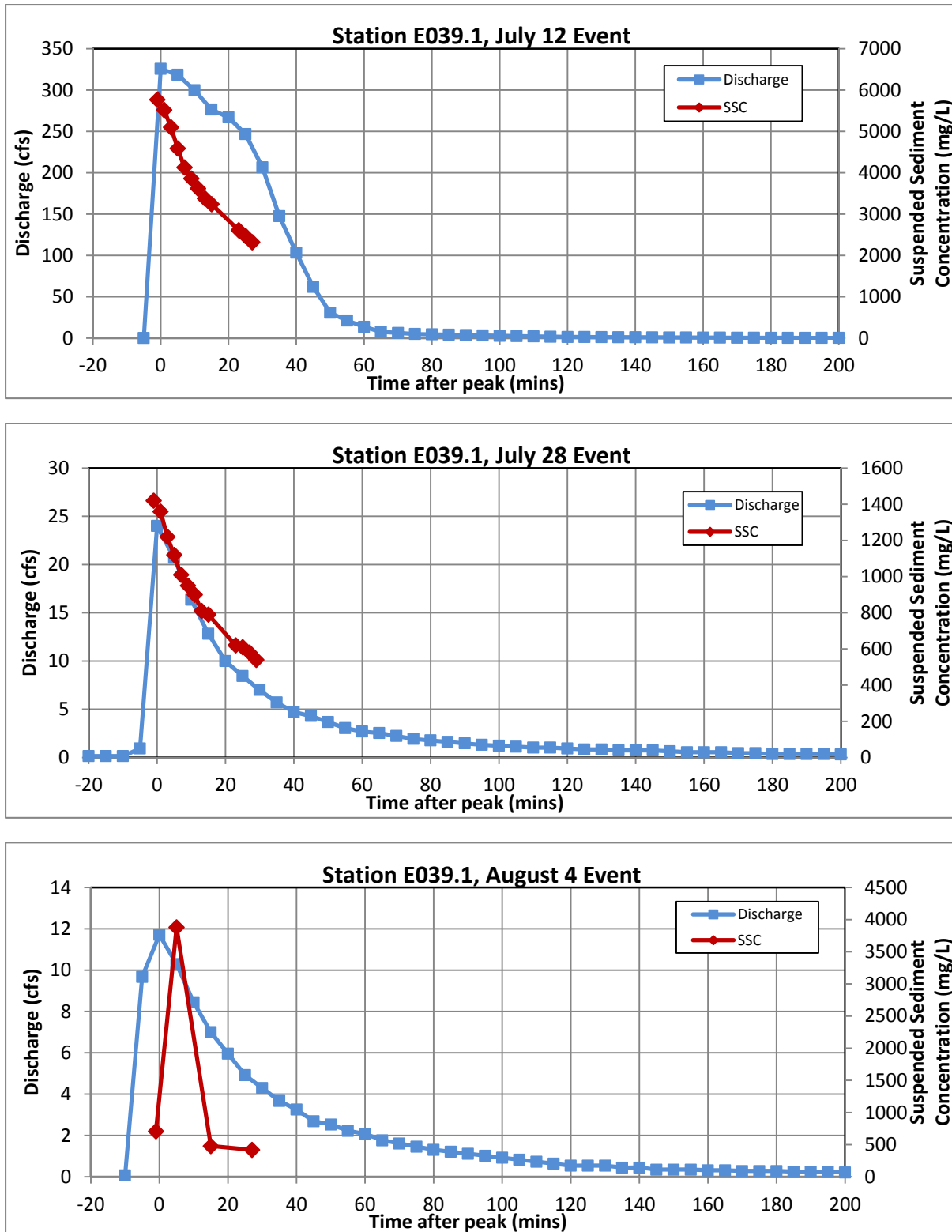


Figure 3.2-4 (continued) Discharge and SSC for sampled events at E026, E038, E039.1, E042.1, E050.1, E099, and E109.9

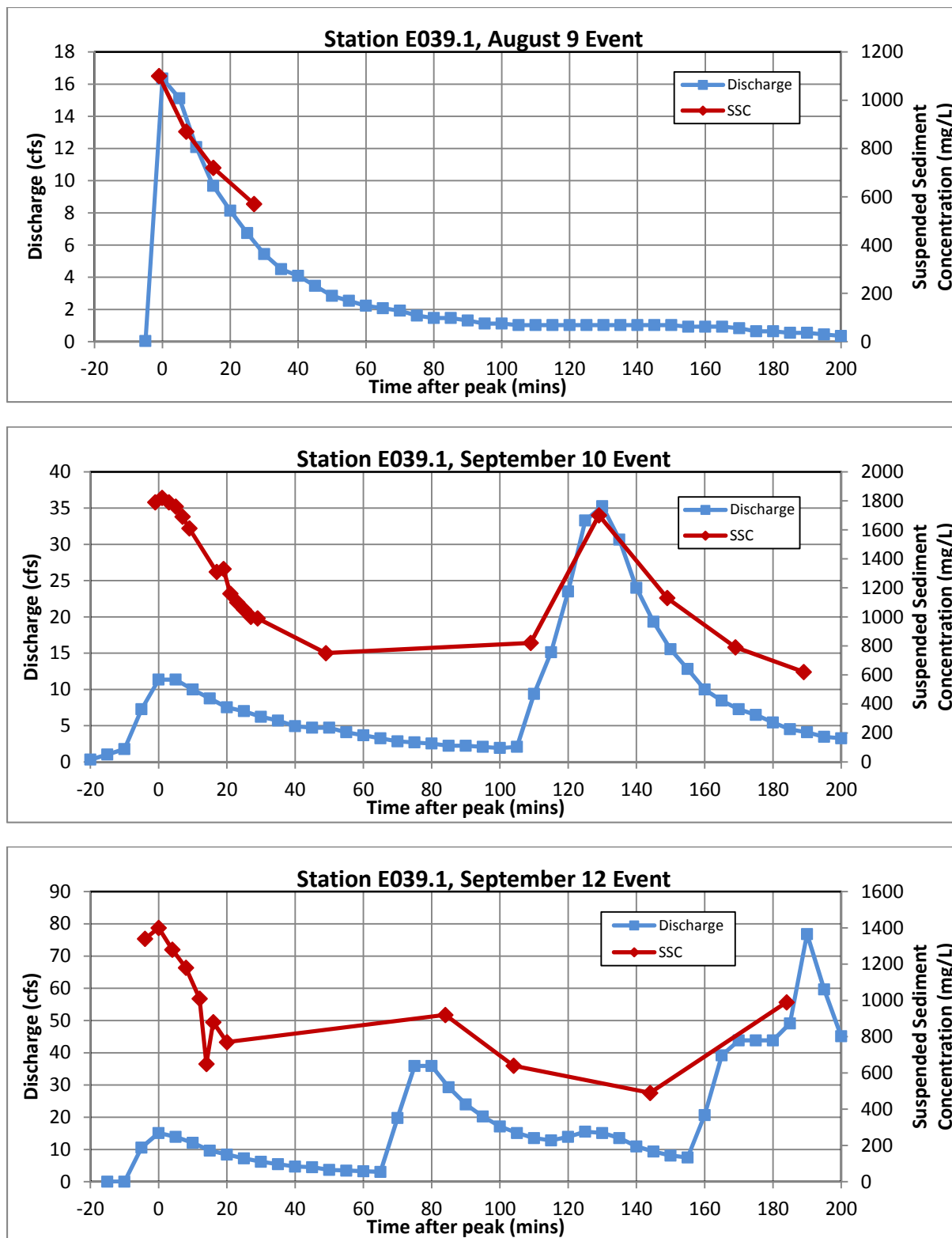


Figure 3.2-4 (continued) Discharge and SSC for sampled events at E026, E038, E039.1, E042.1, E050.1, E099, and E109.9

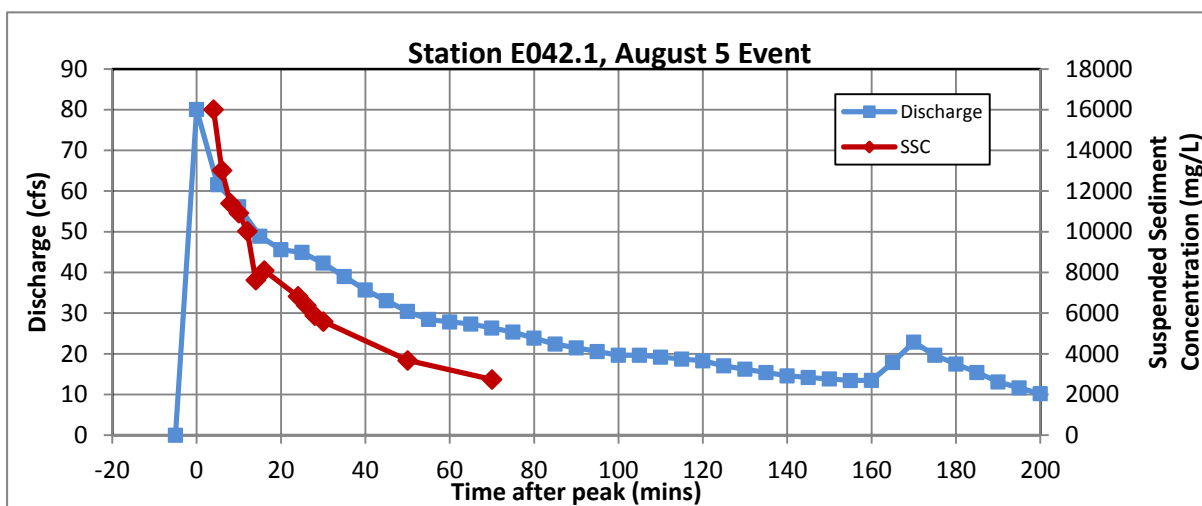
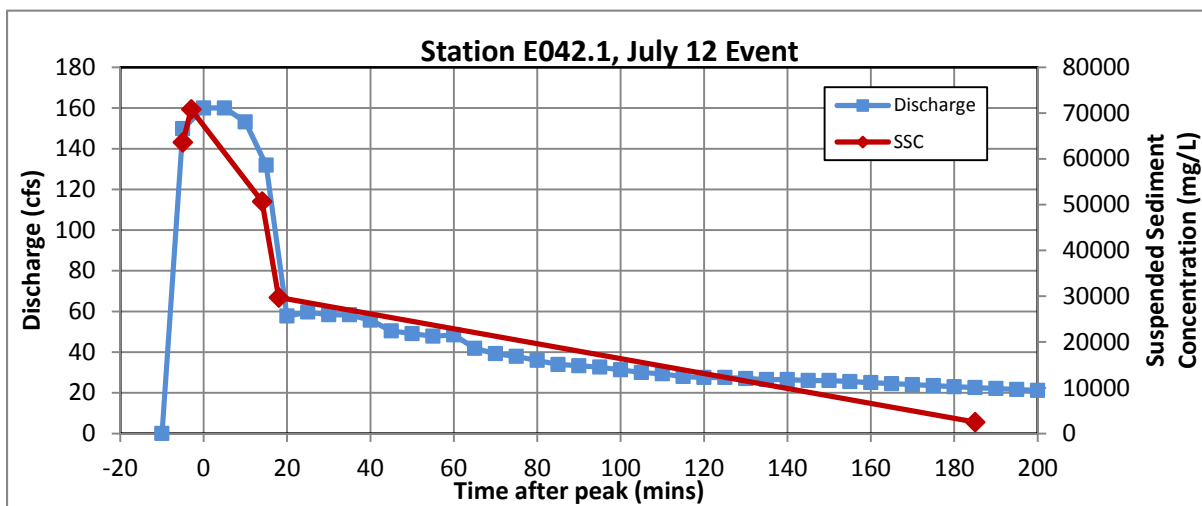
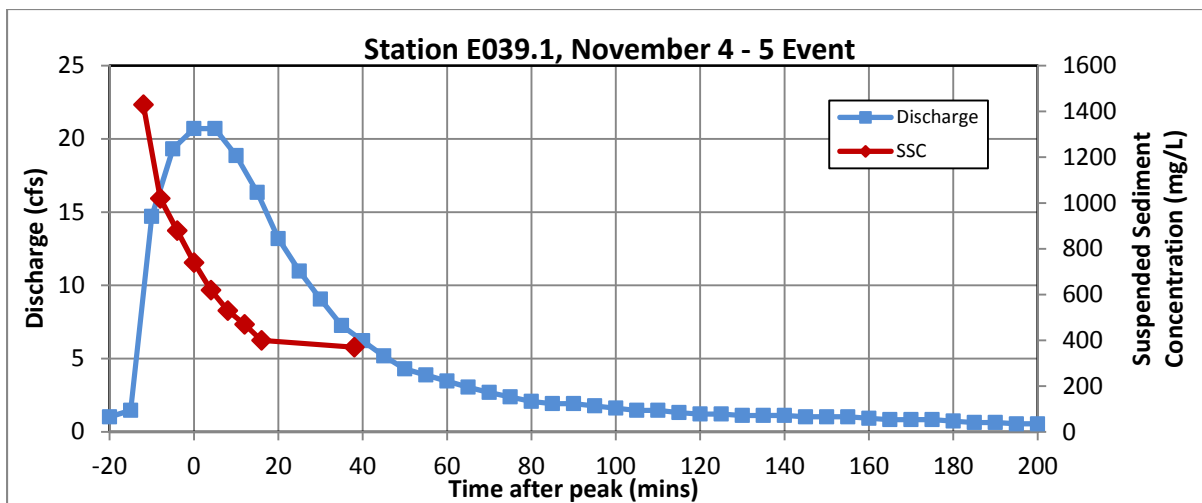


Figure 3.2-4 (continued) Discharge and SSC for sampled events at E026, E038, E039.1, E042.1, E050.1, E099, and E109.9

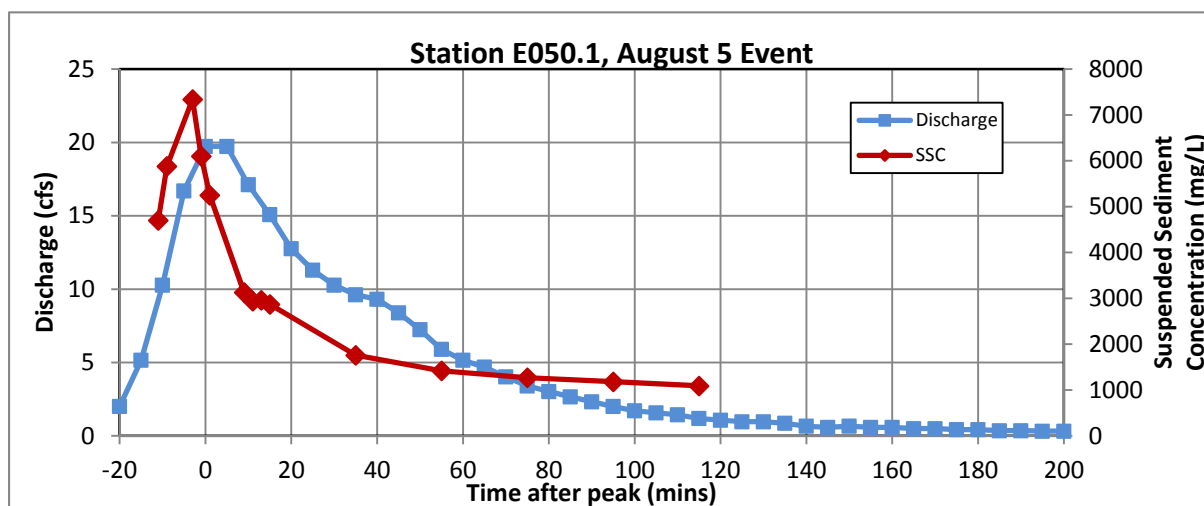
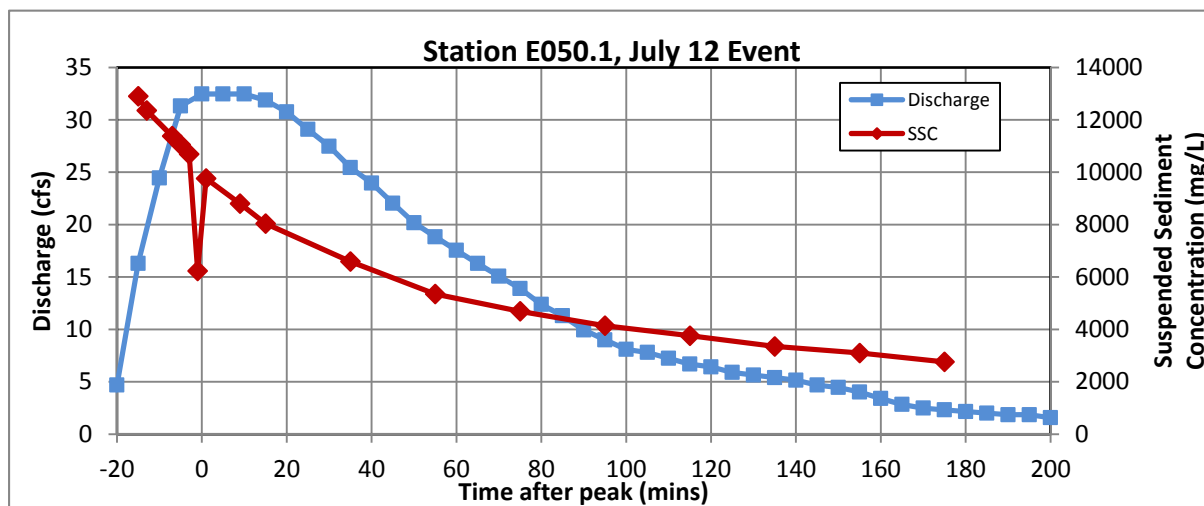
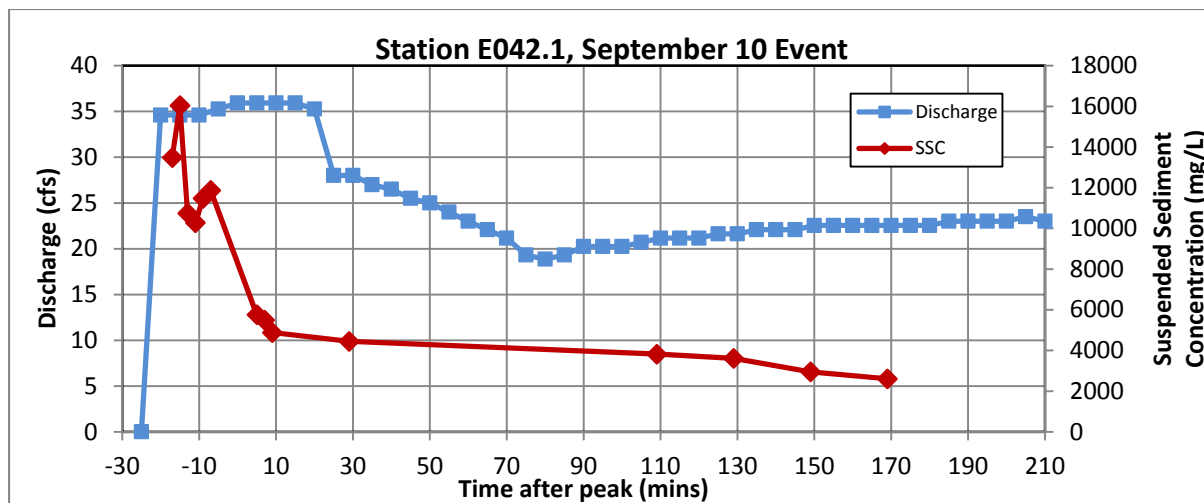


Figure 3.2-4 (continued) Discharge and SSC for sampled events at E026, E038, E039.1, E042.1, E050.1, E099, and E109.9

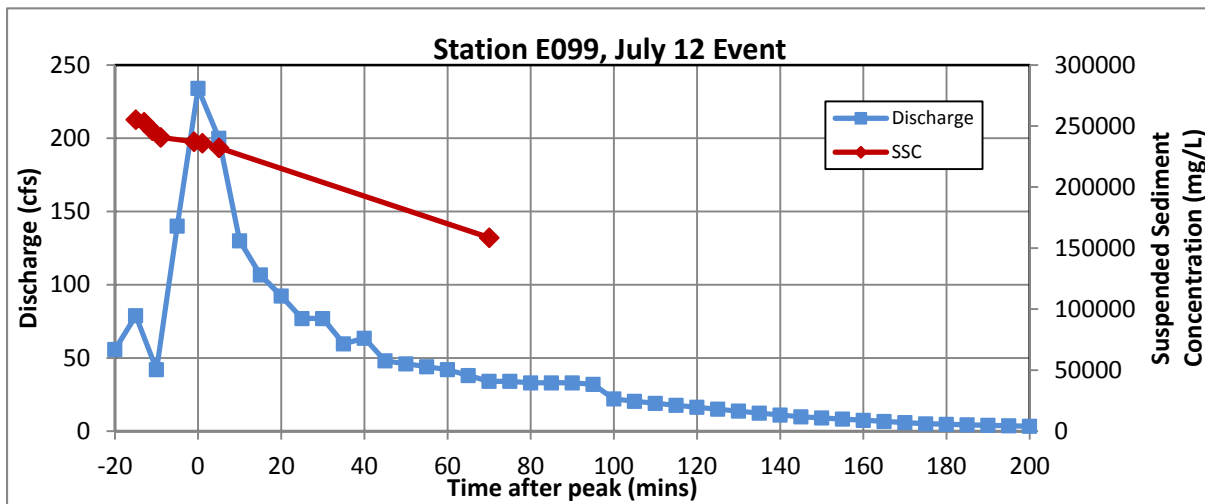
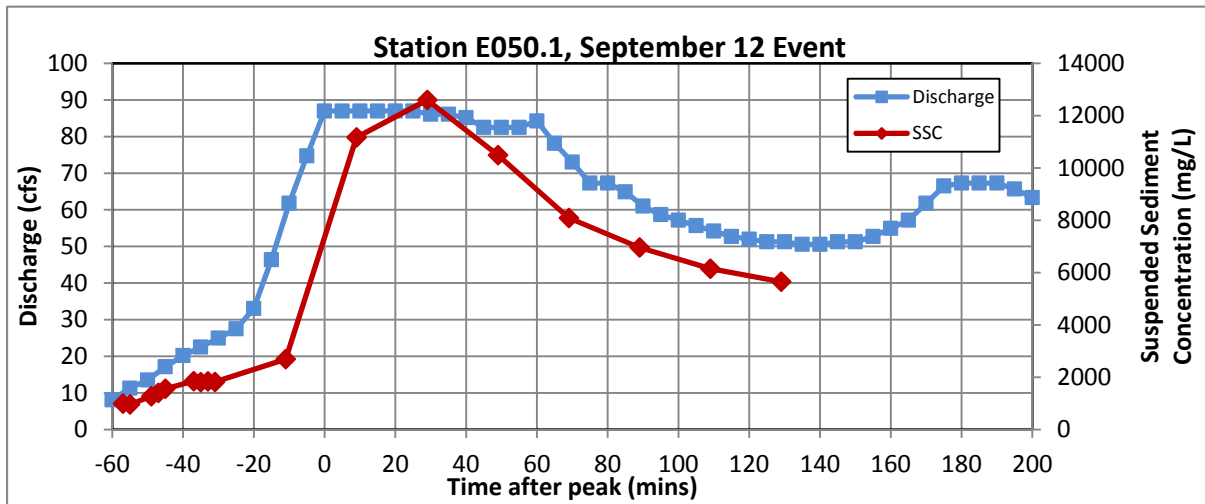
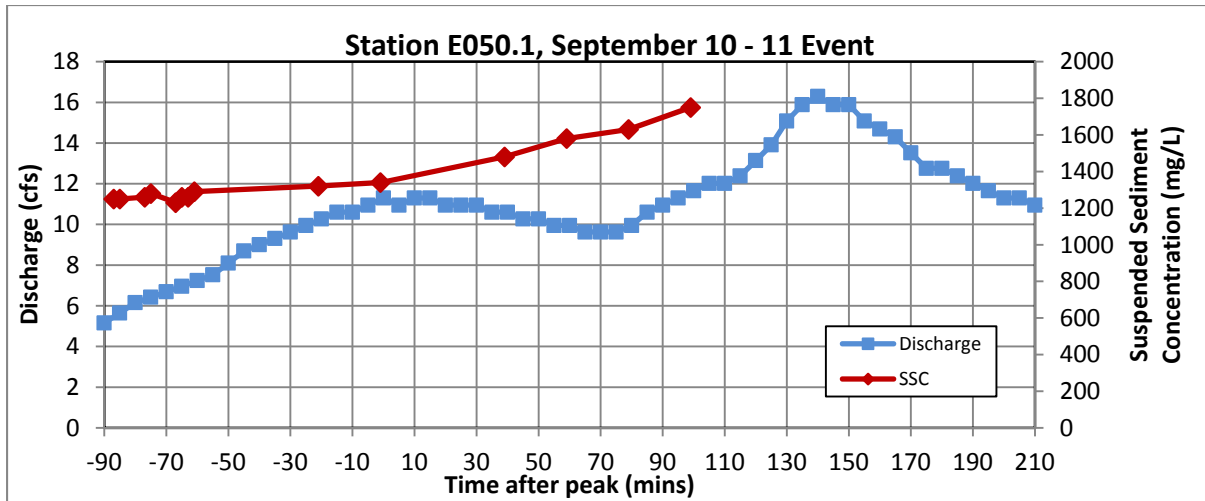


Figure 3.2-4 (continued) Discharge and SSC for sampled events at E026, E038, E039.1, E042.1, E050.1, E099, and E109.9

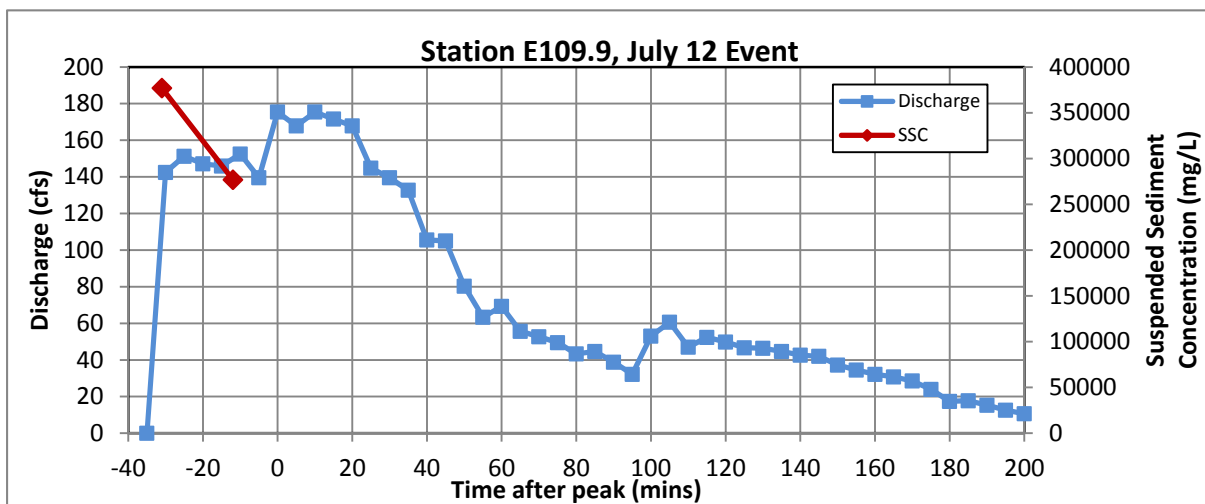
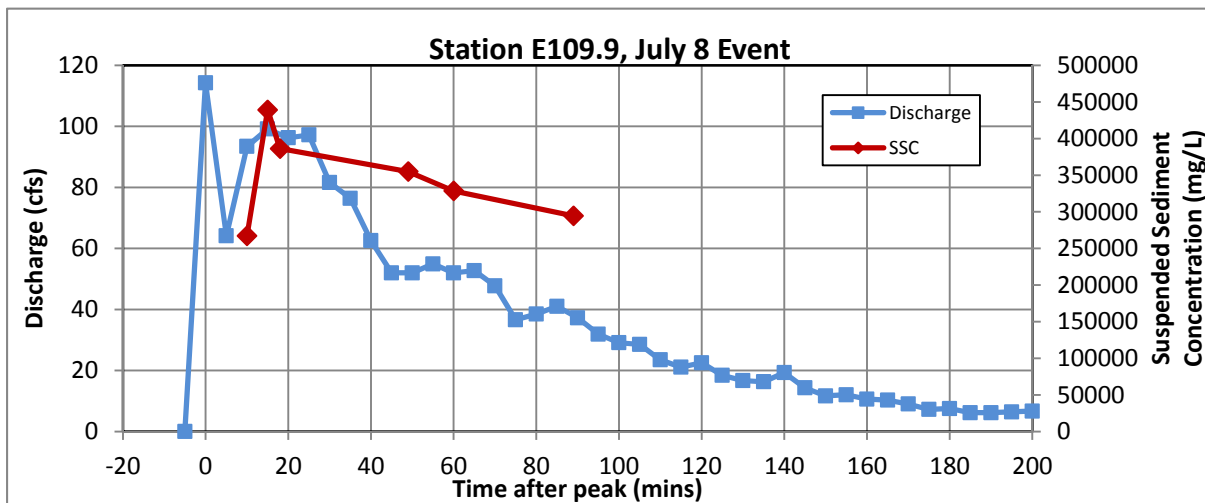
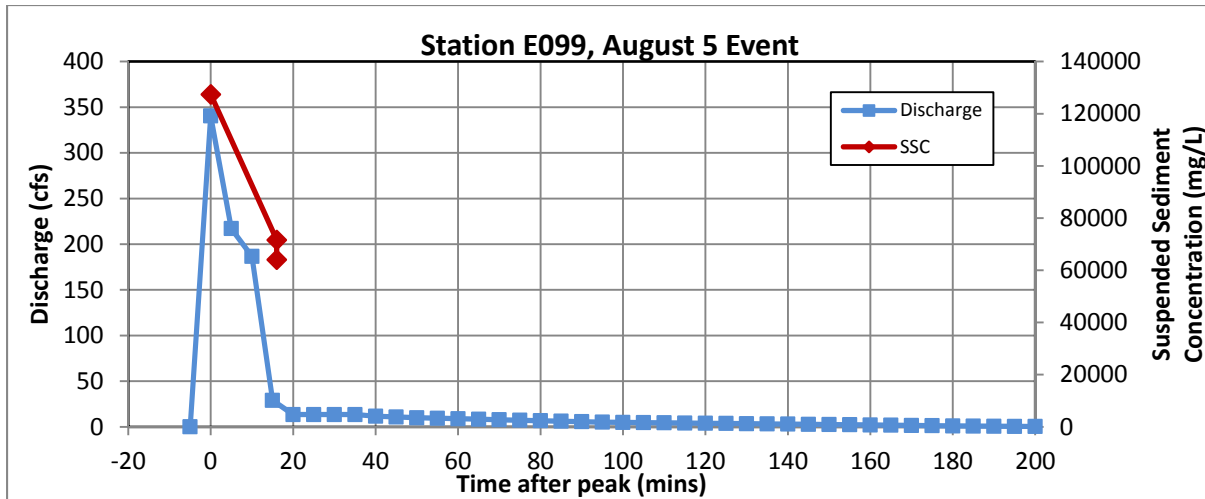


Figure 3.2-4 (continued) Discharge and SSC for sampled events at E026, E038, E039.1, E042.1, E050.1, E099, and E109.9

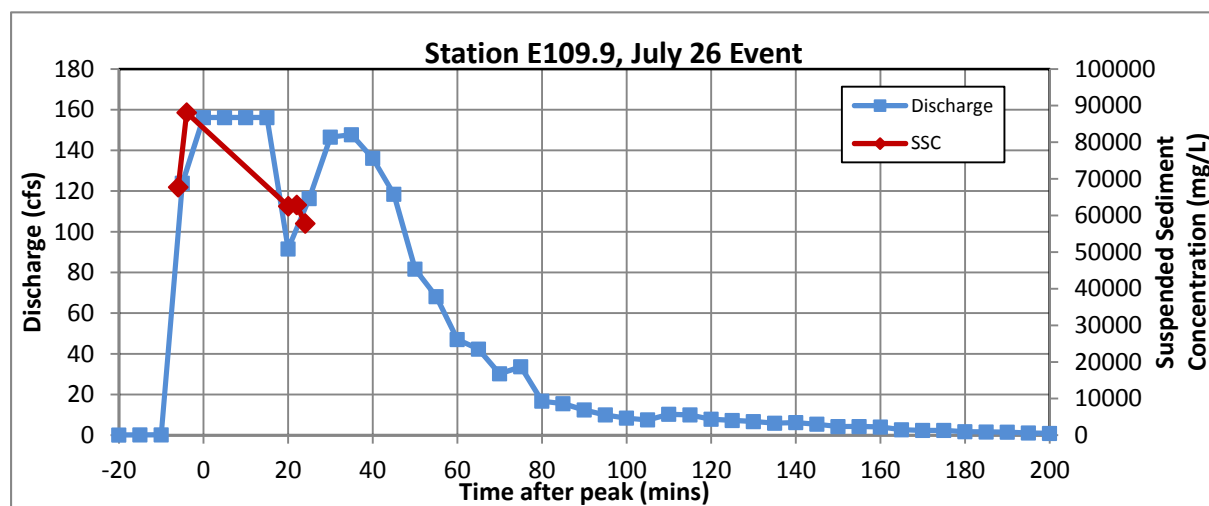
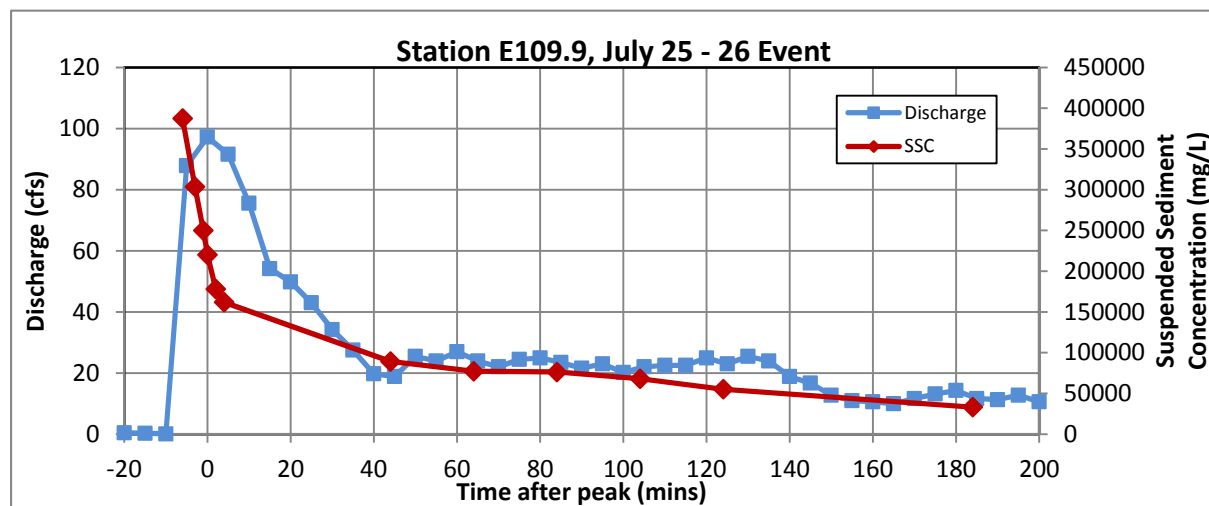
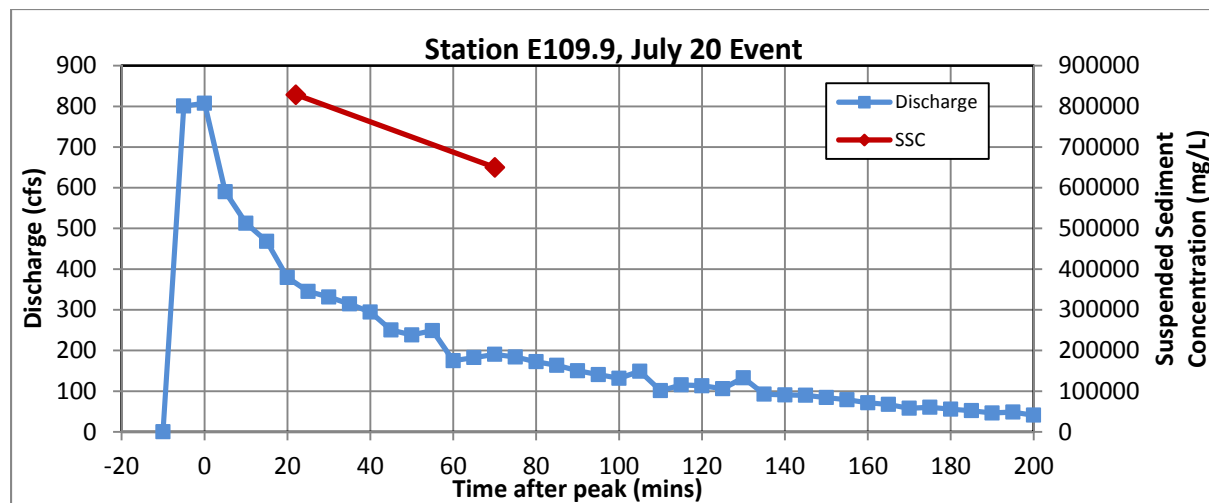


Figure 3.2-4 (continued) Discharge and SSC for sampled events at E026, E038, E039.1, E042.1, E050.1, E099, and E109.9

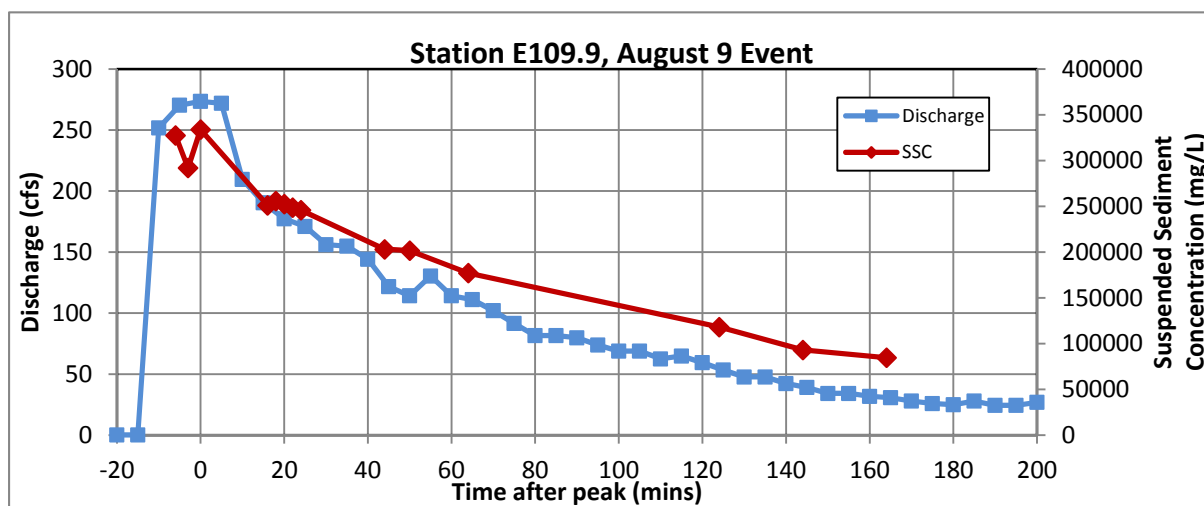
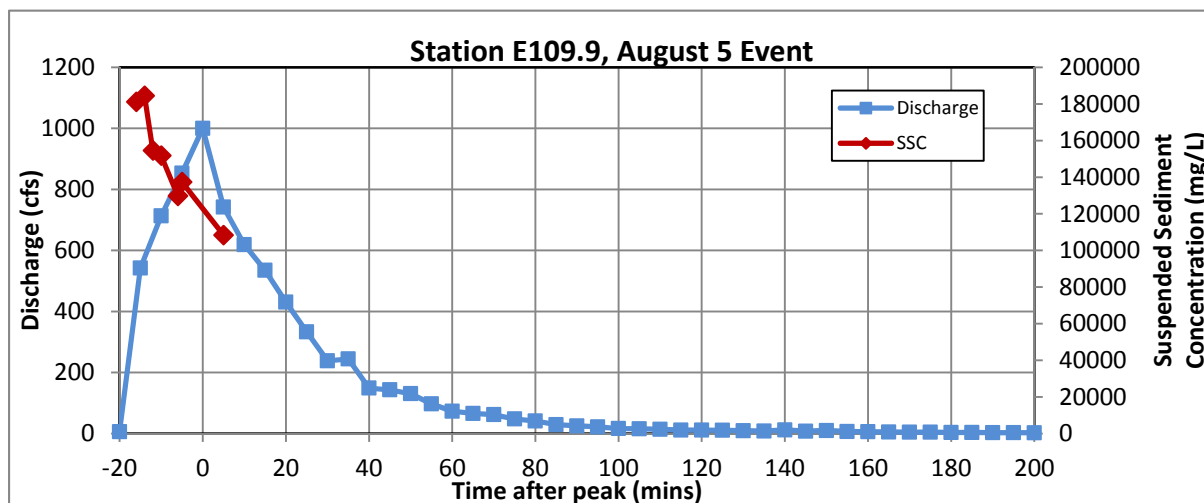
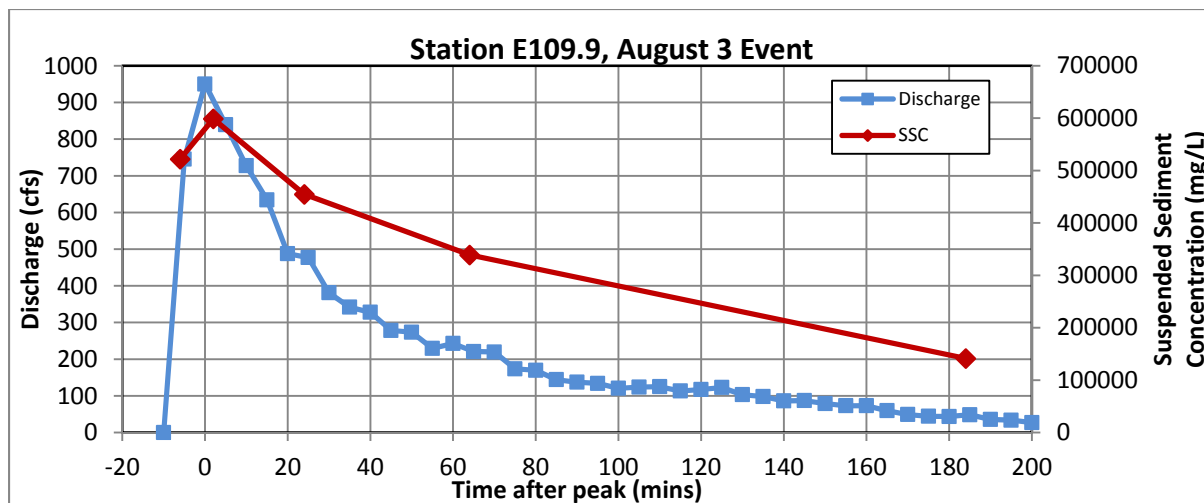


Figure 3.2-4 (continued) Discharge and SSC for sampled events at E026, E038, E039.1, E042.1, E050.1, E099, and E109.9

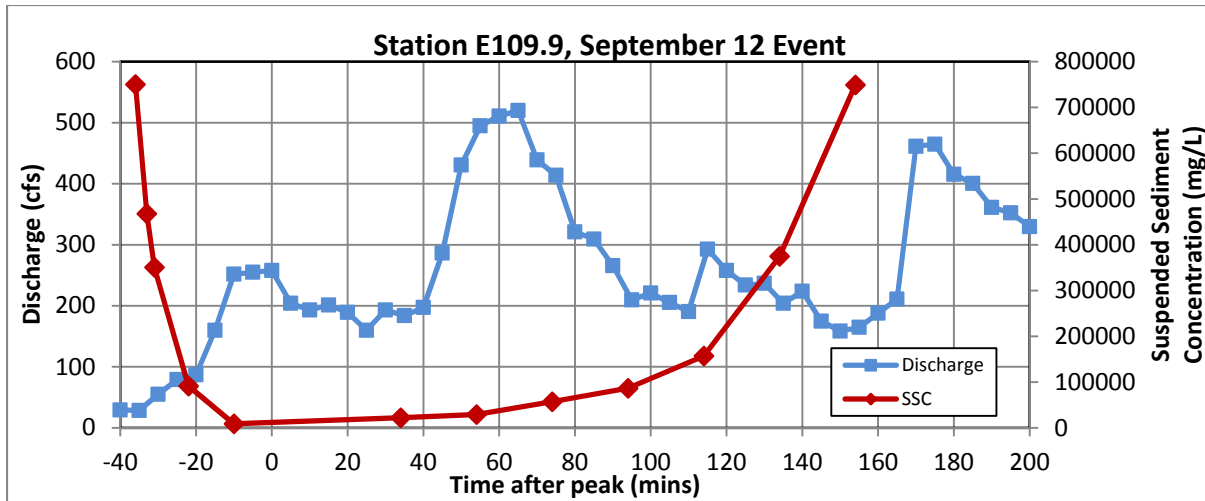


Figure 3.2-4 (continued) Discharge and SSC for sampled events at E026, E038, E039.1, E042.1, E050.1, E099, and E109.9

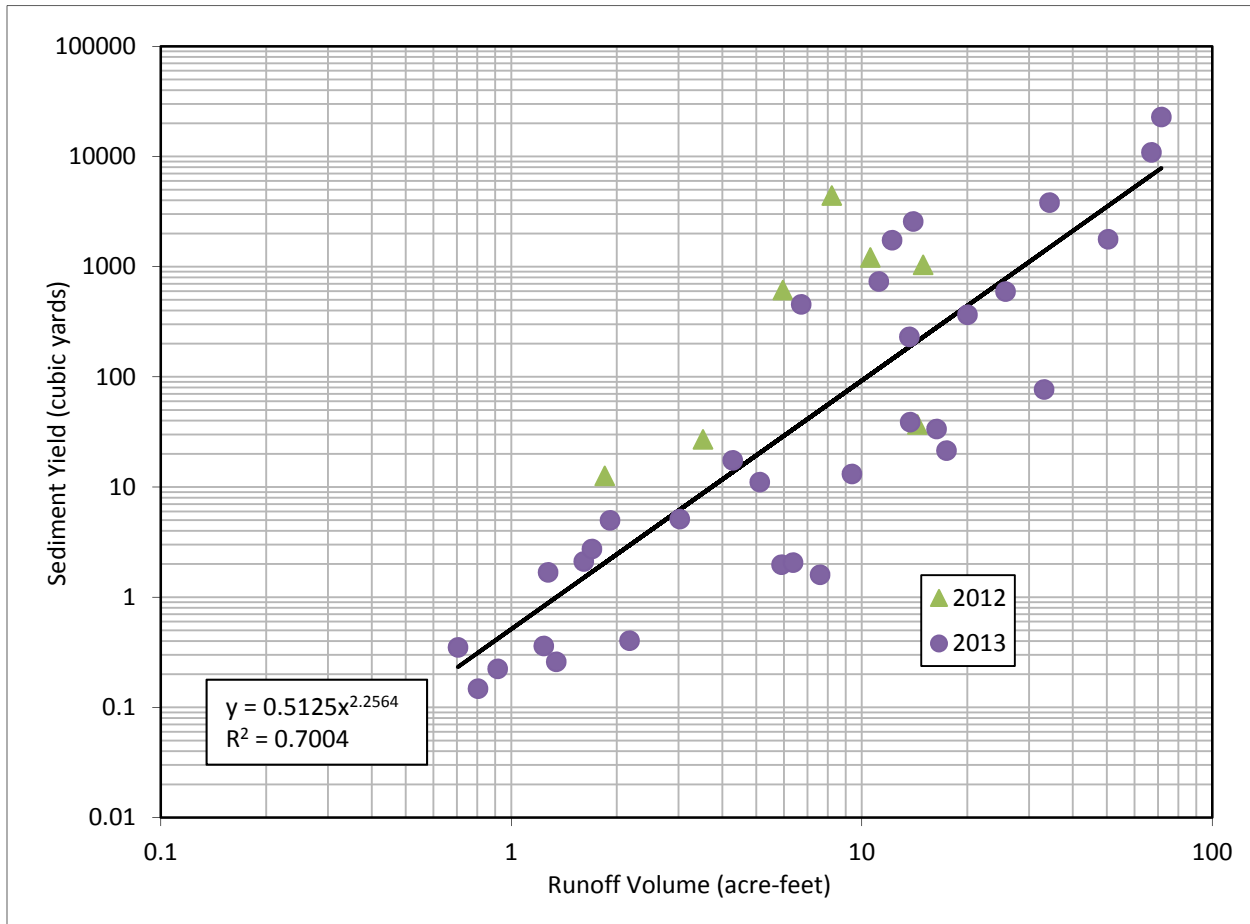


Figure 3.2-5 Relationship between SSC-based sediment yield and runoff volume over the past 2 yr of monitoring

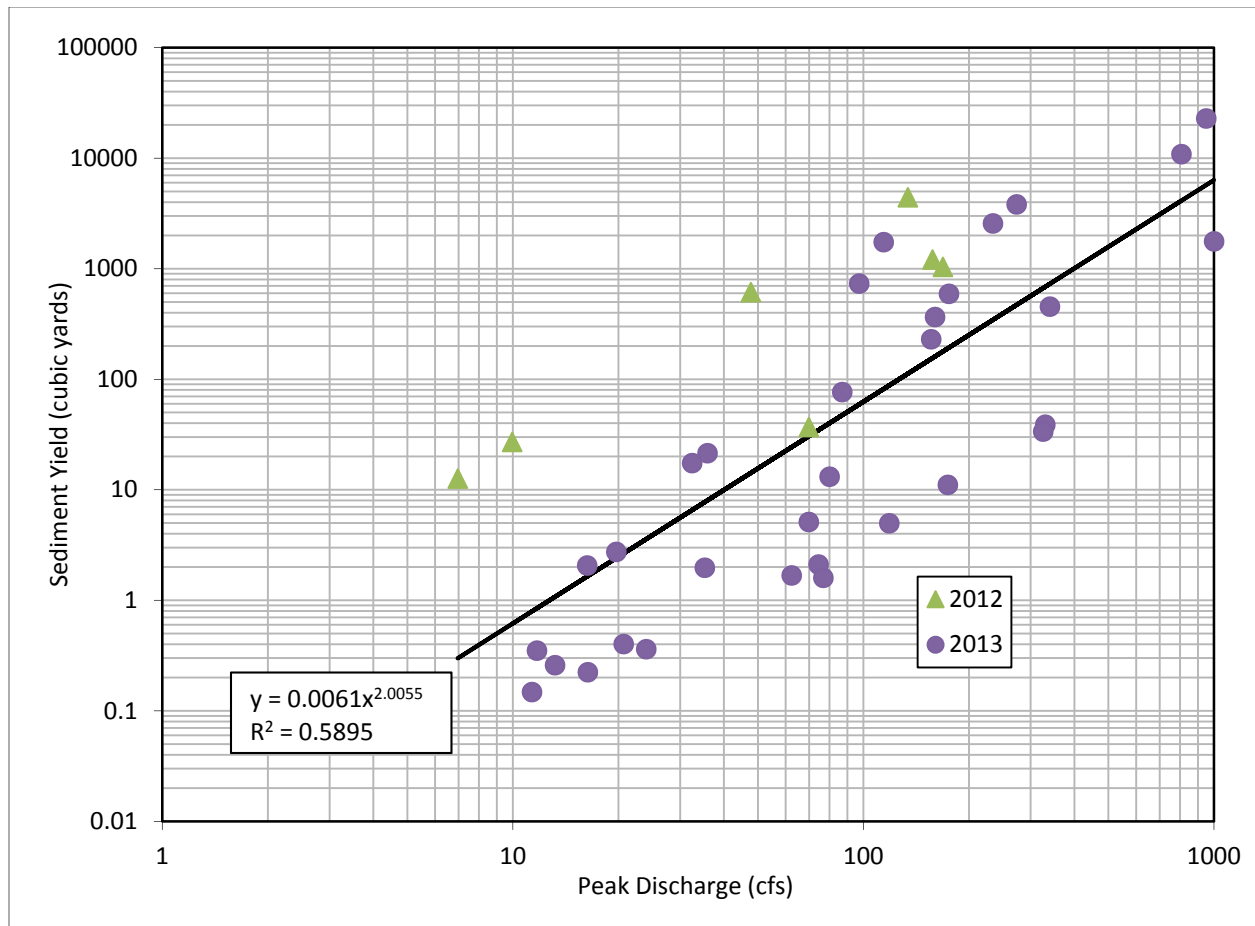


Figure 3.2-6 Relationship between SSC-based sediment yield and peak discharge over the past 2 yr of monitoring

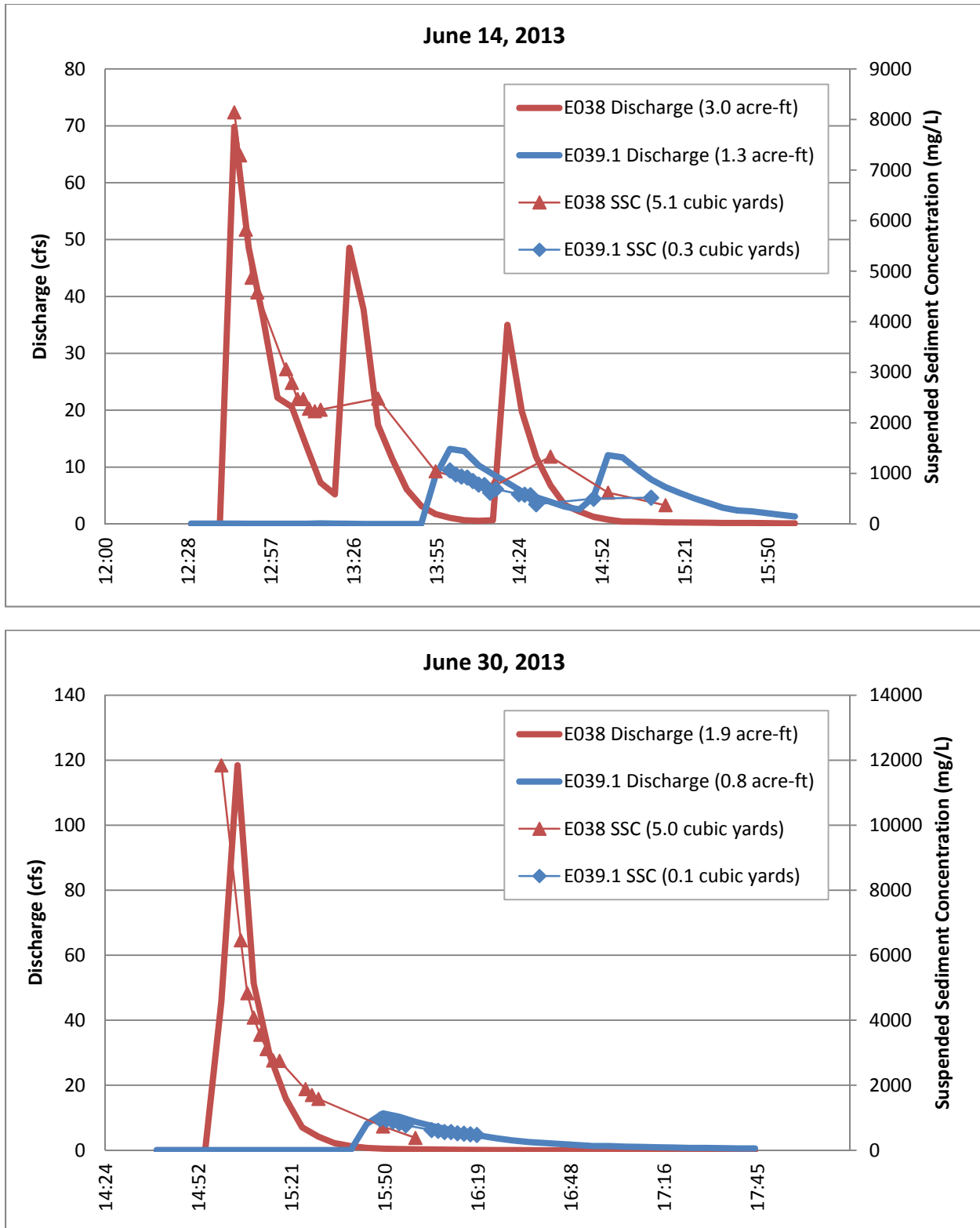


Figure 3.4-1 Discharge and SSC at E038 and E039.1 in DP Canyon on days when sampling of the same runoff event occurred

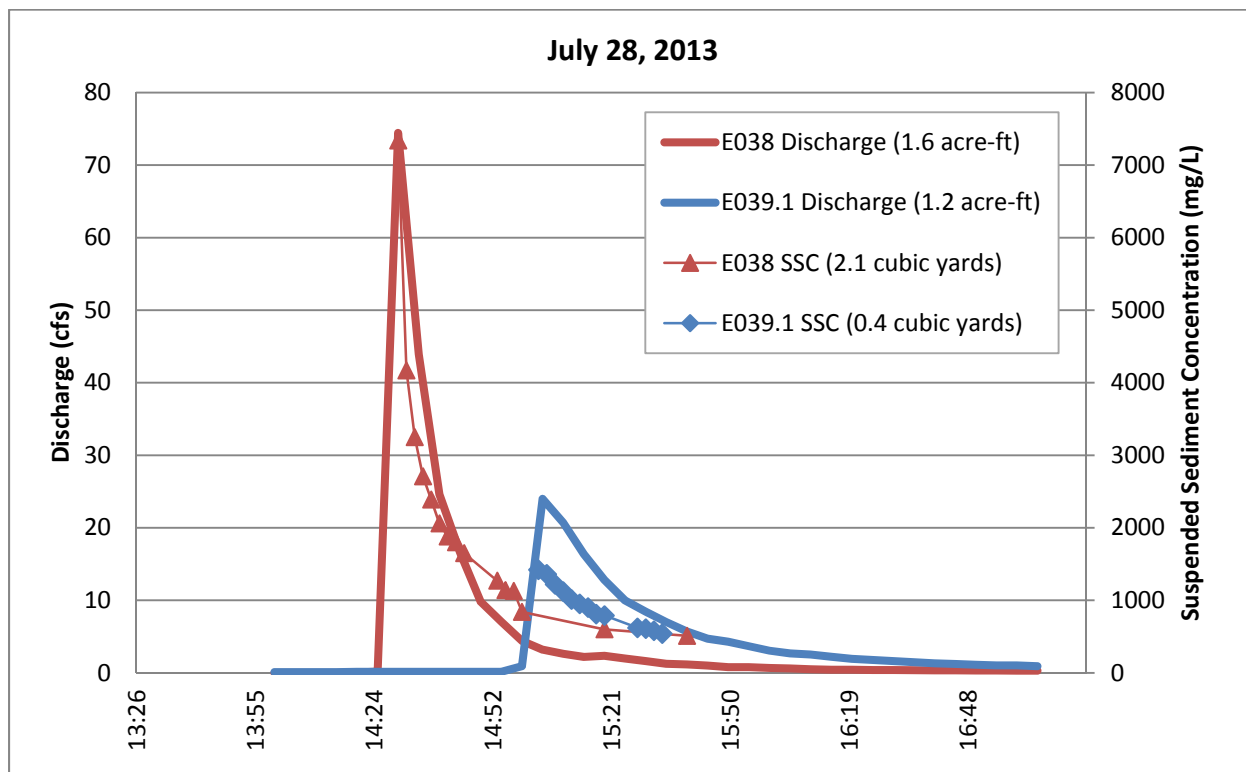
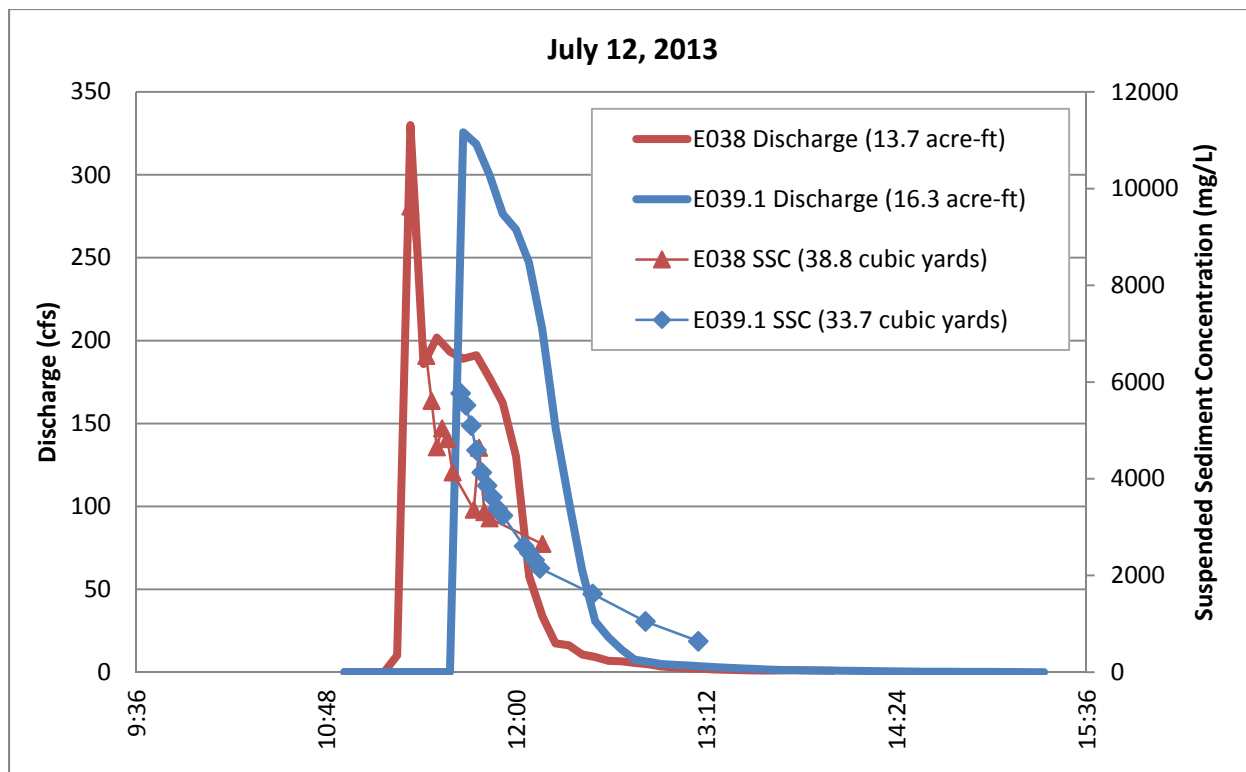


Figure 3.4-1 (continued) Discharge and SSC at E038 and E039.1 in DP Canyon on days when sampling of the same runoff event occurred

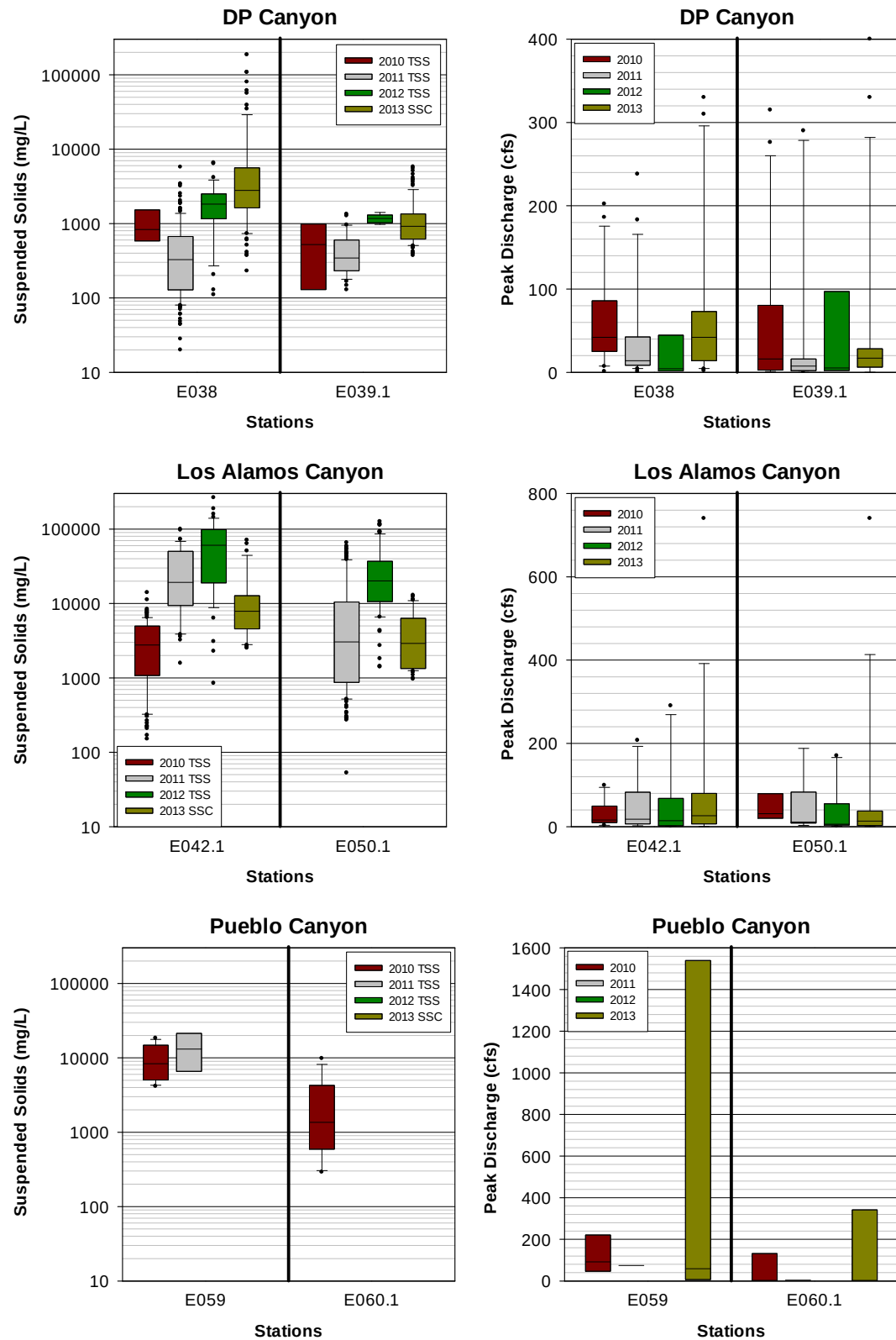


Figure 3.4-2 Box and whisker plots of TSS and SSC (left) and peak discharge (right) upstream and downstream of the watershed mitigations in DP (top), Los Alamos (middle), and Pueblo (bottom) Canyons over the past 4 yr of monitoring

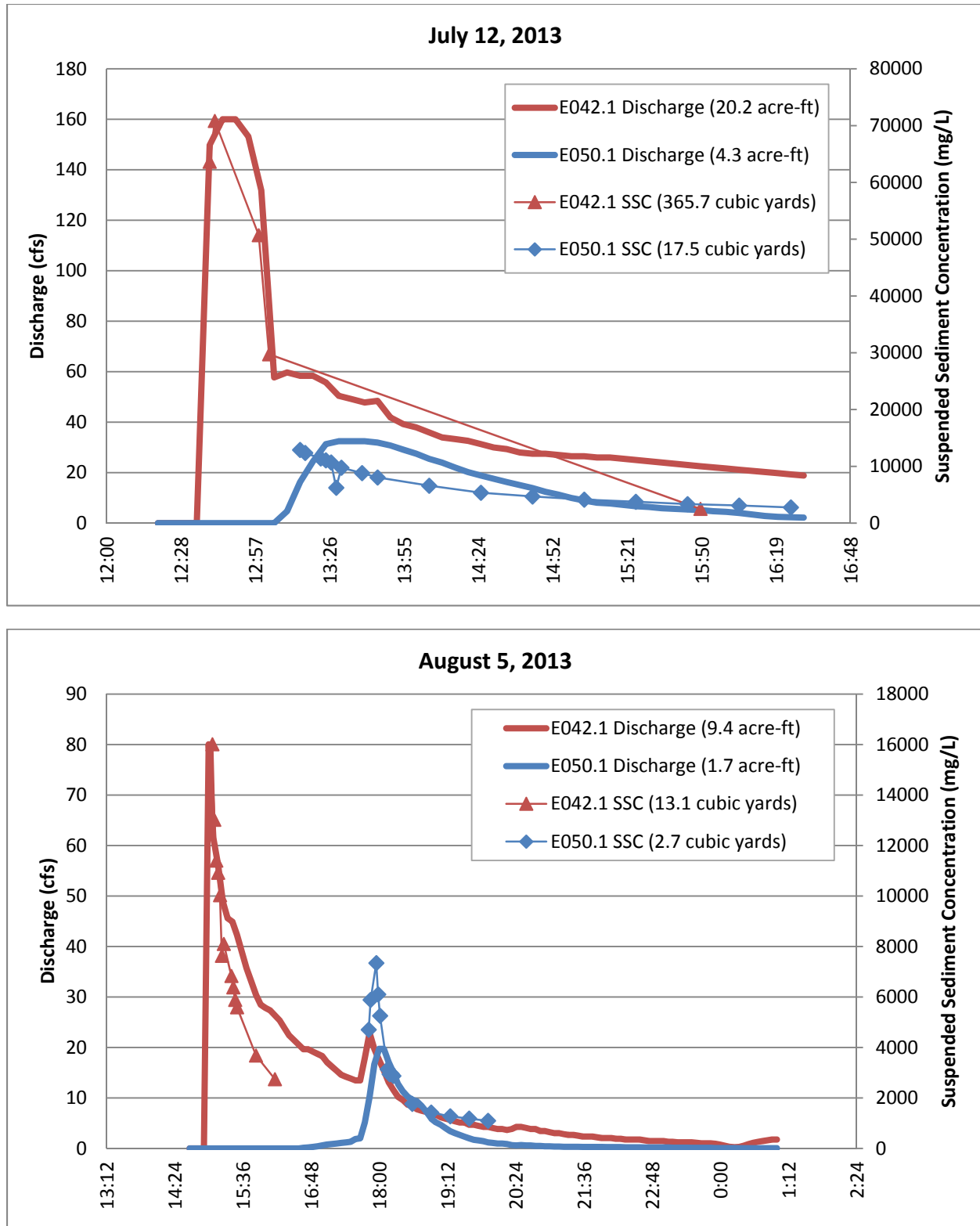


Figure 3.4-3 Discharge and TSS at E042.1 and E050.1 in upper Los Alamos Canyon on days when sampling of the same runoff event occurred

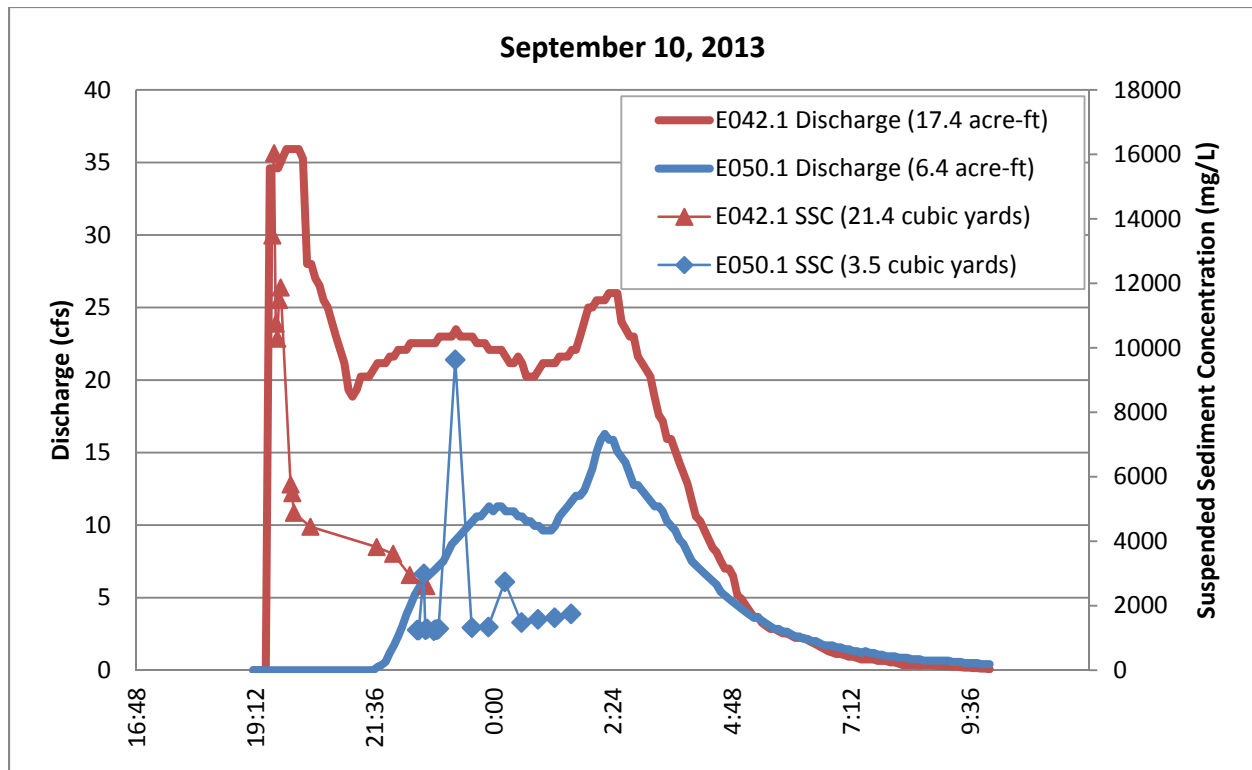


Figure 3.4-3 (continued) Discharge and TSS at E042.1 and E050.1 in upper Los Alamos Canyon on days when sampling of the same event occurred



Figure 4.1-1 Photograph of samples collected at E109.9 (bottle 1 on far left to bottle 24 on far right)

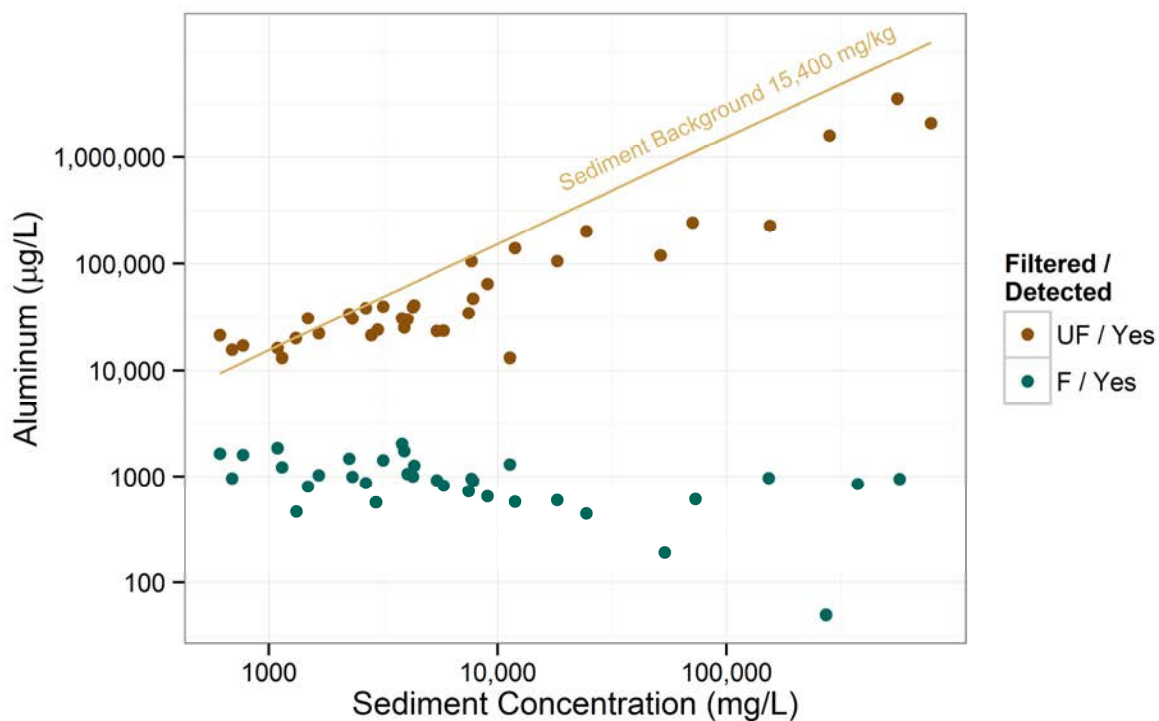


Figure 4.3-1 SSC vs. aluminum for each gage station

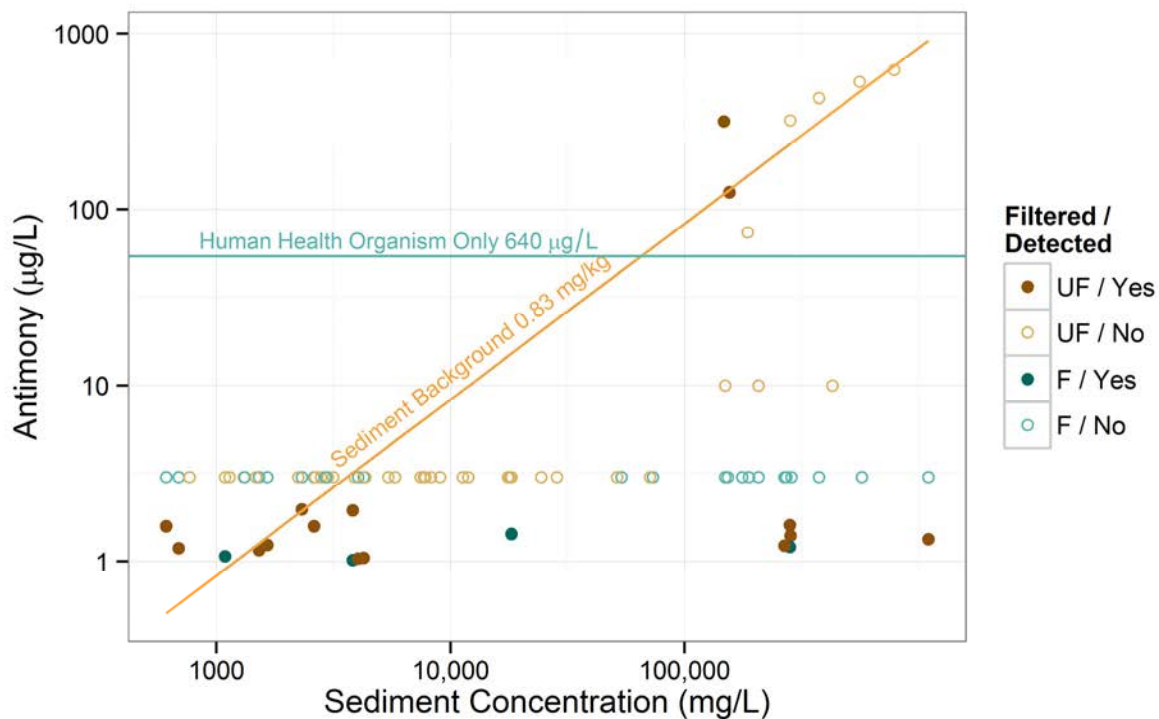


Figure 4.3-2 SSC vs. antimony for each gage station

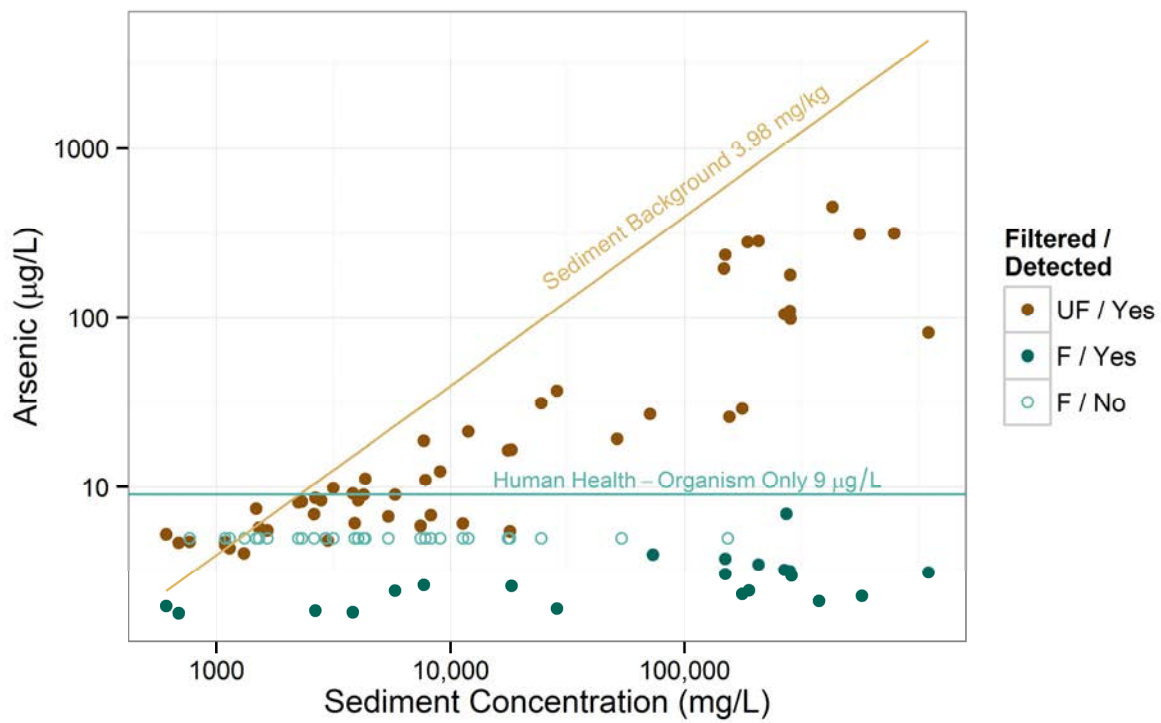


Figure 4.3-3 SSC vs. arsenic for each gage station

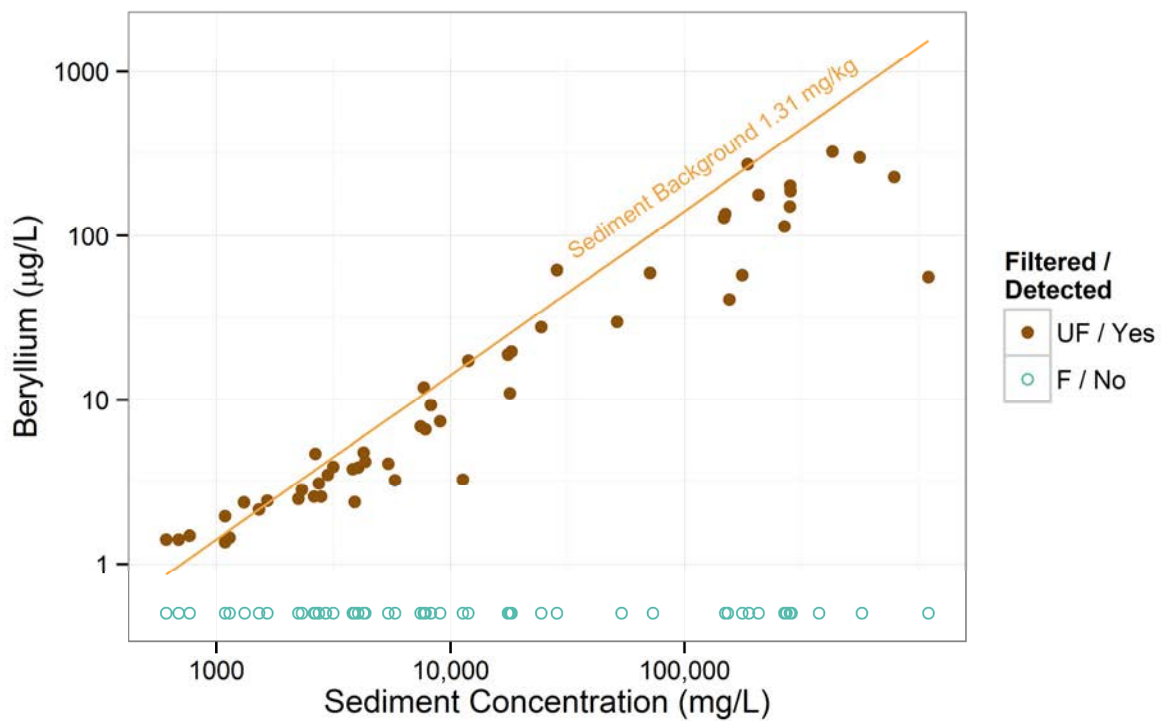


Figure 4.3-4 SSC vs. beryllium for each gage station

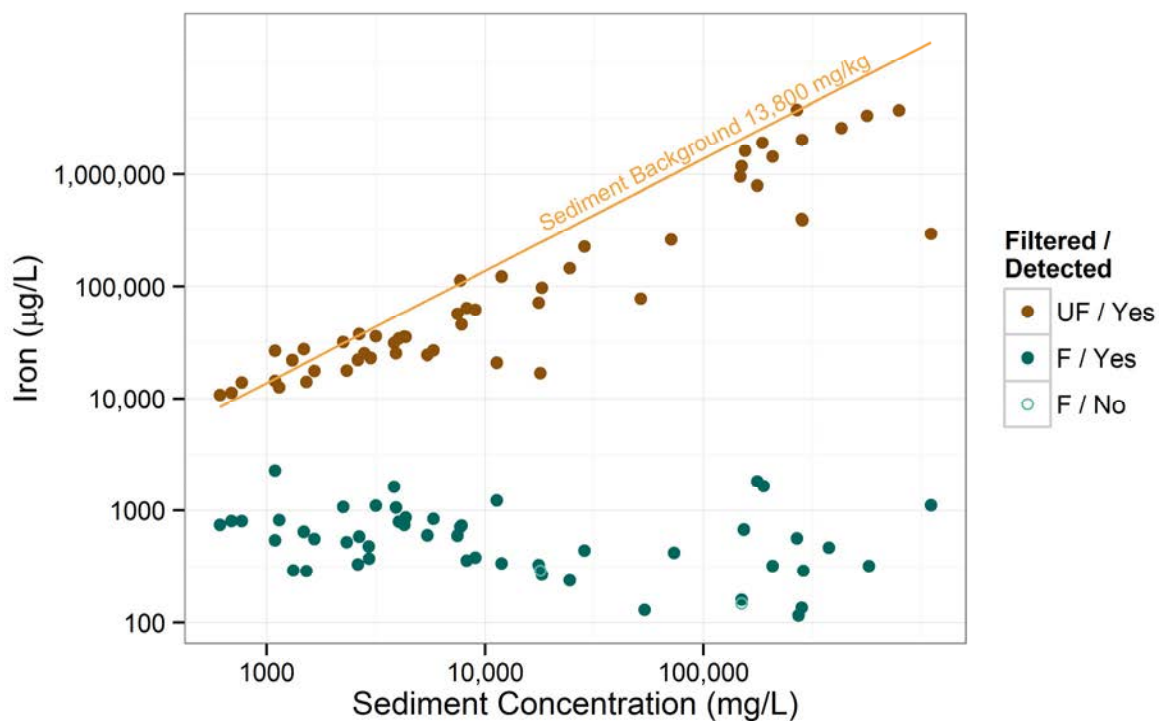


Figure 4.3-5 SSC vs. iron for each gage station

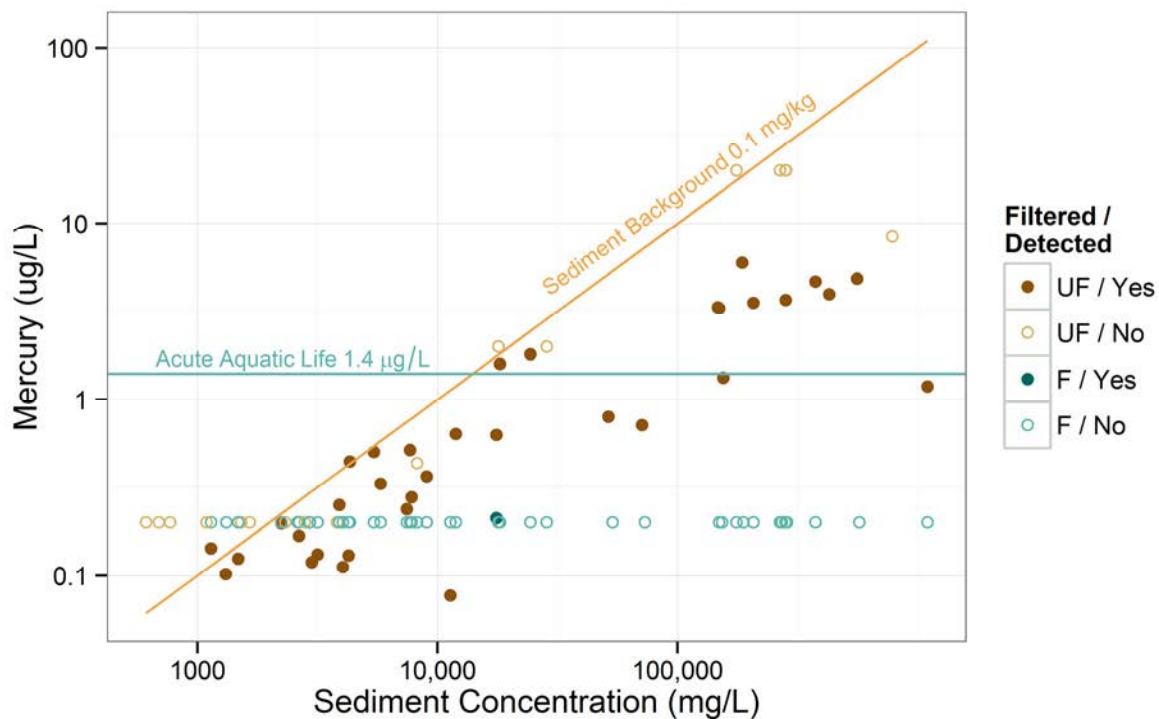


Figure 4.3-6 SSC vs. mercury for each gage station

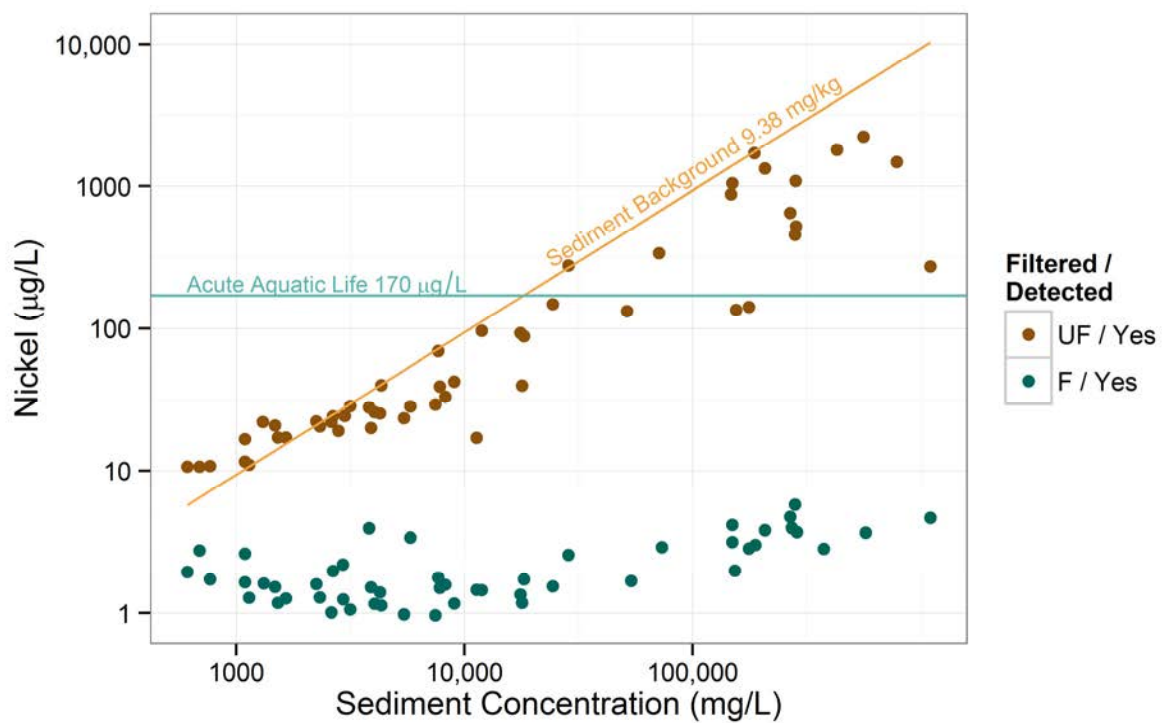


Figure 4.3-7 SSC vs. nickel for each gage station

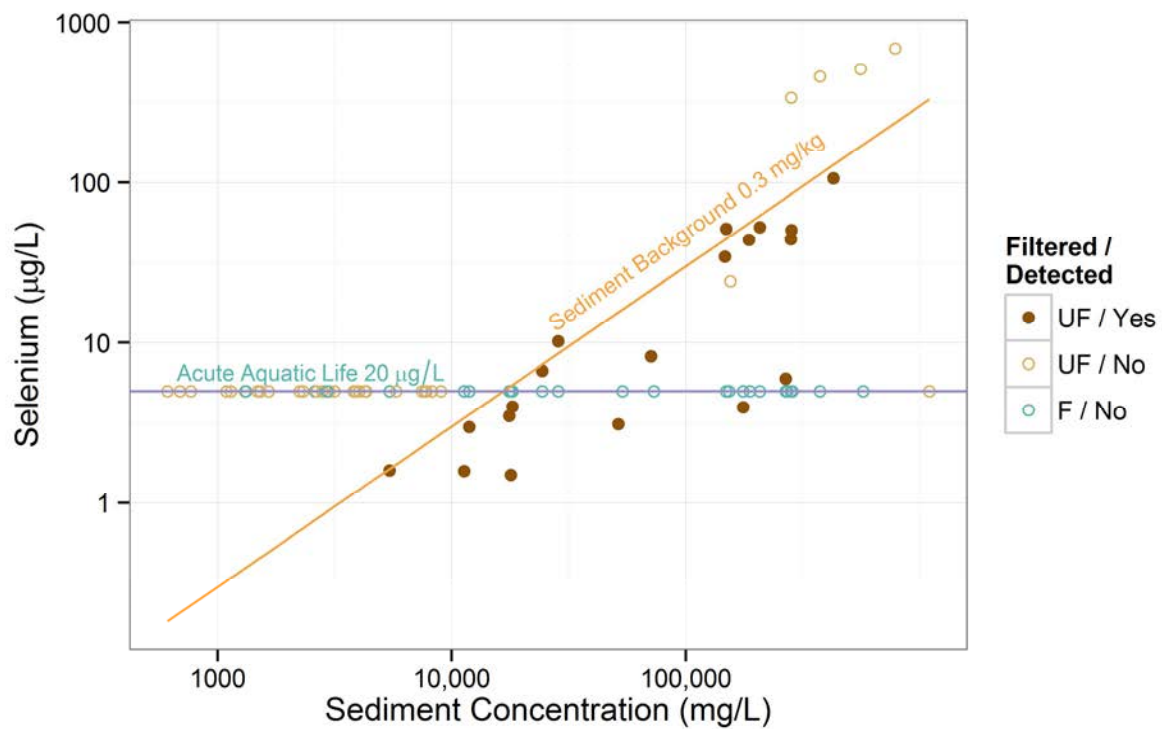


Figure 4.3-8 SSC vs. selenium for each gage station

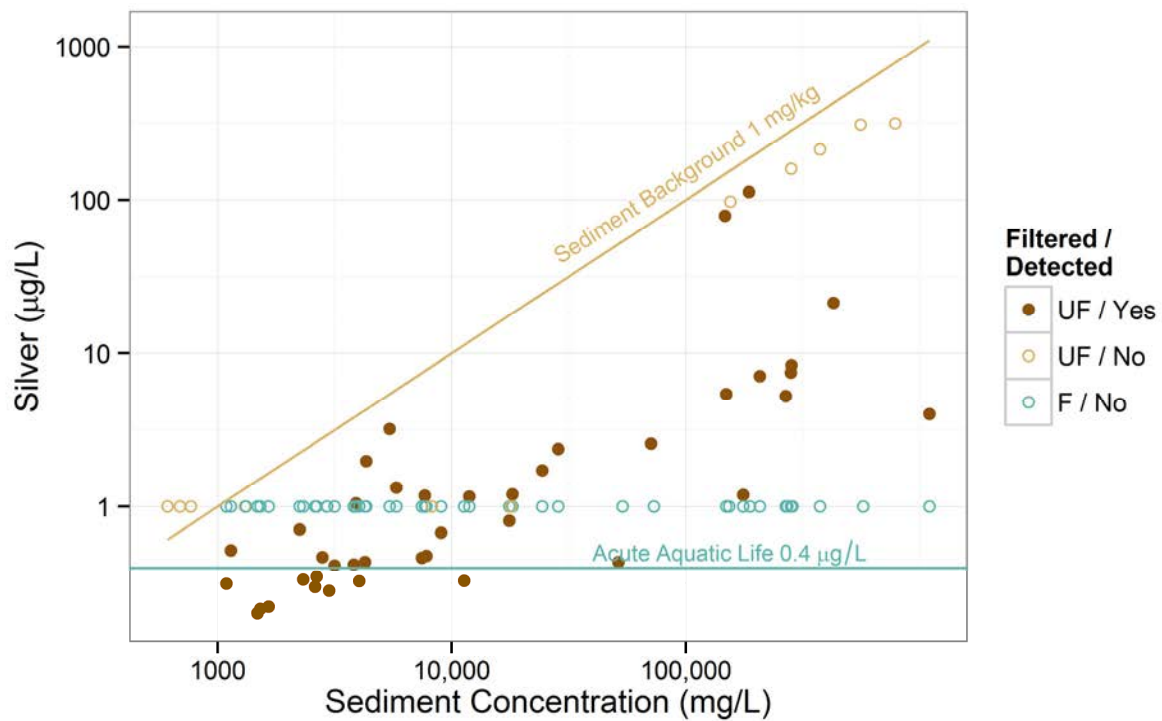


Figure 4.3-9 SSC vs. silver for each gage station

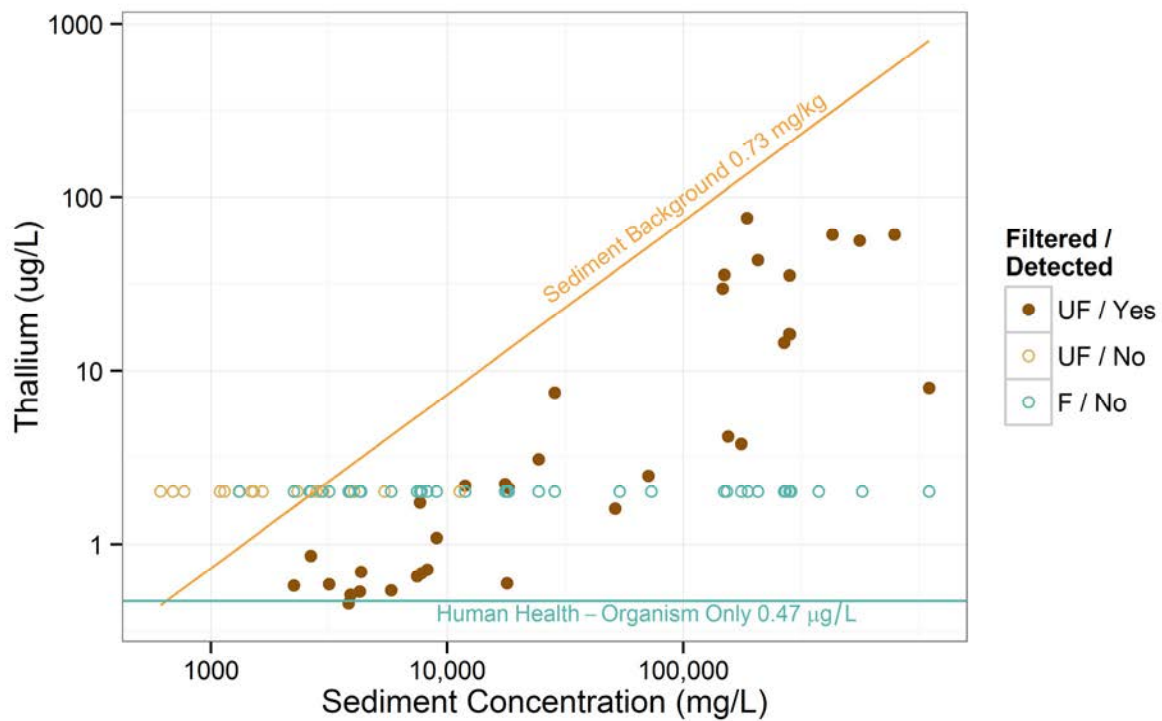


Figure 4.3-10 SSC vs. thallium for each gage station

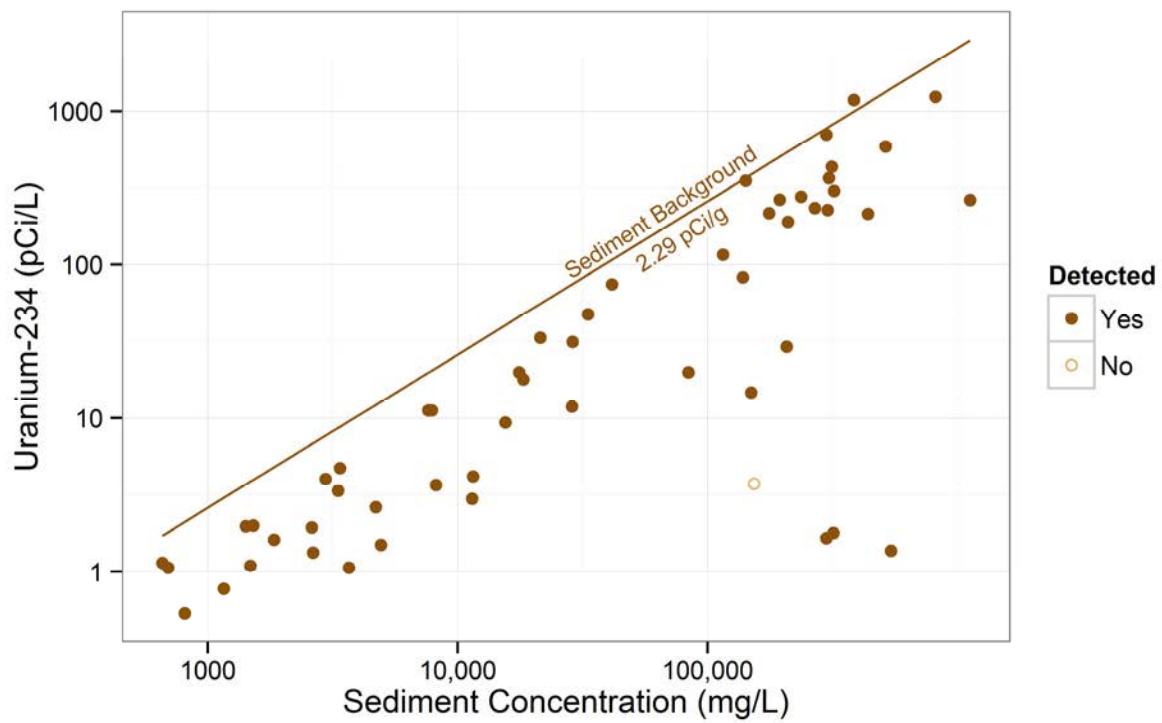


Figure 4.3-11 SSC vs. uranium-234 for each gage station

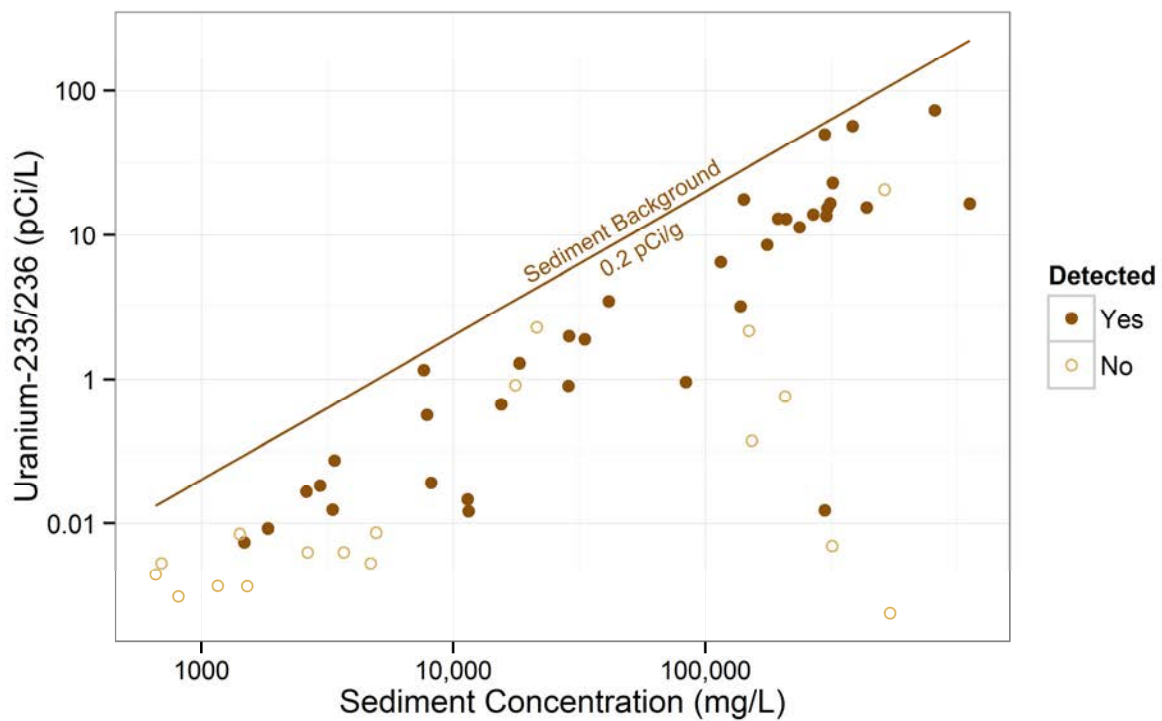


Figure 4.3-12 SSC vs. uranium-235 for each gage station

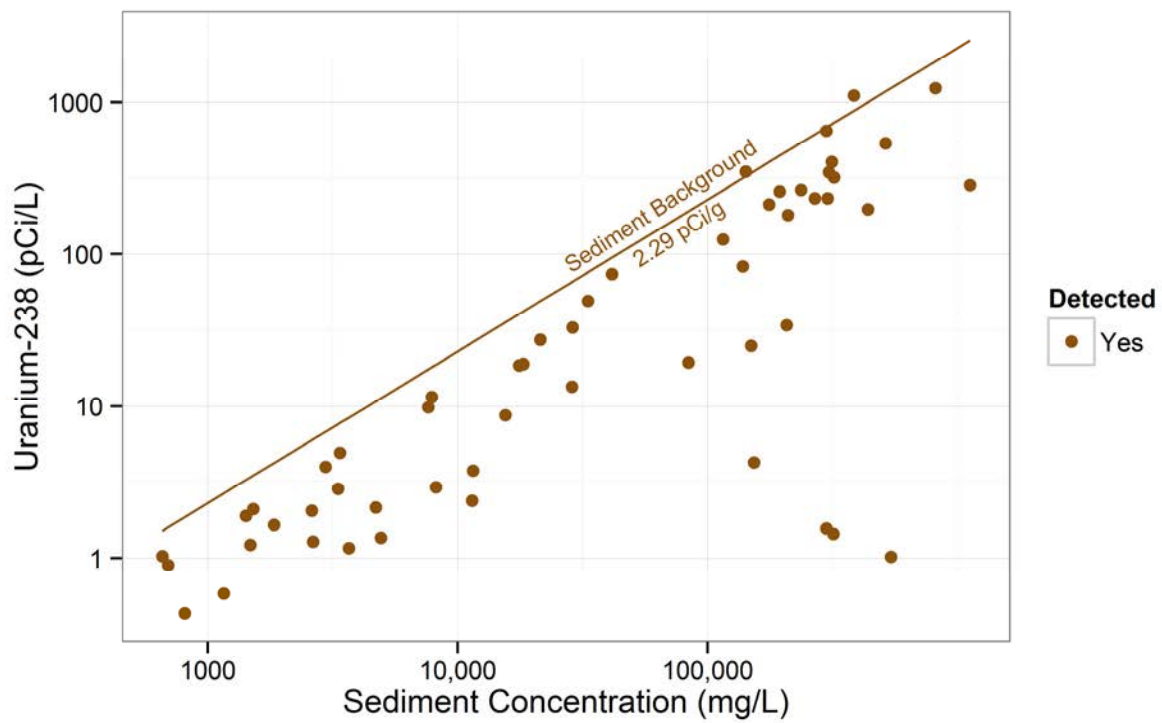


Figure 4.3-13 SSC vs. uranium-238 for each gage station

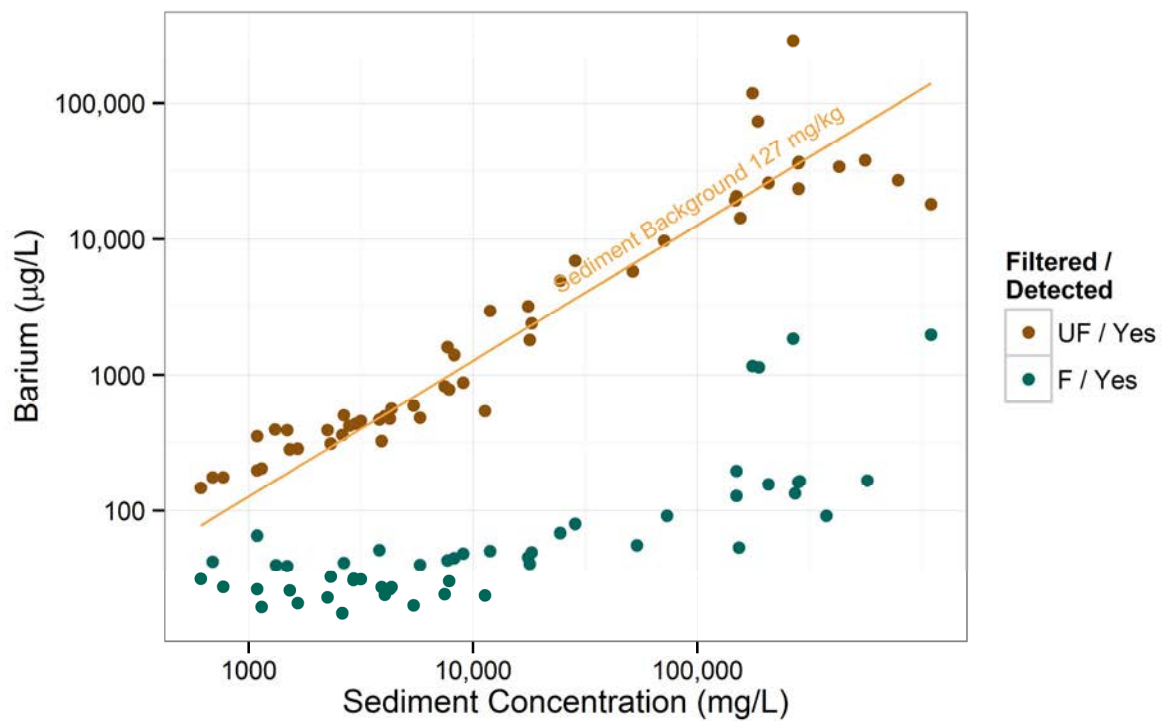


Figure 4.3-14 SSC vs. barium for each gage station

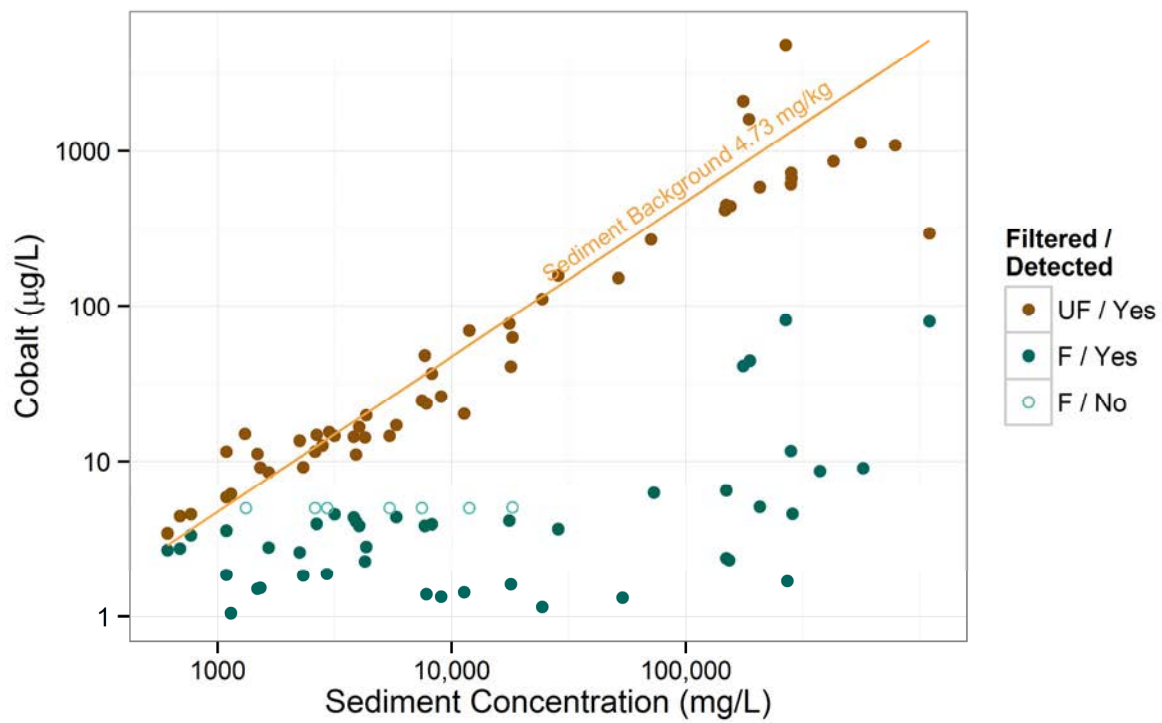


Figure 4.3-15 SSC vs. cobalt for each gage station

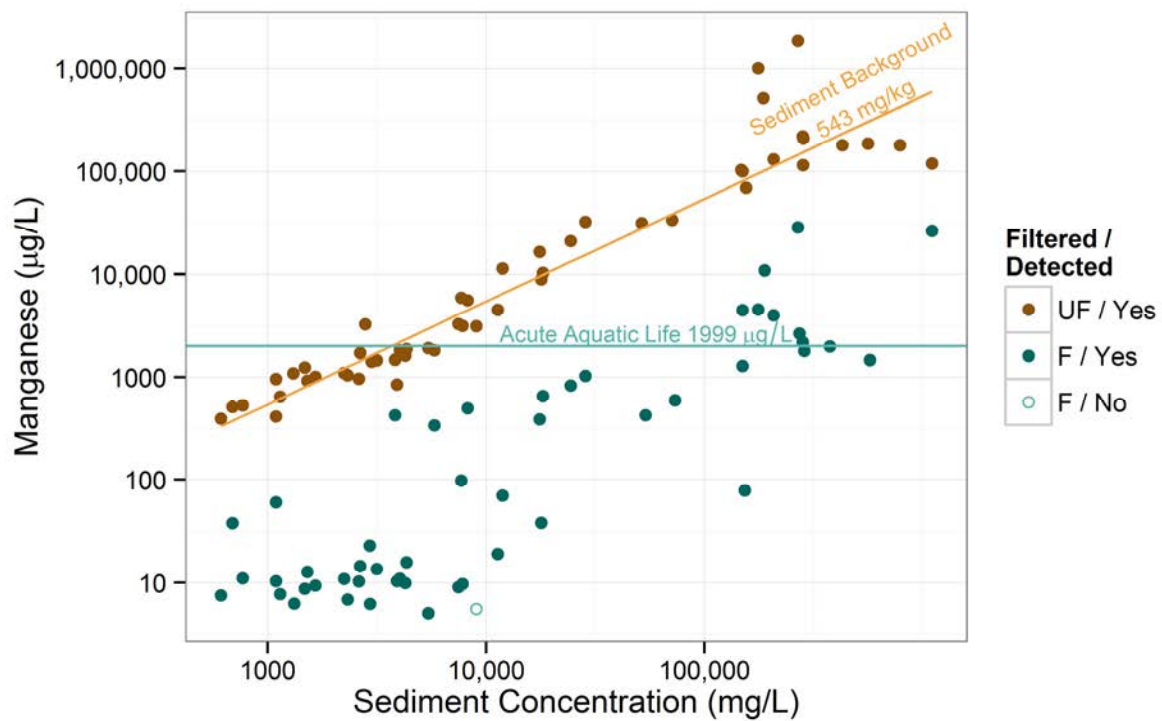


Figure 4.3-16 SSC vs. manganese for each gage station

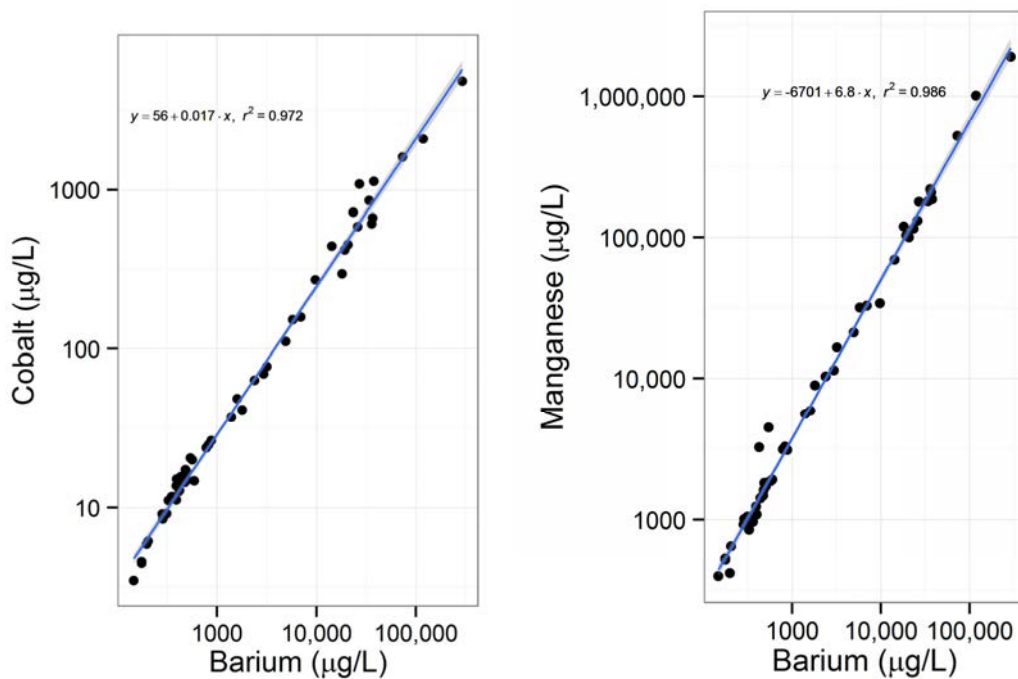


Figure 4.3-17 Correlation of concentrations of barium, cobalt, and manganese for each gage station

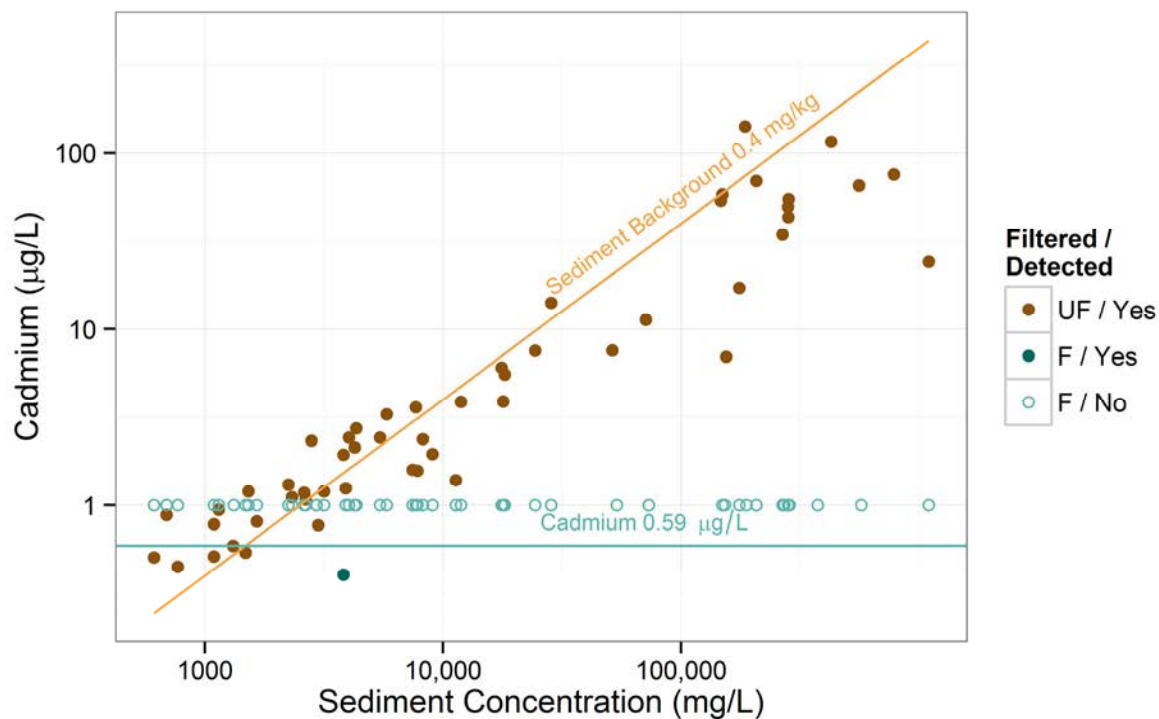


Figure 4.3-18 SSC vs. cadmium for each gage station

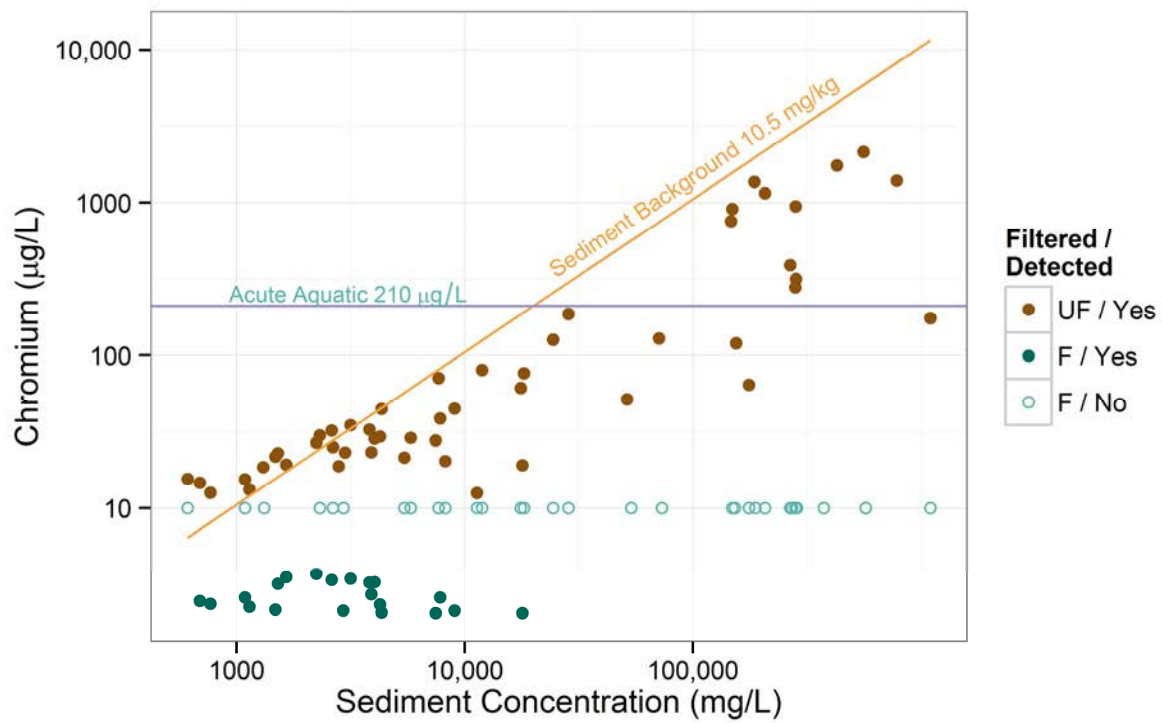


Figure 4.3-19 SSC vs. chromium for each gage station

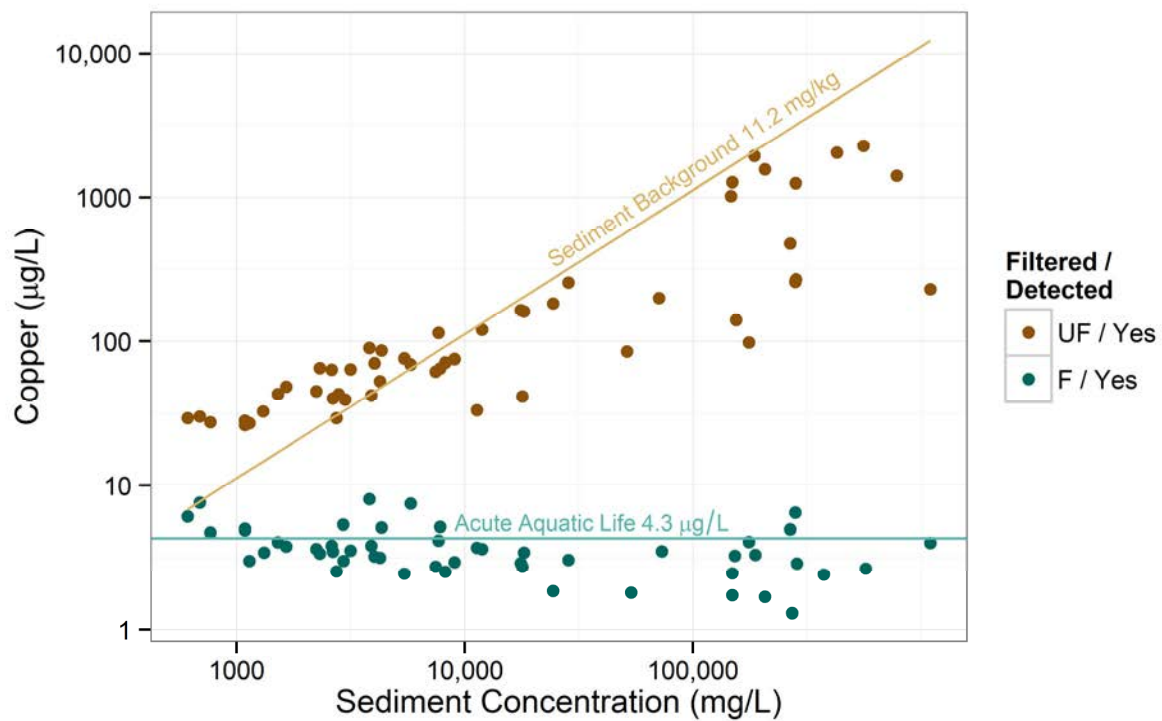


Figure 4.3-20 SSC vs. copper for each gage station

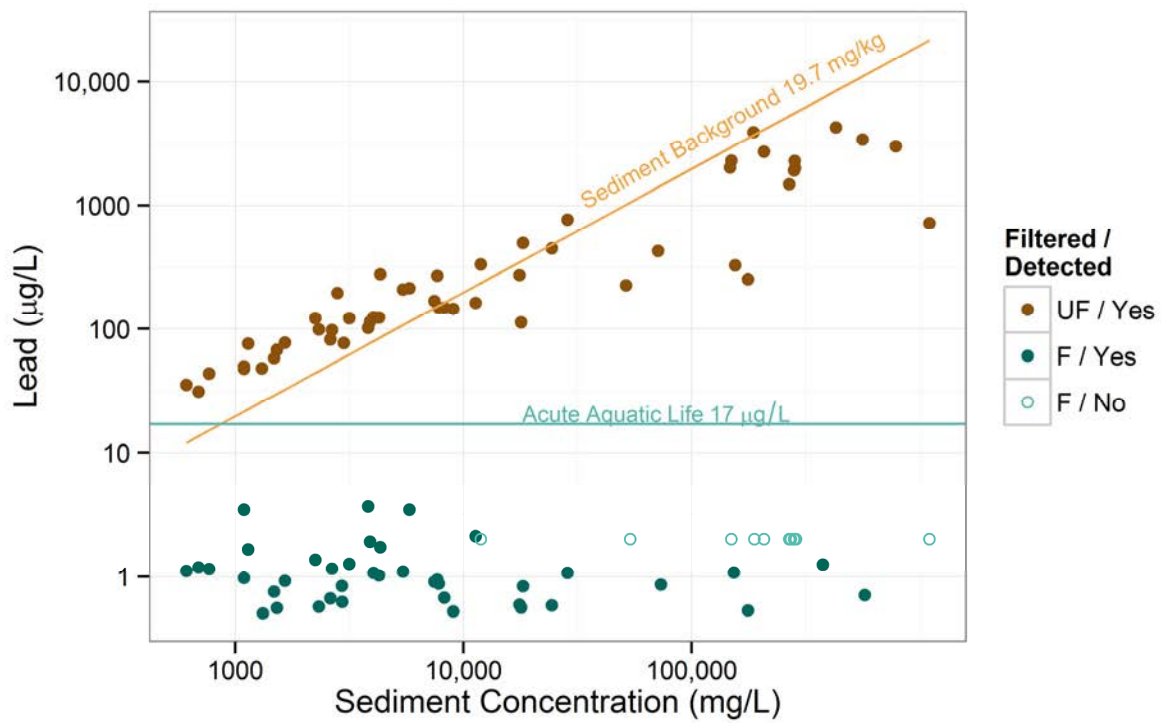


Figure 4.3-21 SSC vs. lead for each gage station

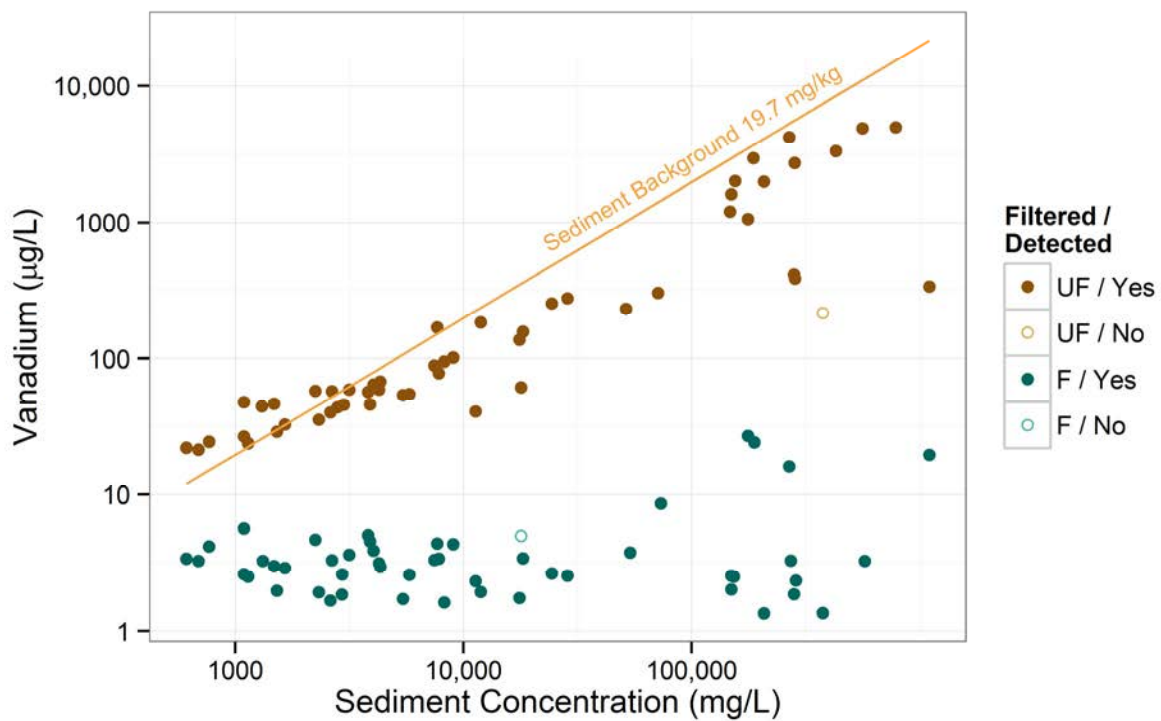


Figure 4.3-22 SSC vs. vanadium for each gage station

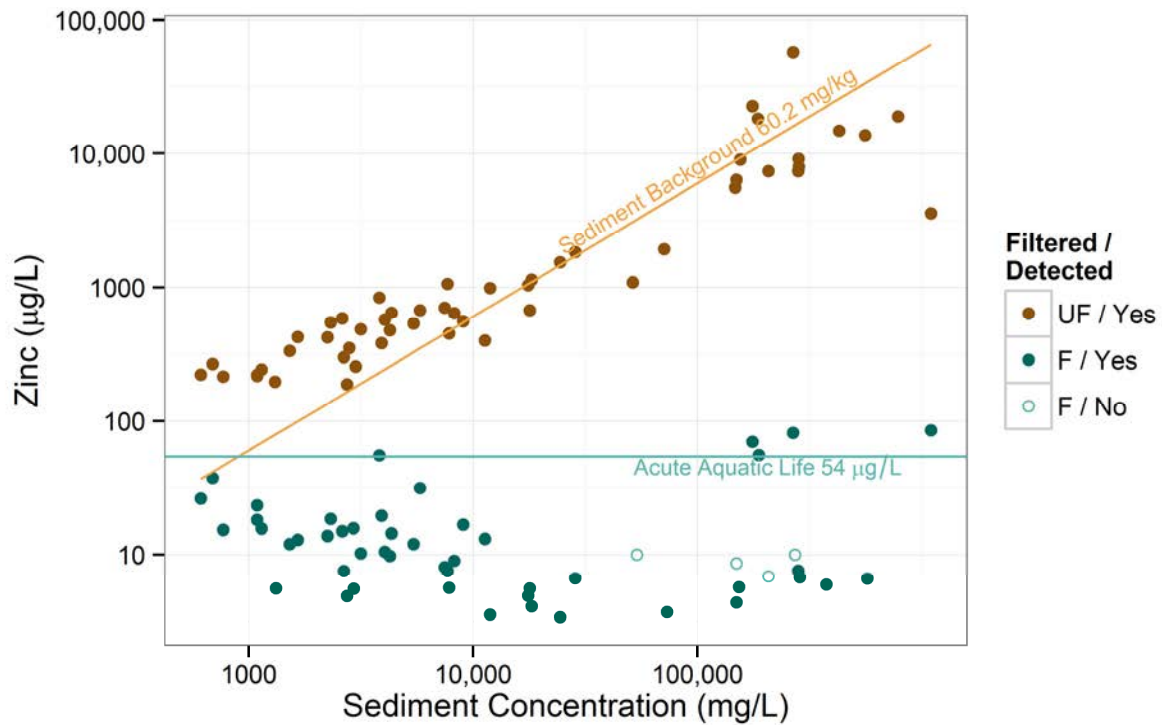


Figure 4.3-23 SSC vs. zinc for each gage station

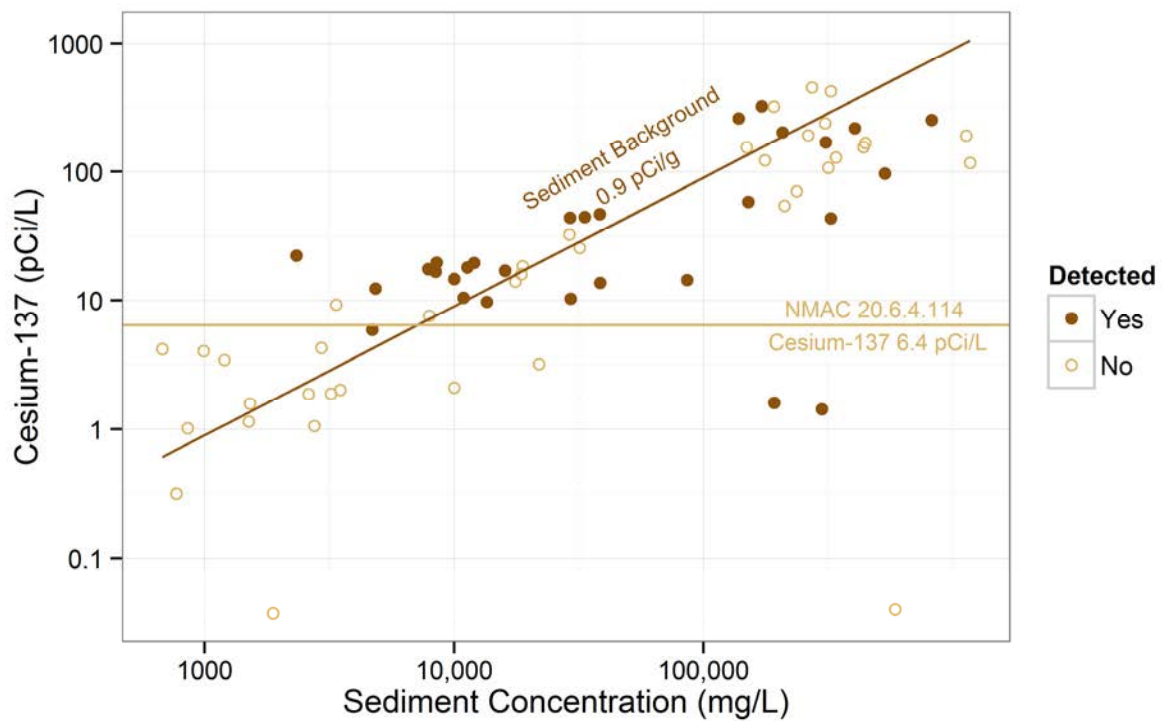


Figure 4.3-24 SSC vs. cesium-137 for each gage station

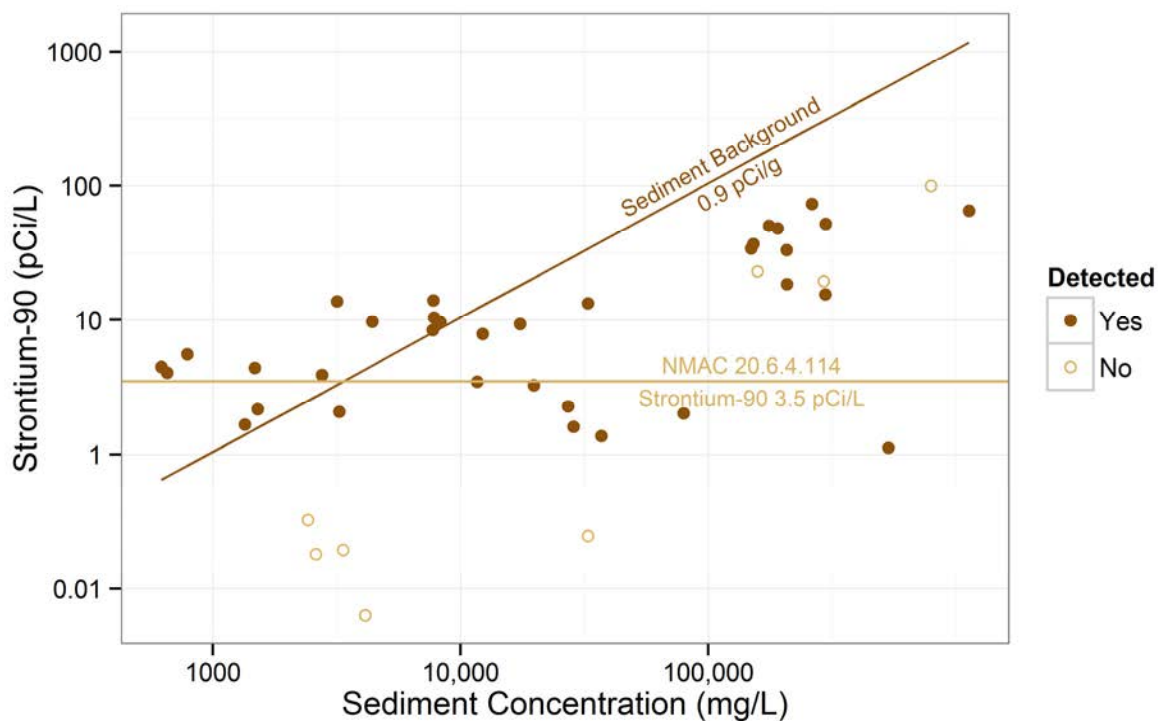


Figure 4.3-25 SSC vs. strontium-90 for each gage station

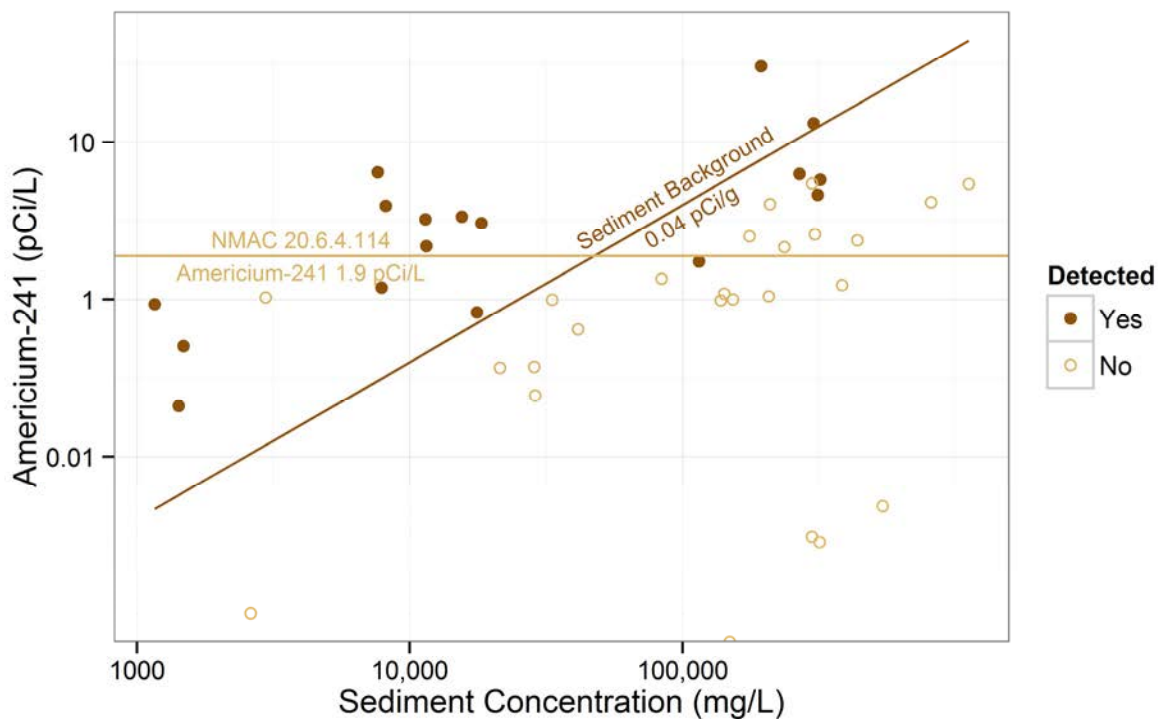


Figure 4.3-26 SSC vs. americium-241 for each gage station

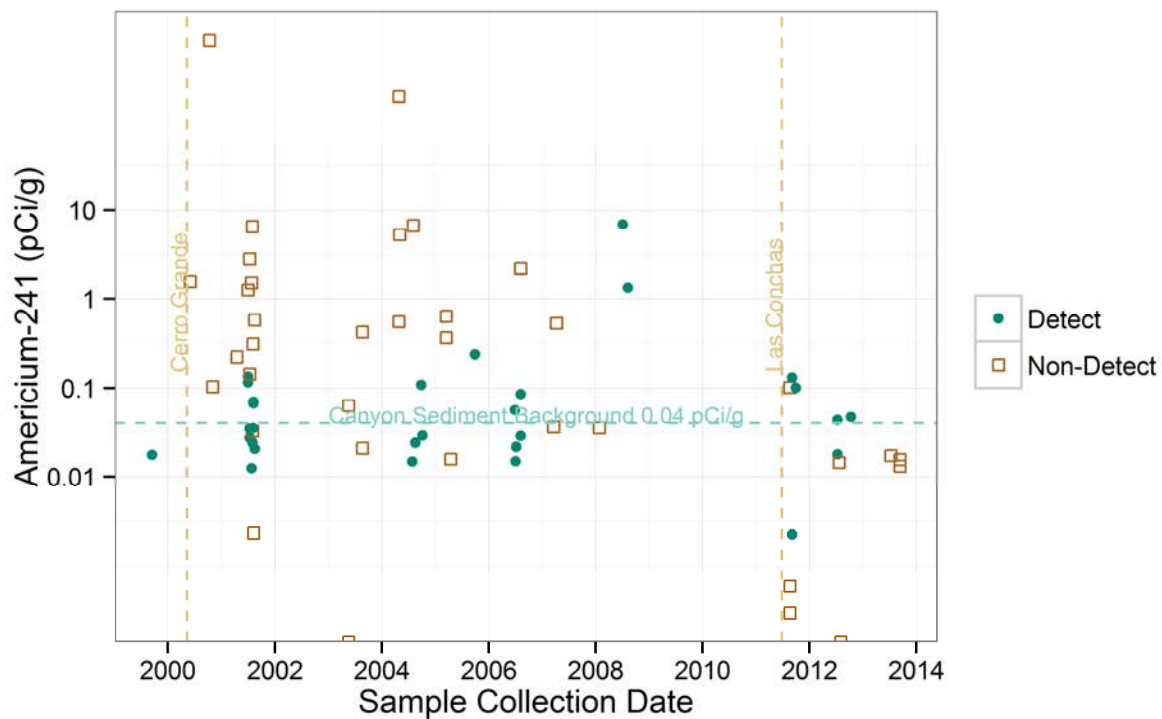


Figure 4.3-27 Americium-241 in storm water normalized to suspended sediment since 2000

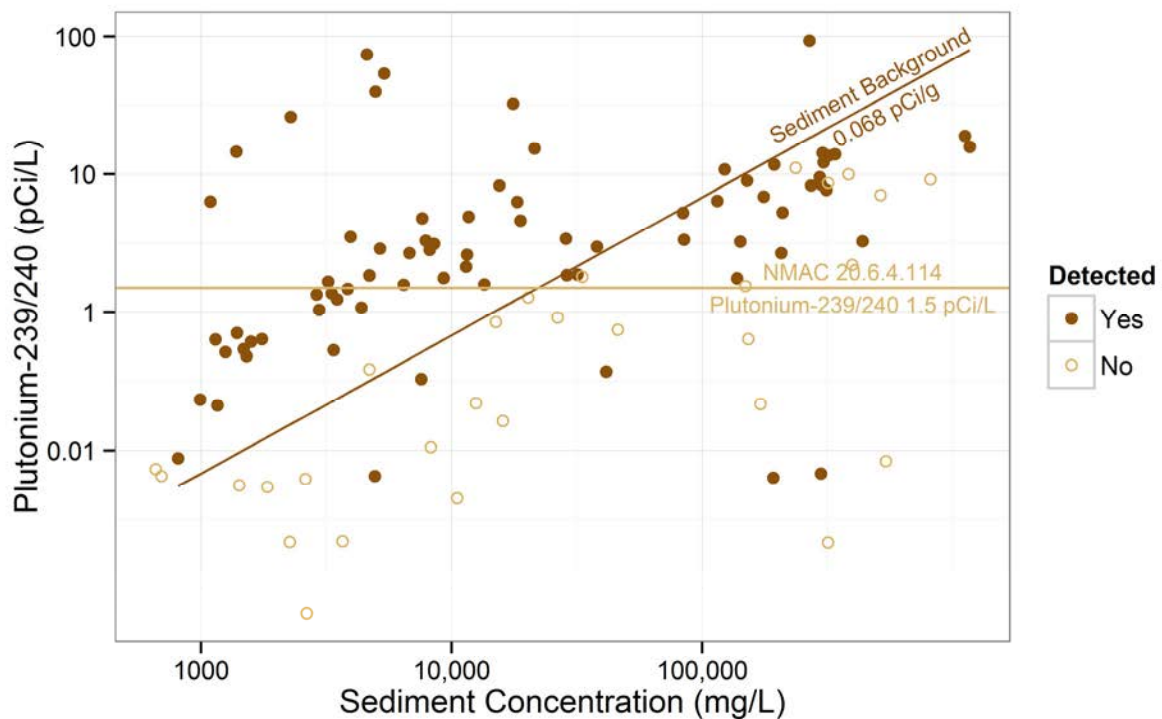


Figure 4.3-28 SSC vs. plutonium-239/240 for each gage station

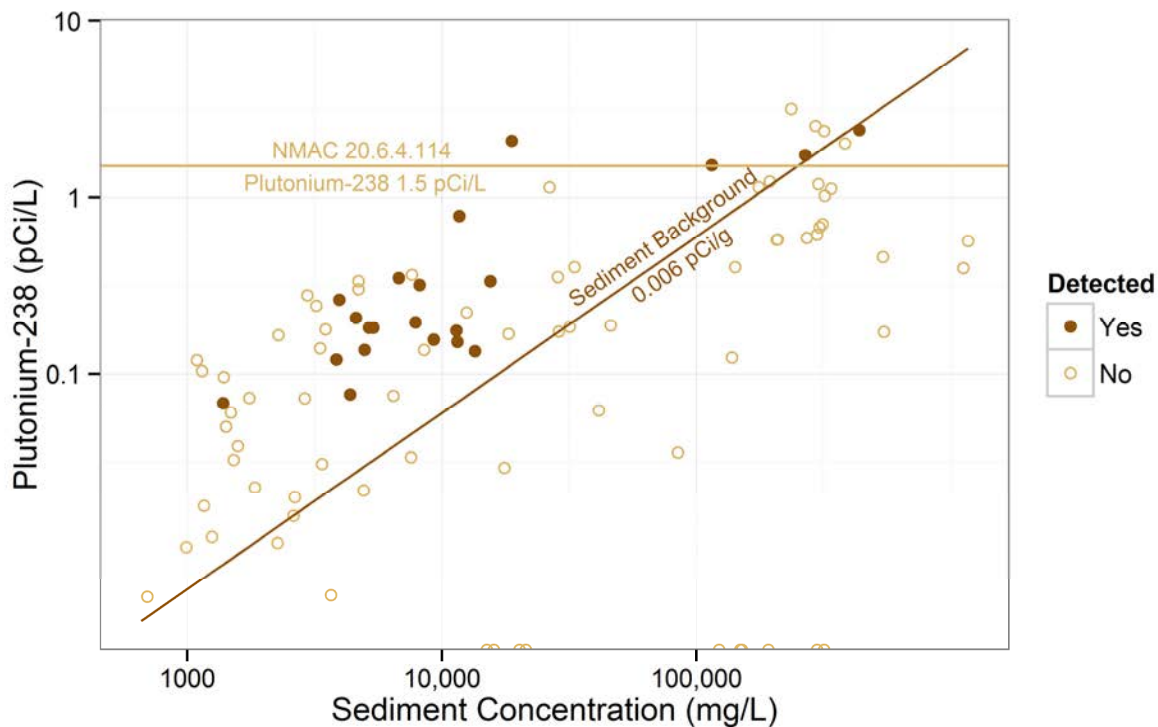


Figure 4.3-29 SSC vs. plutonium-238 for each gage station

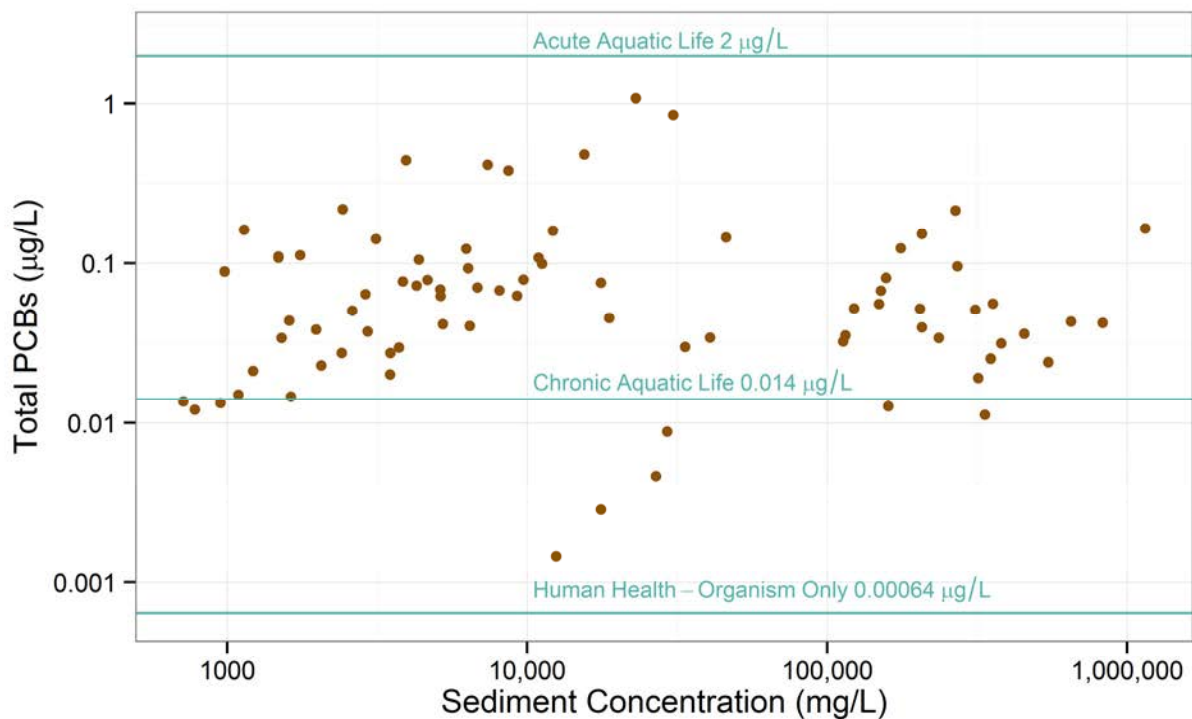


Figure 4.3-30 SSC vs. total PCBs for each gage station

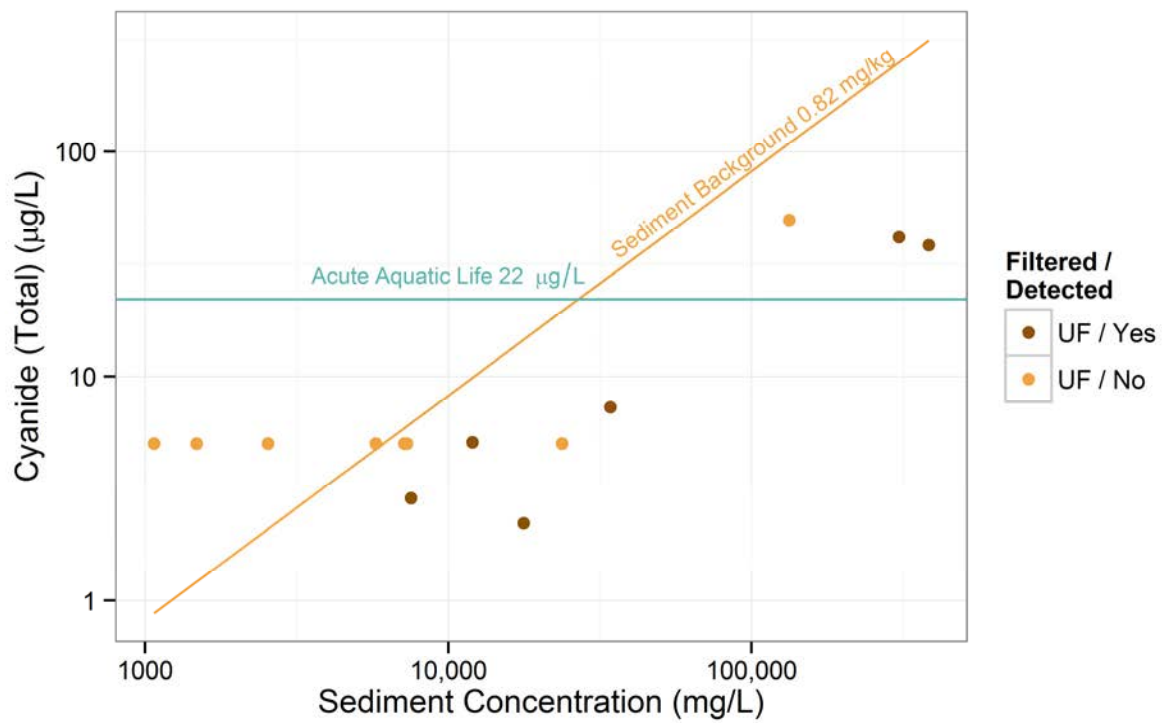


Figure 4.3-31 SSC vs. total cyanide for each gage station

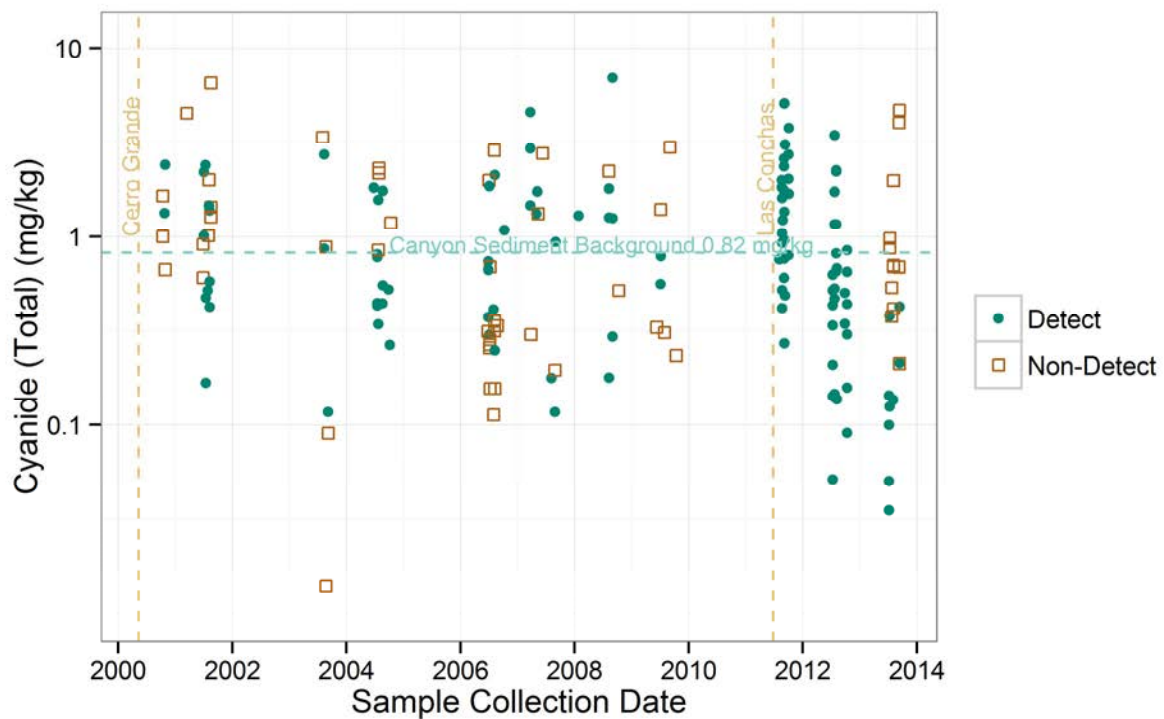


Figure 4.3-32 Cyanide in storm water normalized to suspended sediment since 2000

Table 1.1-1
Total Precipitation at Each Laboratory Meteorological Tower and
Return Period (24-h Storms) from 9/10/2013 to 9/15/2013

Met Tower	9/10/2013		9/11/2013		9/12/2013 to 9/13/2013		9/14/2013 to 9/15/2013	
	Precip (in.)	Return Period (yr)	Precip (in.)	Return Period (yr)	Precip (in.)	Return Period (yr)	Precip (in.)	Return Period (yr)
TA-06	1.35	3	0.10	<1	5.07	>1000	0.36	<1
TA-49	1.40	2	0.08	<1	3.94	200	1.85	5
TA-53	1.21	3	0.05	<1	3.70	>1000	0.49	<1
TA-54	1.37	4	0.02	<1	4.28	>1000	1.02	1
NCOMM	1.40	2	0.09	<1	4.49	>1000	0.35	<1
LANL Average	1.35	3	0.07	<1	4.30	>1000	0.81	1

Table 2.1-1
Station Configuration at LA/P Gages

Gage	Stage Measurement Device	Communication Method with Gage Datalogger	Sampler Trip Level (Aboveground)	Sampler Intake Level (Aboveground)
E026	Encoder	Radio telemetry	1.3 ft	4 in.
E030	Encoder	Radio telemetry	1.54 ft	4 in.
E038	Bubbler	Radio telemetry	0.7 ft	4 in.
E039.1	Encoder	Radio telemetry	0.58 ft	4 in.
E040	Probe	Radio telemetry	2.73 ft	4 in.
E042.1	Encoder	Radio telemetry	0.58 ft	4 in.
E050.1	Encoder/bubbler	Radio telemetry	0.4 ft	2.4 in.
E055	Bubbler	Radio telemetry	1.21 ft	4 in.
E055.5	Bubbler	Radio telemetry	0.75 ft	4 in.
E056	Bubbler	Radio telemetry	1.39 ft	4 in.
E059	Encoder	Radio telemetry	0.58 ft	4 in.
E060.1	Encoder/bubbler	Radio telemetry	0.4 ft	2.4 in.
E099	Encoder	Radio telemetry	0.9 ft	6 in.
E109.9	Encoder/bubbler/probe	Radio telemetry	0.4 ft	2.4 in.

Table 2.3-1

Maximum Daily Discharge and Storm Water Sampling in the LA/P Watershed during 2013

Date	Los Alamos Canyon Discharge (cfs)									Pueblo and Acid Canyon Discharge (cfs)				
	DP Canyon			Los Alamos Canyon						Acid Canyon		Pueblo Canyon		
	E038	E039.1	E040	E026	E030	E042.1	E050.1	E099 ^a	E109.9	E055.5	E056	E055	E059	E060.1
14 June	70 S ^b	13 S	<1 N ^c	1.5 N	0 N ^d	0 N	0 N	0 N	<1 N	3.5 N	30 S	15 S	0 N	0 N
30 June	120 S	11 S	0 N	7.6 N	1.2 N	0 N	0 N	3.3 N	3.2 N	0 N	7.8 N	0 N	0 N	0 N
5 July	55 N ^e	7 N	0 N	0 N	0 N	0 N	0 N	0 N	<1 N	0 N	0 N	<1 N	0 N	0 N
8 July	0 N	<1 N	0 N	0 N	0 N	0 N	0 N	32 N	110 S	0 N	0 N	0 N	0 N	0 N
12 July	330 S	330 S	260 S	<1 N	17 S	160 S	32 S	230 S	180 S	40 S	43 S	9.2 N	7 N	0 N
13 July	18 N	18 N ^f	0 N	<1 N	0 N	0 N	0 N	1100 N	250 N	0 N	<1 N	4.1 N	0 N	0 N
20-21 July	0 N	<1 N	0 N	0 N	0 N	0 N	0 N	480 S	810 S	0 N	0 N	0 N	0 N	0 N
25 July	13 N	3.9 N	0 N	<1 N	0 N	2.4 N	0 N	10 N	100 S	0 N	0 N	0 N	0 N	0 N
26 July	12 N	10 N	3.3 N	<1 N	0 N	17 N	<1 N	8 N	160 S	0 N	0 N	0 N	0 N	0 N
26-27 July	0 N	<1 N	0 N	0 N	0 N	14 N	0 N	0 N	2.5 N	0 N	0 N	0 N	0 N	0 N
28 July	74 S	24 S	<1 N	<1 N	0 N	31 N	<1 N	<1 N	70 N	0 N	0 N	0 N	0 N	0 N
3 Aug	0 N	0 N	0 N	0 N	0 N	0 N	0 N	0 N	950 S	0 N	0 N	0 N	0 N	0 N
4 Aug	17 N	12 S	0 N	0 N	0 N	0 N	0 N	0 N	68 N	0 N	0 N	0 N	0 N	0 N
5 Aug	170 S	170 N	76 S	<1 N	1.9 N	80 S	20 S	340 S	1000 S	1.8 N	16 S	7.1 N	0 N	1.7 N
9 Aug	62 S	16 S	3.7 N	0 N	0 N	<1 N	0 N	360 N	270 S	0 N	0 N	<1 N	0 N	0 N
20 Aug	0 N	0 N	0 N	4 N	0 N	0 N	0 N	14 N	42 N	0 N	1.5 N	8.6 N	0 N	0 N
30 Aug	0 N	0 N	0 N	0 N	0 N	0 N	0 N	24 N	150 N	0 N	0 N	0 N	0 N	0 N
2 Sept	3.8 N	0 N	0 N	0 N	0 N	0 N	0 N	430 N	310 N	0 N	0 N	0 N	0 N	0 N
10 Sept	39 N	35 S	27 S	6.1 N	5.9 N	36 S	11 S	1 N	130 N	<1 N	7.3 N	9 N	0 N	0 N
11 Sept	13 N	18 N	19 N	3 N	6.1 N	26 N	16 S	<1 N	65 N	0 N	3.3 N	6.2 N	0 N	0 N
12 Sept	51 N	77 S	84 S	400 S	52 S	110 N	87 S	350 N	520 S	4.4 N	260 S	32 S	59 N	<1 N

Table 2.3-1 (continued)

Date	Los Alamos Canyon Discharge (cfs)									Pueblo and Acid Canyon Discharge (cfs)				
	DP Canyon			Los Alamos Canyon						Acid Canyon		Pueblo Canyon		
	E038	E039.1	E040	E026	E030	E042.1	E050.1	E099 ^a	E109.9	E055.5	E056	E055	E059	E060.1
13 Sept	310 N	400 N	830 N	850 N	450 N	740 N	740 N	1600 N	5000 N EST	47 S	820 N	80 N	1500 N	1400 N
14 Sept	1.9 N	3.7 N	na ^g	na	3.8 N	na	48 N	na	na	0 N	2.3 N	1.2 N	na	na
18 Sept	17 N	18 N	na	na	<1 N	na	1.4 N	na	na	0 N	1.8 N	0 N	na	na
21 Sept	0 N	0 N	na	na	0 N	6.6 N	8.1 N	na	na	0 N	<1 N	0 N	na	5.7 N
22-23 Sept	45 N	26 N	na	na	14 N	27 N	34 N	na	na	0 N	3.2 N	<1 N	na	2.2 N
3-4 Oct	0 N	0 N	na	na	4.6 N	16 N	6.7 N	na	na	0 N	0 N	0 N	na	0 N
5 Nov	17 N	21 S	na	na	<1 N	<1 N	3.2 N	na	na	0 N	<1 N	0 N	na	1.7 N

^a Maximum discharge values reported have an accuracy of ± 50 cfs.

^b S = Sample was collected. Cell is highlighted in yellow.

^c N = Sample was not collected.

^d Blank in cell indicates no discharge occurred at this station.

^e Blue highlight in cell indicates no sample was collected on a day with recorded discharge above the triggering threshold at that station.

^f For E039.1, the 18 cfs on 7/13/2013 was the hydrograph tail of the previous day's storm on 7/12/2013.

^g na = Not available. Gage station was damaged.

Table 2.3-2
Sampling Station Operational Issues during the 2013 Monitoring Year

Station	Date	Discharge (cfs)	Reason	Comment
E026	9/13/2013	850	<1 d between storms	Sampler filled with storm water; collected 9/12/2013 between 17:10 MST and 17:27 MST. Next inspection at gage station after 9/13/2013 storm was 9/17/2013. Sampler was not reset to collect discharge from the 9/13/2013 storm that occurred from 06:50 to 18:00 MST.
E030	9/13/2013	450	<1 d between storms	Sampler filled with storm water; collected 9/12/2013 between 18:19 and 18:34 MST. Next inspection at gage station after 9/13/2013 storm was 9/27/2013. Sampler was not reset to collect discharge from the 9/13/2013 storm that occurred between 06:30 and 14:00 MST.
E030	9/22-9/23/2013	14	Access restriction	Sampler filled with storm water; collected 9/12/2013. Next inspection at gage station after 9/13/2013 storm was 9/27/2013. Sampler was not reset to collect discharge from the 9/22–9/23/2013 storm.
E038	7/5/2013	55	Access restriction	Fire restrictions in place 6/24/2013 to 7/8/2013. Sampler filled with storm water collected 6/30/2013. Sampler was not reset to collect discharge from the 7/5/2013 storm.
E038	9/12/2013	51	Operator error	Sampler collected storm water discharge 9/12/2013. Monitoring plan required analysis of SSC. The project operator incorrectly recommended collected water to be left on-site.
E038	9/13/2013	310	Access restriction	Sampler filled with storm water; collected 9/12/2013. Next inspection at gage station after 9/13/2013 storm was 9/27/2013. Sampler was not reset to collect discharge from the 9/13/2013 storm.
E038	9/22-9/23/2013	45	Access restriction	Sampler filled with storm water; collected 9/12/2013. Next inspection at gage station after 9/13/2013 storm was 9/27/2013. Sampler was not reset to collect discharge from the 9/22–9/23/2013 storm.
E039.1	7/26/2013	10	Discharge slightly less than trigger	Peak discharge of 9.98 cfs did not attain sampling trigger of 10 cfs.
E039.1	8/5/2013	170	Personnel availability	Sampler filled with storm water; collected Sunday, 8/4/2013. Next inspection at gage station was Friday, 8/9/2013. Sampler was not reset to collect discharge from the 8/5/2013 storm.
E039.1	9/13/2013	400	<1 d between storms	Sampler filled with storm water; collected 9/12/2013 between 15:24 and 15:37 MST. Next inspection at gage station after 9/13/2013 storm was 9/27/2013. Sampler was not reset to collect discharge from the 9/13/2013 storm that occurred between 05:30 and 12:00 MST.
E039.1	9/18/2013	18	Access restriction	Sampler filled with storm water; collected 9/12/2013. Next inspection at gage station after 9/13/2013 storm was 9/27/2013. Sampler was not reset to collect discharge from the 9/18/2013 storm.
E039.1	9/22-9/23/2013	26	Access restriction	Sampler filled with storm water; collected 9/12/2013. Next inspection at gage station after 9/13/2013 storm was 9/27/2013. Sampler was not reset to collect discharge from the 9/22–9/23/2013 storm.

Table 2.3-2 (continued)

Station	Date	Discharge (cfs)	Reason	Comment
E040	9/11/2013	19	<1 d between storms	Sampler filled with storm water; collected Tuesday, 9/10/2013 between 18:54 MST and 19:10 MST. Next inspection at gage station was Thursday, 9/12/2013. Sampler was not reset to collect discharge from the 9/11/2013 storm that occurred between 01:10 and 04:00 MST.
E040	9/13/2013	830	Access restriction	Sampler filled with storm water; collected 9/12/2013. Next inspection at gage station after 9/13/2013 storm was 9/27/2013. Sampler was not reset to collect discharge from the 9/13/2013 storm.
E042.1	7/26/2013	17	Weekend storm	Sampler attempted but was unsuccessful at collection of storm water discharge on Friday, 7/26/2013. The next inspection at the gage station was Tuesday, 7/30/2013.
E042.1	7/26-7/27/2013	14	Weekend storm	Sampler attempted but was unsuccessful at collection of storm water discharge on Friday, 7/26/2013. The next inspection at the gage station was Tuesday, 7/30/2013. Sampler was not reset to collect discharge from the second storm on Friday, 7/26-7/27/2013.
E042.1	7/28/2013	31	Weekend storm	Sampler attempted but was unsuccessful at collection of storm water discharge on Friday, 7/26/2013. The next inspection at the gage station was Tuesday, 7/30/2013. Sampler was not reset to collect discharge from the storm on Sunday, 7/28/2013.
E042.1	9/11/2013	26	Sampler damaged	Sampler was functional during inspection on 9/11/2013 at 13:36 MST. Sampler was washed into Los Alamos weir during 9/13/2013 storm. Sampler reinstalled on 5/23/2014.
E042.1	9/12/2013	110	Sampler damaged	Sampler was washed into Los Alamos weir during 9/13/2013 storm. Sampler reinstalled on 5/23/2014.
E042.1	9/13/2013	740	Sampler damaged	Sampler was washed into Los Alamos weir during 9/13/2013 storm. Sampler reinstalled on 5/23/2014.
E042.1	9/22-9/23/2013	27	Sampler damaged	Sampler was washed into Los Alamos weir during 9/13/2013 storm. Sampler reinstalled on 5/23/2014.
E042.1	10/3-10/4/2013	16	Sampler damaged	Sampler was washed into Los Alamos weir during 9/13/2013 storm. Sampler reinstalled on 5/23/2014.
E050.1	9/13/2013	740	<1 d between storms	Sampler filled with storm water collected 9/12/2013 between 17:54 and 21:05 MST. Next inspection at gage station after 9/13/2013 storm was 9/17/2013. Sampler was not reset to collect discharge from the 9/13/2013 storm that occurred between 06:40 and 10:30 MST.
E050.1	9/14/2013	48	Access restriction	Sampler filled with storm water collected 9/12/2013. Next inspection at gage station after 9/13/2013 storm was 9/17/2013. Sampler was not reset to collect discharge from the 9/14/2013 storm.
E050.1	9/21/2013	8.1	Operator error	Sampler filled with storm water collected 9/21/2013. Monitoring plan required analyses of SSC. Project operator incorrectly recommended collected water to be left on-site.

Table 2.3-2 (continued)

Station	Date	Discharge (cfs)	Reason	Comment
E050.1	9/22-9/23/2013	34	Weekend storm	Sampler filled with storm water collected Saturday, 9/21/2013. Next inspection at gage station was 10/11/2013. The sampler was not reset to collect discharge from the Sunday to Monday, 9/22-9/23/2013 storm.
E050.1	10/3-10/4/2013	6.7	Personnel availability	Sampler filled with storm water collected Saturday, 9/21/2013. Next inspection at gage station was 10/11/2013. The sampler was not reset to collect discharge from the 10/3–10/4/2013 storm.
E055	9/13/2013	80	<1 d between storms	Sampler filled with storm water collected 9/12/2013 between 16:55 and 17:08 MST. Next inspection at gage station after 9/13/2013 storm was 9/18/2013. Sampler was not reset to collect discharge from the 9/13/2013 storm that occurred between 05:30 and 12:00 MST.
E056	9/13/2013	820	<1 d between storms	Sampler filled with storm water collected 9/12/2013 between 16:25 and 16:49 MST. Next inspection at gage station after 9/13/2013 storm was 9/18/2013. Sampler was not reset to collect discharge from the 9/13/2013 storm that occurred between 05:30 and 12:00 MST.
E059	9/12/2013	59	Sampler damaged	Sampler inspection on 9/16/2013 found Greenlee, batteries and ISCO washed approximately 1 mi downstream from the 9/13/2013 storm.
E059	9/13/2013	1500	Sampler damaged	Sampler inspection on 9/16/2013 found Greenlee, batteries and ISCO washed approximately 1 mi downstream from the 9/13/2013 storm.
E060.1	9/13/2013	1400	Sampler damaged	Sampler overtopped by storm discharge on 9/13/2013. Sampler reinstalled on 5/23/2014.
E060.1	9/21/2013	5.7	Sampler damaged	Sampler overtopped by storm discharge on 9/13/2013. Sampler reinstalled on 5/23/2014.
E099	7/8/2013	32	Sampler intake isolated	Sampler was functional on 7/8/2013, but sampler could not collect discharge of 32 cfs because of isolation from flow.
E099	7/13/2013	1100	Weekend storm	Sampler filled with storm water collected Friday, 7/12/2013 between 13:10 and 16:20 MST. Next inspection at gage station was Wednesday, 7/17/2013. Sampler was not reset to collect discharge from the storm on Saturday, 7/13/2013, that occurred between 20:30 and 21:30 MST.
E099	8/9/2013	360	Access restriction	Letter dated 8/9/2013, Pueblo de San Ildefonso notified LANL that access to gage station E109.9 was being terminated. LANL self-imposed access restrictions to E099.
E099	8/20/2013	14	Access restriction	Letter dated 8/9/2013, Pueblo de San Ildefonso notified LANL that access to gage station E109.9 was being terminated. LANL self-imposed access restrictions to E099.
E099	8/30/2013	24	Access restriction	Letter dated 8/9/2013, Pueblo de San Ildefonso notified LANL that access to gage station E109.9 was being terminated. LANL self-imposed access restrictions to E099.
E099	9/2/2013	430	Access restriction	Letter dated 8/9/2013, Pueblo de San Ildefonso notified LANL that access to gage station E109.9 was being terminated. LANL self-imposed access restrictions to E099.

Table 2.3-2 (continued)

Station	Date	Discharge (cfs)	Reason	Comment
E099	9/12/2013	350	Access restriction	Letter dated 8/9/2013, Pueblo de San Ildefonso notified LANL that access to gage station E109.9 was being terminated. LANL self-imposed access restrictions to E099.
E099	9/13/2013	1600	Access restriction	Letter dated 8/9/2013, Pueblo de San Ildefonso notified LANL that access to gage station E109.9 was being terminated. LANL self-imposed access restrictions to E099.
E109.9	7/8/2013	110	ISCO program error	Sample bottles 7 and 8 missed.
E109.9	7/12/2013	180	ISCO program error	Sample bottles 7 and 8 missed.
E109.9	7/13/2013	250	Weekend storm	Sampler filled with storm water collected Friday, 7/12/2013, between 13:30 and 14:01 MST. Next inspection at gage station was Monday, 7/15/2013. Sampler was not reset to collect discharge from the storm on Saturday, 7/13/2013 that occurred between 15:20 on 7/13/2013 and 00:30 on 7/14/2013 MST.
E109.9	7/25/2013	100	ISCO program error	Sample bottles 7 and 8 missed.
E109.9	7/28/2013	70	Weekend storm	Sampler filled with storm water collected Friday, 7/26/2013. Next inspection at gage station was Monday, 7/29/2013. Sampler was not reset to collect discharge from the storm on Sunday, 7/28/2013.
E109.9	8/3/2013	950	ISCO program error	Sample bottles 7 and 8 missed.
E109.9	8/4/2013	68	Weekend storm	Sampler filled with storm water collected Saturday, 8/3/2013. Next inspection at gage station was Monday, 8/5/2013. Sampler was not reset to collect discharge from the storm on Sunday, 8/4/2013.
E109.9	8/20/2013	42	Access restriction	Sampler filled with storm water collected 8/9/2013. Next inspection at gage station was 9/11/2013. Sampler was not reset to collect discharge from the 8/20/2013 storm.
E109.9	8/30/2013	150	Access restriction	Sampler filled with storm water collected 8/9/2013. Next inspection at gage station was 9/11/2013. Sampler was not reset to collect discharge from the 8/30/2013 storm.
E109.9	9/2/2013	310	Access restriction	Sampler filled with storm water collected 8/9/2013. Next inspection at gage station was 9/11/2013. Sampler was not reset to collect discharge from the 9/2/2013 storm.
E109.9	9/10/2013	130	Access restriction	Sampler filled with storm water collected 8/9/2013. Next inspection at gage station was 9/11/2013. Sampler was not reset to collect discharge from the 9/10/2013 storm.
E109.9	9/11/2013	65	<1 d between access granted and storm	Sampler filled with storm water collected 8/9/2013 between 15:40 and 17:17 MST. Temporary access approved 9/10/2013. Next inspection at gage station was 9/11/2013 at 15:35 MST. Sampler was not reset to collect discharge from the storm on 9/11/2013, which peaked at approximately 01:15 MST.
E109.9	9/13/2013	5000 (estimated)	Sampler damaged	Sampler recorded sample collection on 9/12/2013. Sampler overtopped by storm discharge on 9/13/2013. Temporary access approved 9/24/2013 to retrieve sampling equipment and samples.

Table 2.4-1
Locations and Analytical Suites for Storm Water Samples

Monitoring Group	Locations	Analytical Suites ^{a,b}
Upper Los Alamos Canyon	E026, E030	PCBs (by Method 1668A), gamma spectroscopy radionuclides, isotopic plutonium, isotopic uranium, americium-241 (by alpha spectroscopy), dioxins and furans, strontium-90, TAL metals, hardness ^c , cyanide, SSC, particle size
DP Canyon gages	E038, E039.1, E040	PCBs (by Method 1668A), gamma spectroscopy radionuclides, isotopic plutonium, isotopic uranium, strontium-90, TAL metals, hardness, SSC, particle size
Upper Pueblo Canyon and Acid Canyon gages	E055, E055.5, E056	PCBs (by Method 1668A), isotopic plutonium, TAL metals, hardness, SSC, particle size
Fire-affected lower watershed gages	E042.1, E050.1, E109.9	PCBs (by Method 1668A), isotopic plutonium, gamma spectroscopy radionuclides, isotopic uranium, americium-241 (by alpha spectroscopy), dioxins and furans, strontium-90, TAL metals, hardness, cyanide, SSC, particle size
Lower Pueblo Canyon gages	E059, E060.1	PCBs (by Method 1668A), isotopic plutonium, gamma spectroscopy radionuclides, isotopic uranium, americium-241 (by alpha spectroscopy), strontium-90, TAL metals, hardness, SSC, particle size
Detention basins and wetland below the SWMU 01-001(f) drainage	CO101038, CO111041	PCBs (by Method 1668A), TAL metals, hardness, isotopic uranium, total organic carbon, SSC
BDD ^d -Required Monitoring	E050.1, E060.1, E109.9	PCBs (by Method 1668A), gamma spectroscopy radionuclides, isotopic plutonium, isotopic uranium, americium-241 (by alpha spectroscopy), strontium-90, gross alpha, gross beta, radium-226/radium-228, TAL metals, mercury, hardness, SSC

^a Suites are listed in order of priority to guide analysis of limited water volume. SSC is independent of prioritization because it is derived from separate sample bottles.

^b Radionuclides will be analyzed in filtered and unfiltered samples at E109.9.

^c Hardness is calculated from calcium and magnesium, components of the TAL list.

^d BDD = Buckman Direct Diversion. Analytes requested in addition to the analytical suites assigned to gage stations E050.1, E060.1, and E109.9.

Table 2.4-2
Analytical Requirements for Storm Water Samples

Analytical Suite	Method	Detection Limit ^a	Upper Los Alamos Canyon	DP Canyon	Upper Pueblo Canyon and Acid Canyon	Fire Affected Lower Watershed	Lower Pueblo Canyon	BDD ^b Required Monitoring	Detention Basins below the SWMU 01-001(f) Drainage
PCBs ^c	EPA:1668A	25 pg/L	√ ^d	√	√	√	√	— ^e	√
Isotopic plutonium	HASL-300	0.5 pCi/L	√	√	√	√	√	—	—
Gamma spectroscopy	EPA:901.1	10 pCi/L (cesium-137)	√	√	—	√	√	—	—
Isotopic uranium	HASL-300	0.5 pCi/L	√	√	—	√	√	—	√
Americium-241	HASL-300	0.5 pCi/L	√	—	—	√	√	—	—
Strontium-90	EPA:905.0	0.5 pCi/L	√	√	—	√	√	—	—
TAL ^f metals	EPA:200.7/200.8/245.2	Variable	√	√	√	√	√	—	√
Cyanide	EPA:335.4	1.5 µg/L	√	—	—	√	—	—	—
Dioxins and furans	EPA:1613B	50 pg/L	√	—	—	√	—	—	—
Gross alpha	EPA:900	10 pCi/L	—	—	—	—	—	√	—
Gross beta	EPA:900	10 pCi/L	—	—	—	—	—	√	—
Radium-226/radium-228	EPA:903.1/EPA:904	0.5/0.5 pCi/L	—	—	—	—	—	√	—
SSC	EPA:160.2	10 mg/L	√	√	√	√	√	—	√
Total organic carbon	SW-846:9060	0.5 mg/L	—	—	—	—	—	—	√
Particle size	ASTM:C1070	0.01%	√	√	√	√	√	—	—

^a MDL or MDA for radionuclides.

^b BDD = Buckman Direct Diversion.

^c PCBs = Polychlorinated biphenyls.

^d √ = Monitoring planned.

^e — = Monitoring not planned.

^f Hardness is calculated from calcium and magnesium, components of the TAL list.

Table 2.4-3
Factors Contributing to Analytical Suite Prioritization

Upper Los Alamos Canyon Gages	Priority	Analytical Suite	Glass Bottle	Polyethylene Bottle	Minimum Volume Required (L)
E026, E030, E038, E039.1, E040	1	PCBs	Yes	No	1
	2	Gamma spectroscopy, Iso Pu, Iso U, Am-241 ^a	Yes	Yes	1
	3	Dioxins and furans	Yes	No	1
	4	Strontium-90	Yes	Yes	1
	5	TAL Metals + B + U (F/UF ^b)	No	Yes	0.25/0.25
	6	Cyanide ^a	Yes	Yes	0.25
Upper Pueblo Canyon Gages					
E055, E055.5, E056	1	PCBs	Yes	No	1
	2	Iso Pu	Yes	Yes	1
	3	TAL Metals + B + U (F/UF)	No	Yes	0.25/0.25
E042.1, E050.1, E059, E060.1, E109.9	1	PCBs	Yes	No	1
	2	Gamma spectroscopy, Iso Pu, Iso U, Am-241	Yes	Yes	1
	3	Dioxins and furans	Yes	No	1
	4	Strontium-90	Yes	Yes	1
	5	TAL Metals + B + U (F/UF)	No	Yes	0.25/0.25
	6	Cyanide ^a	Yes	Yes	0.25
Retention Basin and Vegetated Buffer below the SWMU 01-001(f) Drainage					
CO111041, CO101038	1	PCBs	Yes	No	1
	2	TAL Metals + B + U (F/UF)	No	Yes	0.25/0.25
	3	Iso U	Yes	Yes	1
	4	Total organic carbon	Yes	Yes	0.04

^a Americium-241 and cyanide were added to analytical suite in response to the Las Conchas fire.

^b F/UF = Analyses of both filtered (F) and unfiltered (UF) splits.

Table 2.4-4
Planned and Actual Analyses

CO111038 Sampler at the culvert at the terminus of the Vegetative Buffer below the lower basin, Sampled 7/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suite	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	11:33	Trigger	SSC, Particle Size
2	Trigger + 1	PCB (UF ^a)	11:34	Trigger + 1	PCB Congener (UF)
3	Trigger + 2	PCB (UF)			
4	Trigger + 3	TAL metals (F ^b /UF)	11:36	Trigger + 3	TAL metals (F)
			11:37	Trigger + 4	TAL metals (UF)
5	Trigger + 4	Isotopic uranium (UF)	11:38	Trigger + 5	Isotopic uranium (UF)
6	Trigger + 5	TOC ^c (UF)	11:39	Trigger + 6	SSC
7	Trigger + 6	Extra bottle	11:40	Trigger + 7	SO4, Cl ⁻ (F)
8	Trigger + 7	Extra bottle	11:41	Trigger + 8	Alkalinity, pH (UF)
9	Trigger + 8	Extra bottle	11:42	Trigger + 9	DOC(F)
10	Trigger + 9	Extra bottle	11:43	Trigger + 10	SSC
11	Trigger + 10	Extra bottle	11:44	Trigger + 11	TOC (UF)
12	Trigger + 11	Extra bottle	Remaining sample not retrieved for analysis.		
CO111038 Sampler at the culvert at the terminus of the Vegetative Buffer below the lower basin, Sampled 9/18/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suite	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	13:30	Trigger	SSC, Particle Size
2	Trigger + 1	PCB (UF)	13:31	Trigger + 1	PCB Congener (UF)
3	Trigger + 2	PCB (UF)			
4	Trigger + 3	TAL metals (F/UF)	13:33	Trigger + 3	TAL metals (F)
			13:34	Trigger + 4	TAL metals (UF)
5	Trigger + 4	Isotopic uranium (UF)	13:35	Trigger + 5	Isotopic uranium (UF)
6	Trigger + 5	TOC (UF)	13:38	Trigger + 8	TOC (UF)
7	Trigger + 6	Extra bottle	13:39	Trigger + 9	DOC (F)
8	Trigger + 7	Extra bottle	13:40	Trigger + 10	SO4, Cl ⁻ (F)
9	Trigger + 8	Extra bottle	13:41	Trigger + 11	Alkalinity, pH (UF)
10	Trigger + 9	Extra bottle	Remaining samples not retrieved for analysis.		

Table 2.4-4 (continued)

CO111041 Sampler at Inlet to Upper Detention Pond below LA-2, Sampled 6/14/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suite	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	12:40	Trigger	SSC, Particle Size
2	Trigger + 1	PCB (UF)	12:41	Trigger + 1	TOC (UF)
3	Trigger + 2	PCB (UF)	12:43	Trigger + 3	TAL metals (F/UF)
4	Trigger + 3	TAL metals (F/UF)			
5	Trigger + 4	Isotopic uranium (UF)	12:51	Trigger + 11	Isotopic uranium (UF)
6	Trigger + 5	TOC (UF)			
7	Trigger + 6	Extra bottle	12:53	Trigger + 13	PCB Congener (UF)
8	Trigger + 7	Extra bottle			
9	Trigger + 8	Extra bottle	13:15	Trigger + 35	Alkalinity, pH
10	Trigger + 9	Extra bottle			
11	Trigger + 10	Extra bottle	13:24	Trigger + 44	SO4, Cl ⁻ (F)
12	Trigger + 11	Extra bottle			
CO111041 Sampler at Inlet to Upper Detention Pond below LA-2, Sampled 6/30/2013 and 7/5/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suite	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	6/30/2013 14:57	Trigger	PCB Congener (UF)
2	Trigger + 1	PCB (UF)	6/30/2013 15:00	Trigger + 3	SSC, Particle Size
3	Trigger + 2	PCB (UF)			
4	Trigger + 3	TAL metals (F/UF)	6/30/2013 15:01	Trigger + 4	TAL metals (F/UF)
5	Trigger + 4	Isotopic uranium (UF)	6/30/2013 15:02	Trigger + 5	Isotopic uranium (UF)
6	Trigger + 5	TOC (UF)	6/30/2013 15:03	Trigger + 6	TOC (UF)
7	Trigger + 6	Extra bottle	6/30/2013 15:04	Trigger + 7	SSC
8	Trigger + 7	Extra bottle	7/5/2013 00:14	Trigger	PCB Congener (UF)
9	Trigger + 8	Extra bottle	7/5/2013 00:16	Trigger + 2	SSC, Particle Size
10	Trigger + 9	Extra bottle	7/5/2013 00:16	Trigger + 2	TAL metals (F/UF)
11	Trigger + 10	Extra bottle	7/5/2013 00:17	Trigger + 3	SSC
12	Trigger + 11	Extra bottle	Storm water flow ended, no further samples collected.		

Table 2.4-4 (continued)

CO111041 Sampler at Inlet to Upper Detention Pond below LA-2, Sampled 7/12/2013 and 7/13/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suite	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	7/12/2013 11:21	Trigger	SSC, Particle Size
2	Trigger +1	PCB (UF)	7/12/2013 11:22	Trigger + 1	DOC (F), TOC (UF)
3	Trigger +2	PCB (UF)	7/12/2013 11:23	Trigger + 2	SSC
4	Trigger +3	TAL metals (F/UF)	7/12/2013 11:24	Trigger + 3	TAL metals (F/UF)
5	Trigger +4	Isotopic uranium (UF)	7/12/2013 11:25	Trigger + 4	Isotopic uranium (UF)
6	Trigger +5	TOC (UF)			
7	Trigger + 6	SSC	7/12/2013 11:38	Trigger + 17	PCB Congener (UF)
8	Trigger + 7	Extra bottle			
9	Trigger + 8	Extra bottle	7/12/2013 11:39	Trigger + 18	Alkalinity, pH, (UF)
10	Trigger + 9	Extra bottle	7/13/2013 13:32	Trigger	SO4, Cl ⁻ (F)
11	Trigger + 10	Extra bottle	7/13/2013 13:33	Trigger + 1	SSC
12	Trigger + 11	Extra bottle	7/13/2013 13:34	Trigger + 2	SSC
CO111041 Sampler at Inlet to Upper Detention Pond below LA-2, Sampled 7/28/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suite	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	15:18	Trigger	SSC, Particle Size PCB Congener (UF) Isotopic uranium (UF), TAL metals (F/UF)
2	Trigger +1	PCB (UF)			
3	Trigger +2	PCB (UF)			
4	Trigger +3	TAL metals (F/UF)			
5	Trigger +4	Isotopic uranium (UF)			
6	Trigger +5	TOC (UF)	Storm water flow ended, no further samples collected.		

Table 2.4-4 (continued)

CO111041 Sampler at Inlet to Upper Detention Pond below LA-2, Sampled 8/5/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suite	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	13:03	Trigger	TSS
2	Trigger + 1	PCB (UF)	13:05	Trigger + 2	TSS
3	Trigger + 2	PCB (UF)	13:05	Trigger + 2	TSS
4	Trigger + 3	TAL metals (F/UF)	13:06	Trigger + 3	TSS
5	Trigger + 4	Isotopic uranium (UF)	13:07	Trigger + 4	TSS
6	Trigger + 5	TOC (UF)	13:13	Trigger + 10	TSS
7	Trigger + 6	Extra bottle	13:15	Trigger + 12	TSS
8	Trigger + 7	Extra bottle	13:33	Trigger + 30	TSS
9	Trigger + 8	Extra bottle	13:43	Trigger + 40	SSC
10	Trigger + 9	Extra bottle	Remaining samples not retrieved for analysis.		
CO111041 Sampler at Inlet to Upper Detention Pond below LA-2, Sampled 8/9/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suite	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	13:34	Trigger	SSC,
2	Trigger + 1	PCB (UF)	13:41	Trigger + 7	TSS
3	Trigger + 2	PCB (UF)	13:42	Trigger + 8	TSS
4	Trigger + 3	TAL metals (F/UF)	13:44	Trigger + 10	TSS
5	Trigger + 4	Isotopic uranium (UF)	13:45	Trigger + 11	TSS
6	Trigger + 5	TOC (UF)	13:46	Trigger + 12	TSS
7	Trigger + 6	Extra bottle	Storm water flow ended, no further samples collected.		

Table 2.4-4 (continued)

CO111041 Sampler at Inlet to Upper Detention Pond below LA-2, Sampled 9/10/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suite	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	10:34	Trigger	SSC
2	Trigger + 1	PCB (UF)	10:35	Trigger + 1	TSS
3	Trigger + 2	PCB (UF)	10:36	Trigger + 2	TSS
4	Trigger + 3	TAL metals (F/UF)	10:37	Trigger + 3	TSS
5	Trigger + 4	Isotopic uranium (UF)	10:38	Trigger + 4	TSS
6	Trigger + 5	TOC (UF)	10:39	Trigger + 5	TSS
7	Trigger + 6	Extra bottle	10:40	Trigger + 6	TSS
8	Trigger + 7	Extra bottle	10:41	Trigger + 7	TSS
9	Trigger + 8	Extra bottle	10:57	Trigger + 23	TSS
10	Trigger + 9	Extra bottle	Remaining samples not retrieved for analysis.		
E026, Sampler at Los Alamos below Ice Rink, Sampled 9/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	17:10	Max +10	PCB Congener (UF)
2	Max+11	PCB (UF)			
3	Max+12	Gamma spectroscopy (UF)	17:13	Max + 13	Gamma (UF)
4	Max+13	Americium-241; isotopic plutonium; isotopic uranium (UF)	Sampling attempted but collection not successful.		
5	Max+14	Americium-241; isotopic plutonium; isotopic uranium (UF)			
6	Max+15	Strontium-90 (UF)			
7	Max+16	Dioxins and furans (UF)	17:26	Max + 26	Dioxins and furans (UF)
8	Max+17	Dioxins and furans (UF)	Sampling attempted but collection not successful.		
9	Max+18	TAL metals (F/UF)			
10	Max+19	Cyanide (UF)			
11	Max+20	Extra bottle			
12	Max+21	Extra bottle			

Table 2.4-4 (continued)

E026, Sampler at Los Alamos below Ice Rink, Sampled 9/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	16:49	Trigger + 0	SSC
2	Trigger+2	SSC	16:51	Trigger + 2	SSC
3	Trigger+4	SSC	16:53	Trigger + 4	SSC
4	Trigger+6	SSC	16:55	Trigger + 6	SSC
5	Trigger+8	SSC	16:57	Trigger + 8	Metals (F)
6	Trigger+10	SSC	16:59	Trigger + 10	Metals (UF)
7	Trigger+12	SSC	17:01	Trigger + 12	DOC
8	Trigger+14	SSC	17:03	Trigger + 14	SO ₄ , Cl ⁻ (F)
9	Trigger+16	SSC	17:05	Trigger + 16	Alkalinity, pH
10	Trigger+18	SSC; particle size	17:07	Trigger + 18	SSC, particle size
11	Trigger+20	SSC	17:09	Trigger + 20	Americium-241; isotopic plutonium; isotopic uranium (UF)
12	Trigger+22	SSC			
13	Trigger+24	SSC	17:13	Trigger + 24	Gamma spectroscopy(UF)
14	Trigger+26	SSC	17:15	Trigger + 26	Strontium-90 (UF)
15	Trigger+28	SSC	Sampling attempted but collection not successful.		
16	Trigger+30	SSC	17:19	Trigger + 30	Cyanide (UF)
17	Trigger+50	SSC	17:39	Trigger + 50	SSC
18	Trigger+70	SSC	17:59	Trigger + 70	SSC
19	Trigger+90	SSC	18:19	Trigger + 90	SSC
20	Trigger+110	SSC	18:39	Trigger + 110	SSC
21	Trigger+130	SSC	18:59	Trigger + 130	SSC
22	Trigger+150	SSC	19:19	Trigger + 150	SSC
23	Trigger+170	SSC	19:39	Trigger + 170	SSC
24	Trigger+190	SSC	19:59	Trigger + 190	SSC

Table 2.4-4 (continued)

E030, Los Alamos above DP, Sampled 7/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, particle size	12:30	Max+10	SSC, particle size
2	Max+11	PCB (UF)	12:31	Max+11	PCB (UF)
3	Max+12	PCB (UF)			
4	Max+13	Gamma spectroscopy (UF)	12:33	Max+13	Gamma spectroscopy(UF)
5	Max+14	Americium-241; isotopic plutonium; isotopic uranium (UF)	12:34	Max+14	Americium-241; isotopic plutonium; isotopic uranium (UF)
6	Max+15	Americium-241; isotopic plutonium; isotopic uranium (UF)			
7	Max+16	Strontium-90 (UF)	12:37	Max+17	Strontium-90 (UF)
8	Max+17	Dioxins and furans (UF)	12:38	Max+18	Dioxins and furans (UF)
9	Max+18	Dioxins and furans (UF)			
10	Max+19	TAL metals (F/UF)	12:40	Max+20	TAL metals (F/UF)
11	Max+20	Cyanide (UF)	12:41	Max+21	Cyanide (UF)
12	Max+21	SSC, particle size	12:42	Max+22	SSC, particle size

Table 2.4-4 (continued)

E030, Los Alamos above DP, Sampled 9/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, particle size	18:19	Max+10	SSC
2	Max+11	PCB (UF)	18:21	Max+12	PCB (UF)
3	Max+12	PCB (UF)			
4	Max+13	Gamma spectroscopy(UF)	18:23	Max+14	Gamma spectroscopy(UF)
5	Max+14	Americium-241; isotopic plutonium; isotopic uranium (UF)	18:24	Max+15	Americium-241; isotopic plutonium; isotopic uranium (UF)
6	Max+15	Americium-241; isotopic plutonium; isotopic uranium (UF)			
7	Max+16	Strontium-90 (UF)	18:26	Max+17	Strontium-90 (UF)
8	Max+17	Dioxins and furans (UF)	18:28	Max+19	Dioxins and furans (UF)
9	Max+18	Dioxins and furans (UF)			
10	Max+19	TAL metals (F/UF)	18:30	Max+21	TAL metals (F/UF)
11	Max+20	Cyanide (UF)	18:31	Max+22	Cyanide (UF)
12	Max+21	SSC, particle size	18:32	Max+23	SSC

Table 2.4-4 (continued)

E040, DP above Los Alamos, Sampled 7/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, particle size	12:15	Max+10	Gamma spectroscopy(UF)
2	Max+11	PCB (UF)	12:16	Max+11	SSC
3	Max+12	PCB (UF)	Sampling attempted but collection not successful.		
4	Max+13	Gamma spectroscopy (UF)			
5	Max+14	Isotopic plutonium; isotopic uranium (UF)			
6	Max+15	Isotopic plutonium; isotopic uranium (UF)			
7	Max+16	Strontium-90 (UF)			
8	Max+17	TAL metals (F/UF)			
9	Max+18	SSC, particle size			
10	Max+19	Extra Bottle			
11	Max+20	Extra Bottle			
12	Max+21	Extra Bottle			
E040, DP above Los Alamos, Sampled 8/5/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, particle size	14:24	Max+10	SSC, particle size
2	Max+11	PCB (UF)	14:26	Max+12	PCB UF
3	Max+12	PCB (UF)			
4	Max+13	Gamma spectroscopy (UF)	14:28	Max+14	Gamma spectroscopy(UF)
5	Max+14	Isotopic plutonium; isotopic uranium (UF)	14:29	Max+15	Isotopic plutonium; isotopic uranium (UF)
6	Max+15	Isotopic plutonium; isotopic uranium (UF)			
7	Max+16	Strontium-90 (UF)	14:31	Max+17	Strontium-90 (UF)
8	Max+17	TAL metals (F/UF)	14:32	Max+18	TAL metals (F/UF)
9	Max+18	SSC, particle size	14:33	Max+19	Alkalinity, pH (UF)
10	Max+19	Extra Bottle	14:34	Max+20	SO4, Cl ⁻ (F)
11	Max+20	Extra Bottle	14:36	Max+22	DOC (F)
12	Max+21	Extra Bottle	14:37	Max+23	SSC

Table 2.4-4 (continued)

E040, DP above Los Alamos, Sampled 9/10/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, particle size	18:54	Max+10	SSC, particle size
2	Max+11	PCB (UF)	18:55	Max+11	PCB (UF)
3	Max+12	PCB (UF)			
4	Max+13	Gamma spectroscopy(UF)	18:58	Max+14	Gamma spectroscopy (UF)
5	Max+14	Isotopic plutonium; isotopic uranium (UF)	18:59	Max+15	Isotopic plutonium; isotopic uranium (UF)
6	Max+15	Isotopic plutonium; isotopic uranium (UF)			
7	Max+16	Strontium-90 (UF)	19:02	Max+18	Strontium-90 (UF)
8	Max+17	TAL metals (F/UF)	19:03	Max+19	Alkalinity, pH
9	Max+18	SSC, particle size	19:05	Max+21	SO ₄ , Cl ⁻ , DOC (F)
10	Max+19	Extra Bottle	19:06	Max+22	TAL metals (UF)
11	Max+20	Extra Bottle	19:07	Max+23	TAL metals (F)
12	Max+21	Extra Bottle	19:09	Max+25	SSC
E040, DP above Los Alamos, Sampled 9/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, particle size	16:14	Sampling attempted but collection not successful.	
2	Max+11	PCB (UF)	16:15	Max+11	PCB (UF)
3	Max+12	PCB (UF)			
4	Max+13	Gamma spectroscopy (UF)	16:17	Max+13	SSC, particle size
5	Max+14	Isotopic plutonium; isotopic uranium (UF)	16:18	Max+14	Gamma spectroscopy(UF)
6	Max+15	Isotopic plutonium; isotopic uranium (UF)	16:20	Max+16	Isotopic plutonium; isotopic uranium (UF)
7	Max+16	Strontium-90 (UF)			
8	Max+17	TAL metals (F/UF)	16:22	Max+18	Dioxins/Furans
9	Max+18	SSC, particle size			
10	Max+19	Extra Bottle	16:24	Max+20	TAL metals (F/UF)
11	Max+20	Extra Bottle	16:25	Max+21	Cyanide (total)
12	Max+21	Extra Bottle	16:26	Max+22	SSC, particle size

Table 2.4-4 (continued)

E055, Pueblo above Acid, Sampled 6/14/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC (UF); particle size	13:45	Max+10	SSC (UF); particle size
2	Max+11	PCB (UF)	13:46	Max+11	PCB (UF)
3	Max+12	PCB (UF)			
4	Max+13	Isotopic plutonium (UF)	13:48	Max+13	Isotopic plutonium (UF)
5	Max+14	TAL metals (F/UF)			
6	Max+15	SSC			
7	Max+16	Extra bottle	13:52	Max+17	TAL metals (UF)
8	Max+17	Extra bottle	13:53	Max+18	TAL metals (F)
9	Max+18	Extra bottle	13:54	Max+19	Alkalinity, pH (UF)
10	Max+19	Extra bottle	13:55	Max+20	SO ₄ , Cl ⁻ (F)
11	Max+20	Extra bottle	13:56	Max+21	DOC (F)
12	Max+21	Extra bottle	13:57	Max+22	SSC
E055, Pueblo above Acid, Sampled 9/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC (UF); particle size	16:55	Max+10	SSC (UF); particle size
2	Max+11	PCB (UF)	16:56	Max+11	PCB (UF)
3	Max+12	PCB (UF)			
4	Max+13	Isotopic plutonium (UF)	16:58	Max+13	Isotopic plutonium (UF)
5	Max+14	TAL metals (F/UF)	17:00	Max+15	TAL metals (F/UF)
6	Max+15	SSC	17:01	Max+16	SSC
7	Max+16	Extra bottle	17:02	Max+17	DOC (F)
8	Max+17	Extra bottle	17:03	Max+18	SO ₄ , Cl ⁻ (F)
9	Max+18	Extra bottle	17:04	Max+19	Alkalinity, pH (UF)
10	Max+19	Extra bottle	Remaining samples not retrieved for analysis.		
11	Max+20	Extra bottle			
12	Max+21	Extra bottle			

Table 2.4-4 (continued)

E055.5, South Fork of Acid Canyon, Sampled 7/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC (UF); particle size	11:50	Max+10	SSC (UF); particle size
2	Max+11	PCB (UF)	11:52	Max+12	PCB (UF)
3	Max+12	PCB (UF)			
4	Max+13	Isotopic plutonium (UF)	11:56	Max+16	Isotopic plutonium (UF)
5	Max+14	TAL metals (F/UF)	11:57	Max+17	TAL metals (F/UF)
6	Max+15	SSC	11:59	Max+19	SSC
7	Max+16	Extra bottle	Sampling attempted but collection not successful.		
8	Max+17	Extra bottle			
9	Max+18	Extra bottle			
10	Max+19	Extra bottle			
11	Max+20	Extra bottle			
12	Max+21	Extra bottle			
E055.5, South Fork of Acid Canyon, Sampled 9/13/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC (UF); particle size	06:55	Max+10	SSC (UF); particle size
2	Max+11	PCB (UF)	06:57	Max+12	PCB (UF)
3	Max+12	PCB (UF)			
4	Max+13	Isotopic plutonium (UF)	07:01	Max+16	Isotopic plutonium (UF)
5	Max+14	TAL metals (F/UF)	07:03	Max+18	TAL metals (F/UF)
6	Max+15	SSC	07:05	Max+20	SSC
7	Max+16	Extra bottle	07:06	Max+21	SO4, Cl-, DOC (F)
8	Max+17	Extra bottle	07:08	Max+23	Alkalinity, pH (UF)
9	Max+18	Extra bottle	Sampling attempted but collection not successful.		
10	Max+19	Extra bottle			
11	Max+20	Extra bottle			
12	Max+21	Extra bottle			

Table 2.4-4 (continued)

E056, Acid above Pueblo, Sampled 6/14/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC (UF); particle size	13:40	Max+10	SSC, particle size, TAL metals (F/UF)
2	Max+11	PCB (UF)	Sampling attempted but collection not successful.		
3	Max+12	PCB (UF)			
4	Max+13	Isotopic plutonium (UF)			
5	Max+14	TAL metals (F/UF)			
6	Max+15	SSC			
7	Max+16	Extra bottle			
8	Max+17	Extra bottle			
9	Max+18	Extra bottle			
10	Max+19	Extra bottle			
11	Max+20	Extra bottle			
12	Max+21	Extra bottle			
E056, Acid above Pueblo, Sampled 7/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC; particle size	12:00	Max+10	SSC; particle size
2	Max+11	PCB (UF)	12:02	Max+12	PCB (UF)
3	Max+12	PCB (UF)			
4	Max+13	Isotopic plutonium (UF)	12:04	Max+14	Isotopic plutonium (UF)
5	Max+14	TAL metals (F/UF)	12:05	Max+15	TAL metals (F/UF)
6	Max+15	SSC	12:06	Max+16	SSC
7	Max+16	Extra bottle	12:07	Max+17	DOC (F)
8	Max+17	Extra bottle	12:09	Max+19	SO4, Cl ⁻ (F)
9	Max+18	Extra bottle	12:10	Max+20	Alkalinity, pH (UF)
10	Max+19	Extra bottle	Remaining samples not retrieved for analysis.		
11	Max+20	Extra bottle			
12	Max+21	Extra bottle			

Table 2.4-4 (continued)

E056, Acid above Pueblo, Sampled 8/5/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC; particle size	13:45	Max+10	SSC; particle size
2	Max+11	PCB (UF)	13:46	Max+11	PCB (UF)
3	Max+12	PCB (UF)			
4	Max+13	Isotopic plutonium (UF)	13:49	Max+14	Isotopic plutonium (UF)
5	Max+14	TAL metals (F/UF)	13:50	Max+15	TAL metals (F/UF)
6	Max+15	SSC	13:52	Max+17	SSC
7	Max+16	Extra bottle	13:53	Max+18	DOC (F)
8	Max+17	Extra bottle	13:54	Max+19	SO4, Cl ⁻ (F)
9	Max+18	Extra bottle	13:55	Max+20	Alkalinity, pH (UF)
10	Max+19	Extra bottle	Remaining samples not retrieved for analysis.		
11	Max+20	Extra bottle			
12	Max+21	Extra bottle			
E056, Acid above Pueblo, Sampled 9/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC; particle size	16:25	Max+10	SSC; particle size
2	Max+11	PCB (UF)	16:27	Max+12	PCB (UF)
3	Max+12	PCB (UF)			
4	Max+13	Isotopic plutonium (UF)	16:30	Max+15	Isotopic plutonium (UF)
5	Max+14	TAL metals (F/UF)	16:33	Max+18	TAL metals (F/UF)
6	Max+15	SSC	16:35	Max+20	SSC
7	Max+16	Extra bottle	16:37	Max+22	DOC (F)
8	Max+17	Extra bottle	16:38	Max+23	SO4, Cl ⁻ (F)
9	Max+18	Extra bottle	16:40	Max+25	Alkalinity, pH (UF)
10	Max+19	Extra bottle	Remaining samples not retrieved for analysis.		
11	Max+20	Extra bottle			
12	Max+21	Extra bottle			

Table 2.4-4 (continued)

E038, DP above TA-21, Sampled 6/14/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	12:55	Max+10	PCB (UF)
2	Max+11	PCB (UF)			
3	Max+12	Gamma spectroscopy (UF)	12:58	Max+13	TAL metals (F/UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	12:59	Max+14	Isotopic uranium; isotopic plutonium (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)	13:01	Max+16	Strontium-90 (UF)
7	Max+16	TAL metals (F/UF)	13:02	Max+17	Gamma spectroscopy (UF)
8	Max+17	Extra bottle	Remaining samples not retrieved for analysis.		
9	Max+18	Extra Bottle			
10	Max+19	Extra Bottle			
11	Max+20	Extra Bottle			
12	Max+21	Extra Bottle			
E038, DP above TA-21, Sampled 6/30/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	15:15	Max+10	PCB (UF)
2	Max+11	PCB (UF)			
3	Max+12	Gamma spectroscopy (UF)	15:18	Max+13	Gamma spectroscopy (UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	15:19	Max+14	Isotopic uranium; isotopic plutonium (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)	15:21	Max+16	Strontium-90 (UF)
7	Max+16	TAL metals (F/UF)	15:22	Max+17	TAL metals (F/UF)
8	Max+17	Extra bottle	Remaining samples not retrieved for analysis.		
9	Max+18	Extra Bottle			
10	Max+19	Extra Bottle			
11	Max+20	Extra Bottle			
12	Max+21	Extra Bottle			

Table 2.4-4 (continued)

E038, DP above TA-21, Sampled 6/14/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	12:45	Trigger+0	SSC
2	Trigger+2	SSC	12:47	Trigger+2	SSC
3	Trigger+4	SSC	12:49	Trigger+4	SSC
4	Trigger+6	SSC	12:51	Trigger+6	SSC
5	Trigger+8	SSC	12:53	Trigger+8	SSC; particle size
6	Trigger+10	SSC	12:55	Trigger+10	DOC (F)
7	Trigger+12	SSC	12:57	Trigger+12	SO ₄ , Cl ⁻ (F)
8	Trigger+14	SSC	12:59	Trigger+14	Alk, pH (UF)
9	Trigger+16	SSC	13:01	Trigger+16	SSC
10	Trigger+18	SSC; particle size	13:03	Trigger+18	SSC
11	Trigger+20	SSC	13:05	Trigger+20	SSC
12	Trigger+22	SSC	13:07	Trigger+22	SSC
13	Trigger+24	SSC	13:09	Trigger+24	SSC
14	Trigger+26	SSC	13:11	Trigger+26	SSC
15	Trigger+28	SSC	13:13	Trigger+28	SSC
16	Trigger+30	SSC	13:15	Trigger+30	SSC
17	Trigger+50	SSC	13:35	Trigger+50	SSC
18	Trigger+70	SSC	13:55	Trigger+70	SSC
19	Trigger+90	SSC	14:15	Trigger+90	SSC
20	Trigger+110	SSC	14:35	Trigger+110	SSC
21	Trigger+130	SSC	14:55	Trigger+130	SSC
22	Trigger+150	SSC	15:15	Trigger+150	SSC
23	Trigger+170	SSC	Sampling attempted but collection not successful.		
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E038, DP above TA-21, Sampled 6/30/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	15:00	Trigger+0	SSC
2	Trigger+2	SSC	15:02	Trigger+2	Gamma spectroscopy (UF)
3	Trigger+4	SSC	15:04	Trigger+4	Isotopic plutonium (UF)
4	Trigger+6	SSC	15:06	Trigger+6	SSC
5	Trigger+8	SSC	15:08	Trigger+8	SSC
6	Trigger+10	SSC	15:10	Trigger+10	SSC
7	Trigger+12	SSC	15:12	Trigger+12	SSC
8	Trigger+14	SSC	15:14	Trigger+14	SSC
9	Trigger+16	SSC	15:16	Trigger+16	SSC; particle size
10	Trigger+18	SSC; particle size	15:18	Trigger+18	SSC
11	Trigger+20	SSC	15:20	Trigger+20	DOC (F)
12	Trigger+22	SSC	15:22	Trigger+22	SO ₄ , Cl ⁻ (F)
13	Trigger+24	SSC	15:24	Trigger+24	Alk, pH (UF)
14	Trigger+26	SSC	15:26	Trigger+26	SSC
15	Trigger+28	SSC	15:28	Trigger+28	SSC
16	Trigger+30	SSC	15:30	Trigger+30	SSC
17	Trigger+50	SSC	15:50	Trigger+50	SSC
18	Trigger+70	SSC	16:10	Trigger+70	SSC
19	Trigger+90	SSC	Sampling attempted but collection not successful.		
20	Trigger+110	SSC			
21	Trigger+130	SSC			
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E038, DP above TA-21, Sampled 7/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	11:30	Max+10	PCB (UF)
2	Max+11	PCB (UF)			
3	Max+12	Gamma spectroscopy (UF)	11:32	Max+12	Gamma spectroscopy (UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	11:33	Max+13	Isotopic uranium; isotopic plutonium (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)	11:36	Max+16	Strontium-90 (UF)
7	Max+16	TAL metals (F/UF)	11:37	Max+17	TAL metals (F/UF)
8	Max+17	Extra bottle	Remaining samples not retrieved for analysis.		
9	Max+18	Extra Bottle			
10	Max+19	Extra Bottle			
11	Max+20	Extra Bottle			
12	Max+21	Extra Bottle			
E038, DP above TA-21, Sampled 7/28/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	14:40	Max+10	PCB (UF)
2	Max+11	PCB (UF)			
3	Max+12	Gamma spectroscopy (UF)	14:42	Max+12	Gamma spectroscopy (UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	14:43	Max+13	Isotopic uranium; isotopic plutonium (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)	14:45	Max+15	Strontium-90 (UF)
7	Max+16	TAL metals (F/UF)	14:46	Max+16	TAL metals (F/UF)
8	Max+17	Extra bottle	Remaining samples not retrieved for analysis.		
9	Max+18	Extra Bottle			
10	Max+19	Extra Bottle			
11	Max+20	Extra Bottle			
12	Max+21	Extra Bottle			

Table 2.4-4 (continued)

E038, DP above TA-21, Sampled 7/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	11:20	Trigger+0	SSC
2	Trigger+2	SSC	11:22	Trigger+2	Gamma spectroscopy (UF)
3	Trigger+4	SSC	11:24	Trigger+4	Isotopic plutonium (UF)
4	Trigger+6	SSC	11:26	Trigger+6	SSC
5	Trigger+8	SSC	11:28	Trigger+8	SSC
6	Trigger+10	SSC	11:30	Trigger+10	SSC
7	Trigger+12	SSC	11:32	Trigger+12	SSC
8	Trigger+14	SSC	11:34	Trigger+14	SSC
9	Trigger+16	SSC	11:36	Trigger+16	SSC; particle size
10	Trigger+18	SSC; particle size	11:38	Trigger+18	DOC (F)
11	Trigger+20	SSC	11:40	Trigger+20	SO ₄ , Cl ⁻ (F)
12	Trigger+22	SSC	11:42	Trigger+22	Alk, pH (UF)
13	Trigger+24	SSC	11:44	Trigger+24	SSC
14	Trigger+26	SSC	11:46	Trigger+26	SSC
15	Trigger+28	SSC	11:48	Trigger+28	SSC
16	Trigger+30	SSC	11:50	Trigger+30	SSC
17	Trigger+50	SSC	12:10	Trigger+50	SSC
18	Trigger+70	SSC	12:30	Trigger+70	SSC
19	Trigger+90	SSC	12:50	Trigger+90	SSC
20	Trigger+110	SSC	13:10	Trigger+110	SSC
21	Trigger+130	SSC	13:30	Trigger+130	SSC
22	Trigger+150	SSC	13:50	Trigger+150	SSC
23	Trigger+170	SSC	14:10	Trigger+170	SSC
24	Trigger+190	SSC	14:30	Trigger+190	SSC

Table 2.4-4 (continued)

E038, DP above TA-21, Sampled 7/28/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	14:30	Trigger+0	SSC
2	Trigger+2	SSC	14:32	Trigger+2	SSC
3	Trigger+4	SSC	14:34	Trigger+4	SSC
4	Trigger+6	SSC	14:36	Trigger+6	SSC
5	Trigger+8	SSC	14:38	Trigger+8	SSC
6	Trigger+10	SSC	14:40	Trigger+10	SSC
7	Trigger+12	SSC	14:42	Trigger+12	SSC
8	Trigger+14	SSC	14:44	Trigger+14	SSC
9	Trigger+16	SSC	14:46	Trigger+16	SSC; particle size
10	Trigger+18	SSC; particle size	14:48	Trigger+18	DOC (F)
11	Trigger+20	SSC	14:50	Trigger+20	SO ₄ , Cl ⁻ (F)
12	Trigger+22	SSC	14:52	Trigger+22	Alk, pH (UF)
13	Trigger+24	SSC	14:54	Trigger+24	SSC
14	Trigger+26	SSC	14:56	Trigger+26	SSC
15	Trigger+28	SSC	14:58	Trigger+28	SSC
16	Trigger+30	SSC	15:00	Trigger+30	SSC
17	Trigger+50	SSC	15:20	Trigger+50	SSC
18	Trigger+70	SSC	15:40	Trigger+70	SSC
19	Trigger+90	SSC	16:00	Trigger+90	SSC
20	Trigger+110	SSC	16:20	Trigger+110	SSC
21	Trigger+130	SSC	16:40	Trigger+130	SSC
22	Trigger+150	SSC	17:00	Trigger+150	SSC
23	Trigger+170	SSC	17:20	Trigger+170	SSC
24	Trigger+190	SSC	17:40	Trigger+190	SSC

Table 2.4-4 (continued)

E038, DP above TA-21, Sampled 8/5/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	13:35	Max+10	TSS
2	Max+11	PCB (UF)	13:36	Max+11	TSS
3	Max+12	Gamma spectroscopy (UF)	13:37	Max+12	TSS
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	13:38	Max+13	TSS
5	Max+14	Isotopic uranium; isotopic plutonium (UF)	13:39	Max+14	TSS
6	Max+15	Strontium-90 (UF)	13:41	Max+16	TSS
7	Max+16	TAL metals (F/UF)	13:42	Max+17	TSS
8	Max+17	Extra bottle	Remaining samples not retrieved for analysis.		
9	Max+18	Extra Bottle			
10	Max+19	Extra Bottle			
11	Max+20	Extra Bottle			
12	Max+21	Extra Bottle			
E039.1, DP below Grade-Control Structure, Sampled 6/14/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	14:10	Max+10	PCB (UF)
2	Max+11	PCB (UF)			
3	Max+12	Gamma spectroscopy (UF)	14:12	Max+12	Gamma spectroscopy (UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	14:13	Max+13	Isotopic uranium; isotopic plutonium (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)	14:15	Max+15	Strontium-90 (UF)
7	Max+16	TAL metals (F/UF)	14:16	Max+16	TAL metals (F/UF)
8	Max+17	Extra bottle	Remaining samples not retrieved for analysis.		
9	Max+18	Extra Bottle			
10	Max+19	Extra Bottle			
11	Max+20	Extra Bottle			
12	Max+21	Extra Bottle			

Table 2.4-4 (continued)

E038, DP above TA-21, Sampled 8/5/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	13:25	Trigger+0	SSC
2	Trigger+2	SSC	13:27	Trigger+2	TSS
3	Trigger+4	SSC	13:29	Trigger+4	TSS
4	Trigger+6	SSC	13:31	Trigger+6	TSS
5	Trigger+8	SSC	13:33	Trigger+8	TSS
6	Trigger+10	SSC	13:35	Trigger+10	SSC
7	Trigger+12	SSC	13:37	Trigger+12	TSS
8	Trigger+14	SSC	13:39	Trigger+14	TSS
9	Trigger+16	SSC	13:41	Trigger+16	TSS
10	Trigger+18	SSC; particle size	13:43	Trigger+18	TSS
11	Trigger+20	SSC	13:45	Trigger+20	SSC
12	Trigger+22	SSC	13:47	Trigger+22	TSS
13	Trigger+24	SSC	13:49	Trigger+24	TSS
14	Trigger+26	SSC	13:51	Trigger+26	TSS
15	Trigger+28	SSC	13:53	Trigger+28	TSS
16	Trigger+30	SSC	13:55	Trigger+30	SSC
17	Trigger+50	SSC	14:15	Trigger+50	SSC
18	Trigger+70	SSC	14:35	Trigger+70	TSS
19	Trigger+90	SSC	14:55	Trigger+90	SSC
20	Trigger+110	SSC	15:15	Trigger+110	SSC
21	Trigger+130	SSC	Sampling attempted but collection not successful.		
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E039.1, DP below Grade-Control Structure, Sampled 6/14/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	14:00	Trigger+0	SSC
2	Trigger+2	SSC	14:02	Trigger+2	SSC
3	Trigger+4	SSC	14:04	Trigger+4	SSC
4	Trigger+6	SSC	14:06	Trigger+6	SSC
5	Trigger+8	SSC	14:08	Trigger+8	SSC
6	Trigger+10	SSC	14:10	Trigger+10	SSC
7	Trigger+12	SSC	14:12	Trigger+12	SSC
8	Trigger+14	SSC	14:14	Trigger+14	SSC
9	Trigger+16	SSC	14:16	Trigger+16	SSC; particle size
10	Trigger+18	SSC; particle size	14:18	Trigger+18	DOC (F)
11	Trigger+20	SSC	14:20	Trigger+20	SO ₄ , Cl ⁻ (F)
12	Trigger+22	SSC	14:22	Trigger+22	Alk, pH (UF)
13	Trigger+24	SSC	14:24	Trigger+24	SSC
14	Trigger+26	SSC	14:26	Trigger+26	SSC
15	Trigger+28	SSC	14:28	Trigger+28	SSC
16	Trigger+30	SSC	14:30	Trigger+30	SSC
17	Trigger+50	SSC	14:50	Trigger+50	SSC
18	Trigger+70	SSC	15:10	Trigger+70	SSC
19	Trigger+90	SSC	Sampling attempted but collection not successful.		
20	Trigger+110	SSC			
21	Trigger+130	SSC			
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E039.1, DP below Grade-Control Structure, Sampled 6/30/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	16:00	Max+10	PCB (UF)
2	Max+11	PCB (UF)			
3	Max+12	Gamma spectroscopy (UF)	16:02	Max+12	Gamma spectroscopy (UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	16:03	Max+13	Isotopic uranium; isotopic plutonium (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)	16:05	Max+15	Strontium-90 (UF)
7	Max+16	TAL metals (F/UF)	16:06	Max+16	TAL metals (F/UF)
8	Max+17	Extra bottle	Remaining samples not retrieved for analysis.		
9	Max+18	Extra Bottle			
10	Max+19	Extra Bottle			
11	Max+20	Extra Bottle			
12	Max+21	Extra Bottle			
E039.1, DP below Grade-Control Structure, Sampled 7/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	11:50	Max+10	PCB (UF)
2	Max+11	PCB (UF)			
3	Max+12	Gamma spectroscopy (UF)	11:52	Max+12	Gamma spectroscopy (UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	11:53	Max+13	Isotopic uranium; isotopic plutonium (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)	11:55	Max+15	Strontium-90 (UF)
7	Max+16	TAL metals (F/UF)	11:56	Max+16	TAL metals (F/UF)
8	Max+17	Extra bottle	Remaining samples not retrieved for analysis.		
9	Max+18	Extra Bottle			
10	Max+19	Extra Bottle			
11	Max+20	Extra Bottle			
12	Max+21	Extra Bottle			

Table 2.4-4 (continued)

E039.1, DP below Grade-Control Structure, Sampled 6/30/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	15:49	Trigger+0	SSC
2	Trigger+2	SSC	15:51	Trigger+2	SSC
3	Trigger+4	SSC	15:53	Trigger+4	SSC
4	Trigger+6	SSC	15:55	Trigger+6	SSC
5	Trigger+8	SSC	15:57	Trigger+8	SSC
6	Trigger+10	SSC	15:59	Trigger+10	DOC (F)
7	Trigger+12	SSC	16:01	Trigger+12	SO ₄ , Cl ⁻ (F)
8	Trigger+14	SSC	16:03	Trigger+14	Alk, pH (UF)
9	Trigger+16	SSC	16:05	Trigger+16	SSC; particle size
10	Trigger+18	SSC; particle size	16:07	Trigger+18	SSC
11	Trigger+20	SSC	16:09	Trigger+20	SSC
12	Trigger+22	SSC	16:11	Trigger+22	SSC
13	Trigger+24	SSC	16:13	Trigger+24	SSC
14	Trigger+26	SSC	16:15	Trigger+26	SSC
15	Trigger+28	SSC	16:17	Trigger+28	SSC
16	Trigger+30	SSC	16:19	Trigger+30	SSC
17	Trigger+50	SSC	Sampling attempted but collection not successful.		
18	Trigger+70	SSC			
19	Trigger+90	SSC			
20	Trigger+110	SSC			
21	Trigger+130	SSC			
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E039.1, DP below Grade-Control Structure, Sampled 7/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	11:39	Trigger+0	SSC
2	Trigger+2	SSC	11:41	Trigger+2	SSC
3	Trigger+4	SSC	11:43	Trigger+4	SSC
4	Trigger+6	SSC	11:45	Trigger+6	SSC
5	Trigger+8	SSC	11:47	Trigger+8	SSC
6	Trigger+10	SSC	11:49	Trigger+10	SSC
7	Trigger+12	SSC	11:51	Trigger+12	SSC
8	Trigger+14	SSC	11:53	Trigger+14	SSC
9	Trigger+16	SSC	11:55	Trigger+16	SSC; particle size
10	Trigger+18	SSC; particle size	11:57	Trigger+18	DOC (F)
11	Trigger+20	SSC	11:59	Trigger+20	SO ₄ , Cl ⁻ (F)
12	Trigger+22	SSC	12:01	Trigger+22	Alk, pH (UF)
13	Trigger+24	SSC	12:03	Trigger+24	SSC
14	Trigger+26	SSC	12:05	Trigger+26	SSC
15	Trigger+28	SSC	12:07	Trigger+28	SSC
16	Trigger+30	SSC	12:09	Trigger+30	SSC
17	Trigger+50	SSC	12:29	Trigger+50	SSC
18	Trigger+70	SSC	12:49	Trigger+70	SSC
19	Trigger+90	SSC	13:09	Trigger+90	SSC
20	Trigger+110	SSC	Sampling attempted but collection not successful.		
21	Trigger+130	SSC			
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E039.1, DP below Grade-Control Structure, Sampled 7/28/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	15:14	Max+10	PCB (UF)
2	Max+11	PCB (UF)			
3	Max+12	Gamma spectroscopy (UF)	15:17	Max+13	Gamma spectroscopy (UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	15:18	Max+14	Isotopic uranium; isotopic plutonium (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)	15:20	Max+16	Strontium-90 (UF)
7	Max+16	TAL metals (F/UF)	15:21	Max+17	TAL metals (F/UF)
8	Max+17	Extra bottle	Remaining samples not retrieved for analysis.		
9	Max+18	Extra Bottle			
10	Max+19	Extra Bottle			
11	Max+20	Extra Bottle			
12	Max+21	Extra Bottle			
E039.1, DP below Grade-Control Structure, Sampled 8/4/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	14:14	Max+10	TSS
2	Max+11	PCB (UF)	14:16	Max+12	TSS
3	Max+12	Gamma spectroscopy (UF)	14:17	Max+13	TSS
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	14:18	Max+14	TSS
5	Max+14	Isotopic uranium; isotopic plutonium (UF)	14:19	Max+15	TSS
6	Max+15	Strontium-90 (UF)	14:20	Max+16	TSS
7	Max+16	TAL metals (F/UF)	14:21	Max+17	TSS
8	Max+17	Extra bottle	Remaining samples not retrieved for analysis.		
9	Max+18	Extra Bottle			
10	Max+19	Extra Bottle			
11	Max+20	Extra Bottle			
12	Max+21	Extra Bottle			

Table 2.4-4 (continued)

E039.1, DP below Grade-Control Structure, Sampled 7/28/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	15:04	Trigger+0	SSC
2	Trigger+2	SSC	15:06	Trigger+2	SSC
3	Trigger+4	SSC	15:08	Trigger+4	SSC
4	Trigger+6	SSC	15:10	Trigger+6	SSC
5	Trigger+8	SSC	15:12	Trigger+8	SSC
6	Trigger+10	SSC	15:14	Trigger+10	SSC
7	Trigger+12	SSC	15:16	Trigger+12	SSC
8	Trigger+14	SSC	15:18	Trigger+14	SSC
9	Trigger+16	SSC	15:20	Trigger+16	SSC; particle size
10	Trigger+18	SSC; particle size	15:22	Trigger+18	DOC (F)
11	Trigger+20	SSC	15:24	Trigger+20	SO ₄ , Cl ⁻ (F)
12	Trigger+22	SSC	15:26	Trigger+22	Alk, pH (UF)
13	Trigger+24	SSC	15:28	Trigger+24	SSC
14	Trigger+26	SSC	15:30	Trigger+26	SSC
15	Trigger+28	SSC	15:32	Trigger+28	SSC
16	Trigger+30	SSC	15:34	Trigger+30	SSC
17	Trigger+50	SSC	Sampling attempted but collection not successful.		
18	Trigger+70	SSC			
19	Trigger+90	SSC			
20	Trigger+110	SSC			
21	Trigger+130	SSC			
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E039.1, DP below Grade-Control Structure, Sampled 8/4/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	14:04	Trigger+0	SSC
2	Trigger+2	SSC	14:06	Trigger+2	SSC
3	Trigger+4	SSC	14:08	Trigger+4	SSC
4	Trigger+6	SSC	14:10	Trigger+6	SSC
5	Trigger+8	SSC	14:12	Trigger+8	SSC
6	Trigger+10	SSC	14:14	Trigger+10	SSC
7	Trigger+12	SSC	14:16	Trigger+12	SSC
8	Trigger+14	SSC	14:18	Trigger+14	SSC
9	Trigger+16	SSC	14:20	Trigger+16	SSC; particle size
10	Trigger+18	SSC; particle size	14:22	Trigger+18	DOC (F)
11	Trigger+20	SSC	14:24	Trigger+20	SO ₄ , Cl ⁻ (F)
12	Trigger+22	SSC	14:26	Trigger+22	Alk, pH (UF)
13	Trigger+24	SSC	14:28	Trigger+24	SSC
14	Trigger+26	SSC	14:30	Trigger+26	SSC
15	Trigger+28	SSC	14:32	Trigger+28	SSC
16	Trigger+30	SSC	14:34	Trigger+30	SSC
17	Trigger+50	SSC	Sampling attempted but collection not successful.		
18	Trigger+70	SSC			
19	Trigger+90	SSC			
20	Trigger+110	SSC			
21	Trigger+130	SSC			
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E039.1, DP below Grade-Control Structure, Sampled 8/9/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	Samples not retrieved for analysis.		
2	Max+11	PCB (UF)			
3	Max+12	Gamma spectroscopy (UF)			
4	Max+13	Isotopic uranium; isotopic plutonium (UF)			
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)			
7	Max+16	TAL metals (F/UF)			
8	Max+17	Extra bottle			
9	Max+18	Extra Bottle			
10	Max+19	Extra Bottle			
11	Max+20	Extra Bottle			
12	Max+21	Extra Bottle			
E039.1, DP below Grade-Control Structure, Sampled 9/10/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	16:19	Max+10	PCB (UF)
2	Max+11	PCB (UF)			
3	Max+12	Gamma spectroscopy (UF)	16:22	Max+13	Gamma spectroscopy (UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)			
5	Max+14	Isotopic uranium; isotopic plutonium (UF)	16:24	Max+15	Isotopic uranium; isotopic plutonium (UF)
6	Max+15	Strontium-90 (UF)			
7	Max+16	TAL metals (F/UF)	16:26	Max+17	Strontium-90 (UF)
8	Max+17	Extra bottle	16:27	Max+18	TAL metals (UF)
9	Max+18	Extra Bottle	16:28	Max+19	TAL metals (F)
10	Max+19	Extra Bottle	16:29	Max+20	TSS
11	Max+20	Extra Bottle	16:30	Max+21	TSS
12	Max+21	Extra Bottle	16:31	Max+22	TSS

Table 2.4-4 (continued)

E039.1, DP below Grade-Control structure, Sampled 8/9/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	14:09	Trigger	SSC
2	Trigger+2	SSC	Samples not retrieved for analysis.		
3	Trigger+4	SSC			
4	Trigger+6	SSC			
5	Trigger+8	SSC	14:17	Trigger+8	SSC
6	Trigger+10	SSC	Samples not retrieved for analysis.		
7	Trigger+12	SSC			
8	Trigger+14	SSC			
9	Trigger+16	SSC	14:25	Trigger+16	SSC
10	Trigger+18	SSC; particle size	Samples not retrieved for analysis.		
11	Trigger+20	SSC			
12	Trigger+22	SSC			
13	Trigger+24	SSC			
14	Trigger+26	SSC			
15	Trigger+28	SSC	14:37	Trigger+28	SSC
16	Trigger+30	SSC	Sampling attempted but collection not successful.		
17	Trigger+50	SSC			
18	Trigger+70	SSC			
19	Trigger+90	SSC			
20	Trigger+110	SSC			
21	Trigger+130	SSC			
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E039.1, DP below Grade-Control Structure, Sampled 9/10/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	16:09	Trigger+0	SSC
2	Trigger+2	SSC	16:11	Trigger+2	SSC
3	Trigger+4	SSC	16:13	Trigger+4	SSC
4	Trigger+6	SSC	16:15	Trigger+6	SSC
5	Trigger+8	SSC	16:17	Trigger+8	SSC
6	Trigger+10	SSC	16:19	Trigger+10	SSC; particle size
7	Trigger+12	SSC	16:21	Trigger+12	DOC (F)
8	Trigger+14	SSC	16:23	Trigger+14	SO ₄ , Cl ⁻ (F)
9	Trigger+16	SSC	16:25	Trigger+16	Alk, pH (UF)
10	Trigger+18	SSC; particle size	16:27	Trigger+18	SSC
11	Trigger+20	SSC	16:29	Trigger+20	SSC
12	Trigger+22	SSC	16:31	Trigger+22	SSC
13	Trigger+24	SSC	16:33	Trigger+24	SSC
14	Trigger+26	SSC	16:35	Trigger+26	SSC
15	Trigger+28	SSC	16:37	Trigger+28	SSC
16	Trigger+30	SSC	16:39	Trigger+30	SSC
17	Trigger+50	SSC	16:59	Trigger+50	SSC
18	Trigger+70	SSC	Sampling attempted but collection not successful.		
19	Trigger+90	SSC			
20	Trigger+110	SSC	17:59	Trigger+110	SSC
21	Trigger+130	SSC	18:19	Trigger+130	SSC
22	Trigger+150	SSC	18:39	Trigger+150	SSC
23	Trigger+170	SSC	18:59	Trigger+170	SSC
24	Trigger+190	SSC	19:19	Trigger+190	SSC

Table 2.4-4 (continued)

E039.1, DP below Grade-Control Structure, Sampled 9/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	Samples not retrieved for analysis.		
2	Max+11	PCB (UF)			
3	Max+12	Gamma spectroscopy (UF)			
4	Max+13	Isotopic uranium; isotopic plutonium (UF)			
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)			
7	Max+16	TAL metals (F/UF)			
8	Max+17	Extra bottle			
9	Max+18	Extra Bottle			
10	Max+19	Extra Bottle			
11	Max+20	Extra Bottle			
12	Max+21	Extra Bottle			

Table 2.4-4 (continued)

E039.1, DP below Grade-Control Structure, Sampled 9/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	Sample not retrieved for analysis.		
2	Trigger+2	SSC	15:11	Trigger+2	SSC; particle size
3	Trigger+4	SSC	Sample not retrieved for analysis.		
4	Trigger+6	SSC	15:15	Trigger+6	SSC
5	Trigger+8	SSC	Sample not retrieved for analysis.		
6	Trigger+10	SSC	15:19	Trigger+10	SSC
7	Trigger+12	SSC	Sample not retrieved for analysis.		
8	Trigger+14	SSC	15:23	Trigger+14	SSC
9	Trigger+16	SSC	Sample not retrieved for analysis.		
10	Trigger+18	SSC; particle size	15:27	Trigger+18	SSC
11	Trigger+20	SSC	Sample not retrieved for analysis.		
12	Trigger+22	SSC	15:31	Trigger+22	SSC
13	Trigger+24	SSC	Sample not retrieved for analysis.		
14	Trigger+26	SSC	15:35	Trigger+26	SSC
15	Trigger+28	SSC	Sample not retrieved for analysis.		
16	Trigger+30	SSC	Sample not retrieved for analysis.		
17	Trigger+50	SSC	Sampling attempted but collection not successful.		
18	Trigger+70	SSC			
19	Trigger+90	SSC	16:39	Trigger+90	SSC
20	Trigger+110	SSC	16:59	Trigger+110	SSC
21	Trigger+130	SSC	Sample not retrieved for analysis.		
22	Trigger+150	SSC	17:39	Trigger+150	SSC
23	Trigger+170	SSC	Sample not retrieved for analysis.		
24	Trigger+190	SSC	18:19	Trigger+190	SSC

Table 2.4-4 (continued)

E039.1, DP below Grade-Control Structure, Sampled 11/5/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	13:43	Trigger+0	SSC
2	Trigger+2	SSC	Sample not retrieved for analysis.		
3	Trigger+4	SSC	13:47	Trigger+4	SSC
4	Trigger+6	SSC	Sample not retrieved for analysis.		
5	Trigger+8	SSC	13:51	Trigger+8	SSC
6	Trigger+10	SSC	Sample not retrieved for analysis.		
7	Trigger+12	SSC	13:55	Trigger+12	SSC
8	Trigger+14	SSC	Sample not retrieved for analysis.		
9	Trigger+16	SSC	13:59	Trigger+16	SSC
10	Trigger+18	SSC; particle size	Sample not retrieved for analysis.		
11	Trigger+20	SSC	14:03	Trigger+20	SSC
12	Trigger+22	SSC	Sample not retrieved for analysis.		
13	Trigger+24	SSC	14:07	Trigger+24	SSC
14	Trigger+26	SSC	Sample not retrieved for analysis.		
15	Trigger+28	SSC	14:11	Trigger+28	SSC
16	Trigger+30	SSC	Sample not retrieved for analysis.		
17	Trigger+50	SSC	14:33	Trigger+50	SSC
18	Trigger+70	SSC	Sampling attempted but collection not successful.		
19	Trigger+90	SSC			
20	Trigger+110	SSC			
21	Trigger+130	SSC			
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E042.1, Los Alamos above Low-head Weir, Sampled 7/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites 12-Bottle ISCO	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	12:55	Sampling attempted but collection not successful.	
2	Max+11	Gamma spectroscopy (UF)			
3	Max+12	Isotopic plutonium, americium-241, and isotopic uranium (UF)	12:59	14	SSC
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)	Sampling attempted but collection not successful.		
5	Max+14	Strontium-90 (UF)	13:03	18	SSC
6	Max+16	TAL metals (F/UF)	Sampling attempted but collection not successful.		
7	Max+17	Cyanide (UF)	13:07	22	Gamma spectroscopy (UF)
8	Max+60	PCB (UF)	13:09	24	PCB Congeners (UF)
9	Max+61	Isotopic plutonium (UF)	13:45	60	DOC (F)
10	Max+105	PCB (UF)	Sampling attempted but collection not successful.		
11	Max+106	Isotopic plutonium (UF)	14:30	105	PCB Congeners (UF)
12	n/a ^e	n/a	14:30	105	Isotopic plutonium, isotopic uranium, Americium-241 (UF)

Table 2.4-4 (continued)

E042.1, Los Alamos above Low-head Weir, Sampled 7/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	12:40	Trigger+0	SSC
2	Trigger+2	SSC	12:42	Trigger+2	SSC
3	Trigger+4	SSC	Sampling attempted but collection not successful.		
4	Trigger+6	SSC			
5	Trigger+8	SSC			
6	Trigger+12	SSC			
7	Trigger+14	SSC			
8	Trigger+16	SSC			
9	Trigger+18	SSC; particle size			
10	Trigger+20	SSC	12:58	Trigger+18	TSS
11	Trigger+22	SSC	13:00	Trigger+20	Alkalinity, pH (UF)
12	Trigger+24	SSC	13:02	Trigger+22	TSS
13	Trigger+26	SSC	13:04	Trigger+24	TSS
14	Trigger+28	SSC	13:06	Trigger+26	TSS
15	Trigger+30	SSC	13:08	Trigger+28	TSS
16	Trigger+50	SSC	13:10	Trigger+30	TSS
17	Trigger+70	SSC; particle size	13:30	Trigger+50	TSS
18	Trigger+90	SSC	13:50	Trigger+70	TSS
19	Trigger+110	SSC; particle size	14:10	Trigger+90	TSS
20	Trigger+130	SSC	14:30	Trigger+110	TSS
21	Trigger+150	SSC	14:50	Trigger+130	Sr-90 (UF)
22	Trigger+170	SSC	15:10	Trigger+150	Metals (F/UF)
23	Trigger+190	SSC	15:30	Trigger+170	Cyanide (UF)
24	Trigger+210	SSC	15:50	Trigger+190	SSC; particle size

Table 2.4-4 (continued)

E042.1, Los Alamos above Low-head Weir, Sampled 8/5/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites 12-Bottle ISCO	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	15:10	Max+10	PCB (UF)
2	Max+11	Gamma spectroscopy (UF)	15:12	Max+12	Gamma spectroscopy (UF)
3	Max+12	Isotopic plutonium, americium-241, and isotopic uranium (UF)	15:14	Max+14	Isotopic plutonium, americium-241, and isotopic uranium (UF)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
5	Max+14	Strontium-90 (UF)	15:18	Max+18	Strontium-90 (UF)
6	Max+16	TAL metals (F/UF)	15:20	Max+20	TAL metals (F/UF)
7	Max+17	Cyanide (UF)	15:22	Max+22	Alkalinity, pH,Cyanide (UF)
8	Max+60	PCB (UF)	15:24	Max+24	PCB (UF)
9	Max+61	Isotopic plutonium (UF)			
10	Max+105	PCB (UF)	16:00	Max+60	Isotopic plutonium (UF)
11	Max+106	Isotopic plutonium (UF)	Sampling attempted but collection not successful.		
12	n/a ^d	n/a			
E042.1, Los Alamos above Low-head Weir, Sampled 9/10/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites 12-Bottle ISCO	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	19:40	Sampling attempted but collection not successful.	
2	Max+11	Gamma spectroscopy (UF)	19:42	Max+12	Gamma spectroscopy (UF)
3	Max+12	Isotopic plutonium, americium-241, and isotopic uranium (UF)	19:44	Max+14	Isotopic plutonium, americium-241, and isotopic uranium (UF)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
5	Max+14	Strontium-90 (UF)			
6	Max+16	TAL metals (F/UF)	19:50	Max+20	Strontium-90 (UF)
7	Max+17	Cyanide (UF)	19:52	Max+22	Cyanide (UF)
8	Max+60	PCB (UF)	19:54	Max+24	PCB (UF)
9	Max+61	Isotopic plutonium (UF)			
10	Max+105	PCB (UF)	20:30	Max+60	Isotopic plutonium (UF)
11	Max+106	Isotopic plutonium (UF)	Sampling attempted but collection not successful.		
12	n/a	n/a			

Table 2.4-4 (continued)

E042.1, Los Alamos above Low-head Weir, Sampled 8/5/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	15:00	Trigger+0	Gamma spectroscopy (UF)
2	Trigger+2	SSC	15:02	Trigger+2	Isotopic plutonium (UF)
3	Trigger+4	SSC	15:04	Trigger+4	SSC
4	Trigger+6	SSC	15:06	Trigger+6	SSC
5	Trigger+8	SSC	15:08	Trigger+8	SSC
6	Trigger+12	SSC	15:10	Trigger+10	SSC
7	Trigger+14	SSC	15:12	Trigger+12	SSC
8	Trigger+16	SSC	15:14	Trigger+14	SSC
9	Trigger+18	SSC; particle size	15:16	Trigger+16	SSC; particle size
10	Trigger+20	SSC	15:18	Trigger+18	DOC (F)
11	Trigger+22	SSC	15:20	Trigger+20	SO ₄ , Cl ⁻ (F)
12	Trigger+24	SSC	15:22	Trigger+22	Alk, pH
13	Trigger+26	SSC	15:24	Trigger+24	SSC
14	Trigger+28	SSC	15:26	Trigger+26	SSC
15	Trigger+30	SSC	15:28	Trigger+28	SSC
16	Trigger+50	SSC	15:30	Trigger+30	SSC
17	Trigger+70	SSC; particle size	15:50	Trigger+50	SSC
18	Trigger+90	SSC	16:10	Trigger+70	SSC; particle size
19	Trigger+110	SSC; particle size	Sampling attempted but collection not successful.		
20	Trigger+130	SSC			
21	Trigger+150	SSC			
22	Trigger+170	SSC			
23	Trigger+190	SSC			
24	Trigger+210	SSC			

Table 2.4-4 (continued)

E042.1, Los Alamos above Low-head Weir, Sampled 9/10/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	19:29	Trigger+0	Gamma spectroscopy (UF)
2	Trigger+2	SSC	19:31	Trigger+2	Isotopic plutonium (UF)
3	Trigger+4	SSC	19:33	Trigger+4	SSC
4	Trigger+6	SSC	19:35	Trigger+6	SSC
5	Trigger+8	SSC	19:37	Trigger+8	SSC
6	Trigger+12	SSC	19:39	Trigger+10	SSC
7	Trigger+14	SSC	19:41	Trigger+12	SSC
8	Trigger+16	SSC	19:43	Trigger+14	SSC
9	Trigger+18	SSC; particle size	19:45	Trigger+16	DOC (F)
10	Trigger+20	SSC	19:47	Trigger+18	SO ₄ , Cl ⁻ (F)
11	Trigger+22	SSC	19:49	Trigger+20	Alk, pH
12	Trigger+24	SSC	19:51	Trigger+22	TAL metals (F/UF)
13	Trigger+26	SSC	19:53	Trigger+24	Isotopic plutonium (UF)
14	Trigger+28	SSC	19:55	Trigger+26	SSC
15	Trigger+30	SSC	19:57	Trigger+28	SSC
16	Trigger+50	SSC	19:59	Trigger+30	SSC
17	Trigger+70	SSC; particle size	20:19	Trigger+50	SSC; particle size
18	Trigger+90	SSC	Sampling attempted but collection not successful.		
19	Trigger+110	SSC; particle size			
20	Trigger+130	SSC			
21	Trigger+150	SSC	21:39	Trigger+130	SSC; particle size
22	Trigger+170	SSC	21:59	Trigger+150	SSC
23	Trigger+190	SSC	22:19	Trigger+170	SSC
24	Trigger+210	SSC	22:39	Trigger+190	SSC; particle size

Table 2.4-4 (continued)

E050.1, Los Alamos below Low-head Weir, Sampled 7/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites 12-Bottle ISCO	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	13:40	Max+10	PCB (UF)
2	Max+11	Gamma spectroscopy (UF)	13:42	Max+12	Gamma spectroscopy (UF)
3	Max+12	Isotopic plutonium, americium-241, and isotopic uranium (UF)	13:44	Max+14	Isotopic plutonium, americium-241, and isotopic uranium (UF)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
5	Max+14	Strontium-90 (UF)	13:48	Max+18	Strontium-90 (UF)
6	Max+16	TAL metals (F/UF)	13:50	Max+20	TAL metals (F/UF)
7	Max+17	Cyanide (UF) Gross alpha/beta (UF)	13:52	Max+22	Cyanide (UF); Gross Alpha/Beta
8	Max+60	PCB (UF)	13:54	Max+24	PCB (UF)
9	Max+61	Isotopic plutonium (UF)	14:30	Max+60	PCB (UF)
10	Max+105	PCB (UF)	14:30	Max+60	Isotopic plutonium (UF)
11	Max+106	Isotopic plutonium (UF)	15:15	Max+105	PCB (UF)
12	n/a	n/a	15:15	Max+105	Isotopic plutonium (UF)

Table 2.4-4 (continued)

E050.1, Los Alamos below Low-head Weir, Sampled 7/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	13:15	Trigger+0	SSC
2	Trigger+2	SSC	13:17	Trigger+2	SSC
3	Trigger+4	SSC	13:19	Trigger+4	Gamma spectroscopy (UF)
4	Trigger+6	SSC	13:21	Trigger+6	Isotopic plutonium (UF)
5	Trigger+8	Radium-226 (UF)	13:23	Trigger+8	SSC
6	Trigger+10	Radium-228 (UF)	13:25	Trigger+10	SSC
7	Trigger+12	SSC	13:27	Trigger+12	SSC
8	Trigger+14	SSC	13:29	Trigger+14	SSC
9	Trigger+16	SSC; particle size	13:31	Trigger+16	SSC; particle size
10	Trigger+18	SSC	13:33	Trigger+18	DOC (F)
11	Trigger+20	SSC	13:35	Trigger+20	SO ₄ , Cl ⁻ (F)
12	Trigger+22	SSC	13:37	Trigger+22	Alk, pH
13	Trigger+24	SSC	13:39	Trigger+24	SSC
14	Trigger+26	SSC	13:41	Trigger+26	Ra-226/Ra-228 SSC
15	Trigger+28	SSC			
16	Trigger+30	SSC	13:45	Trigger+30	SSC
17	Trigger+50	SSC; particle size	14:05	Trigger+50	SSC
18	Trigger+70	SSC	14:25	Trigger+70	SSC; particle size SSC
19	Trigger+90	SSC; particle size	14:45	Trigger+90	SSC
20	Trigger+110	SSC	15:05	Trigger+110	SSC; particle size
21	Trigger+130	SSC	15:25	Trigger+130	SSC
22	Trigger+150	SSC	15:45	Trigger+150	SSC
23	Trigger+170	SSC	16:05	Trigger+170	SSC
24	Trigger+190	SSC	16:25	Trigger+190	SSC

Table 2.4-4 (continued)

E050.1, Los Alamos below Low-head Weir, Sampled 8/5/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites 12-Bottle ISCO	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	18:09	Max+10	PCB (UF)
2	Max+11	Gamma spectroscopy (UF)	18:11	Max+12	Gamma spectroscopy (UF)
3	Max+12	Isotopic plutonium, americium-241, and isotopic uranium (UF)	18:13	Max+14	Isotopic plutonium, americium-241, and isotopic uranium (UF)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
5	Max+14	Strontium-90 (UF)	18:17	Max+18	Strontium-90 (UF)
6	Max+16	TAL metals (F/UF)	18:19	Max+20	TAL metals (F/UF)
7	Max+17	Cyanide (UF) Gross alpha/beta (UF)	18:21	Max+22	Cyanide (UF); Gross Alpha/Beta
8	Max+60	PCB (UF)	18:23	Max+24	PCB (UF)
9	Max+61	Isotopic plutonium (UF)	18:59	Max+60	PCB (UF)
10	Max+105	PCB (UF)	18:59	Max+60	Isotopic plutonium (UF)
11	Max+106	Isotopic plutonium (UF)	19:44	Max+105	PCB (UF)
12	n/a	n/a	19:44	Max+105	Isotopic plutonium (UF)

Table 2.4-4 (continued)

E050.1, Los Alamos below low-head weir, Sampled 8/5/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	17:45	Trigger+0	Gamma spectroscopy (UF)
2	Trigger+2	SSC	17:47	Trigger+2	Isotopic plutonium (UF)
3	Trigger+4	SSC	17:49	Trigger+4	SSC
4	Trigger+6	SSC	17:51	Trigger+6	SSC
5	Trigger+8	Radium-226 (UF)	17:53	Trigger+8	Ra-226/Ra-228
6	Trigger+10	Radium-228 (UF)			
7	Trigger+12	SSC	17:57	Trigger+12	SSC
8	Trigger+14	SSC	17:59	Trigger+14	SSC
9	Trigger+16	SSC; particle size	18:01	Trigger+16	SSC; particle size
10	Trigger+18	SSC	18:03	Trigger+18	DOC (F)
11	Trigger+20	SSC	18:05	Trigger+20	SO ₄ , Cl ⁻ (F)
12	Trigger+22	SSC	18:07	Trigger+22	Alk, pH
13	Trigger+24	SSC	18:09	Trigger+24	SSC
14	Trigger+26	SSC	18:11	Trigger+26	SSC
15	Trigger+28	SSC	18:13	Trigger+28	SSC
16	Trigger+30	SSC	18:15	Trigger+30	SSC
17	Trigger+50	SSC	18:35	Trigger+50	SSC
18	Trigger+70	SSC; particle size	18:55	Trigger+70	SSC; particle size SSC
19	Trigger+90	SSC	19:15	Trigger+90	SSC
20	Trigger+110	SSC; particle size SSC	19:35	Trigger+110	SSC; particle size
21	Trigger+130	SSC	19:55	Trigger+130	SSC
22	Trigger+150	SSC	Sampling attempted but collection not successful.		
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E050.1, Los Alamos below Low-head weir, Sampled 9/10-11/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites 12-Bottle ISCO	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	0:04	Max+10	PCB (UF)
2	Max+11	Gamma spectroscopy (UF)	0:06	Max+12	Gamma spectroscopy (UF)
3	Max+12	Isotopic plutonium, americium-241, and isotopic uranium (UF)	0:08	Max+14	Isotopic plutonium, americium-241, and isotopic uranium (UF)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
5	Max+14	Strontium-90 (UF)	0:12	Max+18	Strontium-90 (UF)
6	Max+16	TAL metals (F/UF)	0:14	Max+20	TAL metals (F/UF)
7	Max+17	Cyanide (UF) Gross alpha/beta (UF)	0:16	Max+22	Cyanide (UF); Gross Alpha/Beta
8	Max+60	PCB (UF)	0:18	Max+24	PCB (UF)
9	Max+61	Isotopic plutonium (UF)	0:54	Max+60	PCB (UF)
10	Max+105	PCB (UF)	0:54	Max+60	Isotopic plutonium (UF)
11	Max+106	Isotopic plutonium (UF)	01:39	Max+105	PCB (UF)
12	n/a	n/a	01:39	Max+105	Isotopic plutonium (UF)

Table 2.4-4 (continued)

E050.1, Los Alamos below Low-head Weir, Sampled 9/10-11/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	22:24	Trigger+0	Gamma spectroscopy (UF)
2	Trigger+2	SSC	22:26	Trigger+2	Isotopic plutonium (UF)
3	Trigger+4	SSC	22:28	Trigger+4	SSC
4	Trigger+6	SSC	22:30	Trigger+6	SSC
5	Trigger+8	Radium-226 (UF)	22:32	Trigger+8	Ra-226/Ra-228
6	Trigger+10	Radium-228 (UF)			
7	Trigger+12	SSC	22:36	Trigger+12	SSC
8	Trigger+14	SSC	22:38	Trigger+14	SSC
9	Trigger+16	SSC; particle size	22:40	Trigger+16	SSC; particle size
10	Trigger+18	SSC	22:42	Trigger+18	DOC (F)
11	Trigger+20	SSC	22:44	Trigger+20	SO ₄ , Cl ⁻ (F)
12	Trigger+22	SSC	22:46	Trigger+22	Alk, pH
13	Trigger+24	SSC	22:48	Trigger+24	SSC
14	Trigger+26	SSC	22:50	Trigger+26	SSC
15	Trigger+28	SSC	22:52	Trigger+28	SSC
16	Trigger+30	SSC	22:54	Trigger+30	SSC
17	Trigger+50	SSC	23:14	Trigger+50	SSC
18	Trigger+70	SSC; particle size	23:34	Trigger+70	SSC; particle size SSC
19	Trigger+90	SSC	23:54	Trigger+90	SSC
20	Trigger+110	SSC; particle size	0:14	Trigger+110	SSC; particle size
21	Trigger+130	SSC	0:34	Trigger+130	SSC
22	Trigger+150	SSC	0:54	Trigger+150	SSC
23	Trigger+170	SSC	1:14	Trigger+170	SSC
24	Trigger+190	SSC	1:34	Trigger+190	SSC

Table 2.4-4 (continued)

E050.1, Los Alamos below Low-head Weir, Sampled 9/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites 12-Bottle ISCO	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	19:04	Max+10	PCB (UF)
2	Max+11	Gamma spectroscopy (UF)	19:06	Max+12	Gamma spectroscopy (UF)
3	Max+12	Isotopic plutonium, americium-241, and isotopic uranium (UF)	19:08	Max+14	Isotopic plutonium, americium-241, and isotopic uranium (UF)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
5	Max+14	Strontium-90 (UF)	19:12	Max+18	Strontium-90 (UF)
6	Max+16	TAL metals (F/UF)	19:14	Max+20	TAL metals (F/UF)
7	Max+17	Cyanide (UF) Gross alpha/beta (UF)	19:16	Max+22	Cyanide (UF); Gross Alpha/Beta
8	Max+60	PCB (UF)	19:18	Max+24	PCB (UF)
9	Max+61	Isotopic plutonium (UF)	19:54	Max+60	PCB (UF)
10	Max+105	PCB (UF)	19:54	Max+60	Isotopic plutonium (UF)
11	Max+106	Isotopic plutonium (UF)	20:39	Max+105	PCB (UF)
12	n/a	n/a	Sample not retrieved.		

Table 2.4-4 (continued)

E050.1, Los Alamos below Low-head Weir, Sampled 9/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	17:54	Trigger+0	Gamma spectroscopy (UF)
2	Trigger+2	SSC	17:56	Trigger+2	Isotopic plutonium (UF)
3	Trigger+4	SSC	17:58	Trigger+4	SSC
4	Trigger+6	SSC	18:00	Trigger+6	SSC
5	Trigger+8	Radium-226 (UF)	18:02	Trigger+8	Ra-226/Ra-228
6	Trigger+10	Radium-228 (UF)			
7	Trigger+12	SSC	18:06	Trigger+12	SSC
8	Trigger+14	SSC	18:08	Trigger+14	SSC
9	Trigger+16	SSC; particle size	18:10	Trigger+16	SSC; particle size
10	Trigger+18	SSC	18:12	Trigger+18	DOC (F)
11	Trigger+20	SSC	18:14	Trigger+20	SO ₄ , Cl ⁻ (F)
12	Trigger+22	SSC	18:16	Trigger+22	Alk, pH
13	Trigger+24	SSC	18:18	Trigger+24	SSC
14	Trigger+26	SSC	18:20	Trigger+26	SSC
15	Trigger+28	SSC	18:22	Trigger+28	SSC
16	Trigger+30	SSC	18:24	Trigger+30	SSC
17	Trigger+50	SSC	18:44	Trigger+50	SSC
18	Trigger+70	SSC; particle size	19:04	Trigger+70	SSC; particle size SSC
19	Trigger+900	SSC	19:24	Trigger+90	SSC
20	Trigger+110	SSC; particle size	19:44	Trigger+110	SSC; particle size
21	Trigger+130	SSC	20:04	Trigger+130	SSC
22	Trigger+150	SSC	20:24	Trigger+150	SSC
23	Trigger+170	SSC	20:44	Trigger+170	SSC
24	Trigger+190	SSC	21:04	Trigger+190	SSC

Table 2.4-4 (continued)

E109.9, Los Alamos above Rio Grande, Sampled 7/8/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites 12-Bottle ISCO	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	16:15	Max+10	SSC
2	Max+11	Gamma spectroscopy (UF)	Sampling attempted but collection not successful.		
3	Max+12	Isotopic plutonium, americium-241, and isotopic uranium (UF)	16:20	Max+15	SSC
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)	16:23	Max+18	SSC
5	Max+14	Strontium-90 (UF)	16:25	Max+20	Cyanide
6	Max+15	Dioxins and furans (UF)	16:28	Max+23	PCB
7	Max+16	TAL metals (F/UF)	Sampling attempted but collection not successful.		
8	Max+17	Gross alpha/beta (UF) cyanide (UF)			
9	Max+60	PCB (UF)	17:05	Max+60	SSC
10	Max+61	Isotopic plutonium (UF)	Sampling attempted but collection not successful.		
11	Max+105	PCB (UF)			
12	Max+106	Isotopic plutonium (UF)			

Table 2.4-4 (continued)

E109.9, Los Alamos above Rio Grande, Sampled 7/8/2013					
Sample Bottle (1 L)	Planned		Actual		
	Start Time (min) 24-Bottle ISCO	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	Sampling attempted but collection not successful.		
2	Trigger+2	SSC			
3	Trigger+4	SSC			
4	Trigger+6	SSC			
5	Trigger+8	SSC			
6	Trigger+10	Gamma spectroscopy; isotopic plutonium, americium-241, and isotopic uranium (F)			
7	Trigger+12	SSC; particle size			
8	Trigger+14	Strontium-90 (F)	16:22	Trigger+18	Gamma spectroscopy
9	Trigger+16	SSC	16:25	Trigger+21	Isotopic plutonium, americium-241, and isotopic uranium (UF)
10	Trigger+18	Radium-226 (UF)	16:27	Trigger+23	Isotopic plutonium, americium-241, and isotopic uranium (UF)
11	Trigger+20	SSC	16:30	Trigger+26	Strontium-90
12	Trigger+22	Radium-228 (UF)	16:31	Trigger+27	Gross alpha/beta (UF)
13	Trigger+24	SSC	Sampling attempted but collection not successful.		
14	Trigger+26	Radium-226 (F)			
15	Trigger+28	SSC			
16	Trigger+30	Radium-228 (F)	16:34	Trigger+30	TAL metals (F/UF)
17	Trigger+50	SSC	16:54	Trigger+50	SSC
18	Trigger+70	SSC; particle size	17:14	Trigger+70	Isotopic plutonium
19	Trigger+90	SSC	17:34	Trigger+90	SSC
20	Trigger+110	SSC; particle size	17:54	Trigger+110	Isotopic plutonium
21	Trigger+130	SSC	Sampling attempted but collection not successful.		
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E109.9, Los Alamos above Rio Grande, Sampled 7/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	Start Time (min) 12-Bottle ISCO	Analytical Suites 12-Bottle ISCO	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	13:30	Max+10	PCB (UF)
2	Max+11	Gamma spectroscopy (UF)	13:32	Max+12	Gamma spectroscopy (UF)
3	Max+12	Isotopic plutonium, americium-241, and isotopic uranium (UF)	13:34	Max+14	Isotopic plutonium, americium-241, and isotopic uranium (UF)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)	13:36	Max+15	Strontium-90 (UF)
5	Max+14	Strontium-90 (UF)	13:38	Max+18	SSC
6	Max+15	Dioxins and furans (UF)	13:40	Max+20	Dioxins and furans (UF)
7	Max+16	TAL metals (F/UF)	Sampling attempted but collection not successful.		
8	Max+17	Gross alpha/beta (UF) cyanide (UF)			
9	Max+60	PCB (UF)			
10	Max+61	Isotopic plutonium (UF)			
11	Max+105	PCB (UF)			
12	Max+106	Isotopic plutonium (UF)			

Table 2.4-4 (continued)

E109.9, Los Alamos above Rio Grande, Sampled 7/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	Start Time (min) 24-Bottle ISCO	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	Sampling attempted but collection not successful.		
2	Trigger+2	SSC	13:22	Trigger+3	SSC
3	Trigger+4	SSC	Sampling attempted but collection not successful.		
4	Trigger+6	SSC			
5	Trigger+8	SSC			
6	Trigger+10	Gamma spectroscopy; isotopic plutonium, americium-241, and isotopic uranium (F)			
7	Trigger+12	SSC; particle size			
8	Trigger+14	Strontium-90 (F)			
9	Trigger+16	SSC			
10	Trigger+18	Radium-226 (UF)			
11	Trigger+20	SSC			
12	Trigger+22	Radium-228 (UF)			
13	Trigger+24	SSC			
14	Trigger+26	Radium-226 (F)			
15	Trigger+28	SSC			
16	Trigger+30	Radium-228 (F)			
17	Trigger+50	SSC			
18	Trigger+70	SSC; particle size			
19	Trigger+90	SSC			
20	Trigger+110	SSC; particle size			
21	Trigger+130	SSC			
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E109.9, Los Alamos above Rio Grande, Sampled 7/20/2013					
Sample Bottle (1 L)	Planned		Actual		
	Start Time (min) 12-Bottle ISCO	Analytical Suites 12-Bottle ISCO	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	19:55	Max+10	PCB (UF)
2	Max+11	Gamma spectroscopy (UF)	19:57	Max+12	Particle Size
3	Max+12	Isotopic plutonium, americium-241, and isotopic uranium (UF)	19:59	Max+14	Gamma spectroscopy (UF)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)	20:01	Max+16	Isotopic plutonium, americium-241, and isotopic uranium (UF)
5	Max+14	Strontium-90 (UF)			
6	Max+15	Dioxins and furans (UF)	20:05	Max+20	Dioxins and furans (UF)
7	Max+16	TAL metals (F/UF)	20:07	Max+22	Strontium-90 (UF)
8	Max+17	Gross alpha/beta (UF) cyanide (UF)	20:09	Max+24	TAL metals (F/UF)
9	Max+60	PCB (UF)	20:45	Max+60	PCB (UF)
10	Max+61	Isotopic plutonium (UF)	20:45	Max+60	SSC
11	Max+105	PCB (UF)	Sampling attempted but collection not successful.		
12	Max+106	Isotopic plutonium (UF)			

Table 2.4-4 (continued)

E109.9, Los Alamos above Rio Grande, Sampled 7/20/2013					
Sample Bottle (1 L)	Planned		Actual		
	Start Time (min) 24-Bottle ISCO	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	Sampling attempted but collection not successful.		
2	Trigger+2	SSC			
3	Trigger+4	SSC			
4	Trigger+6	SSC			
5	Trigger+8	SSC			
6	Trigger+10	Gamma spectroscopy; isotopic plutonium, americium-241, and isotopic uranium (F)			
7	Trigger+12	SSC; particle size			
8	Trigger+14	Strontium-90 (F)			
9	Trigger+16	SSC			
10	Trigger+18	Radium-226 (UF)			
11	Trigger+20	SSC			
12	Trigger+22	Radium-228 (UF)			
13	Trigger+24	SSC			
14	Trigger+26	Radium-226 (F)			
15	Trigger+28	SSC			
16	Trigger+30	Radium-228 (F)			
17	Trigger+50	SSC			
18	Trigger+70	SSC; particle size			
19	Trigger+90	SSC			
20	Trigger+110	SSC; particle size			
21	Trigger+130	SSC			
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E109.9, Los Alamos above Rio Grande, Sampled 7/25-26/2013					
Sample Bottle (1 L)	Planned		Actual		
	Start Time (min) 12-Bottle ISCO	Analytical Suites 12-Bottle ISCO	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	23:05	Max+10	PCB (UF)
2	Max+11	Gamma spectroscopy (UF)	23:07	Max+12	Gross alpha/beta (UF) cyanide (UF)
3	Max+12	Isotopic plutonium, americium-241, and isotopic uranium (UF)	23:09	Max+14	TAL metals (F)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)	23:11	Max+16	DOC(F)
5	Max+14	Strontium-90 (UF)	23:14	Max+19	SO4, Cl ⁻ (F)
6	Max+15	Dioxins and furans (UF)			
7	Max+16	TAL metals (F/UF)	Sampling attempted but collection not successful.		
8	Max+17	Gross alpha/beta (UF) cyanide (UF)			
9	Max+60	PCB (UF)			
10	Max+61	Isotopic plutonium (UF)			
11	Max+105	PCB (UF)			
12	Max+106	Isotopic plutonium (UF)			

Table 2.4-4 (continued)

E109.9, Los Alamos above Rio Grande, Sampled 7/25-26/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	22:54	Trigger	SSC
2	Trigger+2	SSC	22:57	Trigger+3	SSC
3	Trigger+4	SSC	22:59	Trigger+5	SSC
4	Trigger+6	SSC	23:00	Trigger+6	SSC
5	Trigger+8	SSC	23:02	Trigger+8	SSC
6	Trigger+10	Gamma spectroscopy, isotopic plutonium, americium-241, and isotopic uranium (F)	23:04	Trigger+10	SSC; particle size
7	Trigger+12	SSC; particle size	23:06	Trigger+12	Strontium-90 (F)
8	Trigger+14	Strontium-90 (F)	23:08	Trigger+14	TAL (UF)
9	Trigger+16	SSC	23:10	Trigger+16	Gamma spectroscopy
10	Trigger+18	Radium-226 (UF)	23:13	Trigger+19	Gamma spectroscopy
11	Trigger+20	SSC	23:15	Trigger+21	Isotopic plutonium, americium-241, and isotopic uranium (UF)
12	Trigger+22	Radium-228 (UF)	23:17	Trigger+23	Isotopic plutonium, americium-241, and isotopic uranium (UF)
13	Trigger+24	SSC	23:20	Trigger+26	Cyanide
14	Trigger+26	Radium-226 (F)	Sampling attempted but collection not successful.		
15	Trigger+28	SSC			
16	Trigger+30	Radium-228 (F)	23:24	Trigger+30	Alkalinity+pH
17	Trigger+50	SSC	23:44	Trigger+50	SSC
18	Trigger+70	SSC; particle size	00:04	Trigger+70	SSC
19	Trigger+90	SSC	00:24	Trigger+90	SSC
20	Trigger+110	SSC; particle size	00:44	Trigger+110	SSC
21	Trigger+130	SSC	01:04	Trigger+130	SSC
22	Trigger+150	SSC	02:04	Trigger+150	SSC
23	Trigger+170	SSC	Sampling attempted but collection not successful.		
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E109.9, Los Alamos above Rio Grande, Sampled 7/26/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites 12-Bottle ISCO	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	Sampling attempted but collection not successful.		
2	Max+11	Gamma spectroscopy (UF)			
3	Max+12	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
5	Max+14	Strontium-90 (UF)			
6	Max+15	Dioxins and furans (UF)			
7	Max+16	TAL metals (F/UF)			
8	Max+17	Gross alpha/beta (UF) cyanide (UF)			
9	Max+60	PCB (UF)			
10	Max+61	Isotopic plutonium (UF)			
11	Max+105	PCB (UF)			
12	Max+106	Isotopic plutonium (UF)			

Table 2.4-4 (continued)

E109.9, Los Alamos above Rio Grande, Sampled 7/26/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	17:14	Trigger	Particle Size
2	Trigger+2	SSC	17:16	Trigger+2	SSC
3	Trigger+4	SSC	17:18	Trigger+4	Gamma spectroscopy (UF)
4	Trigger+6	SSC	17:20	Trigger+6	isotopic plutonium, americium-241, and isotopic uranium (UF)
5	Trigger+8	SSC			
6	Trigger+10	Gamma spectroscopy; isotopic plutonium, americium-241, and isotopic uranium (F)	17:24	Trigger+10	Strontium-90 (UF)
7	Trigger+12	SSC; particle size	17:26	Trigger+12	Gross alpha/beta (UF) cyanide (UF)
8	Trigger+14	Strontium-90 (F)	17:28	Trigger+14	Radium-226/Radium-228 (UF)
9	Trigger+16	SSC	17:30	Trigger+16	TAL metals (F)
10	Trigger+18	Radium-226 (UF)	17:32	Trigger+18	TAL metals (UF)
11	Trigger+20	SSC	17:34	Trigger+20	Alkalinity, pH (UF)
12	Trigger+22	Radium-228 (UF)	17:36	Trigger+22	SO ₄ , CL ⁻ (F)
13	Trigger+24	SSC	17:38	Trigger+24	DOC (F)
14	Trigger+26	Radium-226 (F)	17:40	Trigger+26	SSC
15	Trigger+28	SSC	17:42	Trigger+28	Particle Size
16	Trigger+30	Radium-228 (F)	17:44	Trigger+30	SSC
17	Trigger+50	SSC	Sampling attempted but collection not successful.		
18	Trigger+70	SSC; particle size			
19	Trigger+90	SSC			
20	Trigger+110	SSC; particle size			
21	Trigger+130	SSC			
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E109.9, Los Alamos above Rio Grande, Sampled 8/3/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites 12-Bottle ISCO	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	15:40	Max+10	PCB (UF)
2	Max+11	Gamma spectroscopy (UF)	15:42	Max+12	Gross alpha/beta (UF) cyanide (UF)
3	Max+12	Isotopic plutonium, americium-241, and isotopic uranium (UF)	15:45	Max+15	Isotopic plutonium, americium-241, and isotopic uranium (UF)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
5	Max+14	Strontium-90 (UF)	15:50	Max+20	Strontium-90 (UF)
6	Max+15	Dioxins and furans (UF)	15:52	Max+22	Dioxins and furans (UF)
7	Max+16	TAL metals (F/UF)	Sampling attempted but collection not successful.		
8	Max+17	Gross alpha/beta (UF) cyanide (UF)			
9	Max+60	PCB (UF)	16:30	Max+60	PCB (UF)
10	Max+61	Isotopic plutonium (UF)	Sampling attempted but collection not successful.		
11	Max+105	PCB (UF)			
12	Max+106	Isotopic plutonium (UF)			

Table 2.4-4 (continued)

E109.9, Los Alamos above Rio Grande, Sampled 8/3/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	15:24	Trigger	SSC; Particle Size
2	Trigger+2	SSC	15:26	Trigger+2	Gamma spectroscopy; Isotopic plutonium, americium-241, and isotopic uranium (F)
3	Trigger+4	SSC			
4	Trigger+6	SSC	Sampling attempted but collection not successful.		
5	Trigger+8	SSC	15:32	Trigger+8	SSC
6	Trigger+10	Gamma spectroscopy; isotopic plutonium, americium-241, and isotopic uranium (F)	15:34	Trigger+10	Gamma spectroscopy (F)
7	Trigger+12	SSC; particle size	15:36	Trigger+12	TAL (F)
8	Trigger+14	Strontium-90 (F)	15:38	Trigger+14	TAL (UF)
9	Trigger+16	SSC	15:40	Trigger+16	Isotopic plutonium(F)
10	Trigger+18	Radium-226 (UF)	15:42	Trigger+18	Strontium-90 (F)
11	Trigger+20	SSC	15:44	Trigger+20	Radium-226, Radium-228 (UF)
12	Trigger+22	Radium-228 (UF)			
13	Trigger+24	SSC	15:48	Trigger+24	Radium-226, Radium-228 (F)
14	Trigger+26	Radium-226 (F)			
15	Trigger+28	SSC	15:52	Trigger+28	Gross alpha/beta (UF)
16	Trigger+30	Radium-228 (F)	15:54	Trigger+30	SSC
17	Trigger+50	SSC	16:14	Trigger+50	Iso Pu (UF)
18	Trigger+70	SSC; particle size	16:34	Trigger+70	SSC
19	Trigger+90	SSC	16:54	Trigger+90	Cyanide (UF)
20	Trigger+110	SSC; particle size	17:14	Trigger+110	SO4, Cl ⁻ (F)
21	Trigger+130	SSC	17:34	Trigger+130	DOC (F)
22	Trigger+150	SSC	17:54	Trigger+150	Alkalinity, pH (UF)
23	Trigger+170	SSC	Sampling attempted but collection not successful.		
24	Trigger+190	SSC	18:34	Trigger+190	Particle Size

Table 2.4-4 (continued)

E109.9, Los Alamos above Rio Grande, Sampled 8/5/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites 12-Bottle ISCO	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	18:35	Max+10	SSC
2	Max+11	Gamma spectroscopy (UF)	Sampling attempted but collection not successful.		
3	Max+12	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
5	Max+14	Strontium-90 (UF)			
6	Max+15	Dioxins and furans (UF)			
7	Max+16	TAL metals (F/UF)			
8	Max+17	Gross alpha/beta (UF) cyanide (UF)			
9	Max+60	PCB (UF)			
10	Max+61	Isotopic plutonium (UF)			
11	Max+105	PCB (UF)			
12	Max+106	Isotopic plutonium (UF)			

Table 2.4-4 (continued)

E109.9, Los Alamos above Rio Grande, Sampled 8/5/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	18:14	Trigger	SSC; Particle Size
2	Trigger+2	SSC	18:16	Trigger+2	SSC
3	Trigger+4	SSC			
4	Trigger+6	SSC	18:18	Trigger+4	SSC
5	Trigger+8	SSC	18:20	Trigger+6	SSC
6	Trigger+10	Gamma spectroscopy; isotopic plutonium, americium-241, and isotopic uranium (F)	18:22	Trigger+8	SSC
7	Trigger+12	SSC; particle size	18:24	Trigger+10	SSC
8	Trigger+14	Strontium-90 (F)	Sampling attempted but collection not successful.		
9	Trigger+16	SSC			
10	Trigger+18	Radium-226 (UF)			
11	Trigger+20	SSC			
12	Trigger+22	Radium-228 (UF)			
13	Trigger+24	SSC			
14	Trigger+26	Radium-226 (F)			
15	Trigger+28	SSC			
16	Trigger+30	Radium-228 (F)			
17	Trigger+50	SSC			
18	Trigger+70	SSC; particle size			
19	Trigger+90	SSC			
20	Trigger+110	SSC; particle size			
21	Trigger+130	SSC			
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E109.9, Los Alamos above Rio Grande, Sampled 8/9/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites 12-Bottle ISCO	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	15:45	Max+10	PCB (UF)
2	Max+11	Gamma spectroscopy (UF)	15:47	Max+12	Gamma Spectroscopy (UF)
3	Max+12	Isotopic plutonium, americium-241, and isotopic uranium (UF)	15:49	Max+14	Isotopic plutonium, americium-241, and isotopic uranium (UF)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
5	Max+14	Strontium-90 (UF)	15:53	Max+18	Strontium-90 (UF)
6	Max+15	Dioxins and furans (UF)	15:55	Max+20	Dioxins and furans (UF)
7	Max+16	TAL metals (F/UF)	15:58	Max+23	TAL metals (F/UF)
8	Max+17	Gross alpha/beta (UF) cyanide (UF)	15:58	Max+23	Gross alpha/beta (UF)
9	Max+60	PCB (UF)	16:35	Max+60	PCB (UF)
10	Max+61	Isotopic plutonium (UF)	16:35	Max+60	Isotopic Plutonium (UF)
11	Max+105	PCB (UF)	17:20	Max+105	PCB (UF)
12	Max+106	Isotopic plutonium (UF)	17:20	Max+105	Isotopic Plutonium (UF)

Table 2.4-4 (continued)

E109.9, Los Alamos above Rio Grande, Sampled 8/9/2013					
Sample Bottle (1 L)	Planned		Actual		
	24Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	15:34	Trigger	SSC
2	Trigger+2	SSC	15:37	Trigger+3	SSC
3	Trigger+4	SSC	15:40	Trigger+6	SSC, Particle Size
4	Trigger+6	SSC	15:42	Trigger+8	Gamma spectroscopy (F)
5	Trigger+8	SSC	15:43	Trigger+9	Isotopic plutonium, americium-241, and isotopic uranium (F)
6	Trigger+10	Gamma spectroscopy; isotopic plutonium, americium-241, and isotopic uranium (F)			
7	Trigger+12	SSC; particle size	15:46	Trigger+13	Strontium-90 (F)
8	Trigger+14	Strontium-90 (F)	15:49	Trigger+15	Radium-226, Radium-228 (UF)
9	Trigger+16	SSC			
10	Trigger+18	Radium-226 (UF)	15:52	Trigger+18	Radium-226, Radium-228 (F)
11	Trigger+20	SSC			
12	Trigger+22	Radium-228 (UF)	15:56	Trigger+22	SSC, Particle Size
13	Trigger+24	SSC	15:58	Trigger+24	SSC
14	Trigger+26	Radium-226 (F)	16:00	Trigger+26	SSC
15	Trigger+28	SSC	16:02	Trigger+28	SSC
16	Trigger+30	Radium-228 (F)	16:04	Trigger+30	SSC
17	Trigger+50	SSC	16:24	Trigger+50	SSC
18	Trigger+70	SSC; particle size	16:44	Trigger+70	SSC
19	Trigger+90	SSC	Sampling attempted but collection not successful.		
20	Trigger+110	SSC; particle size			
21	Trigger+130	SSC	17:44	Trigger+130	SSC
22	Trigger+150	SSC	18:04	Trigger+150	SSC
23	Trigger+170	SSC	18:24	Trigger+170	SSC
24	Trigger+190	SSC	Sampling attempted but collection not successful.		

Table 2.4-4 (continued)

E109.9, Los Alamos above Rio Grande, Sampled 9/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites 12-Bottle ISCO	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCB (UF)	15:40	Max+10	SSC
2	Max+11	Gamma spectroscopy (UF)	15:42	Max+12	Gamma Spectroscopy (UF)
3	Max+12	Isotopic plutonium, americium-241, and isotopic uranium (UF)	15:44	Max+14	Isotopic plutonium, americium-241, and isotopic uranium (UF)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
5	Max+14	Strontium-90 (UF)	15:48	Max+18	Strontium-90 (UF)
6	Max+15	Dioxins and furans (UF)	15:50	Max+20	TAL (UF)
7	Max+16	TAL metals (F/UF)	15:52	Max+22	TAL (F)
8	Max+17	Gross alpha/beta (UF) cyanide (UF)	15:54	Max+24	Gross alpha/ gross beta (UF)
9	Max+60	PCB (UF)	16:30	Max+60	SSC
10	Max+61	Isotopic plutonium (UF)	Sampling attempted but collection not successful.		
11	Max+105	PCB (UF)			
12	Max+106	Isotopic plutonium (UF)			

Table 2.4-4 (continued)

E109.9, Los Alamos above Rio Grande, Sampled 9/12/2013					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge ^a	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	15:39	Trigger	SSC
2	Trigger+2	SSC	15:42	Trigger+3	SSC
3	Trigger+4	SSC	15:44	Trigger+5	SSC
4	Trigger+6	SSC	15:46	Trigger+7	Gamma spectroscopy (UF)
5	Trigger+8	SSC	15:48	Trigger+9	Gamma spectroscopy; isotopic plutonium, americium-241, and isotopic uranium (UF)
6	Trigger+10	Gamma spectroscopy; isotopic plutonium, americium-241, and isotopic uranium (F)			
7	Trigger+12	SSC; particle size	15:53	Trigger+14	SSC; particle size
8	Trigger+14	Strontium-90 (F)	15:55	Trigger+16	Strontium-90 (UF)
9	Trigger+16	SSC	15:57	Trigger+18	TAL Metals (F)
10	Trigger+18	Radium-226 (UF)	15:59	Trigger+20	DOC (F)
11	Trigger+20	SSC	16:01	Trigger+22	SO ₄ , Cl ⁻
12	Trigger+22	Radium-228 (UF)	16:03	Trigger+24	Alkalinity, pH (UF)
13	Trigger+24	SSC	16:05	Trigger+26	SSC
14	Trigger+26	Radium-226 (F)	16:05	Trigger+26	Radium-226; Radium-228 (UF)
15	Trigger+28	SSC			
16	Trigger+30	Radium-228 (F)	16:09	Trigger+30	Radium-226; Radium-228 (UF)
17	Trigger+50	SSC			
18	Trigger+70	SSC; particle size	16:49	Trigger+70	SSC; particle size
19	Trigger+90	SSC	17:09	Trigger+90	SSC
20	Trigger+110	SSC; particle size	17:29	Trigger+110	SSC; particle size
21	Trigger+130	SSC	17:49	Trigger+130	SSC
22	Trigger+150	SSC	18:09	Trigger+150	SSC
23	Trigger+170	SSC	18:29	Trigger+170	SSC
24	Trigger+190	SSC	18:49	Trigger+190	SSC

^a UF = Unfiltered.^b F = Filtered.^c TOC = Total organic carbon.^d n/a = Not applicable.

Table 2.6-1
Sample Collection and Sample Retrieval Working Day Intervals

Location	Count of Sampled Storm Events	Count Retrieved on First Working Day	Count Retrieved after First Working Day	Comment
CO101038	2	1	1	1 working day between sample collection on Fri 7/12 sample retrieval on Mon 7/15. 34 working days between sample collection on Wed 9/18 sample retrieval on Tue 11/05.
CO111041	9	3	6	1 working day between sample collection on Fri 6/14 sample retrieval on Mon 6/17. 6 working days between sample collection on Sun 6/30 sample retrieval on Tue 7/09. 1 working day between sample collection on Fri 7/12 sample retrieval on Mon 7/15. 1 working day between sample collection on Sat 7/13 sample retrieval on Mon 7/15. 2 working days between sample collection on Sun 7/28 sample retrieval on Tue 7/30. 2 working days between sample collection on Fri 7/05 sample retrieval on Tue 7/09. 2 working days between sample collection on Mon 8/05 sample retrieval on Wed 8/07. 4 working days between sample collection on Fri 8/09 sample retrieval on Thu 8/15. 2 working days between sample collection on Tue 9/10 sample retrieval on Thu 9/12.
E026	1	0	1	3 working days between sample collection on Thu 9/12 sample retrieval on Tue 9/17.
E030	2	1	1	1 working day between sample collection on Fri 7/12 sample retrieval on Mon 7/15. 11 working days between sample collection on Thu 9/12 sample retrieval on Fri 9/27.
E038	5	1	4	1 working day between sample collection on Fri 6/14 sample retrieval on Mon 6/17. 7 working days between sample collection on Sun 6/30 sample retrieval on Tue 7/09. 3 working days between sample collection on Fri 7/12 sample retrieval on Wed 7/17. 3 working days between sample collection on Sun 7/28 sample retrieval on Wed 7/31. 4 working days between sample collection on Mon 8/05 sample retrieval on Fri 8/09.

Table 2.6-1 (continued)

Location	Count of Sampled Storm Events	Count Retrieved on First Working Day	Count Retrieved after First Working Day	Comment
E039.1	9	2	7	1 working day between sample collection on Fri 6/14 sample retrieval on Mon 6/17. 7 working days between sample collection on Sun 6/30 sample retrieval on Tue 7/09. 3 working days between sample collection on Fri 7/12 sample retrieval on Wed 7/17. 3 working days between sample collection on Sun 7/28 sample retrieval on Wed 7/31. 5 working days between sample collection on Sun 8/04 sample retrieval on Fri 8/09. 1 working day between sample collection on Fri 8/09 sample retrieval on Mon 8/12. 2 working days between sample collection on Tue 9/10 sample retrieval on Thu 9/12. 11 working days between sample collection on Thu 9/12 sample retrieval on Fri 9/27. 2 working days between sample collection on Tue 11/05 sample retrieval on Thu 11/07.
E040	4	0	4	3 working days between sample collection on Fri 7/12 sample retrieval on Wed 7/17. 2 working days between sample collection on Mon 8/05 sample retrieval on Wed 8/07. 2 working days between sample collection on Tue 9/10 sample retrieval on Thu 9/12. 11 working days between sample collection on Thu 9/12 sample retrieval on Fri 9/27.
E042.1	3	3	0	1 working day between sample collection on Fri 7/12 sample retrieval on Mon 7/15. 1 working day between sample collection on Mon 8/05 sample retrieval on Tue 8/06. 1 working day between sample collection on Tue 9/10 sample retrieval on Wed 9/11.
E050.1	5	4	1	1 working day between sample collection on Fri 7/12 sample retrieval on Mon 7/15. 1 working day between sample collection on Mon 8/05 sample retrieval on Tue 8/06. 1 working day between sample collection on Tue 9/10 sample retrieval on Wed 9/11. 0 working day between sample collection on Wed 9/11 sample retrieval on Wed 9/11. 3 working days between sample collection on Thu 9/12 sample retrieval on Tue 9/17.

Table 2.6-1 (continued)

Location	Count of Sampled Storm Events	Count Retrieved on First Working Day	Count Retrieved after First Working Day	Comment
E055	2	1	1	1 working day between sample collection on Fri 6/14 sample retrieval on Mon 6/17. 4 working days between sample collection on Thu 9/12 sample retrieval on Wed 9/18.
E055.5	2	0	2	2 working days between sample collection on Fri 7/12 sample retrieval on Tue 7/16. 3 working days between sample collection on Fri 9/13 sample retrieval on Wed 9/18.
E056	4	1	3	1 working day between sample collection on Fri 6/14 sample retrieval on Mon 6/17. 2 working days between sample collection on Fri 7/12 sample retrieval on Tue 7/16. 2 working days between sample collection on Mon 8/05 sample retrieval on Wed 8/07. 4 working days between sample collection on Thu 9/12 sample retrieval on Wed 9/18.
E109.9	10	8	2	1 working day between sample collection on Mon 7/08 sample retrieval on Tue 7/09. 1 working day between sample collection on Fri 7/12 sample retrieval on Mon 7/15. 1 working day between sample collection on Sat 7/20 sample retrieval on Mon 7/22. 1 working day between sample collection on Thu 7/25 sample retrieval on Fri 7/26. 0 working days between sample collection on Fri 7/26 sample retrieval on Fri 7/26. 1 working day between sample collection on Fri 7/26 sample retrieval on Mon 7/29. 1 working day between sample collection on Sat 8/03 sample retrieval on Mon 8/05. 1 working day between sample collection on Mon 8/05 sample retrieval on Tue 8/06. 23 working days between sample collection on Fri 8/09 sample retrieval on Wed 9/11. 8 working days between sample collection on Thu 9/12 sample retrieval on Tue 9/24.

Table 2.6-2
Gage Station Operational Issues during the 2013 Monitoring Year

Station	Operational Issue	Issue Date	Repair Date	Working Days from Issue to Repair	Potential Discharge above Trigger
E026	Silting in stilling well.	9/3/2013	1/23/2014	74	9/22/2013
E030	Silting in stilling well.	9/11/2013	9/27/2013	12	9/22/2013
E038	None				None
E039.1	Encoder tape dislodged from wheel during high flow event.	7/12/2013	7/17/2013	3	None
E040	Silting in channel.	7/12/2013	7/17/2013	3	None
	Silting in channel.	7/26/2013	8/7/2013	8	8/5/2013
	Silting in channel.	8/9/2013	8/15/2013	4	None
	Silting in channel.	9/11/2013	9/12/2013	1	9/11/2013
	Large boulders and rock under probe.	9/13/2013	2/20/2014	88	9/18/2013, 9/22/2013
E042.1	Sutron malfunction	7/8/2013	7/8/2013	0	None
	Silting	7/12/2013	7/15/2013	1	None
	Silting	7/25/2013	8/7/2013	8	7/26/2013, 7/27/2013, 7/28/2013
	Sutron power failure	8/19/2013	8/19/2013	0	None
	Major station damage from high-flow event.	9/13/2013	9/20/2013	5	9/14/2013
E050.1	Encoder shifted.	8/6/2013	8/6/2013	0	none
	Silting	9/13/2013	9/20/2013	5	9/14/2013
E055	None				None
E055.5	None				None
E056	Silting	None	6/17/2013	1	none
	Silting, Sutron malfunction	None	9/18/2013	3	none
E059	Major station damage from high-flow event. Greenlee, ISCOs, and batteries are washed 1 mile downstream.	None	11/13/2013	27	none

Table 2.6-2 (continued)

Station	Operational Issue	Issue Date	Repair Date	Working Days from Issue to Repair	Potential Discharge above Trigger
E060.1	Major station damage from high-flow event.	9/13/2013	9/19/2013	4	none
E109.9	Sutron malfunction	6/25/2013	6/26/2013	1	none
	Silting.	7/8/2013	7/9/2013	1	none
	Encoder tape dislodged during MSS maintenance.	7/10/2013	7/10/2013	0	none
	Encoder tape dislodged during MSS maintenance.	7/12/2013	7/15/2013	1	none
	Sutron malfunction.	7/21/2013	7/22/2013	1	none
	Silting.	7/26/2013	7/29/2013	1	none
	Silting.	8/3/2013	8/5/2013	1	none
	Silting.	8/5/2013	8/6/2013	1	none
	Major station damage from high-flow event.	9/13/2013	No repair	Not applicable	Unknown

Table 2.6-3
Gaging Station and Sampler Inspection Intervals

Gage Station	Inspection Date	Days from Previous Inspection
CO101038	06-Nov-12	Initial
CO101038	13-Nov-12	7
CO101038	21-Nov-12	8
CO101038	28-Nov-12	7
CO101038	12-Dec-12	14
CO101038	28-May-13	167
CO101038	12-Jun-13	15
CO101038	17-Jun-13	5
CO101038	09-Jul-13	22
CO101038	15-Jul-13	6
CO101038	30-Jul-13	15
CO101038	07-Aug-13	8
CO101038	15-Aug-13	8
CO101038	21-Aug-13	0
CO101038	05-Sep-13	15
CO101038	12-Sep-13	7
CO101038	17-Sep-13	5
CO101038	05-Nov-13	49
CO111041	06-Nov-12	Initial
CO111041	13-Nov-12	7
CO111041	21-Nov-12	8
CO111041	28-Nov-12	7
CO111041	12-Dec-12	14
CO111041	28-May-13	167
CO111041	12-Jun-13	15
CO111041	17-Jun-13	5
CO111041	09-Jul-13	22
CO111041	15-Jul-13	6
CO111041	30-Jul-13	15
CO111041	07-Aug-13	8
CO111041	15-Aug-13	8
CO111041	21-Aug-13	6
CO111041	05-Sep-13	15
CO111041	12-Sep-13	7
CO111041	17-Sep-13	5
CO111041	05-Nov-13	49
E026	08-Nov-12	Initial
E026	15-Nov-12	7

Table 2.6-3 (continued)

Gage Station	Inspection Date	Days from Previous Inspection
E026	19-Nov-12	4
E026	19-Nov-12	0
E026	29-Nov-12	10
E026	12-Dec-12	13
E026	23-Jan-13	42
E026	05-Feb-13	13
E026	13-Mar-13	36
E026	09-Apr-13	27
E026	28-May-13	49
E026	31-May-13	3
E026	10-Jun-13	10
E026	28-Jun-13	18
E026	08-Jul-13	10
E026	26-Jul-13	18
E026	31-Jul-13	5
E026	09-Aug-13	9
E026	15-Aug-13	6
E026	04-Sep-13	20
E026	05-Sep-13	1
E026	17-Sep-13	12
E026	30-Sep-13	13
E026	01-Oct-13	1
E026	05-Nov-13	35
E026	02-Dec-13	27
E026	23-Dec-13	21
E030	05-Nov-12	Initial
E030	13-Nov-12	8
E030	19-Nov-12	6
E030	19-Nov-12	0
E030	27-Nov-12	8
E030	05-Dec-12	8
E030	22-Jan-13	48
E030	28-Jan-13	6
E030	05-Feb-13	8
E030	13-Mar-13	36
E030	03-Apr-13	21
E030	28-May-13	55
E030	31-May-13	3

Table 2.6-3 (continued)

Gage Station	Inspection Date	Days from Previous Inspection
E030	10-Jun-13	10
E030	28-Jun-13	18
E030	08-Jul-13	10
E030	08-Jul-13	0
E030	15-Jul-13	7
E030	31-Jul-13	16
E030	07-Aug-13	7
E030	15-Aug-13	8
E030	04-Sep-13	20
E030	05-Sep-13	1
E030	20-Sep-13	15
E030	27-Sep-13	7
E030	30-Sep-13	3
E030	01-Oct-13	1
E030	07-Nov-13	37
E030	02-Dec-13	25
E030	11-Dec-13	9
E038	06-Nov-12	Initial
E038	15-Nov-12	9
E038	21-Nov-12	6
E038	21-Nov-12	0
E038	27-Nov-12	6
E038	28-Nov-12	1
E038	12-Dec-12	14
E038	30-Jan-13	49
E038	19-Feb-13	20
E038	11-Mar-13	20
E038	11-Apr-13	31
E038	30-May-13	49
E038	31-May-13	1
E038	12-Jun-13	12
E038	17-Jun-13	5
E038	28-Jun-13	11
E038	09-Jul-13	11
E038	17-Jul-13	8
E038	31-Jul-13	14
E038	31-Jul-13	0
E038	09-Aug-13	9

Table 2.6-3 (continued)

Gage Station	Inspection Date	Days from Previous Inspection
E038	12-Aug-13	3
E038	04-Sep-13	23
E038	06-Sep-13	2
E038	20-Sep-13	14
E038	27-Sep-13	7
E038	30-Sep-13	3
E038	01-Oct-13	1
E038	07-Nov-13	37
E038	02-Dec-13	25
E038	24-Dec-13	22
E039.1	06-Nov-12	Initial
E039.1	13-Nov-12	7
E039.1	21-Nov-12	8
E039.1	21-Nov-12	0
E039.1	27-Nov-12	6
E039.1	12-Dec-12	15
E039.1	30-Jan-13	49
E039.1	19-Feb-13	20
E039.1	11-Mar-13	20
E039.1	11-Apr-13	31
E039.1	29-May-13	48
E039.1	31-May-13	2
E039.1	12-Jun-13	12
E039.1	17-Jun-13	5
E039.1	28-Jun-13	11
E039.1	09-Jul-13	11
E039.1	17-Jul-13	8
E039.1	31-Jul-13	14
E039.1	31-Jul-13	0
E039.1	09-Aug-13	9
E039.1	12-Aug-13	3
E039.1	04-Sep-13	23
E039.1	06-Sep-13	2
E039.1	12-Sep-13	6
E039.1	27-Sep-13	15
E039.1	30-Sep-13	3
E039.1	01-Oct-13	1
E039.1	06-Nov-13	36

Table 2.6-3 (continued)

Gage Station	Inspection Date	Days from Previous Inspection
E039.1	02-Dec-13	26
E039.1	04-Dec-13	2
E039.1	24-Dec-13	20
E040	05-Nov-12	Initial
E040	13-Nov-12	8
E040	19-Nov-12	6
E040	19-Nov-12	0
E040	27-Nov-12	8
E040	03-Dec-12	6
E040	18-Dec-12	15
E040	03-Jan-13	16
E040	22-Jan-13	19
E040	05-Feb-13	14
E040	13-Mar-13	36
E040	09-Apr-13	27
E040	08-May-13	29
E040	31-May-13	23
E040	10-Jun-13	10
E040	28-Jun-13	18
E040	08-Jul-13	10
E040	17-Jul-13	9
E040	31-Jul-13	14
E040	07-Aug-13	7
E040	15-Aug-13	8
E040	04-Sep-13	20
E040	05-Sep-13	1
E040	12-Sep-13	7
E040	27-Sep-13	15
E040	30-Sep-13	3
E040	01-Oct-13	1
E040	07-Nov-13	37
E040	02-Dec-13	25
E040	11-Dec-13	9
E042.1	05-Nov-12	Initial
E042.1	13-Nov-12	8
E042.1	19-Nov-12	6
E042.1	19-Nov-12	0
E042.1	27-Nov-12	8

Table 2.6-3 (continued)

Gage Station	Inspection Date	Days from Previous Inspection
E042.1	28-Nov-12	1
E042.1	05-Dec-12	7
E042.1	22-Jan-13	48
E042.1	24-Jan-13	2
E042.1	05-Feb-13	12
E042.1	06-Mar-13	29
E042.1	09-Apr-13	34
E042.1	23-May-13	44
E042.1	31-May-13	8
E042.1	06-Jun-13	6
E042.1	28-Jun-13	22
E042.1	08-Jul-13	10
E042.1	15-Jul-13	7
E042.1	30-Jul-13	15
E042.1	31-Jul-13	1
E042.1	07-Aug-13	7
E042.1	15-Aug-13	8
E042.1	19-Aug-13	4
E042.1	04-Sep-13	16
E042.1	05-Sep-13	1
E042.1	11-Sep-13	6
E042.1	20-Sep-13	9
E042.1	27-Sep-13	7
E042.1	30-Sep-13	3
E042.1	01-Oct-13	1
E042.1	06-Nov-13	36
E042.1	02-Dec-13	26
E042.1	04-Dec-13	2
E042.1	11-Dec-13	7
E050.1	05-Nov-12	Initial
E050.1	13-Nov-12	8
E050.1	20-Nov-12	7
E050.1	28-Nov-12	8
E050.1	28-Nov-12	0
E050.1	05-Dec-12	7
E050.1	12-Dec-12	7
E050.1	18-Dec-12	6
E050.1	03-Jan-13	16

Table 2.6-3 (continued)

Gage Station	Inspection Date	Days from Previous Inspection
E050.1	09-Jan-13	6
E050.1	17-Jan-13	8
E050.1	22-Jan-13	5
E050.1	28-Jan-13	6
E050.1	05-Feb-13	8
E050.1	12-Feb-13	7
E050.1	21-Feb-13	9
E050.1	27-Feb-13	6
E050.1	06-Mar-13	7
E050.1	13-Mar-13	7
E050.1	19-Mar-13	6
E050.1	26-Mar-13	7
E050.1	03-Apr-13	8
E050.1	09-Apr-13	6
E050.1	16-Apr-13	7
E050.1	17-Apr-13	1
E050.1	22-Apr-13	5
E050.1	29-Apr-13	7
E050.1	07-May-13	8
E050.1	13-May-13	6
E050.1	17-May-13	4
E050.1	22-May-13	5
E050.1	28-May-13	6
E050.1	04-Jun-13	7
E050.1	06-Jun-13	2
E050.1	13-Jun-13	7
E050.1	20-Jun-13	7
E050.1	26-Jun-13	6
E050.1	28-Jun-13	2
E050.1	01-Jul-13	3
E050.1	08-Jul-13	7
E050.1	15-Jul-13	7
E050.1	25-Jul-13	10
E050.1	29-Jul-13	4
E050.1	31-Jul-13	2
E050.1	06-Aug-13	6
E050.1	15-Aug-13	9
E050.1	23-Aug-13	8

Table 2.6-3 (continued)

Gage Station	Inspection Date	Days from Previous Inspection
E050.1	28-Aug-13	5
E050.1	04-Sep-13	7
E050.1	06-Sep-13	2
E050.1	11-Sep-13	5
E050.1	17-Sep-13	6
E050.1	20-Sep-13	3
E050.1	27-Sep-13	7
E050.1	30-Sep-13	3
E050.1	01-Oct-13	1
E050.1	04-Oct-13	3
E050.1	11-Oct-13	7
E050.1	15-Oct-13	4
E050.1	24-Oct-13	9
E050.1	05-Nov-13	12
E050.1	15-Nov-13	10
E050.1	20-Nov-13	5
E050.1	26-Nov-13	6
E050.1	02-Dec-13	6
E050.1	06-Dec-13	4
E050.1	09-Dec-13	3
E050.1	19-Dec-13	10
E050.1	20-Dec-13	1
E050.1	23-Dec-13	3
E055	02-Nov-12	Initial
E055	07-Nov-12	5
E055	15-Nov-12	8
E055	21-Nov-12	6
E055	21-Nov-12	0
E055	29-Nov-12	8
E055	13-Dec-12	14
E055	23-Jan-13	41
E055	13-Feb-13	21
E055	18-Mar-13	33
E055	01-Apr-13	14
E055	29-May-13	58
E055	31-May-13	2
E055	13-Jun-13	13
E055	17-Jun-13	4

Table 2.6-3 (continued)

Gage Station	Inspection Date	Days from Previous Inspection
E055	28-Jun-13	11
E055	11-Jul-13	13
E055	16-Jul-13	5
E055	31-Jul-13	15
E055	07-Aug-13	7
E055	15-Aug-13	8
E055	04-Sep-13	20
E055	06-Sep-13	2
E055	16-Sep-13	10
E055	18-Sep-13	2
E055	30-Sep-13	12
E055	01-Oct-13	1
E055	06-Nov-13	36
E055	02-Dec-13	26
E055	20-Dec-13	18
E055.5	02-Nov-12	Initial
E055.5	06-Nov-12	4
E055.5	16-Nov-12	10
E055.5	16-Nov-12	0
E055.5	21-Nov-12	5
E055.5	28-Nov-12	7
E055.5	13-Dec-12	15
E055.5	04-Jan-13	22
E055.5	07-Jan-13	3
E055.5	14-Jan-13	7
E055.5	23-Jan-13	9
E055.5	20-Feb-13	28
E055.5	18-Mar-13	26
E055.5	01-Apr-13	14
E055.5	25-Apr-13	24
E055.5	30-May-13	35
E055.5	31-May-13	1
E055.5	13-Jun-13	13
E055.5	20-Jun-13	7
E055.5	28-Jun-13	8
E055.5	11-Jul-13	13
E055.5	16-Jul-13	5
E055.5	31-Jul-13	15

Table 2.6-3 (continued)

Gage Station	Inspection Date	Days from Previous Inspection
E055.5	09-Aug-13	9
E055.5	15-Aug-13	6
E055.5	04-Sep-13	20
E055.5	06-Sep-13	2
E055.5	18-Sep-13	12
E055.5	30-Sep-13	12
E055.5	30-Sep-13	0
E055.5	01-Oct-13	1
E055.5	06-Nov-13	36
E055.5	02-Dec-13	26
E055.5	10-Dec-13	8
E056	02-Nov-12	Initial
E056	07-Nov-12	5
E056	15-Nov-12	8
E056	21-Nov-12	6
E056	21-Nov-12	0
E056	28-Nov-12	7
E056	29-Nov-12	1
E056	13-Dec-12	14
E056	23-Jan-13	41
E056	13-Feb-13	21
E056	18-Mar-13	33
E056	01-Apr-13	14
E056	29-May-13	58
E056	31-May-13	2
E056	13-Jun-13	13
E056	17-Jun-13	4
E056	28-Jun-13	11
E056	11-Jul-13	13
E056	16-Jul-13	5
E056	31-Jul-13	15
E056	07-Aug-13	7
E056	15-Aug-13	8
E056	04-Sep-13	20
E056	06-Sep-13	2
E056	18-Sep-13	12
E056	30-Sep-13	12
E056	01-Oct-13	1

Table 2.6-3 (continued)

Gage Station	Inspection Date	Days from Previous Inspection
E056	06-Nov-13	36
E056	02-Dec-13	26
E056	20-Dec-13	18
E059	06-Nov-12	Initial
E059	15-Nov-12	9
E059	19-Nov-12	4
E059	19-Nov-12	0
E059	28-Nov-12	9
E059	05-Dec-12	7
E059	28-Jan-13	54
E059	13-Feb-13	16
E059	18-Mar-13	33
E059	01-Apr-13	14
E059	13-May-13	42
E059	31-May-13	18
E059	06-Jun-13	6
E059	28-Jun-13	22
E059	11-Jul-13	13
E059	26-Jul-13	15
E059	31-Jul-13	5
E059	09-Aug-13	9
E059	15-Aug-13	6
E059	04-Sep-13	20
E059	06-Sep-13	2
E059	20-Sep-13	14
E059	26-Sep-13	6
E059	30-Sep-13	4
E059	01-Oct-13	1
E059	13-Nov-13	43
E059	02-Dec-13	19
E059	13-Dec-13	11
E059	23-Dec-13	10
E060.1	02-Nov-12	Initial
E060.1	05-Nov-12	3
E060.1	13-Nov-12	8
E060.1	20-Nov-12	7
E060.1	28-Nov-12	8
E060.1	05-Dec-12	7

Table 2.6-3 (continued)

Gage Station	Inspection Date	Days from Previous Inspection
E060.1	12-Dec-12	7
E060.1	18-Dec-12	6
E060.1	04-Jan-13	17
E060.1	09-Jan-13	5
E060.1	17-Jan-13	8
E060.1	24-Jan-13	7
E060.1	28-Jan-13	4
E060.1	06-Feb-13	9
E060.1	12-Feb-13	6
E060.1	21-Feb-13	9
E060.1	25-Feb-13	4
E060.1	06-Mar-13	9
E060.1	13-Mar-13	7
E060.1	19-Mar-13	6
E060.1	26-Mar-13	7
E060.1	03-Apr-13	8
E060.1	09-Apr-13	6
E060.1	17-Apr-13	8
E060.1	17-Apr-13	0
E060.1	22-Apr-13	5
E060.1	29-Apr-13	7
E060.1	07-May-13	8
E060.1	13-May-13	6
E060.1	22-May-13	9
E060.1	28-May-13	6
E060.1	31-May-13	3
E060.1	06-Jun-13	6
E060.1	13-Jun-13	7
E060.1	20-Jun-13	7
E060.1	26-Jun-13	6
E060.1	28-Jun-13	2
E060.1	01-Jul-13	3
E060.1	10-Jul-13	9
E060.1	17-Jul-13	7
E060.1	25-Jul-13	8
E060.1	29-Jul-13	4
E060.1	31-Jul-13	2
E060.1	09-Aug-13	9

Table 2.6-3 (continued)

Gage Station	Inspection Date	Days from Previous Inspection
E060.1	15-Aug-13	6
E060.1	23-Aug-13	8
E060.1	28-Aug-13	5
E060.1	04-Sep-13	7
E060.1	06-Sep-13	2
E060.1	11-Sep-13	5
E060.1	20-Sep-13	9
E060.1	27-Sep-13	7
E060.1	30-Sep-13	3
E060.1	01-Oct-13	1
E060.1	04-Oct-13	3
E060.1	11-Oct-13	7
E060.1	15-Oct-13	4
E060.1	24-Oct-13	9
E060.1	05-Nov-13	12
E060.1	15-Nov-13	10
E060.1	22-Nov-13	7
E060.1	26-Nov-13	4
E060.1	02-Dec-13	6
E060.1	06-Dec-13	4
E060.1	12-Dec-13	6
E060.1	18-Dec-13	6
E060.1	20-Dec-13	2
E060.1	24-Dec-13	4
E109.9	06-Nov-12	Initial
E109.9	07-Nov-12	1
E109.9	13-Nov-12	6
E109.9	20-Nov-12	7
E109.9	28-Nov-12	8
E109.9	28-Nov-12	0
E109.9	05-Dec-12	7
E109.9	12-Dec-12	7
E109.9	18-Dec-12	6
E109.9	04-Jan-13	17
E109.9	04-Jan-13	0
E109.9	09-Jan-13	5
E109.9	17-Jan-13	8
E109.9	24-Jan-13	7

Table 2.6-3 (continued)

Gage Station	Inspection Date	Days from Previous Inspection
E109.9	28-Jan-13	4
E109.9	05-Feb-13	8
E109.9	12-Feb-13	7
E109.9	21-Feb-13	9
E109.9	27-Feb-13	6
E109.9	06-Mar-13	7
E109.9	13-Mar-13	7
E109.9	19-Mar-13	6
E109.9	25-Mar-13	6
E109.9	03-Apr-13	9
E109.9	09-Apr-13	6
E109.9	16-Apr-13	7
E109.9	22-Apr-13	6
E109.9	29-Apr-13	7
E109.9	02-May-13	3
E109.9	09-May-13	7
E109.9	15-May-13	6
E109.9	17-May-13	2
E109.9	22-May-13	5
E109.9	29-May-13	7
E109.9	31-May-13	2
E109.9	05-Jun-13	5
E109.9	13-Jun-13	8
E109.9	20-Jun-13	7
E109.9	21-Jun-13	1
E109.9	26-Jun-13	5
E109.9	28-Jun-13	2
E109.9	01-Jul-13	3
E109.9	08-Jul-13	7
E109.9	09-Jul-13	1
E109.9	10-Jul-13	1
E109.9	15-Jul-13	5
E109.9	19-Jul-13	4
E109.9	23-Jul-13	4
E109.9	26-Jul-13	3
E109.9	30-Jul-13	4
E109.9	31-Jul-13	1
E109.9	01-Aug-13	1

Table 2.6-3 (continued)

Gage Station	Inspection Date	Days from Previous Inspection
E109.9	05-Aug-13	4
E109.9	06-Aug-13	1
E109.9	15-Aug-13	9
E109.9	04-Sep-13	20
E109.9	11-Sep-13	7
E109.9	20-Sep-13	9
E109.9	24-Sep-13	4

Table 3.1-1
Drainage Areas, Impermeable Surface Percentages, and
Las Conchas Fire Burn Areas in the Los Alamos Canyon Watershed

Canyon	Gage	Drainage to Gage (acres)	Impermeable Surface (%) ^a	Las Conchas Fire, High- and Moderate- Burn Severity (%)
Acid	E055.5	53	81	0
Acid ^b	E056	237	70	0
Acid	Acid Canyon above E056	290	72	0
Pueblo	E055	2191	25	0
Pueblo ^b	E059	1827	39	0
Pueblo ^b	E060.1	1006	8	0
Pueblo	Pueblo Canyon above E060.1	5310	29	0
DP	E038	144	88	0
DP ^b	E039.1	112	29	0
DP ^b	E040	133	24	0
DP	DP Canyon above E039.1	256	62	0
DP	DP Canyon above E040	388	49	0
LA	E026	4534	2	42
LA ^b	E030	960	30	0
LA ^b	E042.1	601	12	0
LA ^b	E050.1	195	11	0
LA ^b	E109.9 (including Guaje Canyon)	25,800	8	12
LA	Los Alamos Canyon above E050.1	6680	10	29
LA	Los Alamos, Pueblo, and Guaje Canyons above E109.9	37,800	11	13
LA ^b	Los Alamos Canyon between E050.1, E060.1, and E109.9	4761	19	0
Guaje	E099	21,000	5	15

^a Percent of impermeable surface does not account for hydrophobic soils in the Las Conchas burn area.

^b Drainage area shown in this row does not extend to head of watershed above gage, excluding areas of subwatersheds that are also shown in this table.

Table 3.2-1
Travel Time of Flood Bore, Peak Discharge, Increase or Decrease in Peak Discharge, and Percent Change
in Peak Discharge from Upstream to Downstream Stations for Sampled 2013 Runoff Events in Lower LA/P Watershed

Date	Travel Time from E050.1 to E109.9 (min)	Peak Discharge ^a (cfs)		+/- ^b	% ^b	Travel Time from E060.1 to E109.9 (min)	Peak Discharge (cfs)		+/-	%	Travel Time from E099 to E109.9 (min)	Peak Discharge (cfs)		+/-	%
		E050.1	E109.9				E060.1	E109.9				E099	E109.9		
6/14	— ^c	0	0.1	N	N	—	0	0.1	N	N	—	0	0.1	N	N
6/30	—	0	3.2	+	100	—	0	3.2	+	100	-10	3.2	3.2	G	G
7/5	—	0	0.1	N	N	—	0	0.1	N	N	—	0	0.1	N	N
7/8	—	0	110	+	100	—	0	110	+	100	5	32	110	+	72
7/12	30	32	180	+	82	—	0	180	+	100	-15	230	180	G	G
	—	0.1	170	+	100	—	0	170	+	100	-20	38	170	G	G
7/13	—	0	120	+	100	—	0	120	+	100	—	0	120	+	100
	—	0	250	+	100	—	0	250	+	100	0	1100	250	—	77
7/20-7/21	—	0	810	+	100	—	0	810	+	100	10	480	810	+	40
7/25	—	0	100	+	100	—	0	100	+	100	-15	10	100	G	G
7/26	—	0.1	160	+	100	—	0	160	+	100	—	0	160	+	100
7/27	—	0	0.1	N	N	—	0	0.1	N	N	—	0	0.1	N	N
7/28	—	0	70	+	100	—	0	70	+	100	—	0.1	70	+	100
8/3	—	0	950	+	100	—	0	950	+	100	—	0	950	+	100
8/4	—	0	68	N	N	—	0	68	N	N	—	0	68	+	100
8/5	25	20	1000	+	98	—	1.7	1000	+	100	0	340	1000	+	66
8/9	—	0	270	+	100	—	0	270	+	100	10	360	270	—	25
8/20	—	0	42	+	100	—	0	42	+	100	20	14	42	+	67
8/30	—	0	150	+	100	—	0	150	+	100	35	24	150	+	84
9/2	—	0	310	+	100	—	0	310	+	100	10	430	310	-	28
9/10	—	0	100	+	100	—	0	100	+	100	—	0	100	+	100
	—	0	120	+	100	—	0	120	+	100	20	1.0	120	+	99
	70	11	130	+	92	—	0	130	+	100	—	0.1	130	+	100
9/11	65	16	65	+	75	—	0	65	+	100	—	0.1	65	+	100

Table 3.2-1 (continued)

Date	Travel Time from E050.1 to E109.9 (min)	Peak Discharge ^a (cfs)		+/- ^b	% ^b	Travel Time from E060.1 to E109.9 (min)	Peak Discharge (cfs)		+/-	%	Travel Time from E099 to E109.9 (min)	Peak Discharge (cfs)		+/-	%
		E050.1	E109.9				E060.1	E109.9				E099	E109.9		
9/12	—	0.1	520	+	100	—	0.1	520	+	100	10	4.0	520	+	99
	-15	87	470	G	81	—	0	470	+	100	15	44	470	+	91
	40	67	350	G	G	—	0	350	+	100	-135	350	350	G	G
9/13	15	740	5000	+	85	60	1400	5000	+	73	10	1600	5000	+	68
9/14	—	48	n/a ^d	n/a	n/a	—	—	n/a	n/a	n/a	—	—	n/a	n/a	n/a
9/18	—	1.4	n/a	n/a	n/a	—	—	n/a	n/a	n/a	—	—	n/a	n/a	n/a
9/21	—	8.1	n/a	n/a	n/a	—	5.7	n/a	n/a	n/a	—	—	n/a	n/a	n/a
9/22–9/23	—	34	n/a	n/a	n/a	—	2.2	n/a	n/a	n/a	—	—	n/a	n/a	n/a
10/3-10/4	—	6.7	n/a	n/a	n/a	—	0	n/a	n/a	n/a	—	—	n/a	n/a	n/a
11/5	—	3.2	n/a	n/a	n/a	—	1.6	n/a	n/a	n/a	—	—	n/a	n/a	n/a
Min	-15	0	0	—	75	—	0	0	—	72	-135	0	0	—	25
Mean	33	32	411	—	96	—	44	411	—	99	-3	181	411	—	81
Max	70	740	5000	—	100	—	1400	5000	—	100	35	1600	5000	—	100

^a Peak discharge is not the peak of the entire storm (see Table 2.3-1 for the storm peak), but is the peak discharge estimated to align with the transmission of water from the upstream to downstream station.

^b + = Increase; – = decrease; % = percent change in peak discharge; N = little to no change in peak discharge; G = negative travel time (i.e., peak of downstream station occurred before peak of upstream station).

^c — = Result not applicable.

^d n/a = Not available due to maintenance issues.

Table 3.2-2
Summary of Peak Discharge Increases/Decreases in Lower LA/P Watershed

Year	Summary	E050.1 to E109.9	E060.1 to E109.9	E099 to E109.9
2013	Number of Increases	23	24	17
	Number of Decreases	0	0	3
	Mean Increase	96%	99%	87%
	Mean Decrease	0%	0%	43%
2012	Number of Increases	10	14	13
	Number of Decreases	1	0	3
	Mean Increase	74%	100%	75%
	Mean Decrease	16%	0%	22%
2011	Number of Increases	19	22	n/a
	Number of Decreases	4	0	n/a
	Mean Increase	90%	100%	n/a
	Mean Decrease	78%	0%	n/a
2010	Number of Increases	2	3	n/a
	Number of Decreases	2	1	n/a
	Mean Increase	59%	100%	n/a
	Mean Decrease	84%	28%	n/a

Table 3.2-3
Pearson's Correlation Coefficients between Post-Flood-Bore Discharge (Q) and SSC for Each Station Sampled during 2013

Time Lag	E038						E039.1				
	6/14	6/30	7/12	7/28	8/5	8/9	6/14	6/30	7/12	7/28	8/4
Q_t, TSS_t	0.99	0.64	0.79	0.95	0.98	0.93	0.95	0.98	0.82	0.94	0.50
Q_t, TSS_{t-5}	0.96	0.96	0.36	0.95	1.00	0.94	0.91	0.98	0.84	0.98	n/a*
Q_t, TSS_{t-10}	0.95	0.95	0.42	0.94	1.00	0.97	0.85	0.96	0.83	0.98	n/a
Q_t, TSS_{t-15}	0.94	0.90	0.27	0.93	0.99	n/a	0.90	0.94	0.84	0.97	n/a
Q_t, TSS_{t-20}	0.89	0.90	0.53	0.92	0.99	n/a	0.85	0.92	0.87	0.98	n/a
Q_t, TSS_{t-25}	0.82	0.90	0.45	0.89	n/a	n/a	0.75	0.98	0.86	0.98	n/a
Q_t, TSS_{t-30}	0.82	0.93	0.38	0.90	n/a	n/a	0.71	0.95	0.86	0.98	n/a

Table 3.2-3 (continued)

Time Lag	E039.1 (continued)				E042.1			E050.1			
	8/9	9/10	9/12	11/4 to 5	7/12	8/5	9/10	7/12	8/5	9/10 to 11	9/12
Q _t , TSS _t	0.86	0.50	0.10	-0.15	0.99	0.73	0.67	0.69	0.71	0.77	0.95
Q _t , TSS _{t-5}	n/a	0.03	-0.45	0.39	0.96	0.88	0.73	0.80	0.85	0.70	0.80
Q _t , TSS _{t-10}	n/a	-0.29	-0.45	0.62	0.69	0.81	0.80	0.88	0.88	0.65	0.59
Q _t , TSS _{t-15}	n/a	-0.25	-0.45	0.73	n/a	0.83	0.89	0.87	0.86	0.60	0.37
Q _t , TSS _{t-20}	n/a	-0.16	-0.52	0.79	n/a	0.85	0.85	0.87	0.87	0.40	0.18
Q _t , TSS _{t-25}	n/a	-0.22	-0.32	0.80	n/a	0.71	0.69	0.88	0.86	0.40	0.06
Q _t , TSS _{t-30}	n/a	-0.35	-0.73	0.81	n/a	0.45	0.62	0.87	0.78	0.51	0.02

Time Lag	E099		E109.9							
	7/12	8/5	7/8	7/12	7/20	7/25 to 26	7/26	8/3	8/5	8/9
Q _t , TSS _t	0.20	0.99	0.47	n/a	n/a	0.77	0.76	0.96	-0.79	0.98
Q _t , TSS _{t-5}	-0.45	n/a	0.10	n/a	n/a	0.84	-0.54	0.69	-0.86	0.91
Q _t , TSS _{t-10}	-0.37	n/a	-0.46	n/a	n/a	0.87	-0.19	0.37	-0.54	0.90
Q _t , TSS _{t-15}	0.15	n/a	-0.22	n/a	n/a	0.85	n/a	n/a	-0.15	0.89
Q _t , TSS _{t-20}	0.87	n/a	n/a	n/a	n/a	0.83	n/a	n/a	n/a	0.85
Q _t , TSS _{t-25}	n/a	n/a	n/a	n/a	n/a	0.77	n/a	n/a	n/a	0.87
Q _t , TSS _{t-30}	n/a	n/a	n/a	n/a	n/a	0.26	n/a	n/a	n/a	0.74

Note: Maximum correlations are highlighted.

* n/a = Not applicable because data points are limited (i.e., less than 3).

Table 3.2-4
SSC-Based Sediment Yield and Runoff Volume for Sampled 2012 and 2013 Runoff Events

Station	Date	Sediment Yield (tons)	Sediment Yield (yd ³) ^a	Runoff Volume (acre-feet)	Peak Discharge (cfs)
2012 Runoff Events					
E042.1	10/12/2012	82	37	14	70
E050.1	7/11/2012	9883	4425	8.2	130
E050.1	7/24/2012	60	27	3.5	9.9
E050.1	8/3/2012	2320	1039	15	170
E050.1	9/28/2012	28	13	1.8	7.0
E109.9	7/5/2012	1369	613	5.9	48
E109.9	8/24/2012	2706	1211	11	160
2013 Runoff Events					
E038	6/14/2013	11	5.1	3.0	70
E038	6/30/2013	11	5.0	1.9	120
E038	7/12/2013	87	39	14	330
E038	7/28/2013	4.7	2.1	1.6	74
E038	8/5/2013	25	11	5.1	170
E038	8/9/2013	3.8	1.7	1.3	62
E039.1	6/14/2013	0.6	0.3	1.3	13
E039.1	6/30/2013	0.3	0.1	0.8	11
E039.1	7/12/2013	75	34	16	330
E039.1	7/28/2013	0.8	0.4	1.2	24
E039.1	8/4/2013	0.8	0.4	0.7	12
E039.1	8/9/2013	0.5	0.2	0.9	16
E039.1	9/10/2013	4.4	2.0	5.9	35
E039.1	9/12/2013	3.6	1.6	7.6	77
E039.1	11/5/2013	0.9	0.4	2.2	21
E042.1	7/12/2013	817	366	20	160
E042.1	8/5/2013	29	13	9.4	80
E042.1	9/10/2013	48	21	17	36
E050.1	7/12/2013	39	17	4.3	32
E050.1	8/5/2013	6.1	2.7	1.7	20
E050.1	9/10/2013	4.6	2.1	6.4	11
E050.1	9/12/2013	171	77	33	87
E099	7/12/2013	5748	2574	14	230
E099	8/5/2013	1015	455	6.7	340
E109.9	7/8/2013	3880	1737	12	110
E109.9	7/12/2013 ^b	1326	594	26	180
E109.9	7/20/2013 ^b	24305	10883	67	810

Table 3.2-4 (continued)

Station	Date	Sediment Yield	Sediment Yield	Runoff Volume	Peak Discharge
E109.9	7/25/2013	1639	734	11	100
E109.9	7/26/2013 ^b	515	230	14	160
E109.9	8/3/2013	51060	22862	72	950
E109.9	8/5/2013 ^b	3955	1771	50	1000
E109.9	8/9/2013	8524	3816	34	270

Note: Sediment yield and runoff volume were calculated only from sampled events with reliable hydrographs and sedigraphs. Thus, the September 12, 2013 sampling at E026 and E109.9 were excluded.

^a Volumetric sediment yield was computed using a soil bulk density of 2650 kg/m³ and volume = mass/density.

^b Samples were not collected throughout the entire hydrograph (see Figure 3.2-3); thus, sediment yields may be underestimated.

Table 3.4-1
Travel Time of Flood Bore, Peak Discharge, Increase or Decrease in Peak Discharge, and Percent Change in Peak Discharge
from Upstream to Downstream Stations for 2012 Runoff Events Exceeding Sampling Triggers across the Watershed Mitigations

Date	Travel Time from E038 to E039.1 (min)	Peak Discharge (cfs)		+/- ^a	% ^a	Travel Time from E042.1 to E050.1 (min)	Peak Discharge (cfs)		+/-	%	Travel Time from E059 to E060.1 (min)	Peak Discharge (cfs)		+/-	%
		E038	E039.1				E042.1	E050.1				E059	E060.1		
6/14	75	70	13	—	81	— ^b	—	—	—	—	—	—	—	—	—
6/30	45	120	11	—	91	—	—	—	—	—	—	—	—	—	—
7/5	55	55	7.0	—	87	—	—	—	—	—	—	—	—	—	—
7/8	—	0	0.1	N	N	—	—	—	—	—	—	—	—	—	—
7/12	20	330	330	N	N	45	160	32	—	80	—	7.0	0	—	10
	—	—	—	N	N	—	0.1	0.1	N	N	—	—	—	—	—
7/13	—	18	0	—	99	—	—	—	—	—	—	—	—	—	—
	—	—	—	N	N	—	—	—	—	—	—	—	—	—	—
7/20-7/21	—	0	0.1	N	N	—	—	—	—	—	—	—	—	—	—
7/25	60	13	3.9	—	70	—	2.0	0	-	100	—	—	—	—	—
7/26	50	12	10	—	17	—	17	0.1	-	100	—	—	—	—	—
7/26-7/27	—	0.1	0.1	N	N	—	14	0	-	100	—	—	—	—	—
7/28	35	74	24	—	68	—	31	0.1	-	100	—	—	—	—	—
8/3	—	0	0.1	N	N	—	—	—	—	—	—	—	—	—	—
8/4	40	17	12	—	29	—	—	—	—	—	—	—	—	—	—
8/5	20	170	170	N	N	180	80	20	—	75	—	0	1.7	+	10
8/9	35	62	16	—	74	—	0.1	0	N	N	—	—	—	—	—
8/20	—	—	—	N	N	—	—	—	—	—	—	—	—	—	—
8/30	—	—	—	N	N	—	—	—	—	—	—	—	—	—	—
9/2	—	3.8	0	—	100	—	—	—	—	—	—	—	—	—	—
9/10	30	39	35	+	10	—	36	0	—	100	—	—	—	—	—
	35	6.0	7.0	+	14	—	25	0	—	—	—	—	—	—	—
	35	13	18	+	28	40	24	11	—	54	—	—	—	—	—

Table 3.4-1 (continued)

Date	Travel Time from E038 to E039.1 (min)	Peak Discharge (cfs)		+/- ^a	% ^a	Travel Time from E042.1 to E050.1 (min)	Peak Discharge (cfs)		+/-	%	Travel Time from E059 to E060.1 (min)	Peak Discharge (cfs)		+/-	%
		E038	E039.1				E042.1	E050.1				E059	E060.1		
9/11	10	13	18	+	28	-5	26	16	G	G	—	—	—	—	—
9/12	—	—	—	—	—	—	0.1	0.1	N	N	—	0	0.1	N	N
	-10	39	35	G	G	-10	110	87	G	G	—	59	0	—	10
	20	51	77	—	34	20	68	67	—	1	—	13	0	—	10
9/13	20	310	400	+	23	15	740	740	N	N	40	1500	1400	—	7
9/14	45	1.9	3.7	+	49	—	0	48	—	100	—	—	—	—	—
9/18	50	17	18	+	6	—	0	1.4	—	100	—	—	—	—	—
9/21	—	0	0.1	N	N	-10	7.0	8.1	+	14	—	0	5.7	—	10
9/22-9/23	20	45	26	—	42	20	27	34	+	21	—	0	2.2	—	10
10/3-10/4	—	0	0.1	N	N	105	16	7.0	—	56	—	—	—	—	—
11/5	35	17	21	+	19	—	0.1	3.0	+	97	—	0	1.6	—	10
Min	-10	0	0	—	17	45	0	0	—	1	—	0	0	—	7
Mean	35	52	43	—	69	113	83	49	—	73	—	175	1	—	88
Max	75	330	400	—	99	180	740	740	—	100	—	1500	2	—	10

^a + = Increase; - = decrease; % = percent change in peak discharge; N = little to no change in peak discharge; G = negative travel time (i.e., peak of downstream station occurred before peak of upstream station).

^b — = Result not applicable.

Table 4.2-1
NMWQCC Surface Water Standards for 2013

Analytical Suite ^a	Analyte Code	Analyte Name	Field Prep	Acute Aquatic	Chronic Aquatic	Human Health Persistent	Livestock Watering	Wildlife Habitat
DIOX/FUR	n/a ^b	Dioxin (TEQ)	UF ^c	n/a	n/a	5.1E-8	n/a	n/a
METALS	Al	Aluminum	10F ^d	HD ^e	HD	n/a	n/a	n/a
METALS	Sb	Antimony	F ^f	n/a	n/a	640	n/a	n/a
METALS	As	Arsenic	F	340	150	9	200	n/a
METALS	B	Boron	F	n/a	n/a	n/a	5000	n/a
METALS	Cd	Cadmium	F	0.466-1.44 ^g	0.114-0.200	n/a	50	n/a
METALS	Cr	Chromium	F	n/a	n/a	n/a	1000	n/a
METALS	Cr(III)	Chromium(III)	F	169-500	15.5-29.2	n/a	n/a	n/a
METALS	Cr(VI)	Chromium(VI)	F	16	11	n/a	n/a	n/a
METALS	Co	Cobalt	F	n/a	n/a	n/a	1000	n/a
METALS	Cu	Copper	F	3.32-11.6	1.75-3.39	n/a	500	n/a
METALS	Pb	Lead	F	12.4-54.3	0.299-0.716	n/a	100	n/a
METALS	Mn	Manganese	F	1820-2830	873-1130	n/a	n/a	n/a
METALS	Hg	Mercury	F	1.4	0.77	n/a	n/a	n/a
METALS	Hg	Mercury	UF	n/a	n/a	n/a	10	0.77
METALS	Ni	Nickel	F	134-409	10.3-19.9	4600	n/a	n/a
METALS	Se	Selenium	F	n/a	n/a	4200	50	n/a
METALS	Se	Selenium	UF	20	5	n/a	n/a	5
METALS	Ag	Silver	F	0.466-1.44	n/a	n/a	n/a	n/a
METALS	Tl	Thallium	F	n/a	n/a	0.47	n/a	n/a
METALS	V	Vanadium	F	n/a	n/a	n/a	100	n/a
METALS	Zn	Zinc	F	41.5-138	21.3-42.1	26,000	25,000	n/a
WET_CHEM	CN(TOTAL)	Cyanide (Total)	UF	22	5.2	140	n/a	5.2
PCB_CONG	1336-36-3	Total PCB	UF	2	0.014	0.00064	n/a	0.014
RAD	GROSSA	Gross alpha, adjusted	UF	n/a	n/a	n/a	15	n/a
RAD	Ra-226+228	Radium-226 and Radium-228	UF	n/a	n/a	n/a	30	n/a

^a All units are µg/L except for RAD, which are pCi/L.

^b n/a = Not applicable.

^c UF = Unfiltered.

^d 10F = Filtration using 10-µm pore size.

^e HD = Hardness-dependent criteria; however, no samples were filtered using a 10-µm pore size, thus no criteria can be calculated.

^f F = Filtration using 0.45-µm pore size.

^g For hardness-dependent criteria, the minimum and maximum range are presented based on hardness measurements obtained in 2013.

Table 4.2-2
NMWQCC Surface Water Standard Exceedances in 2013

Canyon	Station	Field Sample ID	Sample Collection Date	Parameter	Detect Flag	Parameter Result ^a (µg/L)	Hardness Result (mg/L)	WQ Criteria ^a (µg/L)	Water-Quality Criterion
Los Alamos	E026	WTLAP-13-31159	9/12/2013	Cyanide, total recoverable	Y	0.00729	n/a ^b	0.0052	Wildlife Habitat, Chronic Aquatic Life
Los Alamos	E026	WTLAP-13-31155	9/12/2013	Dioxin (TEQ)	N ^c	0.0000242	n/a	0.000000051	Human Health Organism Only
Los Alamos	E026	WTLAP-13-31139	9/12/2013	Mercury, total	Y	0.798	n/a	0.77	Wildlife Habitat
Los Alamos	E026	WTLAP-13-31163	9/12/2013	Total PCBs	Y	0.034	n/a	0.00064	Human Health Organism Only
Los Alamos	E030	WTLAP-13-39063	7/12/2013	Mercury, total	Y	1.59	n/a	0.77	Wildlife Habitat
Los Alamos	E030	WTLAP-13-39042	7/12/2013	Total PCBs	Y	1.08	n/a	0.00064	Human Health Organism Only
Los Alamos	E030	WTLAP-13-39059	9/12/2013	Dioxin (TEQ)	N	0.000011	n/a	0.000000051	Human Health Organism Only
Los Alamos	E030	WTLAP-13-39064	9/12/2013	Mercury, total	Y	1.81	n/a	0.77	Wildlife Habitat
Los Alamos	E030	WTLAP-13-39064	9/12/2013	Selenium, total recoverable	Y	6.69	n/a	5	Wildlife Habitat, Chronic Aquatic Life
Los Alamos	E030	WTLAP-13-39043	9/12/2013	Total PCBs	Y	0.847	n/a	0.00064	Human Health Organism Only
DP	E038	WTLAP-13-31087	6/14/2013	Copper, dissolved	Y	8.01	43.6	6.15	Acute Aquatic Life
DP	E038	WTLAP-13-31103	6/14/2013	Total PCBs	Y	0.0724	n/a	0.00064	Human Health Organism Only
DP	E038	WTLAP-13-31106	6/30/2013	Total PCBs	Y	0.0371	n/a	0.00064	Human Health Organism Only
DP	E038	WTLAP-13-31107	7/12/2013	Total PCBs	Y	0.0784	n/a	0.00064	Human Health Organism Only
DP	E038	WTLAP-13-31094	7/28/2013	Copper, dissolved	Y	3.79	22.7	3.32	Acute Aquatic Life
DP	E038	WTLAP-13-31110	7/28/2013	Total PCBs	Y	0.0229	n/a	0.00064	Human Health Organism Only
DP	E039.1	WTLAP-13-31088	6/14/2013	Copper, dissolved	Y	7.6	35.3	5.04	Acute Aquatic Life
DP	E039.1	WTLAP-13-31104	6/14/2013	Total PCBs	Y	0.0121	n/a	0.00064	Human Health Organism Only
DP	E039.1	WTLAP-13-31089	6/30/2013	Copper, dissolved	Y	6.1	28.6	4.13	Acute Aquatic Life
DP	E039.1	WTLAP-13-31105	6/30/2013	Total PCBs	Y	0.0136	n/a	0.00064	Human Health Organism Only
DP	E039.1	WTLAP-13-31108	7/12/2013	Total PCBs	Y	0.0295	n/a	0.00064	Human Health Organism Only
DP	E039.1	WTLAP-13-31093	7/28/2013	Copper, dissolved	Y	4.72	26.1	3.79	Acute Aquatic Life
DP	E039.1	WTLAP-13-31109	7/28/2013	Total PCBs	Y	0.0133	n/a	0.00064	Human Health Organism Only

Table 4.2-2 (continued)

Canyon	Station	Field Sample ID	Sample Collection Date	Parameter	Detect Flag	Parameter Result ^a (µg/L)	Hardness Result (mg/L)	WQ Criteria ^a (µg/L)	Water Quality Criterion
DP	E039.1	WTLAP-13-41782	9/10/2013	Total PCBs	Y	0.0435	n/a	0.00064	Human Health Organism Only
DP	E040	WTLAP-13-40573	8/5/2013	Total PCBs	Y	0.0685	n/a	0.00064	Human Health Organism Only
DP	E040	WTLAP-13-41755	9/10/2013	Total PCBs	Y	0.0273	n/a	0.00064	Human Health Organism Only
DP	E040	WTLAP-13-42297	9/12/2013	Dioxin (TEQ)	N	0.0000107	n/a	0.000000051	Human Health Organism Only
DP	E040	WTLAP-13-42294	9/12/2013	Total PCBs	Y	0.0211	n/a	0.00064	Human Health Organism Only
Los Alamos	E042.1	WTLAP-13-39151	7/12/2013	Total PCBs	Y	0.477	n/a	0.00064	Human Health Organism Only
Los Alamos	E042.1	WTLAP-13-30750	8/5/2013	Total PCBs	Y	0.108	n/a	0.00064	Human Health Organism Only
Los Alamos	E042.1	WTLAP-13-30754	8/5/2013	Total PCBs	Y	0.0704	n/a	0.00064	Human Health Organism Only
Los Alamos	E042.1	WTLAP-13-30751	9/10/2013	Total PCBs	Y	0.123	n/a	0.00064	Human Health Organism Only
Los Alamos	E042.1	WTLAP-13-30755	9/10/2013	Total PCBs	Y	0.105	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-13-30861	7/12/2013	Gross alpha, adjusted ^d	Y	77.3	n/a	15	Livestock Watering
Los Alamos	E050.1	WTLAP-13-30837	7/12/2013	Total PCBs	Y	0.41	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-13-30841	7/12/2013	Total PCBs	Y	0.437	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-13-30865	7/12/2013	Total PCBs	Y	0.377	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-13-30862	8/5/2013	Gross alpha, adjusted	Y	32.9	n/a	15	Livestock Watering
Los Alamos	E050.1	WTLAP-13-30838	8/5/2013	Total PCBs	Y	0.218	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-13-30842	8/5/2013	Total PCBs	Y	0.162	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-13-30867	8/5/2013	Total PCBs	Y	0.142	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-13-30863	9/11/2013	Gross alpha, adjusted	Y	24.8	n/a	15	Livestock Watering
Los Alamos	E050.1	WTLAP-13-30839	9/11/2013	Total PCBs	Y	0.108	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-13-30843	9/11/2013	Total PCBs	Y	0.112	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-13-30869	9/11/2013	Total PCBs	Y	0.11	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-13-30864	9/12/2013	Gross alpha, adjusted	Y	470	n/a	15	Livestock Watering

Table 4.2-2 (continued)

Canyon	Station	Field Sample ID	Sample Collection Date	Parameter	Detect Flag	Parameter Result ^a (µg/L)	Hardness Result (mg/L)	WQ Criteria ^a (µg/L)	Water Quality Criterion
Los Alamos	E050.1	WTLAP-13-30840	9/12/2013	Total PCBs	Y	0.16	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-13-30844	9/12/2013	Total PCBs	Y	0.0928	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-13-30871	9/12/2013	Total PCBs	Y	0.0987	n/a	0.00064	Human Health Organism Only
Pueblo	E055	WTLAP-13-30670	6/14/2013	Copper, dissolved	Y	5.36	28.5	3.06	Chronic Aquatic Life
Pueblo	E055	WTLAP-13-30670	6/14/2013	Lead, dissolved	Y	0.842	28.5	0.627	Chronic Aquatic Life
Pueblo	E055	WTLAP-13-30694	6/14/2013	Total PCBs	Y	0.0382	n/a	0.00064	Human Health Organism Only
Pueblo	E055	WTLAP-13-30673	9/12/2013	Copper, dissolved	Y	3.71	29.5	3.16	Chronic Aquatic Life
Pueblo	E055	WTLAP-13-30673	9/12/2013	Lead, dissolved	Y	2.12	29.5	0.652	Chronic Aquatic Life
Pueblo	E055	WTLAP-13-30697	9/12/2013	Total PCBs	Y	0.0789	n/a	0.00064	Human Health Organism Only
Acid	E055.5	WTLAP-13-30671	7/12/2013	Copper, dissolved	Y	3.82	20	2.26	Chronic Aquatic Life
Acid	E055.5	WTLAP-13-30671	7/12/2013	Lead, dissolved	Y	1.91	20	0.421	Chronic Aquatic Life
Acid	E055.5	WTLAP-13-30695	7/12/2013	Total PCBs	Y	0.0624	n/a ^a	0.00064	Human Health Organism Only
Acid	E055.5	WTLAP-13-30674	9/13/2013	Copper, dissolved	Y	2.45	15.5	1.82	Chronic Aquatic Life
Acid	E055.5	WTLAP-13-30674	9/13/2013	Lead, dissolved	Y	1.1	15.5	0.315	Chronic Aquatic Life
Acid	E055.5	WTLAP-13-30698	9/13/2013	Total PCBs	Y	0.0413	n/a	0.00064	Human Health Organism Only
Acid	E056	WTLAP-13-36892	6/14/2013	Copper, dissolved	Y	7.47	32.1	3.39	Chronic Aquatic Life
Acid	E056	WTLAP-13-36892	6/14/2013	Lead, dissolved	Y	3.43	32.1	0.716	Chronic Aquatic Life
Acid	E056	WTLAP-13-36895	7/12/2013	Copper, dissolved	Y	5.11	19.5	2.22	Chronic Aquatic Life
Acid	E056	WTLAP-13-36895	7/12/2013	Lead, dissolved	Y	1.73	19.5	0.409	Chronic Aquatic Life
Acid	E056	WTLAP-13-36901	7/12/2013	Total PCBs	Y	0.062	n/a	0.00064	Human Health Organism Only
Acid	E056	WTLAP-13-36896	8/5/2013	Copper, dissolved	Y	3.64	16.8	1.95	Chronic Aquatic Life
Acid	E056	WTLAP-13-36896	8/5/2013	Lead, dissolved	Y	1.37	16.8	0.345	Chronic Aquatic Life
Acid	E056	WTLAP-13-36902	8/5/2013	Total PCBs	Y	0.0272	n/a	0.00064	Human Health Organism Only

Table 4.2-2 (continued)

Canyon	Station	Field Sample ID	Sample Collection Date	Parameter	Detect Flag	Parameter Result ^a (µg/L)	Hardness Result (mg/L)	WQ Criteria ^a (µg/L)	Water Quality Criterion
Acid	E056	WTLAP-13-36899	9/12/2013	Copper, dissolved	Y	3	14.8	1.75	Chronic Aquatic Life
Acid	E056	WTLAP-13-36899	9/12/2013	Lead, dissolved	Y	1.66	14.8	0.299	Chronic Aquatic Life
Acid	E056	WTLAP-13-36903	9/12/2013	Total PCBs	Y	0.0146	n/a	0.00064	Human Health Organism Only

^a Units for columns "Parameter Result" and "WQ Criteria" are µg/L with the exception of adjusted gross alpha, which is in pCi/L.

^b n/a = Not applicable.

^c Nondetected results that have an MDL greater than the water-quality criteria potentially exceed the water-quality criteria and thus are included in this table.

^d Adjusted gross-alpha activity concentration (pCi/L) is computed as gross-alpha activity concentration (pCi/L) minus 0.667 times total uranium concentration (µg/L). The nearest total uranium result on the hydrograph to the gross-alpha result is used. This methodology is recommended in the "Procedures for Assessing Water Quality Standards Attainment for the State of New Mexico Clean Water Act §303(d)/§305(b) Integrated Report: Assessment Protocol" (see <https://www.env.nm.gov/swqb/protocols/2014/AssessmentProtocol-w-Appendices-2014.pdf>).

Table 4.2-3
Dioxin and Furan TEFs for the Dibenzodioxins and Dibenzofurans

Analyte Code	Analyte	TEF
35822-46-9	Heptachlorodibenzodioxin[1,2,3,4,6,7,8-]	0.01
67562-39-4	Heptachlorodibenzofuran[1,2,3,4,6,7,8-]	0.01
55673-89-7	Heptachlorodibenzofuran[1,2,3,4,7,8,9-]	0.01
39227-28-6	Hexachlorodibenzodioxin[1,2,3,4,7,8-]	0.1
57653-85-7	Hexachlorodibenzodioxin[1,2,3,6,7,8-]	0.1
19408-74-3	Hexachlorodibenzodioxin[1,2,3,7,8,9-]	0.1
70648-26-9	Hexachlorodibenzofuran[1,2,3,4,7,8-]	0.1
57117-44-9	Hexachlorodibenzofuran[1,2,3,6,7,8-]	0.1
72918-21-9	Hexachlorodibenzofuran[1,2,3,7,8,9-]	0.1
60851-34-5	Hexachlorodibenzofuran[2,3,4,6,7,8-]	0.1
3268-87-9	Octachlorodibenzodioxin[1,2,3,4,6,7,8,9-]	0.0003
39001-02-0	Octachlorodibenzofuran[1,2,3,4,6,7,8,9-]	0.0003
40321-76-4	Pentachlorodibenzodioxin[1,2,3,7,8-]	1
57117-41-6	Pentachlorodibenzofuran[1,2,3,7,8-]	0.03
57117-31-4	Pentachlorodibenzofuran[2,3,4,7,8-]	0.3
1746-01-6	Tetrachlorodibenzodioxin[2,3,7,8-]	1
51207-31-9	Tetrachlorodibenzofuran[2,3,7,8-]	0.1

Table 4.2-4
TCDD TEQs in 2013 Storm Water Samples

Station	Collection Date	Sample ID	2,3,7,8-TCDD TEQ (µg/L)
CO101038	7/12/2013	WTLAP-13-39028	0.00001043169
CO101038	9/18/2013	WTLAP-13-30639	0.000000453542
CO111041	6/14/2013	WTLAP-13-30638	0.0001659902
CO111041	6/30/2013	WTLAP-13-30640	0.0000889952
CO111041	7/5/2013	WTLAP-13-30642	0.0000433991
CO111041	7/12/2013	WTLAP-13-39022	0.0004087444
CO111041	7/28/2013	WTLAP-13-39428	0.0001102095
E026	9/12/2013	WTLAP-13-31155	0.000002348
E026	9/12/2013	WTLAP-13-31163	0.000000043069
E030	7/12/2013	WTLAP-13-39042	0.00003488553
E030	9/12/2013	WTLAP-13-39043	0.00000960516
E030	9/12/2013	WTLAP-13-39059	0.0000007496
E038	6/14/2013	WTLAP-13-31103	0.000004322102
E038	6/30/2013	WTLAP-13-31106	0.000002056319
E038	7/12/2013	WTLAP-13-31107	0.000003467393
E038	7/28/2013	WTLAP-13-31110	0.000001139484
E039.1	6/14/2013	WTLAP-13-31104	0.000000028857
E039.1	6/30/2013	WTLAP-13-31105	0.000000943035
E039.1	7/12/2013	WTLAP-13-31108	0.000001055907
E039.1	7/28/2013	WTLAP-13-31109	0.0000000234495

Table 4.2-4 (continued)

Station	Collection Date	Sample ID	2,3,7,8-TCDD TEQ (µg/L)
E039.1	9/10/2013	WTLAP-13-41782	0.00000170705
E040	8/5/2013	WTLAP-13-40573	0.000003119424
E040	9/10/2013	WTLAP-13-41755	0.00000106701
E040	9/12/2013	WTLAP-13-42294	0.000000025756
E040	9/12/2013	WTLAP-13-42297	0.0000000831
E042.1	7/12/2013	WTLAP-13-39151	0.000014199993
E042.1	8/5/2013	WTLAP-13-30750	0.000004924344
E042.1	8/5/2013	WTLAP-13-30754	0.000002660045
E042.1	9/10/2013	WTLAP-13-30751	0.000002359876
E042.1	9/10/2013	WTLAP-13-30755	0.000003085143
E050.1	7/12/2013	WTLAP-13-30837	0.00001133383
E050.1	7/12/2013	WTLAP-13-30841	0.000015166499
E050.1	7/12/2013	WTLAP-13-30865	0.000010629613
E050.1	8/5/2013	WTLAP-13-30838	0.000000181457
E050.1	8/5/2013	WTLAP-13-30842	0.00000013482
E050.1	8/5/2013	WTLAP-13-30867	0.000001414822
E050.1	9/11/2013	WTLAP-13-30839	0.000002503637
E050.1	9/11/2013	WTLAP-13-30843	0.000002543177
E050.1	9/11/2013	WTLAP-13-30869	0.000003089068
E050.1	9/12/2013	WTLAP-13-30840	0.000003275059
E050.1	9/12/2013	WTLAP-13-30844	0.000001420583
E050.1	9/12/2013	WTLAP-13-30871	0.000001759689
E055	6/14/2013	WTLAP-13-30694	0.000000935764
E055	9/12/2013	WTLAP-13-30697	0.000001026135
E055.5	7/12/2013	WTLAP-13-30695	0.000001094876
E055.5	9/13/2013	WTLAP-13-30698	0.0000000724811
E056	7/12/2013	WTLAP-13-36901	0.000001285666
E056	8/5/2013	WTLAP-13-36902	0.000000045932
E056	9/12/2013	WTLAP-13-36903	0.00000001875
E099	7/12/2013	WTESR-13-33858	0.000000023079
E109.9	7/8/2013	WTLAP-13-38797	0.00000006309
E109.9	7/12/2013	WTLAP-13-39008	0.000000033194
E109.9	7/20/2013	WTLAP-13-39326	0.00000007927
E109.9	7/20/2013	WTLAP-13-39334	0.00000008183
E109.9	7/25/2013	WTLAP-13-39377	0.000000015498
E109.9	8/3/2013	WTLAP-13-39441	0.00000004336
E109.9	8/3/2013	WTLAP-13-39446	0.00000004668
E109.9	9/12/2013	WTLAP-13-42176	0.00000097216
E109.9	9/12/2013	WTLAP-13-42180	0.0000088889
E109.9	9/12/2013	WTLAP-13-42183	0.000002934403
E109.9	9/12/2013	WTLAP-13-42185	0.000004952188

Table 4.3-1
Calculated Suspended Solids and Instantaneous Discharge Determined
for Each Sample Collected during 2013 in the LA/P Watershed

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
CO101038	07/12/2013 11:33	UF ^a	WTLAP-13-39027	4110	na ^b	na
CO101038	07/12/2013 11:34	UF	WTLAP-13-39028	3780	na	na
CO101038	07/12/2013 11:36	F ^c	WTLAP-13-39029	3130	na	na
CO101038	07/12/2013 11:37	UF	WTLAP-13-39030	2800	na	na
CO101038	07/12/2013 11:38	UF	WTLAP-13-39031	2480	na	na
CO101038	07/12/2013 11:39	UF	WTLAP-13-39032	2150	na	na
CO101038	07/12/2013 11:40	F	WTLAP-13-39033	2040	na	na
CO101038	07/12/2013 11:41	UF	WTLAP-13-39034	1920	na	na
CO101038	07/12/2013 11:42	F	WTLAP-13-39035	1800	na	na
CO101038	07/12/2013 11:43	UF	WTLAP-13-39036	1690	na	na
CO101038	07/12/2013 11:44	UF	WTLAP-13-39037	1690	na	na
CO101038	09/18/2013 13:30	UF	WTLAP-13-30647	350	na	na
CO101038	09/18/2013 13:31	UF	WTLAP-13-30639	350	na	na
CO101038	09/18/2013 13:33	F	WTLAP-13-30623	350	na	na
CO101038	09/18/2013 13:34	UF	WTLAP-13-30631	350	na	na
CO101038	09/18/2013 13:35	UF	WTLAP-13-30655	350	na	na
CO101038	09/18/2013 13:38	UF	WTLAP-13-30663	350	na	na
CO101038	09/18/2013 13:39	F	WTLAP-13-32564	350	na	na
CO101038	09/18/2013 13:40	F	WTLAP-13-32560	350	na	na
CO101038	09/18/2013 13:41	UF	WTLAP-13-32556	350	na	na
CO111041	06/14/2013 12:40	UF	WTLAP-13-30646	2870	na	na
CO111041	06/14/2013 12:41	UF	WTLAP-13-36961	2870	na	na
CO111041	06/14/2013 12:43	F	WTLAP-13-30622	2870	na	na
CO111041	06/14/2013 12:43	UF	WTLAP-13-30630	2870	na	na
CO111041	06/14/2013 12:51	UF	WTLAP-13-30654	2870	na	na
CO111041	06/14/2013 12:53	F	WTLAP-13-32575	2870	na	na
CO111041	06/14/2013 12:53	UF	WTLAP-13-30638	2870	na	na
CO111041	06/14/2013 13:15	UF	WTLAP-13-32567	2870	na	na
CO111041	06/14/2013 13:24	F	WTLAP-13-32571	2870	na	na
CO111041	06/30/2013 02:57	UF	WTLAP-13-30640	1750	na	na
CO111041	06/30/2013 03:00	UF	WTLAP-13-30648	1750	na	na
CO111041	06/30/2013 03:01	F	WTLAP-13-30624	1580	na	na
CO111041	06/30/2013 03:01	UF	WTLAP-13-30632	1580	na	na
CO111041	06/30/2013 03:02	UF	WTLAP-13-30656	1420	na	na

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
CO111041	06/30/2013 03:03	UF	WTLAP-13-30664	1260	na	na
CO111041	06/30/2013 03:04	UF	WTLAP-13-32568	1090	na	na
CO111041	07/05/2013 00:14	UF	WTLAP-13-30642	1500	na	na
CO111041	07/05/2013 00:16	F	WTLAP-13-30626	1500	na	na
CO111041	07/05/2013 00:16	UF	WTLAP-13-30634	1500	na	na
CO111041	07/05/2013 00:16	UF	WTLAP-13-30650	1500	na	na
CO111041	07/05/2013 00:17	UF	WTLAP-13-32569	880	na	na
CO111041	07/12/2013 11:21	UF	WTLAP-13-39015	4350	1200	na
CO111041	07/12/2013 11:22	F	WTLAP-13-39016	4350	1200	na
CO111041	07/12/2013 11:22	UF	WTLAP-13-39017	4350	1200	na
CO111041	07/12/2013 11:23	UF	WTLAP-13-39018	4350	1200	na
CO111041	07/12/2013 11:24	F	WTLAP-13-39020	4350	1200	na
CO111041	07/12/2013 11:24	UF	WTLAP-13-39019	4350	1200	na
CO111041	07/12/2013 11:25	UF	WTLAP-13-39021	4350	1200	na
CO111041	07/12/2013 11:38	UF	WTLAP-13-39022	4350	1200	na
CO111041	07/12/2013 11:39	UF	WTLAP-13-39023	4350	1200	na
CO111041	07/13/2013 13:32	F	WTLAP-13-39024	4130	na	na
CO111041	07/13/2013 13:33	UF	WTLAP-13-39025	4130	na	na
CO111041	07/13/2013 13:34	UF	WTLAP-13-39026	4160	na	na
CO111041	07/28/2013 05:18	F	WTLAP-13-39429	180	na	na
CO111041	07/28/2013 05:18	UF	WTLAP-13-39428	180	na	na
CO111041	08/05/2013 13:03	UF	WTLAP-13-40532	260	901	na
CO111041	08/05/2013 13:05	UF	WTLAP-13-40533	260	651	na
CO111041	08/05/2013 13:05	UF	WTLAP-13-40533	260	721	na
CO111041	08/05/2013 13:05	UF	WTLAP-13-40534	260	651	na
CO111041	08/05/2013 13:05	UF	WTLAP-13-40534	260	721	na
CO111041	08/05/2013 13:06	UF	WTLAP-13-40535	260	545	na
CO111041	08/05/2013 13:07	UF	WTLAP-13-40536	260	458	na
CO111041	08/05/2013 13:13	UF	WTLAP-13-40537	260	288	na
CO111041	08/05/2013 13:15	UF	WTLAP-13-40538	260	304	na
CO111041	08/05/2013 13:33	UF	WTLAP-13-40539	260	367	na
CO111041	08/05/2013 13:43	UF	WTLAP-13-40540	260	367	na
CO111041	08/09/2013 13:34	UF	WTLAP-13-41057	na	104	na
CO111041	08/09/2013 13:41	UF	WTLAP-13-41058	na	265	na
CO111041	08/09/2013 13:42	UF	WTLAP-13-41059	na	288	na
CO111041	08/09/2013 13:44	UF	WTLAP-13-41060	na	288	na

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
CO111041	08/09/2013 13:45	UF	WTLAP-13-41061	na	254	na
CO111041	08/09/2013 13:46	UF	WTLAP-13-41062	na	217	na
CO111041	09/10/2013 10:34	UF	WTLAP-13-41772	1000	360	na
CO111041	09/10/2013 10:35	UF	WTLAP-13-41773	1000	432	na
CO111041	09/10/2013 10:36	UF	WTLAP-13-41774	1000	504	na
CO111041	09/10/2013 10:37	UF	WTLAP-13-41775	1000	478	na
CO111041	09/10/2013 10:38	UF	WTLAP-13-41776	1000	356	na
CO111041	09/10/2013 10:39	UF	WTLAP-13-41777	1000	339	na
CO111041	09/10/2013 10:40	UF	WTLAP-13-41778	1000	292	na
CO111041	09/10/2013 10:41	UF	WTLAP-13-41779	1000	329	na
CO111041	09/10/2013 10:57	UF	WTLAP-13-41780	1000	132	na
E026	09/12/2013 16:49	UF	WTLAP-13-31179	61600	na	30
E026	09/12/2013 16:51	UF	WTLAP-13-31183	59600	na	32
E026	09/12/2013 16:53	UF	WTLAP-13-31187	69600	na	33
E026	09/12/2013 16:55	UF	WTLAP-13-31191	55800	na	33
E026	09/12/2013 16:57	F	WTLAP-13-31135	53700	na	20
E026	09/12/2013 16:59	UF	WTLAP-13-31139	51500	na	8
E026	09/12/2013 17:01	F	WTLAP-13-32623	49400	na	41
E026	09/12/2013 17:03	F	WTLAP-13-32619	47200	na	38
E026	09/12/2013 17:05	UF	WTLAP-13-32615	45000	na	34
E026	09/12/2013 17:07	UF	WTLAP-13-31207	42900	na	36
E026	09/12/2013 17:09	UF	WTLAP-13-31167	41400	na	38
E026	09/12/2013 17:10	UF	WTLAP-13-31163	40700	na	39
E026	09/12/2013 17:13	UF	WTLAP-13-31143	38500	na	39
E026	09/12/2013 17:15	UF	WTLAP-13-31151	37100	na	39
E026	09/12/2013 17:19	UF	WTLAP-13-31159	34200	na	35
E026	09/12/2013 17:26	UF	WTLAP-13-31155	29100	na	44
E026	09/12/2013 17:39	UF	WTLAP-13-31219	19700	na	95
E026	09/12/2013 17:59	UF	WTLAP-13-31223	21900	na	88
E026	09/12/2013 18:19	UF	WTLAP-13-31227	21200	na	400
E026	09/12/2013 18:39	UF	WTLAP-13-31231	19200	na	380
E026	09/12/2013 18:59	UF	WTLAP-13-31235	13000	na	360
E026	09/12/2013 19:19	UF	WTLAP-13-31239	16700	na	300
E026	09/12/2013 19:39	UF	WTLAP-13-31243	17600	na	250
E026	09/12/2013 19:59	UF	WTLAP-13-31247	38900	na	320
E030	07/12/2013 12:30	UF	WTLAP-13-39038	23500	na	13

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E030	07/12/2013 12:31	UF	WTLAP-13-39042	23000	na	13
E030	07/12/2013 12:33	UF	WTLAP-13-39046	21900	na	12
E030	07/12/2013 12:34	UF	WTLAP-13-39050	21400	na	11
E030	07/12/2013 12:37	UF	WTLAP-13-39054	19800	na	10
E030	07/12/2013 12:40	F	WTLAP-13-39062	18200	na	9.5
E030	07/12/2013 12:40	UF	WTLAP-13-39063	18200	na	9.5
E030	07/12/2013 12:41	UF	WTLAP-13-39070	17700	na	9.2
E030	07/12/2013 12:42	UF	WTLAP-13-39074	17100	na	8.9
E030	09/12/2013 18:19	UF	WTLAP-13-39039	32100	na	45
E030	09/12/2013 18:21	UF	WTLAP-13-39043	30700	na	44
E030	09/12/2013 18:23	UF	WTLAP-13-39047	29300	na	44
E030	09/12/2013 18:24	UF	WTLAP-13-39051	28600	na	44
E030	09/12/2013 18:26	UF	WTLAP-13-39055	27200	na	44
E030	09/12/2013 18:28	UF	WTLAP-13-39059	25800	na	44
E030	09/12/2013 18:30	F	WTLAP-13-39065	24400	na	43
E030	09/12/2013 18:30	UF	WTLAP-13-39064	24400	na	43
E030	09/12/2013 18:31	UF	WTLAP-13-39071	23700	na	44
E030	09/12/2013 18:32	UF	WTLAP-13-39075	23000	na	44
E038	06/14/2013 12:45	UF	WTLAP-13-31649	8140	na	70
E038	06/14/2013 12:47	UF	WTLAP-13-31657	7290	na	61
E038	06/14/2013 12:49	UF	WTLAP-13-31665	5820	na	53
E038	06/14/2013 12:51	UF	WTLAP-13-31673	4870	na	46
E038	06/14/2013 12:53	UF	WTLAP-13-31721	4580	na	41
E038	06/14/2013 12:55	F	WTLAP-13-32587	4280	na	36
E038	06/14/2013 12:55	UF	WTLAP-13-31103	4280	na	36
E038	06/14/2013 12:57	F	WTLAP-13-32583	3970	na	22
E038	06/14/2013 12:58	F	WTLAP-13-31087	3820	na	15
E038	06/14/2013 12:58	UF	WTLAP-13-31095	3820	na	15
E038	06/14/2013 12:59	UF	WTLAP-13-31119	3670	na	7.3
E038	06/14/2013 12:59	UF	WTLAP-13-32579	3670	na	7.3
E038	06/14/2013 13:01	UF	WTLAP-13-31127	3360	na	22
E038	06/14/2013 13:02	UF	WTLAP-13-31111	3210	na	22
E038	06/14/2013 13:03	UF	WTLAP-13-31697	3060	na	21
E038	06/14/2013 13:05	UF	WTLAP-13-31705	2790	na	21
E038	06/14/2013 13:07	UF	WTLAP-13-31681	2470	na	18
E038	06/14/2013 13:09	UF	WTLAP-13-31745	2470	na	15

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E038	06/14/2013 13:11	UF	WTLAP-13-31753	2280	na	12
E038	06/14/2013 13:13	UF	WTLAP-13-31761	2230	na	9.9
E038	06/14/2013 13:15	UF	WTLAP-13-31769	2260	na	7.3
E038	06/14/2013 13:35	UF	WTLAP-13-31777	2480	na	17
E038	06/14/2013 13:55	UF	WTLAP-13-31785	1040	na	1.7
E038	06/14/2013 14:15	UF	WTLAP-13-31793	740	na	0.7
E038	06/14/2013 14:35	UF	WTLAP-13-31801	1330	na	6.8
E038	06/14/2013 14:55	UF	WTLAP-13-31809	620	na	0.8
E038	06/14/2013 15:15	UF	WTLAP-13-31817	370	na	0.3
E038	06/30/2013 15:00	UF	WTLAP-13-31652	11800	na	46
E038	06/30/2013 15:02	UF	WTLAP-13-31660	10000	na	75
E038	06/30/2013 15:04	UF	WTLAP-13-31668	8250	na	100
E038	06/30/2013 15:06	UF	WTLAP-13-31676	6460	na	110
E038	06/30/2013 15:08	UF	WTLAP-13-31684	4830	na	78
E038	06/30/2013 15:10	UF	WTLAP-13-31692	4080	na	51
E038	06/30/2013 15:12	UF	WTLAP-13-31700	3550	na	42
E038	06/30/2013 15:14	UF	WTLAP-13-31708	3110	na	33
E038	06/30/2013 15:15	UF	WTLAP-13-31106	2940	na	29
E038	06/30/2013 15:16	UF	WTLAP-13-31724	2760	na	26
E038	06/30/2013 15:18	F	WTLAP-13-32588	2750	na	21
E038	06/30/2013 15:18	UF	WTLAP-13-31114	2750	na	21
E038	06/30/2013 15:19	UF	WTLAP-13-31122	2640	na	18
E038	06/30/2013 15:20	F	WTLAP-13-32584	2530	na	16
E038	06/30/2013 15:21	UF	WTLAP-13-31130	2420	na	14
E038	06/30/2013 15:22	F	WTLAP-13-31090	2320	na	12
E038	06/30/2013 15:22	F	WTLAP-13-32580	2320	na	12
E038	06/30/2013 15:22	UF	WTLAP-13-31098	2320	na	12
E038	06/30/2013 15:24	UF	WTLAP-13-31748	2100	na	8.8
E038	06/30/2013 15:26	UF	WTLAP-13-31756	1880	na	6.5
E038	06/30/2013 15:28	UF	WTLAP-13-31764	1700	na	5.3
E038	06/30/2013 15:30	UF	WTLAP-13-31772	1580	na	4.2
E038	06/30/2013 15:50	UF	WTLAP-13-31780	730	na	0.5
E038	06/30/2013 16:00	UF	WTLAP-13-31788	380	na	0.3
E038	07/12/2013 11:20	UF	WTLAP-13-31653	9630	na	330
E038	07/12/2013 11:22	UF	WTLAP-13-39226	8600	na	270
E038	07/12/2013 11:24	UF	WTLAP-13-39227	7570	na	210

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E038	07/12/2013 11:26	UF	WTLAP-13-31677	6540	na	190
E038	07/12/2013 11:28	UF	WTLAP-13-31685	5610	na	200
E038	07/12/2013 11:30	UF	WTLAP-13-31107	4650	na	200
E038	07/12/2013 11:30	UF	WTLAP-13-31693	4650	na	200
E038	07/12/2013 11:32	UF	WTLAP-13-31115	5040	na	200
E038	07/12/2013 11:32	UF	WTLAP-13-31701	5040	na	200
E038	07/12/2013 11:33	UF	WTLAP-13-31123	4930	na	200
E038	07/12/2013 11:34	UF	WTLAP-13-31709	4820	na	190
E038	07/12/2013 11:36	UF	WTLAP-13-31131	4130	na	190
E038	07/12/2013 11:36	UF	WTLAP-13-31725	4130	na	190
E038	07/12/2013 11:37	F	WTLAP-13-31091	4030	na	190
E038	07/12/2013 11:37	UF	WTLAP-13-31099	4030	na	190
E038	07/12/2013 11:38	F	WTLAP-13-32589	3940	na	190
E038	07/12/2013 11:40	F	WTLAP-13-32585	3740	na	190
E038	07/12/2013 11:42	UF	WTLAP-13-32581	3550	na	190
E038	07/12/2013 11:44	UF	WTLAP-13-31749	3360	na	190
E038	07/12/2013 11:46	UF	WTLAP-13-31757	4640	na	190
E038	07/12/2013 11:48	UF	WTLAP-13-31765	3310	na	180
E038	07/12/2013 11:50	UF	WTLAP-13-31773	3180	na	180
E038	07/12/2013 12:10	UF	WTLAP-13-31781	2650	na	34
E038	07/12/2013 12:30	UF	WTLAP-13-31789	13300	na	9.2
E038	07/12/2013 12:50	UF	WTLAP-13-31797	4870	na	4.8
E038	07/12/2013 13:10	UF	WTLAP-13-31805	34600	na	2.1
E038	07/12/2013 13:30	UF	WTLAP-13-31813	79800	na	1
E038	07/12/2013 13:50	UF	WTLAP-13-31821	185000	na	1.1
E038	07/12/2013 14:10	UF	WTLAP-13-31829	38900	na	0.7
E038	07/12/2013 14:30	UF	WTLAP-13-31837	108000	na	0.4
E038	07/28/2013 14:30	UF	WTLAP-13-31656	7340	na	74
E038	07/28/2013 14:32	UF	WTLAP-13-31664	4170	na	62
E038	07/28/2013 14:34	UF	WTLAP-13-31672	3250	na	50
E038	07/28/2013 14:36	UF	WTLAP-13-31680	2710	na	40
E038	07/28/2013 14:38	UF	WTLAP-13-31688	2390	na	32
E038	07/28/2013 14:40	UF	WTLAP-13-31110	2060	na	25
E038	07/28/2013 14:40	UF	WTLAP-13-31696	2060	na	25
E038	07/28/2013 14:42	UF	WTLAP-13-31118	1880	na	21
E038	07/28/2013 14:42	UF	WTLAP-13-31704	1880	na	21

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E038	07/28/2013 14:43	UF	WTLAP-13-31126	1840	na	20
E038	07/28/2013 14:44	UF	WTLAP-13-31712	1800	na	18
E038	07/28/2013 14:45	UF	WTLAP-13-31134	1720	na	17
E038	07/28/2013 14:46	F	WTLAP-13-31094	1650	na	15
E038	07/28/2013 14:46	UF	WTLAP-13-31102	1650	na	15
E038	07/28/2013 14:46	UF	WTLAP-13-31728	1650	na	15
E038	07/28/2013 14:48	F	WTLAP-13-32590	1560	na	13
E038	07/28/2013 14:50	F	WTLAP-13-32586	1460	na	9.8
E038	07/28/2013 14:52	UF	WTLAP-13-32582	1360	na	8.7
E038	07/28/2013 14:54	UF	WTLAP-13-31752	1270	na	7.6
E038	07/28/2013 14:56	UF	WTLAP-13-31760	1140	na	5.6
E038	07/28/2013 14:58	UF	WTLAP-13-31768	1130	na	2.8
E038	07/28/2013 15:00	UF	WTLAP-13-31776	840	na	4.4
E038	07/28/2013 15:20	UF	WTLAP-13-31784	600	na	2.3
E038	07/28/2013 15:40	UF	WTLAP-13-31792	510	na	1.2
E038	07/28/2013 16:00	UF	WTLAP-13-31800	1990	na	0.7
E038	07/28/2013 16:20	UF	WTLAP-13-31808	20900	na	0.4
E038	07/28/2013 16:40	UF	WTLAP-13-31816	108000	na	0.4
E038	07/28/2013 17:00	UF	WTLAP-13-31824	56300	na	0.3
E038	07/28/2013 17:20	UF	WTLAP-13-31832	9590	na	0.3
E038	07/28/2013 17:40	UF	WTLAP-13-31840	61200	na	0.3
E038	08/05/2013 13:25	UF	WTLAP-13-40658	7120	1410	170
E038	08/05/2013 13:27	UF	WTLAP-13-40645	6370	1700	160
E038	08/05/2013 13:29	UF	WTLAP-13-40646	5620	1990	150
E038	08/05/2013 13:31	UF	WTLAP-13-40647	4870	1830	140
E038	08/05/2013 13:33	UF	WTLAP-13-40648	4120	1630	120
E038	08/05/2013 13:35	UF	WTLAP-13-40638	3370	1290	95
E038	08/05/2013 13:35	UF	WTLAP-13-40659	3370	1290	95
E038	08/05/2013 13:36	UF	WTLAP-13-40639	3260	1170	87
E038	08/05/2013 13:37	UF	WTLAP-13-40640	3150	1420	79
E038	08/05/2013 13:37	UF	WTLAP-13-40640	3150	1460	79
E038	08/05/2013 13:37	UF	WTLAP-13-40649	3150	1420	79
E038	08/05/2013 13:37	UF	WTLAP-13-40649	3150	1460	79
E038	08/05/2013 13:38	UF	WTLAP-13-40641	3050	1380	71
E038	08/05/2013 13:39	UF	WTLAP-13-40642	2940	1310	64
E038	08/05/2013 13:39	UF	WTLAP-13-40642	2940	1400	64

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E038	08/05/2013 13:39	UF	WTLAP-13-40650	2940	1310	64
E038	08/05/2013 13:39	UF	WTLAP-13-40650	2940	1400	64
E038	08/05/2013 13:41	UF	WTLAP-13-40643	2720	1160	53
E038	08/05/2013 13:41	UF	WTLAP-13-40643	2720	1250	53
E038	08/05/2013 13:41	UF	WTLAP-13-40651	2720	1160	53
E038	08/05/2013 13:41	UF	WTLAP-13-40651	2720	1250	53
E038	08/05/2013 13:42	UF	WTLAP-13-40644	2610	1080	50
E038	08/05/2013 13:43	UF	WTLAP-13-40652	2510	1550	47
E038	08/05/2013 13:45	UF	WTLAP-13-40660	2290	1320	41
E038	08/05/2013 13:47	UF	WTLAP-13-40653	2100	1100	34
E038	08/05/2013 13:49	UF	WTLAP-13-40654	1910	1090	27
E038	08/05/2013 13:51	UF	WTLAP-13-40655	1720	767	22
E038	08/05/2013 13:53	UF	WTLAP-13-40656	1530	811	18
E038	08/05/2013 13:55	UF	WTLAP-13-40661	1340	786	15
E038	08/05/2013 14:15	UF	WTLAP-13-40662	1010	537	5.6
E038	08/05/2013 14:35	UF	WTLAP-13-40657	1200	288	2.6
E038	08/05/2013 14:55	UF	WTLAP-13-40663	1380	288	1.7
E038	08/05/2013 15:15	UF	WTLAP-13-40664	410	288	1.2
E038	08/09/2013 13:34	F ^d	WTLAP-13-41067	na	na	50
E038	08/09/2013 13:34	UF	WTLAP-13-40850	na	na	50
E038	08/09/2013 13:34	UF	WTLAP-13-41053	na	na	50
E038	08/09/2013 13:36	F	WTLAP-13-40856	na	na	57
E038	08/09/2013 13:36	F	WTLAP-13-40899	na	na	57
E038	08/09/2013 13:36	F	WTLAP-13-40901	na	na	57
E038	08/09/2013 13:36	F ^d	WTLAP-13-40855	na	na	57
E038	08/09/2013 13:36	F ^d	WTLAP-13-40889	na	na	57
E038	08/09/2013 13:36	F ^d	WTLAP-13-40877	na	na	57
E038	08/09/2013 13:36	F ^d	WTLAP-13-40888	na	na	57
E038	08/09/2013 13:36	UF	WTLAP-13-40898	na	na	57
E038	08/09/2013 13:36	UF	WTLAP-13-40900	na	na	57
E038	08/09/2013 13:40	UF	WTLAP-13-40851	na	na	38
E038	08/09/2013 13:50	UF	WTLAP-13-40852	na	na	12
E038	08/09/2013 14:00	UF	WTLAP-13-40853	na	na	4
E038	08/09/2013 15:44	UF	WTLAP-13-40854	na	na	0.8
E039.1	06/14/2013 14:00	UF	WTLAP-13-31650	1060	na	13
E039.1	06/14/2013 14:02	UF	WTLAP-13-31658	980	na	13

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E039.1	06/14/2013 14:04	UF	WTLAP-13-31666	940	na	13
E039.1	06/14/2013 14:06	UF	WTLAP-13-31674	920	na	12
E039.1	06/14/2013 14:08	UF	WTLAP-13-31682	850	na	11
E039.1	06/14/2013 14:10	UF	WTLAP-13-31104	780	na	10
E039.1	06/14/2013 14:10	UF	WTLAP-13-31690	780	na	10
E039.1	06/14/2013 14:12	UF	WTLAP-13-31112	770	na	9.7
E039.1	06/14/2013 14:12	UF	WTLAP-13-31698	770	na	9.7
E039.1	06/14/2013 14:13	UF	WTLAP-13-31120	695	na	9.4
E039.1	06/14/2013 14:14	UF	WTLAP-13-31706	620	na	9.1
E039.1	06/14/2013 14:15	UF	WTLAP-13-31128	655	na	8.8
E039.1	06/14/2013 14:16	F	WTLAP-13-31088	690	na	8.5
E039.1	06/14/2013 14:16	UF	WTLAP-13-31096	690	na	8.5
E039.1	06/14/2013 14:16	UF	WTLAP-13-31722	690	na	8.5
E039.1	06/14/2013 14:18	F	WTLAP-13-32599	665	na	7.9
E039.1	06/14/2013 14:20	F	WTLAP-13-32595	640	na	7.3
E039.1	06/14/2013 14:22	UF	WTLAP-13-32591	615	na	6.6
E039.1	06/14/2013 14:24	UF	WTLAP-13-31746	590	na	6
E039.1	06/14/2013 14:26	UF	WTLAP-13-31754	580	na	5.5
E039.1	06/14/2013 14:28	UF	WTLAP-13-31762	570	na	5.1
E039.1	06/14/2013 14:30	UF	WTLAP-13-31770	390	na	4.7
E039.1	06/14/2013 14:50	UF	WTLAP-13-31778	500	na	4.7
E039.1	06/14/2013 15:10	UF	WTLAP-13-31786	520	na	7.8
E039.1	06/30/2013 15:49	UF	WTLAP-13-31651	950	na	11
E039.1	06/30/2013 15:51	UF	WTLAP-13-31659	930	na	11
E039.1	06/30/2013 15:53	UF	WTLAP-13-31667	880	na	11
E039.1	06/30/2013 15:55	UF	WTLAP-13-31675	830	na	10
E039.1	06/30/2013 15:57	UF	WTLAP-13-31683	770	na	6.2
E039.1	06/30/2013 15:59	F	WTLAP-13-32600	732	na	2.1
E039.1	06/30/2013 16:00	UF	WTLAP-13-31105	714	na	8.8
E039.1	06/30/2013 16:01	F	WTLAP-13-32596	695	na	8.5
E039.1	06/30/2013 16:02	UF	WTLAP-13-31113	676	na	8.3
E039.1	06/30/2013 16:03	UF	WTLAP-13-31121	658	na	8
E039.1	06/30/2013 16:03	UF	WTLAP-13-32592	658	na	8
E039.1	06/30/2013 16:05	UF	WTLAP-13-31129	620	na	7.5
E039.1	06/30/2013 16:05	UF	WTLAP-13-31723	620	na	7.5
E039.1	06/30/2013 16:06	F	WTLAP-13-31089	610	na	7.3

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E039.1	06/30/2013 16:06	UF	WTLAP-13-31097	610	na	7.3
E039.1	06/30/2013 16:07	UF	WTLAP-13-31691	600	na	7.1
E039.1	06/30/2013 16:09	UF	WTLAP-13-31699	560	na	6.7
E039.1	06/30/2013 16:11	UF	WTLAP-13-31707	560	na	6.2
E039.1	06/30/2013 16:13	UF	WTLAP-13-31747	520	na	5.7
E039.1	06/30/2013 16:15	UF	WTLAP-13-31755	510	na	5.2
E039.1	06/30/2013 16:17	UF	WTLAP-13-31763	490	na	4.9
E039.1	06/30/2013 16:19	UF	WTLAP-13-31771	470	na	4.6
E039.1	07/12/2013 11:39	UF	WTLAP-13-31654	5770	na	260
E039.1	07/12/2013 11:41	UF	WTLAP-13-31662	5520	na	320
E039.1	07/12/2013 11:43	UF	WTLAP-13-31670	5100	na	320
E039.1	07/12/2013 11:45	UF	WTLAP-13-31678	4590	na	320
E039.1	07/12/2013 11:47	UF	WTLAP-13-31686	4130	na	310
E039.1	07/12/2013 11:49	UF	WTLAP-13-31694	3860	na	300
E039.1	07/12/2013 11:50	UF	WTLAP-13-31108	3740	na	300
E039.1	07/12/2013 11:51	UF	WTLAP-13-31702	3620	na	300
E039.1	07/12/2013 11:52	UF	WTLAP-13-31116	3500	na	290
E039.1	07/12/2013 11:53	UF	WTLAP-13-31124	3380	na	290
E039.1	07/12/2013 11:53	UF	WTLAP-13-31710	3380	na	290
E039.1	07/12/2013 11:55	UF	WTLAP-13-31132	3240	na	280
E039.1	07/12/2013 11:55	UF	WTLAP-13-31726	3240	na	280
E039.1	07/12/2013 11:56	F	WTLAP-13-31092	3160	na	220
E039.1	07/12/2013 11:56	UF	WTLAP-13-31100	3160	na	220
E039.1	07/12/2013 11:57	F	WTLAP-13-32601	3080	na	170
E039.1	07/12/2013 11:59	F	WTLAP-13-32597	2920	na	55
E039.1	07/12/2013 12:01	UF	WTLAP-13-32593	2770	na	260
E039.1	07/12/2013 12:03	UF	WTLAP-13-31750	2610	na	250
E039.1	07/12/2013 12:05	UF	WTLAP-13-31758	2470	na	250
E039.1	07/12/2013 12:07	UF	WTLAP-13-31766	2320	na	230
E039.1	07/12/2013 12:09	UF	WTLAP-13-31774	2150	na	210
E039.1	07/12/2013 12:29	UF	WTLAP-13-31782	1620	na	37
E039.1	07/12/2013 12:49	UF	WTLAP-13-31790	1050	na	6.5
E039.1	07/12/2013 13:09	UF	WTLAP-13-31798	640	na	3.6
E039.1	07/28/2013 15:04	UF	WTLAP-13-31655	1420	na	19
E039.1	07/28/2013 15:06	UF	WTLAP-13-31663	1360	na	23
E039.1	07/28/2013 15:08	UF	WTLAP-13-31671	1220	na	22

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E039.1	07/28/2013 15:10	UF	WTLAP-13-31679	1120	na	21
E039.1	07/28/2013 15:12	UF	WTLAP-13-31687	1010	na	19
E039.1	07/28/2013 15:14	UF	WTLAP-13-31109	950	na	17
E039.1	07/28/2013 15:14	UF	WTLAP-13-31695	950	na	17
E039.1	07/28/2013 15:16	UF	WTLAP-13-31703	900	na	16
E039.1	07/28/2013 15:17	UF	WTLAP-13-31117	855	na	15
E039.1	07/28/2013 15:18	UF	WTLAP-13-31125	810	na	14
E039.1	07/28/2013 15:18	UF	WTLAP-13-31711	810	na	14
E039.1	07/28/2013 15:20	UF	WTLAP-13-31133	790	na	13
E039.1	07/28/2013 15:20	UF	WTLAP-13-31727	790	na	13
E039.1	07/28/2013 15:21	F	WTLAP-13-31093	769	na	12
E039.1	07/28/2013 15:21	UF	WTLAP-13-31101	769	na	12
E039.1	07/28/2013 15:22	F	WTLAP-13-32602	748	na	12
E039.1	07/28/2013 15:24	F	WTLAP-13-32598	705	na	11
E039.1	07/28/2013 15:26	UF	WTLAP-13-32594	662	na	9.7
E039.1	07/28/2013 15:28	UF	WTLAP-13-31751	620	na	9.1
E039.1	07/28/2013 15:30	UF	WTLAP-13-31759	610	na	8.4
E039.1	07/28/2013 15:32	UF	WTLAP-13-31767	580	na	7.9
E039.1	07/28/2013 15:34	UF	WTLAP-13-31775	540	na	7.3
E039.1	08/04/2013 14:04	UF	WTLAP-13-40614	710	530	11
E039.1	08/04/2013 14:06	UF	WTLAP-13-40625	1770	502	11
E039.1	08/04/2013 14:08	UF	WTLAP-13-40626	2820	474	11
E039.1	08/04/2013 14:10	UF	WTLAP-13-40615	3880	450	10
E039.1	08/04/2013 14:12	UF	WTLAP-13-40627	3200	425	9.6
E039.1	08/04/2013 14:14	UF	WTLAP-13-40618	2520	376	8.8
E039.1	08/04/2013 14:14	UF	WTLAP-13-40618	2520	392	8.8
E039.1	08/04/2013 14:14	UF	WTLAP-13-40628	2520	376	8.8
E039.1	08/04/2013 14:14	UF	WTLAP-13-40628	2520	392	8.8
E039.1	08/04/2013 14:16	UF	WTLAP-13-40619	1840	281	8.2
E039.1	08/04/2013 14:16	UF	WTLAP-13-40619	1840	367	8.2
E039.1	08/04/2013 14:16	UF	WTLAP-13-40629	1840	281	8.2
E039.1	08/04/2013 14:16	UF	WTLAP-13-40629	1840	367	8.2
E039.1	08/04/2013 14:17	UF	WTLAP-13-40620	1500	362	7.9
E039.1	08/04/2013 14:18	UF	WTLAP-13-40621	1160	329	7.6
E039.1	08/04/2013 14:18	UF	WTLAP-13-40621	1160	348	7.6
E039.1	08/04/2013 14:18	UF	WTLAP-13-40630	1160	329	7.6

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E039.1	08/04/2013 14:18	UF	WTLAP-13-40630	1160	348	7.6
E039.1	08/04/2013 14:19	UF	WTLAP-13-40622	820	230	7.3
E039.1	08/04/2013 14:20	UF	WTLAP-13-40616	480	303	7
E039.1	08/04/2013 14:20	UF	WTLAP-13-40623	480	303	7
E039.1	08/04/2013 14:21	UF	WTLAP-13-40624	475	264	6.8
E039.1	08/04/2013 14:22	UF	WTLAP-13-40631	470	319	6.6
E039.1	08/04/2013 14:24	UF	WTLAP-13-40632	460	342	6.2
E039.1	08/04/2013 14:26	UF	WTLAP-13-40633	450	287	5.8
E039.1	08/04/2013 14:28	UF	WTLAP-13-40634	440	267	5.3
E039.1	08/04/2013 14:30	UF	WTLAP-13-40635	430	252	4.9
E039.1	08/04/2013 14:32	UF	WTLAP-13-40617	420	248	4.7
E039.1	08/04/2013 14:34	UF	WTLAP-13-40636	420	243	4.4
E039.1	08/09/2013 14:09	UF	WTLAP-13-40903	1100	na	13
E039.1	08/09/2013 14:17	UF	WTLAP-13-40904	870	na	14
E039.1	08/09/2013 14:25	UF	WTLAP-13-40905	720	na	9.7
E039.1	08/09/2013 14:37	UF	WTLAP-13-40906	570	na	6.2
E039.1	09/10/2013 16:09	UF	WTLAP-13-41791	1790	1780	11
E039.1	09/10/2013 16:11	UF	WTLAP-13-41792	1820	1680	11
E039.1	09/10/2013 16:13	UF	WTLAP-13-41793	1790	1580	11
E039.1	09/10/2013 16:15	UF	WTLAP-13-41794	1760	1480	11
E039.1	09/10/2013 16:17	UF	WTLAP-13-41795	1690	1380	11
E039.1	09/10/2013 16:19	UF	WTLAP-13-41782	1610	1280	10
E039.1	09/10/2013 16:19	UF	WTLAP-13-41796	1610	1280	10
E039.1	09/10/2013 16:21	F	WTLAP-13-41797	1540	1180	9.7
E039.1	09/10/2013 16:22	UF	WTLAP-13-41783	1500	1130	9.5
E039.1	09/10/2013 16:23	F	WTLAP-13-41798	1460	1080	9.2
E039.1	09/10/2013 16:24	UF	WTLAP-13-41784	1420	1030	9
E039.1	09/10/2013 16:25	UF	WTLAP-13-41799	1380	982	8.8
E039.1	09/10/2013 16:26	UF	WTLAP-13-41785	1350	932	8.5
E039.1	09/10/2013 16:27	UF	WTLAP-13-41786	1310	882	8.3
E039.1	09/10/2013 16:27	UF	WTLAP-13-41800	1310	882	8.3
E039.1	09/10/2013 16:28	F	WTLAP-13-41787	1320	832	8
E039.1	09/10/2013 16:29	UF	WTLAP-13-41788	1330	782	7.8
E039.1	09/10/2013 16:29	UF	WTLAP-13-41801	1330	782	7.8
E039.1	09/10/2013 16:30	UF	WTLAP-13-41789	1240	732	7.5
E039.1	09/10/2013 16:31	UF	WTLAP-13-41790	1160	616	7.4

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E039.1	09/10/2013 16:31	UF	WTLAP-13-41802	1160	616	7.4
E039.1	09/10/2013 16:33	UF	WTLAP-13-41803	1100	616	7.2
E039.1	09/10/2013 16:35	UF	WTLAP-13-41804	1050	616	7
E039.1	09/10/2013 16:37	UF	WTLAP-13-41805	1000	616	6.7
E039.1	09/10/2013 16:39	UF	WTLAP-13-41806	990	616	6.4
E039.1	09/10/2013 16:59	UF	WTLAP-13-41807	750	616	2.4
E039.1	09/10/2013 17:59	UF	WTLAP-13-41808	820	616	4.2
E039.1	09/10/2013 18:19	UF	WTLAP-13-41809	1700	616	35
E039.1	09/10/2013 18:39	UF	WTLAP-13-41810	1130	616	16
E039.1	09/10/2013 18:59	UF	WTLAP-13-41811	790	616	9.2
E039.1	09/10/2013 19:19	UF	WTLAP-13-41812	620	616	4.2
E039.1	09/12/2013 15:11	UF	WTLAP-13-42314	1340	na	12
E039.1	09/12/2013 15:15	UF	WTLAP-13-42302	1400	na	15
E039.1	09/12/2013 15:19	UF	WTLAP-13-42303	1280	na	14
E039.1	09/12/2013 15:23	UF	WTLAP-13-42304	1180	na	13
E039.1	09/12/2013 15:27	UF	WTLAP-13-42305	1010	na	11
E039.1	09/12/2013 15:29	UF	WTLAP-13-42308	650	na	10
E039.1	09/12/2013 15:31	UF	WTLAP-13-42306	880	na	9.4
E039.1	09/12/2013 15:35	UF	WTLAP-13-42307	770	na	8.4
E039.1	09/12/2013 16:39	UF	WTLAP-13-42309	920	na	31
E039.1	09/12/2013 16:59	UF	WTLAP-13-42310	640	na	7
E039.1	09/12/2013 17:39	UF	WTLAP-13-42311	490	na	9.7
E039.1	09/12/2013 18:19	UF	WTLAP-13-42312	990	na	48
E039.1	11/05/2013 01:43	UF	WTLAP-13-46044	1430	na	9.4
E039.1	11/05/2013 01:47	UF	WTLAP-13-46045	1020	na	17
E039.1	11/05/2013 01:51	UF	WTLAP-13-46046	880	na	20
E039.1	11/05/2013 01:55	UF	WTLAP-13-46047	740	na	21
E039.1	11/05/2013 01:59	UF	WTLAP-13-46048	620	na	5
E039.1	11/05/2013 02:03	UF	WTLAP-13-46049	530	na	20
E039.1	11/05/2013 02:07	UF	WTLAP-13-46050	470	na	18
E039.1	11/05/2013 02:11	UF	WTLAP-13-46051	400	na	16
E039.1	11/05/2013 02:33	UF	WTLAP-13-46052	370	na	6.6
E040	07/12/2013 12:15	UF	WTLAP-13-39228	2330	na	250
E040	07/12/2013 12:16	UF	WTLAP-13-39229	2330	na	250
E040	08/05/2013 14:24	UF	WTLAP-13-40572	5420	na	22
E040	08/05/2013 14:26	UF	WTLAP-13-40573	5130	na	20

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E040	08/05/2013 14:28	UF	WTLAP-13-40574	4840	na	18
E040	08/05/2013 14:29	UF	WTLAP-13-40575	4700	na	17
E040	08/05/2013 14:31	UF	WTLAP-13-40576	4410	na	14
E040	08/05/2013 14:32	F	WTLAP-13-40577	4260	na	14
E040	08/05/2013 14:32	UF	WTLAP-13-40578	4260	na	14
E040	08/05/2013 14:33	UF	WTLAP-13-40579	4120	na	13
E040	08/05/2013 14:34	F	WTLAP-13-40580	3970	na	12
E040	08/05/2013 14:36	F	WTLAP-13-40581	3680	na	10
E040	08/05/2013 14:37	UF	WTLAP-13-40582	3540	na	10
E040	09/10/2013 18:54	UF	WTLAP-13-41754	3550	na	26
E040	09/10/2013 18:55	UF	WTLAP-13-41755	3500	na	26
E040	09/10/2013 18:58	UF	WTLAP-13-41758	3360	na	12
E040	09/10/2013 18:59	UF	WTLAP-13-41764	3320	na	7.3
E040	09/10/2013 19:02	UF	WTLAP-13-41765	3180	na	21
E040	09/10/2013 19:03	UF	WTLAP-13-41766	3130	na	21
E040	09/10/2013 19:05	F	WTLAP-13-41767	3040	na	20
E040	09/10/2013 19:05	F	WTLAP-13-41768	3040	na	20
E040	09/10/2013 19:06	UF	WTLAP-13-41769	2990	na	19
E040	09/10/2013 19:07	F	WTLAP-13-41770	2940	na	19
E040	09/10/2013 19:09	UF	WTLAP-13-41771	2850	na	17
E040	09/12/2013 16:15	UF	WTLAP-13-42294	1220	na	10
E040	09/12/2013 16:17	UF	WTLAP-13-42292	1220	na	9.7
E040	09/12/2013 16:18	UF	WTLAP-13-42295	1200	na	9.4
E040	09/12/2013 16:20	UF	WTLAP-13-42301	1160	na	8.7
E040	09/12/2013 16:22	UF	WTLAP-13-42297	1130	na	8.4
E040	09/12/2013 16:24	F	WTLAP-13-42299	1090	na	8
E040	09/12/2013 16:24	UF	WTLAP-13-42298	1090	na	8
E040	09/12/2013 16:25	UF	WTLAP-13-42300	1070	na	7.9
E040	09/12/2013 16:26	UF	WTLAP-13-42293	1050	na	7.8
E042.1	07/12/2013 12:40	UF	WTLAP-13-39153	63600	94000	150
E042.1	07/12/2013 12:42	UF	WTLAP-13-39154	70800	87300	150
E042.1	07/12/2013 12:58	UF	WTLAP-13-39156	51900	34100	61
E042.1	07/12/2013 12:59	UF	WTLAP-13-39147	50700	30800	31
E042.1	07/12/2013 13:00	UF	WTLAP-13-39157	45500	27400	130
E042.1	07/12/2013 13:02	UF	WTLAP-13-39158	35000	20800	100
E042.1	07/12/2013 13:03	UF	WTLAP-13-39148	29700	19400	87

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E042.1	07/12/2013 13:04	UF	WTLAP-13-39159	29600	18000	73
E042.1	07/12/2013 13:06	UF	WTLAP-13-39160	29200	15900	58
E042.1	07/12/2013 13:07	UF	WTLAP-13-39149	29100	16200	58
E042.1	07/12/2013 13:08	UF	WTLAP-13-39161	28900	16400	59
E042.1	07/12/2013 13:10	UF	WTLAP-13-39162	28600	15000	60
E042.1	07/12/2013 13:30	UF	WTLAP-13-39163	25300	12300	50
E042.1	07/12/2013 13:45	F	WTLAP-13-39150	22900	8680	48
E042.1	07/12/2013 13:50	UF	WTLAP-13-39164	22100	7480	42
E042.1	07/12/2013 14:10	UF	WTLAP-13-39165	18800	5740	34
E042.1	07/12/2013 14:30	UF	WTLAP-13-39151	15500	5120	30
E042.1	07/12/2013 14:30	UF	WTLAP-13-39152	15500	5120	30
E042.1	07/12/2013 14:30	UF	WTLAP-13-39166	15500	5120	30
E042.1	07/12/2013 14:50	UF	WTLAP-13-39167	12300	5120	28
E042.1	07/12/2013 15:10	F	WTLAP-13-39168	9020	5120	26
E042.1	07/12/2013 15:10	UF	WTLAP-13-39169	9020	5120	26
E042.1	07/12/2013 15:30	UF	WTLAP-13-39170	5760	5120	24
E042.1	07/12/2013 15:50	UF	WTLAP-13-39171	2500	5120	23
E042.1	08/05/2013 15:00	UF	WTLAP-13-31270	16000	na	80
E042.1	08/05/2013 15:02	UF	WTLAP-13-31278	16000	na	73
E042.1	08/05/2013 15:04	UF	WTLAP-13-31284	16000	na	65
E042.1	08/05/2013 15:06	UF	WTLAP-13-31298	13000	na	60
E042.1	08/05/2013 15:08	UF	WTLAP-13-31306	11400	na	58
E042.1	08/05/2013 15:10	UF	WTLAP-13-30750	10900	na	56
E042.1	08/05/2013 15:10	UF	WTLAP-13-31314	10900	na	56
E042.1	08/05/2013 15:12	UF	WTLAP-13-30758	10000	na	53
E042.1	08/05/2013 15:12	UF	WTLAP-13-31322	10000	na	53
E042.1	08/05/2013 15:14	UF	WTLAP-13-30770	7630	na	50
E042.1	08/05/2013 15:14	UF	WTLAP-13-31330	7630	na	50
E042.1	08/05/2013 15:16	UF	WTLAP-13-31338	8100	na	48
E042.1	08/05/2013 15:18	F	WTLAP-13-32612	7780	na	47
E042.1	08/05/2013 15:18	UF	WTLAP-13-30782	7780	na	47
E042.1	08/05/2013 15:20	F	WTLAP-13-30742	7460	na	46
E042.1	08/05/2013 15:20	F	WTLAP-13-32608	7460	na	46
E042.1	08/05/2013 15:20	UF	WTLAP-13-30746	7460	na	46
E042.1	08/05/2013 15:22	UF	WTLAP-13-30786	7150	na	45
E042.1	08/05/2013 15:22	UF	WTLAP-13-32604	7150	na	45

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E042.1	08/05/2013 15:24	UF	WTLAP-13-30754	6830	na	45
E042.1	08/05/2013 15:24	UF	WTLAP-13-31362	6830	na	45
E042.1	08/05/2013 15:26	UF	WTLAP-13-31370	6380	na	44
E042.1	08/05/2013 15:28	UF	WTLAP-13-31378	5880	na	43
E042.1	08/05/2013 15:30	UF	WTLAP-13-31386	5590	na	42
E042.1	08/05/2013 15:50	UF	WTLAP-13-31394	3680	na	30
E042.1	08/05/2013 16:00	UF	WTLAP-13-30762	3210	na	28
E042.1	08/05/2013 16:10	UF	WTLAP-13-40589	2740	na	26
E042.1	09/10/2013 19:29	UF	WTLAP-13-31271	13500	na	28
E042.1	09/10/2013 19:31	UF	WTLAP-13-30767	13500	na	35
E042.1	09/10/2013 19:33	UF	WTLAP-13-31285	13500	na	35
E042.1	09/10/2013 19:35	UF	WTLAP-13-31291	16000	na	35
E042.1	09/10/2013 19:37	UF	WTLAP-13-31299	10800	na	35
E042.1	09/10/2013 19:39	UF	WTLAP-13-31307	10300	na	35
E042.1	09/10/2013 19:40	UF	WTLAP-13-30759	10900	na	35
E042.1	09/10/2013 19:41	UF	WTLAP-13-31315	11500	na	35
E042.1	09/10/2013 19:43	UF	WTLAP-13-31323	11900	na	35
E042.1	09/10/2013 19:44	UF	WTLAP-13-30771	11400	na	35
E042.1	09/10/2013 19:45	F	WTLAP-13-32613	10900	na	35
E042.1	09/10/2013 19:47	F	WTLAP-13-32609	9830	na	36
E042.1	09/10/2013 19:49	UF	WTLAP-13-32605	8820	na	36
E042.1	09/10/2013 19:50	UF	WTLAP-13-30783	8310	na	36
E042.1	09/10/2013 19:51	F	WTLAP-13-30743	7800	na	36
E042.1	09/10/2013 19:51	UF	WTLAP-13-30747	7800	na	36
E042.1	09/10/2013 19:52	UF	WTLAP-13-30787	7290	na	36
E042.1	09/10/2013 19:53	UF	WTLAP-13-31279	6780	na	36
E042.1	09/10/2013 19:54	UF	WTLAP-13-30751	6270	na	36
E042.1	09/10/2013 19:55	UF	WTLAP-13-31331	5760	na	36
E042.1	09/10/2013 19:57	UF	WTLAP-13-31363	5490	na	22
E042.1	09/10/2013 19:59	UF	WTLAP-13-31371	4880	na	7.2
E042.1	09/10/2013 20:19	UF	WTLAP-13-31339	4450	na	28
E042.1	09/10/2013 20:30	UF	WTLAP-13-30755	4360	na	26
E042.1	09/10/2013 20:30	UF	WTLAP-13-30763	4360	na	26
E042.1	09/10/2013 21:39	UF	WTLAP-13-31403	3820	na	21
E042.1	09/10/2013 21:59	UF	WTLAP-13-31379	3610	na	21
E042.1	09/10/2013 22:19	UF	WTLAP-13-31387	2950	na	22

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E042.1	09/10/2013 22:39	UF	WTLAP-13-31419	2610	na	23
E050.1	07/12/2013 13:15	UF	WTLAP-13-39116	12900	na	16
E050.1	07/12/2013 13:17	UF	WTLAP-13-39122	12400	na	20
E050.1	07/12/2013 13:19	UF	WTLAP-13-39118	12000	na	23
E050.1	07/12/2013 13:21	UF	WTLAP-13-39120	11700	na	26
E050.1	07/12/2013 13:23	UF	WTLAP-13-39124	11400	na	29
E050.1	07/12/2013 13:25	UF	WTLAP-13-39131	11000	na	31
E050.1	07/12/2013 13:27	UF	WTLAP-13-31495	10700	na	32
E050.1	07/12/2013 13:29	UF	WTLAP-13-31503	6230	na	32
E050.1	07/12/2013 13:31	UF	WTLAP-13-31519	9760	na	32
E050.1	07/12/2013 13:33	F	WTLAP-13-32635	9520	na	32
E050.1	07/12/2013 13:35	F	WTLAP-13-32631	9280	na	32
E050.1	07/12/2013 13:37	UF	WTLAP-13-32627	9040	na	32
E050.1	07/12/2013 13:39	UF	WTLAP-13-31543	8800	na	32
E050.1	07/12/2013 13:40	UF	WTLAP-13-30865	8670	na	32
E050.1	07/12/2013 13:41	UF	WTLAP-13-39126	8550	na	32
E050.1	07/12/2013 13:42	UF	WTLAP-13-30845	8420	na	32
E050.1	07/12/2013 13:44	UF	WTLAP-13-31079	8170	na	32
E050.1	07/12/2013 13:45	UF	WTLAP-13-31567	8040	na	32
E050.1	07/12/2013 13:48	UF	WTLAP-13-30853	7820	na	31
E050.1	07/12/2013 13:50	F	WTLAP-13-30829	7680	na	31
E050.1	07/12/2013 13:50	UF	WTLAP-13-30833	7680	na	31
E050.1	07/12/2013 13:52	UF	WTLAP-13-30857	7530	na	30
E050.1	07/12/2013 13:52	UF	WTLAP-13-30861	7530	na	30
E050.1	07/12/2013 13:54	UF	WTLAP-13-30837	7390	na	29
E050.1	07/12/2013 14:05	UF	WTLAP-13-31575	6590	na	25
E050.1	07/12/2013 14:25	UF	WTLAP-13-31591	5350	na	19
E050.1	07/12/2013 14:30	UF	WTLAP-13-31952	5180	na	18
E050.1	07/12/2013 14:45	UF	WTLAP-13-31599	4690	na	14
E050.1	07/12/2013 15:05	UF	WTLAP-13-31607	4140	na	9
E050.1	07/12/2013 15:15	UF	WTLAP-13-30841	3950	na	7.8
E050.1	07/12/2013 15:15	UF	WTLAP-13-31964	3950	na	7.8
E050.1	07/12/2013 15:25	UF	WTLAP-13-31615	3760	na	6.7
E050.1	07/12/2013 15:45	UF	WTLAP-13-31623	3350	na	5.4
E050.1	07/12/2013 16:05	UF	WTLAP-13-31631	3100	na	4
E050.1	07/12/2013 16:25	UF	WTLAP-13-31640	2760	na	2.3

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E050.1	08/05/2013 17:45	UF	WTLAP-13-31458	4700	na	5.2
E050.1	08/05/2013 17:47	UF	WTLAP-13-31466	4700	na	7.2
E050.1	08/05/2013 17:49	UF	WTLAP-13-31474	4700	na	9.2
E050.1	08/05/2013 17:51	UF	WTLAP-13-31482	5880	na	12
E050.1	08/05/2013 17:53	UF	WTLAP-13-31490	6370	na	14
E050.1	08/05/2013 17:57	UF	WTLAP-13-31498	7340	na	10
E050.1	08/05/2013 17:59	UF	WTLAP-13-31506	6100	na	3.8
E050.1	08/05/2013 18:01	UF	WTLAP-13-31522	5250	na	20
E050.1	08/05/2013 18:03	F	WTLAP-13-32636	4720	na	20
E050.1	08/05/2013 18:05	F	WTLAP-13-32632	4190	na	20
E050.1	08/05/2013 18:07	UF	WTLAP-13-32628	3660	na	19
E050.1	08/05/2013 18:09	UF	WTLAP-13-30867	3130	na	18
E050.1	08/05/2013 18:09	UF	WTLAP-13-31546	3130	na	18
E050.1	08/05/2013 18:11	UF	WTLAP-13-30846	2940	na	17
E050.1	08/05/2013 18:11	UF	WTLAP-13-31554	2940	na	17
E050.1	08/05/2013 18:13	UF	WTLAP-13-31082	2960	na	16
E050.1	08/05/2013 18:13	UF	WTLAP-13-31562	2960	na	16
E050.1	08/05/2013 18:15	UF	WTLAP-13-31570	2870	na	15
E050.1	08/05/2013 18:17	UF	WTLAP-13-30854	2760	na	14
E050.1	08/05/2013 18:19	F	WTLAP-13-30830	2650	na	13
E050.1	08/05/2013 18:19	UF	WTLAP-13-30834	2650	na	13
E050.1	08/05/2013 18:21	UF	WTLAP-13-30858	2540	na	12
E050.1	08/05/2013 18:21	UF	WTLAP-13-30862	2540	na	12
E050.1	08/05/2013 18:23	UF	WTLAP-13-30838	2430	na	12
E050.1	08/05/2013 18:35	UF	WTLAP-13-31578	1760	na	9.6
E050.1	08/05/2013 18:55	UF	WTLAP-13-31594	1420	na	5.9
E050.1	08/05/2013 18:59	UF	WTLAP-13-31955	1390	na	17
E050.1	08/05/2013 19:15	UF	WTLAP-13-31602	1270	na	3.4
E050.1	08/05/2013 19:35	UF	WTLAP-13-31610	1180	na	2
E050.1	08/05/2013 19:44	UF	WTLAP-13-30842	1140	na	1.6
E050.1	08/05/2013 19:44	UF	WTLAP-13-31967	1140	na	1.6
E050.1	08/05/2013 19:55	UF	WTLAP-13-31618	1090	na	1.2
E050.1	09/10/2013 22:24	UF	WTLAP-13-31459	1250	na	5
E050.1	09/10/2013 22:26	UF	WTLAP-13-31467	1250	na	5.3
E050.1	09/10/2013 22:28	UF	WTLAP-13-31475	1250	na	5.4
E050.1	09/10/2013 22:30	UF	WTLAP-13-31483	1250	na	5.6

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E050.1	09/10/2013 22:32	UF	WTLAP-13-31491	1250	na	5.8
E050.1	09/10/2013 22:36	UF	WTLAP-13-31499	1260	na	6.2
E050.1	09/10/2013 22:38	UF	WTLAP-13-31507	1260	na	6.3
E050.1	09/10/2013 22:40	UF	WTLAP-13-31523	1280	na	6.4
E050.1	09/10/2013 22:42	F	WTLAP-13-32637	1270	na	6.5
E050.1	09/10/2013 22:44	F	WTLAP-13-32633	1260	na	6.6
E050.1	09/10/2013 22:46	UF	WTLAP-13-32629	1240	na	6.7
E050.1	09/10/2013 22:48	UF	WTLAP-13-31547	1230	na	6.8
E050.1	09/10/2013 22:50	UF	WTLAP-13-31555	1260	na	7
E050.1	09/10/2013 22:52	UF	WTLAP-13-31563	1260	na	7.1
E050.1	09/10/2013 22:54	UF	WTLAP-13-31571	1290	na	7.2
E050.1	09/10/2013 23:14	UF	WTLAP-13-31579	1300	na	8.9
E050.1	09/10/2013 23:34	UF	WTLAP-13-31595	1320	na	10
E050.1	09/10/2013 23:54	UF	WTLAP-13-31603	1340	na	11
E050.1	09/11/2013 00:04	UF	WTLAP-13-30869	1480	na	11
E050.1	09/11/2013 00:06	UF	WTLAP-13-30847	1480	na	11
E050.1	09/11/2013 00:08	UF	WTLAP-13-31083	1480	na	11
E050.1	09/11/2013 00:12	UF	WTLAP-13-30855	1480	na	11
E050.1	09/11/2013 00:14	F	WTLAP-13-30831	1480	na	11
E050.1	09/11/2013 00:14	UF	WTLAP-13-30835	1480	na	11
E050.1	09/11/2013 00:14	UF	WTLAP-13-31611	1480	na	11
E050.1	09/11/2013 00:16	UF	WTLAP-13-30859	1480	na	11
E050.1	09/11/2013 00:16	UF	WTLAP-13-30863	1480	na	11
E050.1	09/11/2013 00:18	UF	WTLAP-13-30839	1480	na	11
E050.1	09/11/2013 00:34	UF	WTLAP-13-31619	1480	na	11
E050.1	09/11/2013 00:54	UF	WTLAP-13-31627	1580	na	9.9
E050.1	09/11/2013 00:54	UF	WTLAP-13-31958	1580	na	9.9
E050.1	09/11/2013 01:14	UF	WTLAP-13-31635	1630	na	9.9
E050.1	09/11/2013 01:34	UF	WTLAP-13-31644	1750	na	12
E050.1	09/11/2013 01:39	UF	WTLAP-13-30843	1750	na	12
E050.1	09/11/2013 01:39	UF	WTLAP-13-31970	1750	na	12
E050.1	09/12/2013 17:54	UF	WTLAP-13-31462	990	na	7.3
E050.1	09/12/2013 17:56	UF	WTLAP-13-31470	990	na	6.5
E050.1	09/12/2013 17:58	UF	WTLAP-13-31478	990	na	3.4
E050.1	09/12/2013 18:00	UF	WTLAP-13-31486	960	na	11
E050.1	09/12/2013 18:02	UF	WTLAP-13-31494	1060	na	12

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E050.1	09/12/2013 18:06	UF	WTLAP-13-31502	1270	na	14
E050.1	09/12/2013 18:08	UF	WTLAP-13-31510	1400	na	16
E050.1	09/12/2013 18:10	UF	WTLAP-13-31526	1560	na	17
E050.1	09/12/2013 18:12	F	WTLAP-13-32638	1630	na	18
E050.1	09/12/2013 18:14	F	WTLAP-13-32634	1700	na	20
E050.1	09/12/2013 18:16	UF	WTLAP-13-32630	1780	na	21
E050.1	09/12/2013 18:18	UF	WTLAP-13-31550	1850	na	22
E050.1	09/12/2013 18:20	UF	WTLAP-13-31558	1810	na	23
E050.1	09/12/2013 18:22	UF	WTLAP-13-31566	1840	na	23
E050.1	09/12/2013 18:24	UF	WTLAP-13-31574	1820	na	24
E050.1	09/12/2013 18:44	UF	WTLAP-13-31582	2690	na	59
E050.1	09/12/2013 19:04	UF	WTLAP-13-30871	11200	na	87
E050.1	09/12/2013 19:04	UF	WTLAP-13-31598	11200	na	87
E050.1	09/12/2013 19:06	UF	WTLAP-13-30848	11300	na	87
E050.1	09/12/2013 19:08	UF	WTLAP-13-31086	11500	na	87
E050.1	09/12/2013 19:12	UF	WTLAP-13-30856	11700	na	87
E050.1	09/12/2013 19:14	F	WTLAP-13-30832	11900	na	87
E050.1	09/12/2013 19:14	UF	WTLAP-13-30836	11900	na	87
E050.1	09/12/2013 19:16	UF	WTLAP-13-30860	12000	na	87
E050.1	09/12/2013 19:16	UF	WTLAP-13-30864	12000	na	87
E050.1	09/12/2013 19:18	UF	WTLAP-13-30840	12200	na	87
E050.1	09/12/2013 19:24	UF	WTLAP-13-31606	12600	na	86
E050.1	09/12/2013 19:44	UF	WTLAP-13-31614	10500	na	82
E050.1	09/12/2013 19:54	UF	WTLAP-13-31961	9290	na	84
E050.1	09/12/2013 20:04	UF	WTLAP-13-31622	8090	na	74
E050.1	09/12/2013 20:24	UF	WTLAP-13-31630	6960	na	62
E050.1	09/12/2013 20:39	UF	WTLAP-13-30844	6350	na	56
E050.1	09/12/2013 20:44	UF	WTLAP-13-31638	6150	na	54
E050.1	09/12/2013 21:04	UF	WTLAP-13-31647	5650	na	51
E055	06/14/2013 13:45	UF	WTLAP-13-30706	1850	na	14
E055	06/14/2013 13:46	UF	WTLAP-13-30694	1980	na	14
E055	06/14/2013 13:48	UF	WTLAP-13-30718	2260	na	13
E055	06/14/2013 13:52	UF	WTLAP-13-30682	2800	na	13
E055	06/14/2013 13:53	F	WTLAP-13-30670	2930	na	12
E055	06/14/2013 13:54	UF	WTLAP-13-32639	3060	na	12
E055	06/14/2013 13:55	F	WTLAP-13-32643	3200	na	12

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E055	06/14/2013 13:56	F	WTLAP-13-32647	3340	na	9.6
E055	06/14/2013 13:57	UF	WTLAP-13-30730	3470	na	7.2
E055	09/12/2013 16:55	UF	WTLAP-13-30709	9330	na	12
E055	09/12/2013 16:56	UF	WTLAP-13-30697	9720	na	11
E055	09/12/2013 16:58	UF	WTLAP-13-30721	10500	na	9.6
E055	09/12/2013 17:00	F	WTLAP-13-30673	11300	na	12
E055	09/12/2013 17:00	UF	WTLAP-13-30685	11300	na	12
E055	09/12/2013 17:01	UF	WTLAP-13-30733	11700	na	12
E055	09/12/2013 17:02	F	WTLAP-13-32648	11700	na	13
E055	09/12/2013 17:03	F	WTLAP-13-32644	11700	na	13
E055	09/12/2013 17:04	UF	WTLAP-13-32640	11700	na	13
E055.5	07/12/2013 11:50	UF	WTLAP-13-30707	11400	na	4.8
E055.5	07/12/2013 11:52	UF	WTLAP-13-30695	9250	na	3.5
E055.5	07/12/2013 11:56	UF	WTLAP-13-30719	4970	na	1.2
E055.5	07/12/2013 11:57	F	WTLAP-13-30671	3900	na	0.9
E055.5	07/12/2013 11:57	UF	WTLAP-13-30683	3900	na	0.9
E055.5	07/12/2013 11:59	UF	WTLAP-13-30731	1760	na	0.3
E055.5	09/13/2013 06:55	UF	WTLAP-13-30710	5180	na	3.5
E055.5	09/13/2013 06:57	UF	WTLAP-13-30698	5240	na	2.1
E055.5	09/13/2013 07:01	UF	WTLAP-13-30722	5370	na	11
E055.5	09/13/2013 07:03	F	WTLAP-13-30674	5430	na	11
E055.5	09/13/2013 07:03	UF	WTLAP-13-30686	5430	na	11
E055.5	09/13/2013 07:05	UF	WTLAP-13-30734	5490	na	11
E055.5	09/13/2013 07:06	F	WTLAP-13-32680	5490	na	11
E055.5	09/13/2013 07:06	F	WTLAP-13-32684	5490	na	11
E055.5	09/13/2013 07:08	UF	WTLAP-13-32676	5490	na	12
E056	06/14/2013 13:40	F	WTLAP-13-36892	5800	na	16
E056	06/14/2013 13:40	UF	WTLAP-13-36893	5800	na	16
E056	06/14/2013 13:40	UF	WTLAP-13-36912	5800	na	16
E056	07/12/2013 12:00	UF	WTLAP-13-36905	5700	na	21
E056	07/12/2013 12:02	UF	WTLAP-13-36901	5150	na	18
E056	07/12/2013 12:04	UF	WTLAP-13-36909	4590	na	15
E056	07/12/2013 12:05	F	WTLAP-13-36895	4320	na	14
E056	07/12/2013 12:05	UF	WTLAP-13-36894	4320	na	14
E056	07/12/2013 12:06	UF	WTLAP-13-36913	4040	na	13
E056	07/12/2013 12:07	F	WTLAP-13-36925	4040	na	13

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E056	07/12/2013 12:09	F	WTLAP-13-36921	4040	na	12
E056	07/12/2013 12:10	UF	WTLAP-13-36917	4040	na	11
E056	08/05/2013 13:45	UF	WTLAP-13-36906	2450	na	9.2
E056	08/05/2013 13:46	UF	WTLAP-13-36902	2410	na	8.9
E056	08/05/2013 13:49	UF	WTLAP-13-36910	2280	na	7.9
E056	08/05/2013 13:50	F	WTLAP-13-36896	2240	na	7.6
E056	08/05/2013 13:50	UF	WTLAP-13-36897	2240	na	7.6
E056	08/05/2013 13:52	UF	WTLAP-13-36914	2160	na	7
E056	08/05/2013 13:53	F	WTLAP-13-36926	2160	na	6.6
E056	08/05/2013 13:54	F	WTLAP-13-36922	2160	na	6.3
E056	08/05/2013 13:55	UF	WTLAP-13-36918	2160	na	6
E056	09/12/2013 16:25	UF	WTLAP-13-36907	1800	na	6.8
E056	09/12/2013 16:27	UF	WTLAP-13-36903	1630	na	6.3
E056	09/12/2013 16:30	UF	WTLAP-13-36911	1380	na	5.5
E056	09/12/2013 16:33	F	WTLAP-13-36899	1140	na	5.6
E056	09/12/2013 16:33	UF	WTLAP-13-36898	1140	na	5.6
E056	09/12/2013 16:35	UF	WTLAP-13-36915	970	na	5.7
E056	09/12/2013 16:37	F	WTLAP-13-36927	970	na	6.2
E056	09/12/2013 16:38	F	WTLAP-13-36923	970	na	6.5
E056	09/12/2013 16:40	UF	WTLAP-13-36919	970	na	7.1
E109.9	07/08/2013 16:15	UF	WTLAP-13-38793	267000	-254000	93
E109.9	07/08/2013 16:20	UF	WTLAP-13-38794	439000	7330	99
E109.9	07/08/2013 16:22	UF	WTLAP-13-38799	404000	112000	98
E109.9	07/08/2013 16:23	UF	WTLAP-13-38795	386000	164000	97
E109.9	07/08/2013 16:25	UF	WTLAP-13-38796	384000	269000	96
E109.9	07/08/2013 16:25	UF	WTLAP-13-38800	384000	269000	96
E109.9	07/08/2013 16:28	UF	WTLAP-13-38797	381000	262000	97
E109.9	07/08/2013 16:30	UF	WTLAP-13-38802	379000	257000	97
E109.9	07/08/2013 16:31	UF	WTLAP-13-38803	378000	236000	94
E109.9	07/08/2013 16:34	F	WTLAP-13-38805	375000	225000	85
E109.9	07/08/2013 16:34	UF	WTLAP-13-38804	375000	225000	85
E109.9	07/08/2013 16:54	UF	WTLAP-13-38806	355000	150000	52
E109.9	07/08/2013 17:05	UF	WTLAP-13-38798	329000	109000	52
E109.9	07/08/2013 17:14	UF	WTLAP-13-38807	318000	75900	49
E109.9	07/08/2013 17:34	UF	WTLAP-13-38808	294000	69800	38
E109.9	07/08/2013 17:54	UF	WTLAP-13-38809	294000	63600	24

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E109.9	07/12/2013 13:19	UF	WTLAP-13-39014	377000	188000	110
E109.9	07/12/2013 13:30	UF	WTLAP-13-39008	319000	160000	150
E109.9	07/12/2013 13:32	UF	WTLAP-13-39009	309000	155000	150
E109.9	07/12/2013 13:34	UF	WTLAP-13-39010	298000	150000	150
E109.9	07/12/2013 13:36	UF	WTLAP-13-39011	288000	133000	150
E109.9	07/12/2013 13:38	UF	WTLAP-13-39012	277000	133000	150
E109.9	07/20/2013 19:55	UF	WTLAP-13-39326	829000	402000	380
E109.9	07/20/2013 19:57	UF	WTLAP-13-39327	829000	395000	230
E109.9	07/20/2013 19:59	UF	WTLAP-13-39328	821000	388000	76
E109.9	07/20/2013 20:01	UF	WTLAP-13-39329	814000	381000	340
E109.9	07/20/2013 20:05	UF	WTLAP-13-39330	799000	436000	330
E109.9	07/20/2013 20:07	UF	WTLAP-13-39331	792000	464000	320
E109.9	07/20/2013 20:09	UF	WTLAP-13-39333	784000	464000	320
E109.9	07/20/2013 20:45	UF	WTLAP-13-39334	650000	464000	190
E109.9	07/20/2013 20:45	UF	WTLAP-13-39335	650000	464000	190
E109.9	07/25/2013 22:54	UF	WTLAP-13-39381	387000	310000	70
E109.9	07/25/2013 22:57	UF	WTLAP-13-39382	304000	259000	53
E109.9	07/25/2013 22:59	UF	WTLAP-13-39383	250000	225000	18
E109.9	07/25/2013 23:00	UF	WTLAP-13-39384	220000	208000	97
E109.9	07/25/2013 23:02	UF	WTLAP-13-39385	178000	175000	95
E109.9	07/25/2013 23:04	UF	WTLAP-13-39386	162000	141000	93
E109.9	07/25/2013 23:05	UF	WTLAP-13-39377	160000	124000	92
E109.9	07/25/2013 23:06	UF	WTLAP-13-39387	158000	107000	88
E109.9	07/25/2013 23:07	UF	WTLAP-13-39378	157000	90100	85
E109.9	07/25/2013 23:08	UF	WTLAP-13-39388	155000	95700	82
E109.9	07/25/2013 23:09	F	WTLAP-13-39379	153000	101000	79
E109.9	07/25/2013 23:10	UF	WTLAP-13-39389	151000	107000	76
E109.9	07/25/2013 23:11	F	WTLAP-13-39380	149000	104000	71
E109.9	07/25/2013 23:15	UF	WTLAP-13-39390	142000	93200	54
E109.9	07/25/2013 23:20	UF	WTLAP-13-39391	133000	93200	50
E109.9	07/25/2013 23:24	UF	WTLAP-13-39392	126000	93200	44
E109.9	07/25/2013 23:44	UF	WTLAP-13-39393	89200	93200	19
E109.9	07/26/2013 00:04	UF	WTLAP-13-39394	77200	na	25
E109.9	07/26/2013 00:24	UF	WTLAP-13-39395	76200	na	24
E109.9	07/26/2013 00:44	UF	WTLAP-13-39396	68100	na	22
E109.9	07/26/2013 01:04	UF	WTLAP-13-39397	55200	na	23

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E109.9	07/26/2013 02:04	UF	WTLAP-13-39398	33200	na	12
E109.9	07/26/2013 17:14	UF	WTLAP-13-39404	67800	na	99
E109.9	07/26/2013 17:16	UF	WTLAP-13-39405	88100	na	130
E109.9	07/26/2013 17:18	UF	WTLAP-13-39406	86000	na	140
E109.9	07/26/2013 17:20	UF	WTLAP-13-39411	83800	na	160
E109.9	07/26/2013 17:24	UF	WTLAP-13-39412	79600	na	160
E109.9	07/26/2013 17:26	UF	WTLAP-13-39413	77500	na	160
E109.9	07/26/2013 17:28	UF	WTLAP-13-39414	75300	na	160
E109.9	07/26/2013 17:30	F	WTLAP-13-39415	73200	na	160
E109.9	07/26/2013 17:32	UF	WTLAP-13-39416	71100	na	160
E109.9	07/26/2013 17:34	UF	WTLAP-13-39417	69000	na	160
E109.9	07/26/2013 17:36	F	WTLAP-13-39418	66800	na	140
E109.9	07/26/2013 17:38	F	WTLAP-13-39419	64700	na	120
E109.9	07/26/2013 17:40	UF	WTLAP-13-39420	62600	na	92
E109.9	07/26/2013 17:42	UF	WTLAP-13-39421	62900	na	100
E109.9	07/26/2013 17:44	UF	WTLAP-13-39422	57800	na	110
E109.9	08/03/2013 15:24	UF	WTLAP-13-39447	522000	na	600
E109.9	08/03/2013 15:26	F	WTLAP-13-39448	541000	na	790
E109.9	08/03/2013 15:32	UF	WTLAP-13-39449	599000	na	910
E109.9	08/03/2013 15:34	F	WTLAP-13-39450	586000	na	860
E109.9	08/03/2013 15:36	F	WTLAP-13-39451	572000	na	820
E109.9	08/03/2013 15:38	UF	WTLAP-13-39452	559000	na	770
E109.9	08/03/2013 15:40	F	WTLAP-13-39453	546000	na	730
E109.9	08/03/2013 15:40	UF	WTLAP-13-39441	546000	na	730
E109.9	08/03/2013 15:42	F	WTLAP-13-39454	533000	na	690
E109.9	08/03/2013 15:42	UF	WTLAP-13-39442	533000	na	690
E109.9	08/03/2013 15:44	UF	WTLAP-13-39455	520000	na	650
E109.9	08/03/2013 15:45	UF	WTLAP-13-39443	514000	na	630
E109.9	08/03/2013 15:48	F	WTLAP-13-39456	494000	na	550
E109.9	08/03/2013 15:50	UF	WTLAP-13-39444	481000	na	490
E109.9	08/03/2013 15:52	UF	WTLAP-13-39445	468000	na	480
E109.9	08/03/2013 15:52	UF	WTLAP-13-39457	468000	na	480
E109.9	08/03/2013 15:54	UF	WTLAP-13-39458	455000	na	480
E109.9	08/03/2013 16:14	UF	WTLAP-13-39459	397000	na	290
E109.9	08/03/2013 16:30	UF	WTLAP-13-39446	351000	na	240
E109.9	08/03/2013 16:34	UF	WTLAP-13-39460	339000	na	230

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E109.9	08/03/2013 16:54	UF	WTLAP-13-39461	306000	na	150
E109.9	08/03/2013 17:14	UF	WTLAP-13-39462	273000	na	120
E109.9	08/03/2013 17:34	F	WTLAP-13-39463	240000	na	120
E109.9	08/03/2013 17:54	UF	WTLAP-13-39464	207000	na	87
E109.9	08/03/2013 18:34	UF	WTLAP-13-39465	141000	na	47
E109.9	08/05/2013 18:14	UF	WTLAP-13-40571	181000	na	430
E109.9	08/05/2013 18:16	UF	WTLAP-13-40566	184000	na	580
E109.9	08/05/2013 18:18	UF	WTLAP-13-40567	155000	na	640
E109.9	08/05/2013 18:20	UF	WTLAP-13-40568	152000	na	710
E109.9	08/05/2013 18:24	UF	WTLAP-13-40570	130000	na	820
E109.9	08/05/2013 18:25	UF	WTLAP-13-40569	137000	na	850
E109.9	08/05/2013 18:35	UF	WTLAP-13-40565	108000	na	740
E109.9	08/09/2013 15:34	UF	WTLAP-13-41689	327000	na	270
E109.9	08/09/2013 15:37	UF	WTLAP-13-41690	292000	na	270
E109.9	08/09/2013 15:40	UF	WTLAP-13-41681	290000	na	270
E109.9	08/09/2013 15:40	UF	WTLAP-13-41681	334000	na	270
E109.9	08/09/2013 15:40	UF	WTLAP-13-41691	290000	na	270
E109.9	08/09/2013 15:40	UF	WTLAP-13-41691	334000	na	270
E109.9	08/09/2013 15:42	F	WTLAP-13-41692	324000	na	270
E109.9	08/09/2013 15:42	UF	WTLAP-13-41682	324000	na	270
E109.9	08/09/2013 15:43	F	WTLAP-13-41693	318000	na	270
E109.9	08/09/2013 15:44	UF	WTLAP-13-41683	313000	na	270
E109.9	08/09/2013 15:46	F	WTLAP-13-41694	303000	na	260
E109.9	08/09/2013 15:48	UF	WTLAP-13-41684	293000	na	230
E109.9	08/09/2013 15:49	UF	WTLAP-13-41695	287000	na	220
E109.9	08/09/2013 15:50	UF	WTLAP-13-41685	282000	na	210
E109.9	08/09/2013 15:52	F	WTLAP-13-41686	272000	na	200
E109.9	08/09/2013 15:52	F	WTLAP-13-41696	272000	na	200
E109.9	08/09/2013 15:54	UF	WTLAP-13-41687	261000	na	190
E109.9	08/09/2013 15:56	UF	WTLAP-13-41697	251000	na	150
E109.9	08/09/2013 15:58	UF	WTLAP-13-41698	256000	na	76
E109.9	08/09/2013 16:00	UF	WTLAP-13-41699	252000	na	180
E109.9	08/09/2013 16:02	UF	WTLAP-13-41700	249000	na	170
E109.9	08/09/2013 16:04	UF	WTLAP-13-41701	246000	na	170
E109.9	08/09/2013 16:24	UF	WTLAP-13-41702	203000	na	130
E109.9	08/09/2013 16:30	UF	WTLAP-13-41688	202000	na	110
E109.9	08/09/2013 16:44	UF	WTLAP-13-41703	177000	na	110

Table 4.3-1 (continued)

Station	Sample Collection Date and Time	Field Prep	Sample ID	Calculated SSC (mg/L)	Calculated TSS (mg/L)	Calculated Instantaneous Discharge (cfs)
E109.9	08/09/2013 17:44	UF	WTLAP-13-41704	118000	na	55
E109.9	08/09/2013 18:04	UF	WTLAP-13-41705	93100	na	40
E109.9	08/09/2013 18:24	UF	WTLAP-13-41706	84600	na	31
E109.9	09/12/2013 15:39	UF	WTLAP-13-42187	750000	na	29
E109.9	09/12/2013 15:42	UF	WTLAP-13-42188	468000	na	39
E109.9	09/12/2013 15:44	UF	WTLAP-13-42189	351000	na	50
E109.9	09/12/2013 15:45	UF	WTLAP-13-42176	322000	na	55
E109.9	09/12/2013 15:46	UF	WTLAP-13-42190	293000	na	60
E109.9	09/12/2013 15:47	UF	WTLAP-13-42177	264000	na	65
E109.9	09/12/2013 15:48	UF	WTLAP-13-42191	236000	na	69
E109.9	09/12/2013 15:49	UF	WTLAP-13-42178	207000	na	74
E109.9	09/12/2013 15:53	UF	WTLAP-13-42179	91600	na	84
E109.9	09/12/2013 15:53	UF	WTLAP-13-42192	91600	na	84
E109.9	09/12/2013 15:55	UF	WTLAP-13-42180	77800	na	87
E109.9	09/12/2013 15:55	UF	WTLAP-13-42193	77800	na	87
E109.9	09/12/2013 15:57	F	WTLAP-13-42194	64000	na	52
E109.9	09/12/2013 15:58	UF	WTLAP-13-42181	57100	na	35
E109.9	09/12/2013 15:58	UF	WTLAP-13-42182	57100	na	35
E109.9	09/12/2013 15:59	F	WTLAP-13-42195	50200	na	17
E109.9	09/12/2013 16:01	F	WTLAP-13-42196	36400	na	180
E109.9	09/12/2013 16:03	UF	WTLAP-13-42197	22600	na	210
E109.9	09/12/2013 16:05	UF	WTLAP-13-42198	8760	na	250
E109.9	09/12/2013 16:05	UF	WTLAP-13-42199	8760	na	250
E109.9	09/12/2013 16:09	UF	WTLAP-13-42200	9970	na	250
E109.9	09/12/2013 16:35	UF	WTLAP-13-42183	17800	na	190
E109.9	09/12/2013 16:35	UF	WTLAP-13-42184	17800	na	190
E109.9	09/12/2013 16:49	UF	WTLAP-13-42201	22000	na	190
E109.9	09/12/2013 17:09	UF	WTLAP-13-42202	29100	na	480
E109.9	09/12/2013 17:20	UF	WTLAP-13-42185	44600	na	520
E109.9	09/12/2013 17:20	UF	WTLAP-13-42186	44600	na	520
E109.9	09/12/2013 17:29	UF	WTLAP-13-42203	57300	na	420
E109.9	09/12/2013 17:49	UF	WTLAP-13-42204	86600	na	220
E109.9	09/12/2013 18:09	UF	WTLAP-13-42205	157000	na	270
E109.9	09/12/2013 18:29	UF	WTLAP-13-42206	375000	na	210
E109.9	09/12/2013 18:49	UF	WTLAP-13-42207	749000	na	160

^a UF = Unfiltered.^b na = Not available.^c F = Filtered.^d Filtered pore size of 0.2 µm, 1 µm, 5 µm, and 10 µm used for additional analysis.

Table 4.4-1
Analytical Results Obtained below the SWMU 01-001(f) Drainage

Sample Location	Analyte	Sample ID	Field Prep	Collection Date Time	Result	Unit
CO101038	Acidity or Alkalinity of a solution	WTLAP-13-39034	UF ^a	7/12/13 11:41	8.4	SU
CO101038	Acidity or Alkalinity of a solution	WTLAP-13-32556	UF	9/18/13 13:41	8.26	SU
CO101038	Alkalinity-CO3	WTLAP-13-39034	UF	7/12/13 11:41	2.08	mg/L
CO101038	Alkalinity-CO3	WTLAP-13-32556	UF	9/18/13 13:41	< 1 ^b	mg/L
CO101038	Alkalinity-CO3+HCO3	WTLAP-13-39034	UF	7/12/13 11:41	57.7	mg/L
CO101038	Alkalinity-CO3+HCO3	WTLAP-13-32556	UF	9/18/13 13:41	104	mg/L
CO101038	Alkalinity-HCO3	WTLAP-13-39034	UF	7/12/13 11:41	55.6	mg/L
CO101038	Alkalinity-HCO3	WTLAP-13-32556	UF	9/18/13 13:41	104	mg/L
CO101038	Aluminum	WTLAP-13-39029	F ^c	7/12/13 11:36	350	µg/L
CO101038	Aluminum	WTLAP-13-39030	UF	7/12/13 11:37	46200	µg/L
CO101038	Aluminum	WTLAP-13-30623	F	9/18/13 13:33	440	µg/L
CO101038	Aluminum	WTLAP-13-30631	UF	9/18/13 13:34	1610	µg/L
CO101038	Antimony	WTLAP-13-39029	F	7/12/13 11:36	< 3	µg/L
CO101038	Antimony	WTLAP-13-39030	UF	7/12/13 11:37	< 3	µg/L
CO101038	Antimony	WTLAP-13-30623	F	9/18/13 13:33	< 3	µg/L
CO101038	Antimony	WTLAP-13-30631	UF	9/18/13 13:34	< 3	µg/L
CO101038	Arsenic	WTLAP-13-39029	F	7/12/13 11:36	2.2	µg/L
CO101038	Arsenic	WTLAP-13-39030	UF	7/12/13 11:37	13.2	µg/L
CO101038	Arsenic	WTLAP-13-30623	F	9/18/13 13:33	< 5	µg/L
CO101038	Arsenic	WTLAP-13-30631	UF	9/18/13 13:34	< 5	µg/L
CO101038	Barium	WTLAP-13-39029	F	7/12/13 11:36	24.7	µg/L
CO101038	Barium	WTLAP-13-39030	UF	7/12/13 11:37	628	µg/L
CO101038	Barium	WTLAP-13-30623	F	9/18/13 13:33	49.2	µg/L
CO101038	Barium	WTLAP-13-30631	UF	9/18/13 13:34	65.3	µg/L
CO101038	Beryllium	WTLAP-13-39029	F	7/12/13 11:36	< 0.5	µg/L
CO101038	Beryllium	WTLAP-13-39030	UF	7/12/13 11:37	3.76	µg/L
CO101038	Beryllium	WTLAP-13-30623	F	9/18/13 13:33	< 0.5	µg/L
CO101038	Beryllium	WTLAP-13-30631	UF	9/18/13 13:34	< 0.5	µg/L
CO101038	Boron	WTLAP-13-39029	F	7/12/13 11:36	< 50	µg/L
CO101038	Boron	WTLAP-13-39030	UF	7/12/13 11:37	28.8	µg/L
CO101038	Boron	WTLAP-13-30623	F	9/18/13 13:33	22.6	µg/L
CO101038	Boron	WTLAP-13-30631	UF	9/18/13 13:34	24.8	µg/L
CO101038	Cadmium	WTLAP-13-39029	F	7/12/13 11:36	< 1	µg/L
CO101038	Cadmium	WTLAP-13-39030	UF	7/12/13 11:37	1.31	µg/L
CO101038	Cadmium	WTLAP-13-30623	F	9/18/13 13:33	< 1	µg/L
CO101038	Cadmium	WTLAP-13-30631	UF	9/18/13 13:34	< 1	µg/L
CO101038	Calcium	WTLAP-13-39029	F	7/12/13 11:36	10.2	mg/L

Table 4.4-1 (continued)

Sample Location	Analyte	Sample ID	Field Prep	Collection Date Time	Result	Unit
CO101038	Calcium	WTLAP-13-39030	UF	7/12/13 11:37	88.3	mg/L
CO101038	Calcium	WTLAP-13-30623	F	9/18/13 13:33	25.5	mg/L
CO101038	Calcium	WTLAP-13-30631	UF	9/18/13 13:34	26.8	mg/L
CO101038	Chloride	WTLAP-13-39033	F	7/12/13 11:40	10.6	mg/L
CO101038	Chloride	WTLAP-13-32560	F	9/18/13 13:40	39.8	mg/L
CO101038	Chromium	WTLAP-13-39029	F	7/12/13 11:36	< 10	µg/L
CO101038	Chromium	WTLAP-13-39030	UF	7/12/13 11:37	54	µg/L
CO101038	Chromium	WTLAP-13-30623	F	9/18/13 13:33	< 10	µg/L
CO101038	Chromium	WTLAP-13-30631	UF	9/18/13 13:34	< 10	µg/L
CO101038	Clay	WTLAP-13-39027	UF	7/12/13 11:33	26.9	%
CO101038	Clay	WTLAP-13-30647	UF	9/18/13 13:30	9.2	%
CO101038	Cobalt	WTLAP-13-39029	F	7/12/13 11:36	< 3.33	µg/L
CO101038	Cobalt	WTLAP-13-39030	UF	7/12/13 11:37	28.5	µg/L
CO101038	Cobalt	WTLAP-13-30623	F	9/18/13 13:33	< 5	µg/L
CO101038	Cobalt	WTLAP-13-30631	UF	9/18/13 13:34	< 5	µg/L
CO101038	Copper	WTLAP-13-39029	F	7/12/13 11:36	2.43	µg/L
CO101038	Copper	WTLAP-13-39030	UF	7/12/13 11:37	124	µg/L
CO101038	Copper	WTLAP-13-30623	F	9/18/13 13:33	2.43	µg/L
CO101038	Copper	WTLAP-13-30631	UF	9/18/13 13:34	3.73	µg/L
CO101038	Dissolved Organic Carbon	WTLAP-13-39035	F	7/12/13 11:42	31.1	mg/L
CO101038	Dissolved Organic Carbon	WTLAP-13-32564	F	9/18/13 13:39	9.14	mg/L
CO101038	Hardness	WTLAP-13-39029	F	7/12/13 11:36	30.4	mg/L
CO101038	Hardness	WTLAP-13-39030	UF	7/12/13 11:37	316	mg/L
CO101038	Hardness	WTLAP-13-30623	F	9/18/13 13:33	79.3	mg/L
CO101038	Hardness	WTLAP-13-30631	UF	9/18/13 13:34	83.9	mg/L
CO101038	Iron	WTLAP-13-39029	F	7/12/13 11:36	191	µg/L
CO101038	Iron	WTLAP-13-39030	UF	7/12/13 11:37	50800	µg/L
CO101038	Iron	WTLAP-13-30623	F	9/18/13 13:33	280	µg/L
CO101038	Iron	WTLAP-13-30631	UF	9/18/13 13:34	1130	µg/L
CO101038	Lead	WTLAP-13-39029	F	7/12/13 11:36	< 2	µg/L
CO101038	Lead	WTLAP-13-39030	UF	7/12/13 11:37	99	µg/L
CO101038	Lead	WTLAP-13-30623	F	9/18/13 13:33	< 2	µg/L
CO101038	Lead	WTLAP-13-30631	UF	9/18/13 13:34	2.07	µg/L
CO101038	Magnesium	WTLAP-13-39029	F	7/12/13 11:36	1.21	mg/L
CO101038	Magnesium	WTLAP-13-39030	UF	7/12/13 11:37	23.3	mg/L
CO101038	Magnesium	WTLAP-13-30623	F	9/18/13 13:33	3.79	mg/L
CO101038	Magnesium	WTLAP-13-30631	UF	9/18/13 13:34	4.11	mg/L
CO101038	Manganese	WTLAP-13-39029	F	7/12/13 11:36	6.36	µg/L

Table 4.4-1 (continued)

Sample Location	Analyte	Sample ID	Field Prep	Collection Date Time	Result	Unit
CO101038	Manganese	WTLAP-13-39030	UF	7/12/13 11:37	2500	µg/L
CO101038	Manganese	WTLAP-13-30623	F	9/18/13 13:33	4.03	µg/L
CO101038	Manganese	WTLAP-13-30631	UF	9/18/13 13:34	154	µg/L
CO101038	Mercury	WTLAP-13-39029	F	7/12/13 11:36	< 0.2	µg/L
CO101038	Mercury	WTLAP-13-39030	UF	7/12/13 11:37	< 0.2	µg/L
CO101038	Mercury	WTLAP-13-30623	F	9/18/13 13:33	< 0.2	µg/L
CO101038	Mercury	WTLAP-13-30631	UF	9/18/13 13:34	< 0.2	µg/L
CO101038	Nickel	WTLAP-13-39029	F	7/12/13 11:36	0.89	µg/L
CO101038	Nickel	WTLAP-13-39030	UF	7/12/13 11:37	53.7	µg/L
CO101038	Nickel	WTLAP-13-30623	F	9/18/13 13:33	1.25	µg/L
CO101038	Nickel	WTLAP-13-30631	UF	9/18/13 13:34	2.01	µg/L
CO101038	Potassium	WTLAP-13-39029	F	7/12/13 11:36	4.93	mg/L
CO101038	Potassium	WTLAP-13-39030	UF	7/12/13 11:37	15.6	mg/L
CO101038	Potassium	WTLAP-13-30623	F	9/18/13 13:33	4.77	mg/L
CO101038	Potassium	WTLAP-13-30631	UF	9/18/13 13:34	5.11	mg/L
CO101038	Sand	WTLAP-13-39027	UF	7/12/13 11:33	0.4	%
CO101038	Sand	WTLAP-13-30647	UF	9/18/13 13:30	25.7	%
CO101038	Selenium	WTLAP-13-39029	F	7/12/13 11:36	< 5	µg/L
CO101038	Selenium	WTLAP-13-39030	UF	7/12/13 11:37	< 5	µg/L
CO101038	Selenium	WTLAP-13-30623	F	9/18/13 13:33	< 5	µg/L
CO101038	Selenium	WTLAP-13-30631	UF	9/18/13 13:34	< 5	µg/L
CO101038	Silt	WTLAP-13-39027	UF	7/12/13 11:33	72.7	%
CO101038	Silt	WTLAP-13-30647	UF	9/18/13 13:30	65	%
CO101038	Silver	WTLAP-13-39029	F	7/12/13 11:36	< 1	µg/L
CO101038	Silver	WTLAP-13-39030	UF	7/12/13 11:37	0.31	µg/L
CO101038	Silver	WTLAP-13-30623	F	9/18/13 13:33	< 1	µg/L
CO101038	Silver	WTLAP-13-30631	UF	9/18/13 13:34	< 1	µg/L
CO101038	Sodium	WTLAP-13-39029	F	7/12/13 11:36	13.1	mg/L
CO101038	Sodium	WTLAP-13-39030	UF	7/12/13 11:37	16.2	mg/L
CO101038	Sodium	WTLAP-13-30623	F	9/18/13 13:33	40.7	mg/L
CO101038	Sodium	WTLAP-13-30631	UF	9/18/13 13:34	42	mg/L
CO101038	Sulfate	WTLAP-13-39033	F	7/12/13 11:40	7.35	mg/L
CO101038	Sulfate	WTLAP-13-32560	F	9/18/13 13:40	21.2	mg/L
CO101038	SSC	WTLAP-13-39027	UF	7/12/13 11:33	4110	mg/L
CO101038	SSC	WTLAP-13-39032	UF	7/12/13 11:39	2150	mg/L
CO101038	SSC	WTLAP-13-39036	UF	7/12/13 11:43	1690	mg/L
CO101038	SSC	WTLAP-13-30647	UF	9/18/13 13:30	350	mg/L
CO101038	Thallium	WTLAP-13-39029	F	7/12/13 11:36	< 2	µg/L

Table 4.4-1 (continued)

Sample Location	Analyte	Sample ID	Field Prep	Collection Date Time	Result	Unit
CO101038	Thallium	WTLAP-13-39030	UF	7/12/13 11:37	0.65	µg/L
CO101038	Thallium	WTLAP-13-30623	F	9/18/13 13:33	< 2	µg/L
CO101038	Thallium	WTLAP-13-30631	UF	9/18/13 13:34	< 2	µg/L
CO101038	Total Organic Carbon	WTLAP-13-39037	UF	7/12/13 11:44	5.23	mg/L
CO101038	Total Organic Carbon	WTLAP-13-30663	UF	9/18/13 13:38	9.06	mg/L
CO101038	Uranium	WTLAP-13-39029	F	7/12/13 11:36	2.24	µg/L
CO101038	Uranium	WTLAP-13-39030	UF	7/12/13 11:37	8.81	µg/L
CO101038	Uranium	WTLAP-13-30623	F	9/18/13 13:33	9.8	µg/L
CO101038	Uranium	WTLAP-13-30631	UF	9/18/13 13:34	9.71	µg/L
CO101038	Uranium-234	WTLAP-13-39031	UF	7/12/13 11:38	5.12	pCi/L
CO101038	Uranium-234	WTLAP-13-30655	UF	9/18/13 13:35	3.11	pCi/L
CO101038	Uranium-235/236	WTLAP-13-39031	UF	7/12/13 11:38	< 0.253	pCi/L
CO101038	Uranium-235/236	WTLAP-13-30655	UF	9/18/13 13:35	0.165	pCi/L
CO101038	Uranium-238	WTLAP-13-39031	UF	7/12/13 11:38	5.2	pCi/L
CO101038	Uranium-238	WTLAP-13-30655	UF	9/18/13 13:35	2.98	pCi/L
CO101038	Vanadium	WTLAP-13-39029	F	7/12/13 11:36	7.16	µg/L
CO101038	Vanadium	WTLAP-13-39030	UF	7/12/13 11:37	78.7	µg/L
CO101038	Vanadium	WTLAP-13-30623	F	9/18/13 13:33	3.73	µg/L
CO101038	Vanadium	WTLAP-13-30631	UF	9/18/13 13:34	5.58	µg/L
CO101038	Zinc	WTLAP-13-39029	F	7/12/13 11:36	< 10	µg/L
CO101038	Zinc	WTLAP-13-39030	UF	7/12/13 11:37	293	µg/L
CO101038	Zinc	WTLAP-13-30623	F	9/18/13 13:33	4.58	µg/L
CO101038	Zinc	WTLAP-13-30631	UF	9/18/13 13:34	16.7	µg/L
CO111041	Acidity or Alkalinity of a solution	WTLAP-13-32567	UF	6/14/13 13:15	6.67	SU
CO111041	Acidity or Alkalinity of a solution	WTLAP-13-39023	UF	7/12/13 11:39	7.23	SU
CO111041	Alkalinity-CO3	WTLAP-13-32567	UF	6/14/13 13:15	< 1	mg/L
CO111041	Alkalinity-CO3	WTLAP-13-39023	UF	7/12/13 11:39	< 1	mg/L
CO111041	Alkalinity-CO3+HCO3	WTLAP-13-32567	UF	6/14/13 13:15	29.9	mg/L
CO111041	Alkalinity-CO3+HCO3	WTLAP-13-39023	UF	7/12/13 11:39	26	mg/L
CO111041	Alkalinity-HCO3	WTLAP-13-32567	UF	6/14/13 13:15	29.9	mg/L
CO111041	Alkalinity-HCO3	WTLAP-13-39023	UF	7/12/13 11:39	26	mg/L
CO111041	Aluminum	WTLAP-13-30622	F	6/14/13 12:43	152	µg/L
CO111041	Aluminum	WTLAP-13-30630	UF	6/14/13 12:43	18200	µg/L
CO111041	Aluminum	WTLAP-13-30624	F	6/30/13 3:01	34.9	µg/L
CO111041	Aluminum	WTLAP-13-30632	UF	6/30/13 3:01	9960	µg/L
CO111041	Aluminum	WTLAP-13-30626	F	7/5/13 0:16	92.4	µg/L
CO111041	Aluminum	WTLAP-13-30634	UF	7/5/13 0:16	10700	µg/L
CO111041	Aluminum	WTLAP-13-39020	F	7/12/13 11:24	92.4	µg/L

Table 4.4-1 (continued)

Sample Location	Analyte	Sample ID	Field Prep	Collection Date Time	Result	Unit
CO111041	Aluminum	WTLAP-13-39019	UF	7/12/13 11:24	18400	µg/L
CO111041	Aluminum	WTLAP-13-39429	F	7/28/13 5:18	753	µg/L
CO111041	Aluminum	WTLAP-13-39428	UF	7/28/13 5:18	6260	µg/L
CO111041	Antimony	WTLAP-13-30622	F	6/14/13 12:43	2.5	µg/L
CO111041	Antimony	WTLAP-13-30630	UF	6/14/13 12:43	4.64	µg/L
CO111041	Antimony	WTLAP-13-30624	F	6/30/13 3:01	1.34	µg/L
CO111041	Antimony	WTLAP-13-30632	UF	6/30/13 3:01	2.34	µg/L
CO111041	Antimony	WTLAP-13-30626	F	7/5/13 0:16	4.06	µg/L
CO111041	Antimony	WTLAP-13-30634	UF	7/5/13 0:16	5	µg/L
CO111041	Antimony	WTLAP-13-39020	F	7/12/13 11:24	4.17	µg/L
CO111041	Antimony	WTLAP-13-39019	UF	7/12/13 11:24	4.17	µg/L
CO111041	Antimony	WTLAP-13-39429	F	7/28/13 5:18	4.45	µg/L
CO111041	Antimony	WTLAP-13-39428	UF	7/28/13 5:18	4.35	µg/L
CO111041	Arsenic	WTLAP-13-30622	F	6/14/13 12:43	2.12	µg/L
CO111041	Arsenic	WTLAP-13-30630	UF	6/14/13 12:43	6.23	µg/L
CO111041	Arsenic	WTLAP-13-30624	F	6/30/13 3:01	< 5	µg/L
CO111041	Arsenic	WTLAP-13-30632	UF	6/30/13 3:01	3.62	µg/L
CO111041	Arsenic	WTLAP-13-30626	F	7/5/13 0:16	< 5	µg/L
CO111041	Arsenic	WTLAP-13-30634	UF	7/5/13 0:16	3.61	µg/L
CO111041	Arsenic	WTLAP-13-39020	F	7/12/13 11:24	< 5	µg/L
CO111041	Arsenic	WTLAP-13-39019	UF	7/12/13 11:24	6.36	µg/L
CO111041	Arsenic	WTLAP-13-39429	F	7/28/13 5:18	< 5	µg/L
CO111041	Arsenic	WTLAP-13-39428	UF	7/28/13 5:18	2.57	µg/L
CO111041	Barium	WTLAP-13-30622	F	6/14/13 12:43	47.2	µg/L
CO111041	Barium	WTLAP-13-30630	UF	6/14/13 12:43	293	µg/L
CO111041	Barium	WTLAP-13-30624	F	6/30/13 3:01	31.8	µg/L
CO111041	Barium	WTLAP-13-30632	UF	6/30/13 3:01	202	µg/L
CO111041	Barium	WTLAP-13-30626	F	7/5/13 0:16	25.1	µg/L
CO111041	Barium	WTLAP-13-30634	UF	7/5/13 0:16	152	µg/L
CO111041	Barium	WTLAP-13-39020	F	7/12/13 11:24	20.1	µg/L
CO111041	Barium	WTLAP-13-39019	UF	7/12/13 11:24	313	µg/L
CO111041	Barium	WTLAP-13-39429	F	7/28/13 5:18	25.5	µg/L
CO111041	Barium	WTLAP-13-39428	UF	7/28/13 5:18	81.8	µg/L
CO111041	Beryllium	WTLAP-13-30622	F	6/14/13 12:43	< 0.5	µg/L
CO111041	Beryllium	WTLAP-13-30630	UF	6/14/13 12:43	1.57	µg/L
CO111041	Beryllium	WTLAP-13-30624	F	6/30/13 3:01	< 0.5	µg/L
CO111041	Beryllium	WTLAP-13-30632	UF	6/30/13 3:01	0.937	µg/L
CO111041	Beryllium	WTLAP-13-30626	F	7/5/13 0:16	< 0.5	µg/L

Table 4.4-1 (continued)

Sample Location	Analyte	Sample ID	Field Prep	Collection Date Time	Result	Unit
CO111041	Beryllium	WTLAP-13-30634	UF	7/5/13 0:16	0.837	µg/L
CO111041	Beryllium	WTLAP-13-39020	F	7/12/13 11:24	< 0.5	µg/L
CO111041	Beryllium	WTLAP-13-39019	UF	7/12/13 11:24	2.88	µg/L
CO111041	Beryllium	WTLAP-13-39429	F	7/28/13 5:18	< 0.5	µg/L
CO111041	Beryllium	WTLAP-13-39428	UF	7/28/13 5:18	0.431	µg/L
CO111041	Boron	WTLAP-13-30622	F	6/14/13 12:43	16.7	µg/L
CO111041	Boron	WTLAP-13-30630	UF	6/14/13 12:43	27.2	µg/L
CO111041	Boron	WTLAP-13-30624	F	6/30/13 3:01	19.4	µg/L
CO111041	Boron	WTLAP-13-30632	UF	6/30/13 3:01	25	µg/L
CO111041	Boron	WTLAP-13-30626	F	7/5/13 0:16	17.4	µg/L
CO111041	Boron	WTLAP-13-30634	UF	7/5/13 0:16	22.3	µg/L
CO111041	Boron	WTLAP-13-39020	F	7/12/13 11:24	< 50	µg/L
CO111041	Boron	WTLAP-13-39019	UF	7/12/13 11:24	16.2	µg/L
CO111041	Boron	WTLAP-13-39429	F	7/28/13 5:18	< 50	µg/L
CO111041	Boron	WTLAP-13-39428	UF	7/28/13 5:18	< 50	µg/L
CO111041	Cadmium	WTLAP-13-30622	F	6/14/13 12:43	< 1	µg/L
CO111041	Cadmium	WTLAP-13-30630	UF	6/14/13 12:43	1.12	µg/L
CO111041	Cadmium	WTLAP-13-30624	F	6/30/13 3:01	< 1	µg/L
CO111041	Cadmium	WTLAP-13-30632	UF	6/30/13 3:01	0.711	µg/L
CO111041	Cadmium	WTLAP-13-30626	F	7/5/13 0:16	< 1	µg/L
CO111041	Cadmium	WTLAP-13-30634	UF	7/5/13 0:16	0.578	µg/L
CO111041	Cadmium	WTLAP-13-39020	F	7/12/13 11:24	< 1	µg/L
CO111041	Cadmium	WTLAP-13-39019	UF	7/12/13 11:24	1.6	µg/L
CO111041	Cadmium	WTLAP-13-39429	F	7/28/13 5:18	< 1	µg/L
CO111041	Cadmium	WTLAP-13-39428	UF	7/28/13 5:18	0.205	µg/L
CO111041	Calcium	WTLAP-13-30622	F	6/14/13 12:43	17.6	mg/L
CO111041	Calcium	WTLAP-13-30630	UF	6/14/13 12:43	25.8	mg/L
CO111041	Calcium	WTLAP-13-30624	F	6/30/13 3:01	12.4	mg/L
CO111041	Calcium	WTLAP-13-30632	UF	6/30/13 3:01	19.3	mg/L
CO111041	Calcium	WTLAP-13-30626	F	7/5/13 0:16	9.13	mg/L
CO111041	Calcium	WTLAP-13-30634	UF	7/5/13 0:16	14.5	mg/L
CO111041	Calcium	WTLAP-13-39020	F	7/12/13 11:24	7.04	mg/L
CO111041	Calcium	WTLAP-13-39019	UF	7/12/13 11:24	24.1	mg/L
CO111041	Calcium	WTLAP-13-39429	F	7/28/13 5:18	8.25	mg/L
CO111041	Calcium	WTLAP-13-39428	UF	7/28/13 5:18	10.3	mg/L
CO111041	Chloride	WTLAP-13-32571	F	6/14/13 13:14	5.82	mg/L
CO111041	Chloride	WTLAP-13-39024	F	7/13/13 13:32	9.57	mg/L
CO111041	Chromium	WTLAP-13-30622	F	6/14/13 12:43	2.03	µg/L

Table 4.4-1 (continued)

Sample Location	Analyte	Sample ID	Field Prep	Collection Date Time	Result	Unit
CO111041	Chromium	WTLAP-13-30630	UF	6/14/13 12:43	25.8	µg/L
CO111041	Chromium	WTLAP-13-30624	F	6/30/13 3:01	< 10	µg/L
CO111041	Chromium	WTLAP-13-30632	UF	6/30/13 3:01	12.8	µg/L
CO111041	Chromium	WTLAP-13-30626	F	7/5/13 0:16	< 10	µg/L
CO111041	Chromium	WTLAP-13-30634	UF	7/5/13 0:16	12.7	µg/L
CO111041	Chromium	WTLAP-13-39020	F	7/12/13 11:24	< 10	µg/L
CO111041	Chromium	WTLAP-13-39019	UF	7/12/13 11:24	22.6	µg/L
CO111041	Chromium	WTLAP-13-39429	F	7/28/13 5:18	2.12	µg/L
CO111041	Chromium	WTLAP-13-39428	UF	7/28/13 5:18	6.92	µg/L
CO111041	Clay	WTLAP-13-30646	UF	6/14/13 12:40	5.85	%
CO111041	Clay	WTLAP-13-30648	UF	6/30/13 3:00	4.8	%
CO111041	Clay	WTLAP-13-30650	UF	7/5/13 0:16	6	%
CO111041	Clay	WTLAP-13-39015	UF	7/12/13 11:21	5.2	%
CO111041	Clay	WTLAP-13-39428	UF	7/28/13 5:18	14.1	%
CO111041	Cobalt	WTLAP-13-30622	F	6/14/13 12:43	3.56	µg/L
CO111041	Cobalt	WTLAP-13-30630	UF	6/14/13 12:43	8.12	µg/L
CO111041	Cobalt	WTLAP-13-30624	F	6/30/13 3:01	< 3.49	µg/L
CO111041	Cobalt	WTLAP-13-30632	UF	6/30/13 3:01	6.02	µg/L
CO111041	Cobalt	WTLAP-13-30626	F	7/5/13 0:16	< 3.85	µg/L
CO111041	Cobalt	WTLAP-13-30634	UF	7/5/13 0:16	< 4.75	µg/L
CO111041	Cobalt	WTLAP-13-39020	F	7/12/13 11:24	< 4.38	µg/L
CO111041	Cobalt	WTLAP-13-39019	UF	7/12/13 11:24	10.2	µg/L
CO111041	Cobalt	WTLAP-13-39429	F	7/28/13 5:18	3.08	µg/L
CO111041	Cobalt	WTLAP-13-39428	UF	7/28/13 5:18	1.75	µg/L
CO111041	Copper	WTLAP-13-30622	F	6/14/13 12:43	7.63	µg/L
CO111041	Copper	WTLAP-13-30630	UF	6/14/13 12:43	60.1	µg/L
CO111041	Copper	WTLAP-13-30624	F	6/30/13 3:01	3.61	µg/L
CO111041	Copper	WTLAP-13-30632	UF	6/30/13 3:01	38.4	µg/L
CO111041	Copper	WTLAP-13-30626	F	7/5/13 0:16	5.04	µg/L
CO111041	Copper	WTLAP-13-30634	UF	7/5/13 0:16	34	µg/L
CO111041	Copper	WTLAP-13-39020	F	7/12/13 11:24	3.37	µg/L
CO111041	Copper	WTLAP-13-39019	UF	7/12/13 11:24	64.8	µg/L
CO111041	Copper	WTLAP-13-39429	F	7/28/13 5:18	5.39	µg/L
CO111041	Copper	WTLAP-13-39428	UF	7/28/13 5:18	15.9	µg/L
CO111041	Dissolved Organic Carbon	WTLAP-13-32575	F	6/14/13 12:53	175	mg/L
CO111041	Dissolved Organic Carbon	WTLAP-13-39016	F	7/12/13 11:22	4.19	mg/L
CO111041	Hardness	WTLAP-13-30622	F	6/14/13 12:43	51.2	mg/L
CO111041	Hardness	WTLAP-13-30630	UF	6/14/13 12:43	91.8	mg/L

Table 4.4-1 (continued)

Sample Location	Analyte	Sample ID	Field Prep	Collection Date Time	Result	Unit
CO111041	Hardness	WTLAP-13-30624	F	6/30/13 3:01	35.6	mg/L
CO111041	Hardness	WTLAP-13-30632	UF	6/30/13 3:01	67.5	mg/L
CO111041	Hardness	WTLAP-13-30626	F	7/5/13 0:16	26.9	mg/L
CO111041	Hardness	WTLAP-13-30634	UF	7/5/13 0:16	50.9	mg/L
CO111041	Hardness	WTLAP-13-39020	F	7/12/13 11:24	21	mg/L
CO111041	Hardness	WTLAP-13-39019	UF	7/12/13 11:24	81.8	mg/L
CO111041	Hardness	WTLAP-13-39429	F	7/28/13 5:18	24.6	mg/L
CO111041	Hardness	WTLAP-13-39428	UF	7/28/13 5:18	34.6	mg/L
CO111041	Iron	WTLAP-13-30622	F	6/14/13 12:43	462	µg/L
CO111041	Iron	WTLAP-13-30630	UF	6/14/13 12:43	15700	µg/L
CO111041	Iron	WTLAP-13-30624	F	6/30/13 3:01	99.2	µg/L
CO111041	Iron	WTLAP-13-30632	UF	6/30/13 3:01	10600	µg/L
CO111041	Iron	WTLAP-13-30626	F	7/5/13 0:16	101	µg/L
CO111041	Iron	WTLAP-13-30634	UF	7/5/13 0:16	8000	µg/L
CO111041	Iron	WTLAP-13-39020	F	7/12/13 11:24	95.3	µg/L
CO111041	Iron	WTLAP-13-39019	UF	7/12/13 11:24	12400	µg/L
CO111041	Iron	WTLAP-13-39429	F	7/28/13 5:18	375	µg/L
CO111041	Iron	WTLAP-13-39428	UF	7/28/13 5:18	5140	µg/L
CO111041	Lead	WTLAP-13-30622	F	6/14/13 12:43	0.934	µg/L
CO111041	Lead	WTLAP-13-30630	UF	6/14/13 12:43	67.5	µg/L
CO111041	Lead	WTLAP-13-30624	F	6/30/13 3:01	< 2	µg/L
CO111041	Lead	WTLAP-13-30632	UF	6/30/13 3:01	42.5	µg/L
CO111041	Lead	WTLAP-13-30626	F	7/5/13 0:16	< 2	µg/L
CO111041	Lead	WTLAP-13-30634	UF	7/5/13 0:16	36.5	µg/L
CO111041	Lead	WTLAP-13-39020	F	7/12/13 11:24	< 2	µg/L
CO111041	Lead	WTLAP-13-39019	UF	7/12/13 11:24	96.7	µg/L
CO111041	Lead	WTLAP-13-39429	F	7/28/13 5:18	0.578	µg/L
CO111041	Lead	WTLAP-13-39428	UF	7/28/13 5:18	14.2	µg/L
CO111041	Magnesium	WTLAP-13-30622	F	6/14/13 12:43	1.75	mg/L
CO111041	Magnesium	WTLAP-13-30630	UF	6/14/13 12:43	6.66	mg/L
CO111041	Magnesium	WTLAP-13-30624	F	6/30/13 3:01	1.16	mg/L
CO111041	Magnesium	WTLAP-13-30632	UF	6/30/13 3:01	4.7	mg/L
CO111041	Magnesium	WTLAP-13-30626	F	7/5/13 0:16	0.996	mg/L
CO111041	Magnesium	WTLAP-13-30634	UF	7/5/13 0:16	3.56	mg/L
CO111041	Magnesium	WTLAP-13-39020	F	7/12/13 11:24	0.828	mg/L
CO111041	Magnesium	WTLAP-13-39019	UF	7/12/13 11:24	5.25	mg/L
CO111041	Magnesium	WTLAP-13-39429	F	7/28/13 5:18	0.979	mg/L
CO111041	Magnesium	WTLAP-13-39428	UF	7/28/13 5:18	2.17	mg/L

Table 4.4-1 (continued)

Sample Location	Analyte	Sample ID	Field Prep	Collection Date Time	Result	Unit
CO111041	Manganese	WTLAP-13-30622	F	6/14/13 12:43	371	µg/L
CO111041	Manganese	WTLAP-13-30630	UF	6/14/13 12:43	818	µg/L
CO111041	Manganese	WTLAP-13-30624	F	6/30/13 3:01	19.5	µg/L
CO111041	Manganese	WTLAP-13-30632	UF	6/30/13 3:01	558	µg/L
CO111041	Manganese	WTLAP-13-30626	F	7/5/13 0:16	27.7	µg/L
CO111041	Manganese	WTLAP-13-30634	UF	7/5/13 0:16	433	µg/L
CO111041	Manganese	WTLAP-13-39020	F	7/12/13 11:24	91.4	µg/L
CO111041	Manganese	WTLAP-13-39019	UF	7/12/13 11:24	1120	µg/L
CO111041	Manganese	WTLAP-13-39429	F	7/28/13 5:18	6.96	µg/L
CO111041	Manganese	WTLAP-13-39428	UF	7/28/13 5:18	160	µg/L
CO111041	Mercury	WTLAP-13-30622	F	6/14/13 12:43	< 0.2	µg/L
CO111041	Mercury	WTLAP-13-30630	UF	6/14/13 12:43	< 0.2	µg/L
CO111041	Mercury	WTLAP-13-30624	F	6/30/13 3:01	< 0.2	µg/L
CO111041	Mercury	WTLAP-13-30632	UF	6/30/13 3:01	< 0.2	µg/L
CO111041	Mercury	WTLAP-13-30626	F	7/5/13 0:16	< 0.2	µg/L
CO111041	Mercury	WTLAP-13-30634	UF	7/5/13 0:16	< 0.2	µg/L
CO111041	Mercury	WTLAP-13-39020	F	7/12/13 11:24	< 0.2	µg/L
CO111041	Mercury	WTLAP-13-39019	UF	7/12/13 11:24	< 0.2	µg/L
CO111041	Mercury	WTLAP-13-39429	F	7/28/13 5:18	< 0.2	µg/L
CO111041	Mercury	WTLAP-13-39428	UF	7/28/13 5:18	< 0.2	µg/L
CO111041	Nickel	WTLAP-13-30622	F	6/14/13 12:43	3.69	µg/L
CO111041	Nickel	WTLAP-13-30630	UF	6/14/13 12:43	18.6	µg/L
CO111041	Nickel	WTLAP-13-30624	F	6/30/13 3:01	1.82	µg/L
CO111041	Nickel	WTLAP-13-30632	UF	6/30/13 3:01	11.3	µg/L
CO111041	Nickel	WTLAP-13-30626	F	7/5/13 0:16	1.53	µg/L
CO111041	Nickel	WTLAP-13-30634	UF	7/5/13 0:16	10.3	µg/L
CO111041	Nickel	WTLAP-13-39020	F	7/12/13 11:24	1.14	µg/L
CO111041	Nickel	WTLAP-13-39019	UF	7/12/13 11:24	20.6	µg/L
CO111041	Nickel	WTLAP-13-39429	F	7/28/13 5:18	1.53	µg/L
CO111041	Nickel	WTLAP-13-39428	UF	7/28/13 5:18	4.76	µg/L
CO111041	Potassium	WTLAP-13-30622	F	6/14/13 12:43	7.61	mg/L
CO111041	Potassium	WTLAP-13-30630	UF	6/14/13 12:43	12.1	mg/L
CO111041	Potassium	WTLAP-13-30624	F	6/30/13 3:01	4.69	mg/L
CO111041	Potassium	WTLAP-13-30632	UF	6/30/13 3:01	8.14	mg/L
CO111041	Potassium	WTLAP-13-30626	F	7/5/13 0:16	3.81	mg/L
CO111041	Potassium	WTLAP-13-30634	UF	7/5/13 0:16	6.57	mg/L
CO111041	Potassium	WTLAP-13-39020	F	7/12/13 11:24	2.78	mg/L
CO111041	Potassium	WTLAP-13-39019	UF	7/12/13 11:24	6.53	mg/L

Table 4.4-1 (continued)

Sample Location	Analyte	Sample ID	Field Prep	Collection Date Time	Result	Unit
CO111041	Potassium	WTLAP-13-39429	F	7/28/13 5:18	2.87	mg/L
CO111041	Potassium	WTLAP-13-39428	UF	7/28/13 5:18	4.36	mg/L
CO111041	Sand	WTLAP-13-30646	UF	6/14/13 12:40	18.63	%
CO111041	Sand	WTLAP-13-30648	UF	6/30/13 3:00	24.3	%
CO111041	Sand	WTLAP-13-30650	UF	7/5/13 0:16	21	%
CO111041	Sand	WTLAP-13-39015	UF	7/12/13 11:21	27.2	%
CO111041	Sand	WTLAP-13-39428	UF	7/28/13 5:18	3.7	%
CO111041	Selenium	WTLAP-13-30622	F	6/14/13 12:43	< 5	µg/L
CO111041	Selenium	WTLAP-13-30630	UF	6/14/13 12:43	< 5	µg/L
CO111041	Selenium	WTLAP-13-30624	F	6/30/13 3:01	< 5	µg/L
CO111041	Selenium	WTLAP-13-30632	UF	6/30/13 3:01	< 5	µg/L
CO111041	Selenium	WTLAP-13-30626	F	7/5/13 0:16	< 5	µg/L
CO111041	Selenium	WTLAP-13-30634	UF	7/5/13 0:16	< 5	µg/L
CO111041	Selenium	WTLAP-13-39020	F	7/12/13 11:24	< 5	µg/L
CO111041	Selenium	WTLAP-13-39019	UF	7/12/13 11:24	< 5	µg/L
CO111041	Selenium	WTLAP-13-39429	F	7/28/13 5:18	< 5	µg/L
CO111041	Selenium	WTLAP-13-39428	UF	7/28/13 5:18	< 5	µg/L
CO111041	Silt	WTLAP-13-30646	UF	6/14/13 12:40	75.51	%
CO111041	Silt	WTLAP-13-30648	UF	6/30/13 3:00	71	%
CO111041	Silt	WTLAP-13-30650	UF	7/5/13 0:16	73.1	%
CO111041	Silt	WTLAP-13-39015	UF	7/12/13 11:21	67.6	%
CO111041	Silt	WTLAP-13-39428	UF	7/28/13 5:18	82.2	%
CO111041	Silver	WTLAP-13-30622	F	6/14/13 12:43	< 1	µg/L
CO111041	Silver	WTLAP-13-30630	UF	6/14/13 12:43	0.244	µg/L
CO111041	Silver	WTLAP-13-30624	F	6/30/13 3:01	< 1	µg/L
CO111041	Silver	WTLAP-13-30632	UF	6/30/13 3:01	< 1	µg/L
CO111041	Silver	WTLAP-13-30626	F	7/5/13 0:16	< 1	µg/L
CO111041	Silver	WTLAP-13-30634	UF	7/5/13 0:16	< 1	µg/L
CO111041	Silver	WTLAP-13-39020	F	7/12/13 11:24	< 1	µg/L
CO111041	Silver	WTLAP-13-39019	UF	7/12/13 11:24	< 1	µg/L
CO111041	Silver	WTLAP-13-39429	F	7/28/13 5:18	< 1	µg/L
CO111041	Silver	WTLAP-13-39428	UF	7/28/13 5:18	< 1	µg/L
CO111041	Sodium	WTLAP-13-30622	F	6/14/13 12:43	12.6	mg/L
CO111041	Sodium	WTLAP-13-30630	UF	6/14/13 12:43	13.5	mg/L
CO111041	Sodium	WTLAP-13-30624	F	6/30/13 3:01	6.35	mg/L
CO111041	Sodium	WTLAP-13-30632	UF	6/30/13 3:01	7.54	mg/L
CO111041	Sodium	WTLAP-13-30626	F	7/5/13 0:16	6.44	mg/L
CO111041	Sodium	WTLAP-13-30634	UF	7/5/13 0:16	7.37	mg/L

Table 4.4-1 (continued)

Sample Location	Analyte	Sample ID	Field Prep	Collection Date Time	Result	Unit
CO111041	Sodium	WTLAP-13-39020	F	7/12/13 11:24	4.23	mg/L
CO111041	Sodium	WTLAP-13-39019	UF	7/12/13 11:24	5.48	mg/L
CO111041	Sodium	WTLAP-13-39429	F	7/28/13 5:18	7.99	mg/L
CO111041	Sodium	WTLAP-13-39428	UF	7/28/13 5:18	8.71	mg/L
CO111041	Sulfate	WTLAP-13-32571	F	6/14/13 13:14	3.6	mg/L
CO111041	Sulfate	WTLAP-13-39024	F	7/13/13 13:32	6.3	mg/L
CO111041	SSC	WTLAP-13-30646	UF	6/14/13 12:40	2870	mg/L
CO111041	SSC	WTLAP-13-30648	UF	6/30/13 3:00	1750	mg/L
CO111041	SSC	WTLAP-13-32568	UF	6/30/13 3:04	1090	mg/L
CO111041	SSC	WTLAP-13-30650	UF	7/5/13 0:16	1500	mg/L
CO111041	SSC	WTLAP-13-32569	UF	7/5/13 0:17	880	mg/L
CO111041	SSC	WTLAP-13-39015	UF	7/12/13 11:21	4350	mg/L
CO111041	SSC	WTLAP-13-39025	UF	7/13/13 13:33	4130	mg/L
CO111041	SSC	WTLAP-13-39026	UF	7/13/13 13:34	4160	mg/L
CO111041	SSC	WTLAP-13-39428	UF	7/28/13 5:18	180	mg/L
CO111041	SSC	WTLAP-13-40540	UF	8/5/13 13:43	260	mg/L
CO111041	SSC	WTLAP-13-41772	UF	9/10/13 10:34	1000	mg/L
CO111041	Thallium	WTLAP-13-30622	F	6/14/13 12:43	< 2	µg/L
CO111041	Thallium	WTLAP-13-30630	UF	6/14/13 12:43	< 2	µg/L
CO111041	Thallium	WTLAP-13-30624	F	6/30/13 3:01	< 2	µg/L
CO111041	Thallium	WTLAP-13-30632	UF	6/30/13 3:01	< 2	µg/L
CO111041	Thallium	WTLAP-13-30626	F	7/5/13 0:16	< 2	µg/L
CO111041	Thallium	WTLAP-13-30634	UF	7/5/13 0:16	< 2	µg/L
CO111041	Thallium	WTLAP-13-39020	F	7/12/13 11:24	< 2	µg/L
CO111041	Thallium	WTLAP-13-39019	UF	7/12/13 11:24	< 2	µg/L
CO111041	Thallium	WTLAP-13-39429	F	7/28/13 5:18	< 2	µg/L
CO111041	Thallium	WTLAP-13-39428	UF	7/28/13 5:18	< 2	µg/L
CO111041	Total Organic Carbon	WTLAP-13-36961	UF	6/14/13 12:41	106	mg/L
CO111041	Total Organic Carbon	WTLAP-13-30664	UF	6/30/13 3:03	16.5	mg/L
CO111041	Total Organic Carbon	WTLAP-13-39017	UF	7/12/13 11:22	20.5	mg/L
CO111041	TSS	WTLAP-13-39018	UF	7/12/13 11:23	1200	mg/L
CO111041	TSS	WTLAP-13-40532	UF	8/5/13 13:03	901	mg/L
CO111041	TSS	WTLAP-13-40534	UF	8/5/13 13:05	651	mg/L
CO111041	TSS	WTLAP-13-40533	UF	8/5/13 13:05	721	mg/L
CO111041	TSS	WTLAP-13-40535	UF	8/5/13 13:06	545	mg/L
CO111041	TSS	WTLAP-13-40536	UF	8/5/13 13:07	458	mg/L
CO111041	TSS	WTLAP-13-40537	UF	8/5/13 13:13	288	mg/L
CO111041	TSS	WTLAP-13-40538	UF	8/5/13 13:15	304	mg/L

Table 4.4-1 (continued)

Sample Location	Analyte	Sample ID	Field Prep	Collection Date Time	Result	Unit
CO111041	TSS	WTLAP-13-40539	UF	8/5/13 13:33	367	mg/L
CO111041	TSS	WTLAP-13-41058	UF	8/9/13 13:41	265	mg/L
CO111041	TSS	WTLAP-13-41059	UF	8/9/13 13:42	288	mg/L
CO111041	TSS	WTLAP-13-41060	UF	8/9/13 13:44	288	mg/L
CO111041	TSS	WTLAP-13-41061	UF	8/9/13 13:45	254	mg/L
CO111041	TSS	WTLAP-13-41062	UF	8/9/13 13:46	217	mg/L
CO111041	TSS	WTLAP-13-41773	UF	9/10/13 10:35	432	mg/L
CO111041	TSS	WTLAP-13-41774	UF	9/10/13 10:36	504	mg/L
CO111041	TSS	WTLAP-13-41775	UF	9/10/13 10:37	478	mg/L
CO111041	TSS	WTLAP-13-41776	UF	9/10/13 10:38	356	mg/L
CO111041	TSS	WTLAP-13-41777	UF	9/10/13 10:39	339	mg/L
CO111041	TSS	WTLAP-13-41778	UF	9/10/13 10:40	292	mg/L
CO111041	TSS	WTLAP-13-41779	UF	9/10/13 10:41	329	mg/L
CO111041	TSS	WTLAP-13-41780	UF	9/10/13 10:57	132	mg/L
CO111041	Uranium	WTLAP-13-30622	F	6/14/13 12:43	2.09	µg/L
CO111041	Uranium	WTLAP-13-30630	UF	6/14/13 12:43	64.2	µg/L
CO111041	Uranium	WTLAP-13-30624	F	6/30/13 3:01	0.994	µg/L
CO111041	Uranium	WTLAP-13-30632	UF	6/30/13 3:01	35.4	µg/L
CO111041	Uranium	WTLAP-13-30626	F	7/5/13 0:16	1.04	µg/L
CO111041	Uranium	WTLAP-13-30634	UF	7/5/13 0:16	34.5	µg/L
CO111041	Uranium	WTLAP-13-39020	F	7/12/13 11:24	0.984	µg/L
CO111041	Uranium	WTLAP-13-39019	UF	7/12/13 11:24	108	µg/L
CO111041	Uranium	WTLAP-13-39429	F	7/28/13 5:18	1.33	µg/L
CO111041	Uranium	WTLAP-13-39428	UF	7/28/13 5:18	9.27	µg/L
CO111041	Uranium-234	WTLAP-13-30654	UF	6/14/13 12:51	8.96	pCi/L
CO111041	Uranium-234	WTLAP-13-30656	UF	6/30/13 3:02	18.6	pCi/L
CO111041	Uranium-234	WTLAP-13-39021	UF	7/12/13 11:25	41.7	pCi/L
CO111041	Uranium-234	WTLAP-13-39428	UF	7/28/13 5:18	1.03	pCi/L
CO111041	Uranium-235/236	WTLAP-13-30654	UF	6/14/13 12:51	0.356	pCi/L
CO111041	Uranium-235/236	WTLAP-13-30656	UF	6/30/13 3:02	1.26	pCi/L
CO111041	Uranium-235/236	WTLAP-13-39021	UF	7/12/13 11:25	2.09	pCi/L
CO111041	Uranium-235/236	WTLAP-13-39428	UF	7/28/13 5:18	< 0.0564	pCi/L
CO111041	Uranium-238	WTLAP-13-30654	UF	6/14/13 12:51	9.66	pCi/L
CO111041	Uranium-238	WTLAP-13-30656	UF	6/30/13 3:02	16.3	pCi/L
CO111041	Uranium-238	WTLAP-13-39021	UF	7/12/13 11:25	45.1	pCi/L
CO111041	Uranium-238	WTLAP-13-39428	UF	7/28/13 5:18	0.974	pCi/L
CO111041	Vanadium	WTLAP-13-30622	F	6/14/13 12:43	2.66	µg/L
CO111041	Vanadium	WTLAP-13-30630	UF	6/14/13 12:43	31.9	µg/L

Table 4.4-1 (continued)

Sample Location	Analyte	Sample ID	Field Prep	Collection Date Time	Result	Unit
CO111041	Vanadium	WTLAP-13-30624	F	6/30/13 3:01	1.62	µg/L
CO111041	Vanadium	WTLAP-13-30632	UF	6/30/13 3:01	22.6	µg/L
CO111041	Vanadium	WTLAP-13-30626	F	7/5/13 0:16	2.17	µg/L
CO111041	Vanadium	WTLAP-13-30634	UF	7/5/13 0:16	18.3	µg/L
CO111041	Vanadium	WTLAP-13-39020	F	7/12/13 11:24	1.26	µg/L
CO111041	Vanadium	WTLAP-13-39019	UF	7/12/13 11:24	30.8	µg/L
CO111041	Vanadium	WTLAP-13-39429	F	7/28/13 5:18	3.05	µg/L
CO111041	Vanadium	WTLAP-13-39428	UF	7/28/13 5:18	11.7	µg/L
CO111041	Zinc	WTLAP-13-30622	F	6/14/13 12:43	94.6	µg/L
CO111041	Zinc	WTLAP-13-30630	UF	6/14/13 12:43	759	µg/L
CO111041	Zinc	WTLAP-13-30624	F	6/30/13 3:01	22	µg/L
CO111041	Zinc	WTLAP-13-30632	UF	6/30/13 3:01	508	µg/L
CO111041	Zinc	WTLAP-13-30626	F	7/5/13 0:16	38.9	µg/L
CO111041	Zinc	WTLAP-13-30634	UF	7/5/13 0:16	403	µg/L
CO111041	Zinc	WTLAP-13-39020	F	7/12/13 11:24	20.2	µg/L
CO111041	Zinc	WTLAP-13-39019	UF	7/12/13 11:24	817	µg/L
CO111041	Zinc	WTLAP-13-39429	F	7/28/13 5:18	24.8	µg/L
CO111041	Zinc	WTLAP-13-39428	UF	7/28/13 5:18	146	µg/L

^a UF = Unfiltered.^b < = Nondetected result.^c F = Filtered.

Appendix A

*2013 Geomorphic Changes at Sediment Transport Mitigation
Sites in the Los Alamos and Pueblo Canyons Watershed*

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Attachments

Attachment A-1	Photographs of Sediment Transport Mitigation Sites in the Los Alamos and Pueblo Canyons Watershed
Attachment A-2	Cross-Section Survey Data (on CD included with this document)

A-1.0 INTRODUCTION

This report evaluates geomorphic changes that occurred in 2013 at sediment transport mitigation sites in the Los Alamos and Pueblo Canyon watersheds within and near Los Alamos National Laboratory (LANL or the Laboratory). Survey data reported previously (LANL 2011, 200902; LANL 2012, 218411) are compared with subsequent survey data obtained in fall 2013 and winter 2014, following the summer 2013 monsoon season, as specified in the “Los Alamos National Laboratory Environmental Surveillance Program Sampling and Analysis Plan for Sediment, 2012” (LANL 2012, 213568). These surveys will be repeated after the 2014 monsoon season, and results will be presented in a report to the New Mexico Environment Department (NMED) by May 15, 2015. NMED has specified that results of inspections of stream bank armoring in the south fork of Acid Canyon be included in the annual report on geomorphic changes in the Los Alamos and Pueblo Canyon watersheds (NMED 2010, 109693), and these results are included herein. NMED has also specified that monitoring reports include information on the health and success of willow plantings and photographic documentation of willow plantings, grade-control structures (GCSs), and examples of erosion and deposition at surveyed cross-sections (NMED 2011, 204349), and these are also included herein. Figure A-1.0-1 shows the locations of sites discussed in this report, and Attachment A-1 presents photographs of the sediment transport mitigation sites.

A-2.0 HYDROLOGIC EVENTS DURING 2013 MONSOON SEASON

The largest runoff events in 2013 at the sediment transport mitigation sites in the Los Alamos and Pueblo Canyon watersheds occurred following heavy rains that fell on the Pajarito Plateau, the Los Alamos townsite and the Sierra de los Valles from September 10 through 15, 2013. Total rainfall measured by rain gages that recorded throughout this entire event ranged from 5.5 to 6.5 in. (Pueblo Canyon gages), 5.5 in. (LA Canyon gage), and 4.8 to 5.5 in. (DP Canyon gages). The maximum measured discharge at these sites occurred in Pueblo Canyon on September 13, 2013, at the E059 gaging station above the Los Alamos County wastewater treatment plant (WWTP). The peak discharge at E059 was 1540 cubic feet per second (cfs). No flow was recorded at this gaging station in 2012. Most gages in Pueblo, DP and Los Alamos Canyons were rendered inoperable due to this high-discharge event, and no data are available on September 14 and 15. Maximum discharges in Los Alamos and DP Canyons were also measured on September 13, as described below.

- Peak discharge was between 310 and 550 cfs below the DP Canyon GCS (310 cfs at E038 in upper DP Canyon and 550 cfs at E040 in lower DP Canyon. This discharge is an order of magnitude greater than the 2012 peak discharge, which was 79 cfs at E038, recorded on October 12, 2012, and 46 cfs at E040, recorded on October 12, 2012.
- Peak discharge in Los Alamos Canyon was 970 cfs at E030 in upper LA Canyon above the confluence with DP Canyon. This discharge is about 7.5 times greater than the 2012 peak discharge, which was 130 cfs at E030, recorded on July 11, 2012.

In some areas of Pueblo Canyon, the large September 2013 floods extended beyond the limits of the originally established cross-sections. These areas include the upper Pueblo willow sections, the lower Pueblo willow sections, and the Pueblo Canyon GCS sections. In each area some sections had to be extended whereas others were of sufficient length that 2013 floods did not extend beyond the existing section. In cases where cross-sections had to be extended, a series of potholes was dug to measure the thickness of 2013 sediment deposits within the newly established segments of the cross-sections. At each point, 2013 sediment thickness was subtracted from the elevation of the 2013 data point to determine the elevation of the pre-2013 profile at that location. These new points are referenced as “Pre-2013 sediment data point” in the legend for figures that include extended cross-sections.

A-3.0 SURVEYS AT SEDIMENT TRANSPORT MITIGATION SITES

Surveys were conducted at all sediment transport mitigation sites specified in the 2012 monitoring plan (LANL 2012, 213568). Surveys were conducted using a combination of a differentially-corrected global positioning system (GPS) and a total station tied to GPS control points, depending on tree cover. Surveys were supplemented with sediment thickness measurements obtained from hand-dug or hand-augered holes at some locations. The general locations of all survey areas are shown in Figure A-1.0-1, and these surveys are discussed below. Surveyed cross-sections are shown in figures with a vertical exaggeration (VE) of 2.5 times, and channel thalweg profiles are shown with a VE of 5 times, 15 times, or 20 times. Raw survey data (x and y coordinates using the New Mexico State Plane coordinate system and elevations of all survey points) for surveyed cross-sections are included electronically as Attachment A-2 (on CD included with this document). Distances along each cross-section and along each thalweg profile that are used for the figures in this report were calculated using basic geometry (Pythagorean theorem) and are also included in Attachment A-2.

Cross-section and thalweg figures include the latest resurvey data and previous survey data that the current data points were compared with, indicating where erosion and deposition have occurred along each section over the last year. Each surveyed cross-section was field checked to confirm elevational differences between surveys and verify that erosion or deposition indicated by the plotted data were not artifacts of the surveys (such as can result from different survey point spacing or slight differences in survey location) or topographic changes not related to flooding (e.g., gopher mounds, road blading outside the floodplain, or slope wash from side hills/drainages). The net changes in cross-sectional area caused by 2013 flooding along each section were calculated and used to estimate total deposition or erosion over the surveyed area, normalized as m^3 per 100 m of channel for comparison with previous studies, and are presented as summary tables in this report. The net deposition or erosion that occurred in each area in 2013 is compared with changes that occurred in previous years. At each cross-section, the changes in thalweg elevation from 2009 to 2013 are compiled in tables and are used to indicate whether, on average, the channel elevation has been stable, aggrading, or incising. In the figures showing channel thalwegs, the distance along the survey can vary between the original survey and the resurvey because of changes in thalweg sinuosity, resulting in changes in thalweg gradient. These changes in thalweg gradient are also summarized in this report.

A-3.1 Pueblo Canyon Cross-Vane Structures

Two cross-sections were originally surveyed in the vicinity of each of the three Pueblo Canyon cross-vane structures (CVSs) in April 2010, one 50 ft upcanyon and one 50 ft downcanyon of the apex rock of each structure. Channel thalweg profiles were also surveyed over these 100-ft distances. These cross-sections and thalweg profiles were resurveyed in December 2010, October 2011, November 2012, and February–March 2014. Cross-section and thalweg profile locations for all CVSs are shown on an orthophotograph in Figure A-3.1-1, and the cross-sections and thalweg profile for the upper CVS (CVS #1) are also shown on a geomorphic map in Figure A-3.1-2 (geomorphic mapping from 1997; LANL 2004, 087390). The cross-sections and thalweg profiles for CVS #1, CVS #2, and CVS #3 are shown in Figures A-3.1-3, A-3.1-4, and A-3.1-5, respectively, and in Photos A1-1, A1-2, and A1-3 in Attachment A-1. Net sediment deposition occurred at two of the six CVS cross-sections, and net sediment erosion occurred at the other four cross-sections during the summer 2013 monsoon season, as summarized in Table A-3.1-1.

Maximum aggradation (net sediment deposition) was 1.7 ft at CVS #3 +50 ft (Photo A1-1, Attachment A-1), and the maximum incision (net erosion) was 2.4 ft, at CVS #1 -50 ft (Photo A1-2, Attachment A-1). Normalized net erosion at the CVSs averaged $-162 \text{ m}^3/100 \text{ m}$. An estimated $1768 \text{ m}^3/100 \text{ m}$ of post-1942 sediment exists in reach P-2W, which contains CVS #1, as measured in 1997 (LANL 2004, 087390). Net erosion in 2013, therefore, removed approximately 9% of the estimated 1942–1997 sediment total. This net

erosion represents a moderate to large decrease in sediment volume. Net deposition occurred at these sites in 2010 and 2011, and net erosion occurred in 2012, resulting in a net deposition of 163 m³/100 m from 2010–2012 (Table A-3.1-1). Therefore, the net 2010–2012 sediment deposition was eroded in 2013 (Table A-3.1-1). Repeat photographs taken in March 2012 and May 2014 show the change from aggradation in 2011 to channel incision and lateral migration during the 2013 monsoon seasons, respectively (Photo A1-3, Attachment A-1). On average, the channel thalweg at the CVS cross-sections incised by 0.3 ft in 2013, compared with 0.1 ft of incision in 2012 (Table A-3.1-1). Figures A-3.1-3 through A-3.1-5 also indicate changes to the channel thalweg (net incision) that occurred during the summer 2013 monsoon season.

These data contrast with conclusions from previous assessments, which indicated this part of Pueblo Canyon had been relatively stable with net sediment deposition since 1998 (LANL 2012, 218411). The net erosion which occurred in 2013 transported an amount of this sediment equivalent to the total net deposition from 2010–2012 an unknown distance downstream, to be redeposited within Pueblo Canyon, deposited in lower LA Canyon, or transported out of the LA/Pueblo watershed.

A-3.2 Upper Pueblo Canyon Willow-Planting Area

A total of 18 cross-sections were surveyed in November 2009 in the part of Pueblo Canyon downstream from the new Los Alamos WWTP outfall and upstream from the access road to the WWTP where willows were planted in spring 2008 and spring 2009. These cross-sections were divided into groups of six within the upper, middle, and lower thirds of the willow-planting area (UW, MW, and LW, respectively). Within each group the cross-sections were spaced at 100-ft intervals. Longitudinal channel thalweg profiles were also surveyed over 500-ft intervals through each of these three areas. These cross-sections and thalweg profiles were resurveyed in April 2010, October 2011, November 2012–January 2013, and January–February 2014. Stream banks in this area were surveyed in January–February 2014. Cross-section locations, thalweg profile locations, and stream banks are shown on an orthophotograph in Figure A-3.2-1, and the cross-sections, thalweg profile, and stream banks for the middle and lower thirds of the area are also shown on a geomorphic map in Figure A-3.2-2 (geomorphic mapping from 1997; LANL 2004, 087390). The cross-sections and thalweg profiles in the upper, middle, and lower thirds of the willow-planting area are shown in Figures A-3.2-3, A-3.2-4, and A-3.2-5, respectively. Geomorphic changes that occurred at these cross-sections during 2013 are summarized in Table A-3.2-1.

Maximum deposition of new sediment was 4.4 ft at cross-section MW-1 in the middle third of the upper Pueblo Canyon willow-planting area (also referred to as the upper willow-planting area), and the maximum erosion was 6.6 ft at cross-section LW-6 in the lower third of this area. The new sediment at cross-section MW-1 was associated with deposition of a sand lobe in the previous channel location in an area where the channel migrated to the north (Photo A1-4, Attachment A-1). The erosion at section LW-6 was associated with channel widening and lateral migration of the stream bank (Photo A1-5, Attachment A-1). Channel widening and/or bank migration was recorded at all of the LW cross-sections and at the majority of the MW cross-sections. Eight of the cross-sections had net sediment deposition during 2013, and all were at the most upstream cross-sections (UW-1 to MW-2). The 10 downstream cross-sections had net erosion. Normalized net sediment erosion in the upper Pueblo Canyon willow-planting area averaged -369 m³/100 m (Table A-3.2-1). Post-1942 sediment deposition in reach P-3W, which includes part of the surveyed area, was estimated to be 3357 m³/100 m as measured in 1997 (LANL 2004, 087390). Net erosion in 2013, therefore, removed approximately 11% of the estimated 1942–1997 sediment. This net erosion represents a moderate to large decrease in sediment volume.

Net deposition occurred at these sites in 2010, 2011, and 2012, resulting in 161 m³/100 m sediment deposition from 2010–2012 (LANL 2011, 200902). The 2013 net erosion is approximately 2.3 times the total 2010–2012 net deposition, mainly from erosion that occurred in the lower half of the upper

Pueblo Canyon willow-planting area in 2013 (Table A-3.2-1). Over most of its length, the channel thalweg in the upper third of the upper Pueblo willow-planting area aggraded by 0.6 to 2 ft in 2013 (average aggradation of 1.3 ft), whereas the channel thalweg incised 0.1 to 2.5 ft (average incision of 0.9 ft) over most of its length in the lower two-thirds of the upper Pueblo willow-planting area (Table A-3.2-1). This is greater in magnitude but broadly similar to a general pattern of upstream aggradation and downstream incision that occurred in 2012, 2011, and 2010 (LANL 2011, 200902). Figures A-3.2-3 through A-3.2-5 also indicate changes to the channel thalweg gradient that occurred in 2013. In the upper third of the willow-planting area, the thalweg gradient decreased since the previous survey; in the middle third, the thalweg gradient increased, and in the lower third the thalweg gradient decreased. Gradient changes in the upper Pueblo Canyon willow-planting area are associated with changes in sinuosity and bed elevation.

These data contrast with conclusions from previous assessments that indicated that net sediment deposition/erosion in this part of Pueblo Canyon has been relatively stable since 1998 (LANL 2011, 200902). The net erosion observed in 2013 has removed approximately 2.3 times the sediment deposited in 2010 through 2012. Sediment eroded from the upper Pueblo Canyon willow-planting area has been transported an unknown distance downstream, to be redeposited within Pueblo Canyon, deposited in lower Los Alamos Canyon, or transported out of the Los Alamos/Pueblo watershed.

A-3.3 Pueblo Canyon Wing Ditch

Five cross-sections were surveyed at 100-ft intervals downcanyon from the Pueblo Canyon wing ditch in November 2009. Longitudinal thalweg profiles of the active channel and a formerly abandoned channel to the south where the wing ditch directs water were also surveyed over this distance. These cross-sections and thalweg profiles were resurveyed in May 2011, October 2011, January 2013, and December 2013 (LANL 2011, 200902). The wing ditch is a short distance downstream from where the road to the Los Alamos County WWTP crosses the Pueblo Canyon stream channel, and the culverts at this crossing were plugged during a runoff event on August 16, 2010. In 2011, the County of Los Alamos rebuilt the road crossing to better withstand large runoff events and to pass flow more effectively (LANL 2011, 200902). The formerly abandoned channel to the south now receives flow during periods of high effluent discharge and stormwater runoff, helping to effectively distribute water across this part of the wetland (a function that the wing ditch was designed to perform; it is no longer needed for this purpose). September 2013 floods overtopped the road adjacent to the wing ditch, and the County of Los Alamos conducted some additional regrading and road construction subsequent to this flood event that extended onto the southern end of all of the cross-sections (Figure A-3.3-1). Cross-section and thalweg profile locations are shown on an orthophotograph in Figure A-3.3-1, and the cross-sections and thalweg profile locations are also shown on a geomorphic map in Figure A-3.3-2 (geomorphic mapping from 1996–1997; LANL 2004, 087390). The cross-sections are shown in Figure A-3.3-3, and the thalweg profiles are shown in Figure A-3.3-4. Geomorphic changes that occurred at these cross-sections during 2013 are summarized in Table A-3.3-1.

Maximum sediment deposition was 2.9 ft in an area in the southern part of cross-section WD-3 that was regraded after the September 2013 floods (Photo A1-6, Attachment A-1). It is possible that the regrading resulted in a thicker deposit than was actually deposited by the flood, but field examination of the sediments suggests that this was an area of significant sedimentation during flooding. The maximum incision (net erosion) was 1.4 ft in a side channel adjacent to the road at cross-section WD-4 (Photo A1-7, Attachment A-1). All five of the cross-sections had net deposition during 2013 (Table A-3.3-1). Normalized net deposition over the surveyed area below the wing ditch averaged 2120 m³/100 m (Table A-3.3-1) compared with an estimated 6991 m³/100 m of post-1942 sediment in reach P-3E, a short distance east of the surveyed area, as measured in 1997 (LANL 2004, 087390). This calculated net deposition, 30% of the estimated 1942–1997 total, represents a large increase in total sediment volume.

The 2013 net deposition is approximately 24 times the 2010–2012 net deposition of $87 \text{ m}^3/100 \text{ m}$. The wing ditch appears to be an area where sediment eroded from upstream areas by 2013 floods was redeposited a short distance downcanyon. Repeat photographs taken in January 2013 and May 2014 show the change from channel incision to deposition of sand lobes in the wing ditch area during the 2012 and 2013 monsoon seasons, respectively (Photo A1-8, Attachment A-1). On average, the main channel thalweg near the wing ditch aggraded by 0.5 ft in 2013 compared with 0.5 ft of incision in 2012 (Table A-3.3-1). As presented in Figure A-3.3-4, the average thalweg gradient of the active channel increased slightly in 2013. This decrease was from greater deposition in the upper end of the wing ditch area relative to the lower end.

A-3.4 Lower Pueblo Canyon Willow-Planting Area

A total of 23 cross-sections were surveyed in September 2009 at 100-ft intervals within reaches P-3FE and P-4W in an area where willows were planted in spring 2009 (Figure A-1.0-1). The surveys extended for 1100 ft above and below a transition area separating a broad upcanyon wetland (P-3FE) from a narrower downcanyon wetland within incised geomorphic surfaces (P-4W). A longitudinal channel thalweg profile was also surveyed over this 2200-ft interval (Figure A-3.4-1). These cross-sections and thalweg profiles were resurveyed in April and May 2011, and in October and November 2011 (LANL 2011, 200902). Cross sections were resurveyed in November and December 2012, but the thalweg was not resurveyed at this time (LANL 2013, 239233, Appendix C). Cross-sections and thalweg profiles were resurveyed in December 2013 to February 2014. Stream banks in this area were surveyed in January and March 2012 and resurveyed in January and February 2014. Cross-section and thalweg profile locations and stream banks are shown on an orthophotograph in Figure A-3.4-1 and on a geomorphic map in Figure A-3.4-2 (geomorphic mapping from 1996–1997; LANL 2004, 087390). The cross-sections are shown in Figure A-3.4-3, and the channel thalweg profiles are shown in Figure A-3.4-4. Geomorphic changes that occurred at these cross-sections during 2013 from monsoonal flooding are summarized in Table A-3.4-1.

In the upper half of the lower Pueblo Canyon willow-planting area (also referred to as the lower willow-planting area, which is reach P-3FE), maximum deposition of new sediment was 2.0 ft at cross-section PU –700 ft (700 ft upstream from the transition zone), and the maximum erosion was 6.4 ft at cross-section PU –800 ft (Figure A-3.4-3 and Table A-3.4-1). The deposition at PU –700 ft was associated with aggradation at the former main channel location, (Photo A1-9, Attachment A-1), and the erosion at PU –800 ft was associated with channel incision, which created a new, much deeper and wider channel on the north side of the valley floor (Photo A1-10, Attachment A-1). The three cross-sections farthest upstream above the approximate transition point (PU 0-ft section) had net sediment deposition and the remaining eight had net erosion (Table A-3.4-1). Repeat photographs taken in March 2012 and May 2014 show the channel incision and widening that occurred in this area (Photo A1-11, Attachment A-1). Normalized net erosion in the upper half of the lower willow-planting area averaged $-861 \text{ m}^3/100 \text{ m}$ (Table A-3.4-1) compared with an estimated $5117 \text{ m}^3/100 \text{ m}$ of post-1942 sediment in reach P-3FE, which includes the surveyed area, as measured in 1997 (LANL 2004, 087390). This net erosion, 16.8% of the estimated 1942–1997 total, represents a large change. Net deposition occurred in this area in 2010 and 2011, and net erosion occurred in 2012, resulting in $141 \text{ m}^3/100 \text{ m}$ net deposition from 2010–2012 (LANL 2011, 200902). Therefore, 2013 net erosion is approximately 6 times the 2010–2012 net sediment deposition.

In the lower half of the lower Pueblo Canyon willow-planting area (reach P-4W), maximum deposition of new sediment was 4.6 ft at cross-section PU +600 ft, and the maximum erosion was 6.5 ft, at section PU +500 ft (Figure A-3.4-3 and Table A-3.4-1). The erosion was associated with lateral bank migration (Photo A1-12, Attachment A-1), and the deposition was associated with channel aggradation adjacent to an area of lateral bank migration. Cross-section PU +600 ft had the highest measured erosion and

deposition in 2010, indicating the channel is continuing to adjust in this downstream area (Figure A-3.4-3 and Table A-3.4-1). Six of the 11 cross-sections below the approximate transition point had net sediment deposition, and five had net erosion (Table A-3.4-1). Net erosion also occurred at cross-section PU 0 ft, where the emergence of alluvial groundwater perched on Puye Formation bedrock resulted in seepage erosion in previous years (Figure A-3.4-3 and Table A-3.4-1). During and following the September 2013 flood event, the headcut formerly located at PU 0 ft migrated nearly 1000 ft upstream (between PU-900 and PU -1000 ft), and Puye Formation bedrock is now exposed as isolated outcrops in the channel floor for a distance of approximately 400 to 500 ft upstream of PU 0 (Figures A-3.4-3 and A-3.4-4). Repeat photographs taken in March 2012 and May 2014 show the channel incision and widening that occurred in this area. (Photo A1-13, Attachment A-1). Net sediment erosion occurred in the lower half of the lower Pueblo Canyon willow-planting area, averaging $-365 \text{ m}^3/100 \text{ m}$ (Table A-3.4-1) compared with an estimated $9871 \text{ m}^3/100 \text{ m}$ of post-1942 sediment in reach P-4W, which includes the surveyed area, as measured in 1997 (LANL 2004, 087390). This calculated net erosion, 3.7% of the estimated 1942–1997 total, represents a modest decrease in post-1942 sediment volume. Net erosion occurred in this area in 2010 and 2011, and net deposition occurred in 2012, resulting in $12.5 \text{ m}^3/100 \text{ m}$ net deposition from 2010–2012 (LANL 2011, 200902). Therefore, 2013 net erosion is approximately 29 times the 2010–2012 net sediment deposition.

On average, the thalweg incised by 2.5 ft above the former transition point (PU 0) and aggraded by 1.2 ft below PU 0 in 2013 compared with no change above the transition and 0.2 ft of aggradation below the transition point in 2012 (Table A-3.4-1). As presented Figure A-3.4-4, the average thalweg gradient increased above the transition point and decreased below the transition point between 2011 and 2013. The increase in gradient above the transition point is due to channel aggradation at the upper end and channel incision in the lower end of the area above the transition point. The decrease in gradient below the transition point is primarily from channel incision at the upper end, along with minor channel aggradation in the lower part of the area below the transition point.

A-3.5 Pueblo Canyon GCS

A total of 15 cross-sections were surveyed in April 2010 at 100-ft intervals upstream of the Pueblo Canyon GCS, and 3 cross-sections were surveyed at 100-ft intervals downstream from the GCS (Figure A-3.5-1). A longitudinal channel thalweg profile was also surveyed over this 1800-ft interval. Because some ground disturbance associated with site restoration occurred after the April 2010 surveys were completed, the area of disturbance was resurveyed in June 2010 (LANL 2011, 206488). These surveys were repeated in April and October 2011 (LANL 2011, 200902) and most recently in February 2014. Because of the lack of monsoonal flows through this area in 2012, downstream attenuation of WWTP effluent discharge and the absence of significant net deposition or incision in the lower Pueblo willow-planting area upstream of the Pueblo Canyon GCS survey area; this area was not resurveyed following the summer 2012 monsoon season. Stream banks in this area were surveyed in January 2012 and were resurveyed in February 2014. Cross-section and thalweg profile locations and stream banks are shown on an orthophotograph in Figure A-3.5-1 and on a geomorphic map in Figure A-3.5-2 (geomorphic mapping from 1996–1997; LANL 2004, 087390). The cross-sections and the channel thalweg profile are shown in Figure A-5.5-3. Geomorphic changes that occurred at these cross-sections during 2013 from monsoonal flooding are summarized in Tables A-3.5-1 and A-3.5-2. In May 2014, the Pueblo Canyon GCS was revisited to document the condition of the structure. Photographs of the GCS are included in Attachment A-1, Photo A1-14.

Above the Pueblo Canyon GCS (PUGCS) maximum sediment deposition was 3.3 ft at cross-section PUGCS -100 (100 ft above the GCS), and a maximum erosion of 4.1 ft occurred at PUGCS -1400 (Table A-3.5-1). The erosion at PUGCS -1400 was associated with incision and lateral bank migration (Photo A1-15, Attachment A-1), and deposition at PUGCS -100 was associated with channel aggradation in the area immediately upstream of the PUGCS (Photo A1-16, Attachment A-1). Repeat photographs taken in March 2012 and May 2014 show the channel incision, widening, and deposition of 2013 sediment deposits that occurred in the upper part of the GCS area, at PUGCS-1100 ft. (Photo A1-17, Attachment A-1). Eight of the 15 cross-sections above the GCS had net erosion and seven had net deposition. Normalized net erosion above the GCS averaged $-256 \text{ m}^3/100 \text{ m}$ (Table A-3.5-1). For comparison, there was an estimated $7021 \text{ m}^3/100 \text{ m}$ of post-1942 sediment in reach P-4E, which includes the GCS, as measured in 1997 (LANL 2004, 087390). This net erosion, 3.6% of the estimated 1942–1997 total, represents a modest decrease in post-1942 sediment volume. Cross-sections with the greatest net erosion were at the upstream end of the GCS area, and cross-sections with the greatest net deposition were within the lower GCS area, 200 ft above the structure (Table A-3.5-1). Deposition within the lower GCS area was enhanced by the presence of the GCS. Net deposition occurred in this area in 2010 and 2011, and minimal change occurred in 2012, resulting in $286 \text{ m}^3/100 \text{ m}$ net deposition from 2010–2012 (LANL 2011, 200902). Therefore, 2013 net erosion is slightly less than 2010–2012 net sediment deposition.

Below the Pueblo Canyon GCS, maximum sediment deposition was 2.5 ft at cross-section PUGCS +300 (300 ft below the GCS), and a maximum erosion of 6.7 ft occurred at PUGCS +200 (Figure A-3.5-3 and Table A-3.5-2). The erosion at PUGCS +200 was associated with incision and lateral bank migration, and deposition at PUGCS +300 was associated with channel migration and aggradation in the former channel location. Net sediment erosion occurred below the GCS, averaging $-1395 \text{ m}^3/100 \text{ m}$ (Table A-3.5-1).

On average, the main channel thalweg above the PUGCS aggraded by 0.9 ft in 2013 compared with 0.2 ft of aggradation in 2011 (Table A-3.5-1). As presented in Figure A-3.5-3, the average thalweg gradient of the active channel remained unchanged between 2011 and 2013. This was from channel aggradation in both the upper and lower PUGCS area. On average, the channel thalweg below the PUGCS incised by 0.3 ft, and the channel gradient decreased between 2011 and 2013 (Table A-3.5-1; Figure A-3.5-3). The decrease in gradient is from channel aggradation above the gaging station (Figure A-3.5-3).

A-3.6 Upper Los Alamos Canyon Sediment Detention Basins

The upper Los Alamos Canyon sediment detention basins, constructed at the base of the drainage below Solid Waste Management Unit (SWMU) 01-001(f) (LA-SMA-2 or Hillside 140), were excavated on July 8 to July 11, 2011, after the Las Conchas fire (LANL 2011, 206488). The basins were resurveyed in July 2011, and Basin 1 was resurveyed in October 2011 (LANL 2011, 200902). Following the excavation of 2011 monsoon season sedimentation, Basin 1 was resurveyed in January 2013 (LANL 2013, 239233, Appendix C). No appreciable sediment was deposited in Basin 2 between July 2011 and January 2013 (LANL 2011, 200902). In April, 2014, Basin 1 was resurveyed following the excavation of the accumulated 2012 monsoon season sediment, and the topography at that time is presented in Figure A-3.6-1. Figure A-3.6-1 also shows variations in total sediment thickness determined by subtracting the January 2013 topographic surface from the April 2014 surface. Maximum sediment thickness resulting from the 2013 monsoon season is 40 cm (1.3 ft) in the northern part of the small delta where the drainage enters the northeast part of the basin (Figure A-3.6-1). Sediment in the delta proximal to the drainage is mostly coarse-grained, whereas fine-grained sediment was observed in hand-dug holes in the center of the basin. Based on field observations, 2013 sediment in the central part of the basin is 6–7 cm thick. This is consistent with sediment thickness determined from the survey data (Figure A-3.6-1). An

estimated 71 m³ of sediment accumulated in Basin 1 during the summer 2013 monsoon season compared with approximately 30 m³ of sediment that was deposited in Basin 1 during the 2012 monsoon season (LANL 2013, 239233, Appendix C). Based on the area and 2013 sediment thickness in the delta and the remainder of Basin 1, it is estimated that 25% of the 2013 sediment in upper Los Alamos Canyon sediment detention Basin 1 is coarse-grained, and 75% of the sediment is fine-grained. Although floodwater clearly spilled into Basin 2, sediment deposition in Basin 2 was minimal (maximum sediment thickness in Basin 2 is less than 0.5 cm). Based on the deposition of sediment observed in Basin 1, and the absence of any appreciable sediment deposition in Basin 2, nearly all of the sediment transported by the small drainage below SWMU 01-001(f) is being contained in the upper Los Alamos Canyon sediment detention basin. Photographs of the sediment detention basins are shown in Photo A1-18, Attachment A-1.

A-3.7 DP Canyon GCS

A total of 11 cross-sections were surveyed in April and May 2010 at 100-ft intervals upstream of the DP Canyon GCS, and 2 cross-sections were surveyed at 125 ft and 225 ft downstream from the GCS, below the E039.1 gaging station (LANL 2012, 218411). A longitudinal channel thalweg profile was also surveyed over this 1325-ft interval. The area above the GCS was first resurveyed in November and December 2010, and the area below the GCS was resurveyed in March 2011 after ice melted from the channel bed (LANL 2011, 200902). The area above and below the GCS was resurveyed in October 2011 and in November–December 2012 (LANL 2013, 239233, Appendix C). In February 2013, an additional cross-section was surveyed 20 ft above the GCS (DPGCS –20 ft). All DPGCS cross-sections were resurveyed in March and April 2014. Cross-section and thalweg profile locations are shown on an orthophotograph in Figure A-3.7-1 and on a geomorphic map in Figure A-3.7-2 (geomorphic mapping from 1998; LANL 2004, 087390). The cross-sections and thalweg profile are shown in Figure A-3.7-3. Geomorphic changes that occurred at these cross-sections during 2013 from monsoonal flooding are summarized in Tables A-3.7-1 and 3.7-2. Photographs of the GCS are shown in Photo A1-19 Attachment A-1.

Net sediment deposition occurred at 11 of the 12 cross-sections above the GCS during the summer 2013 monsoon season and net sediment erosion occurred at one cross-section (Table A-3.7-1). Maximum sediment depositional thickness was 1.5 ft at the cross-section 600 ft above the GCS, and the maximum erosion was 2.5 ft, at the cross-section 200 ft above the GCS (Figure A-3.7-1 and Table A-3.7-1). Maximum sediment deposition was associated with aggradation of the main channel at –600 ft (Photo A1-20, Attachment A-1) and maximum incision was associated with progressive channel incision at –200 ft (Photo A1-21, Attachment A-1 and Figure A-3.7-3). Normalized net sediment deposition above the GCS averaged 120 m³/100 m (Table A-3.7-1) compared with an estimated 749 m³/100 m of post-1942 sediment in reach DP-2, which contains the GCS, as measured in 1999 (LANL 2004, 087390). This net deposition, 16% of the estimated 1942–1999 total, represents a large yearly increase. The 2013 net sediment deposition is 2.6 times the 2012 net deposition and is slightly less than the combined 2010–2012 net deposition (Table A-3.7-1). Most of the 2013 sediment occurred between DPGCS-200 ft and DPGSC-800 ft, with the greatest sediment volume deposited at DPGSC-600 ft (Figure A-3.7-1). This sediment deposition includes both channel aggradation and overbank deposition and is similar to sediment deposition observed in this area during previous monitoring efforts (LANL 2011, 200902). It appears that the locus of sediment deposition is prograding downstream and migrating laterally.

In the area below the GCS net sediment erosion occurred at both cross-sections (Figure A-3.7-3 and Table A-3.7-2). Maximum sediment deposition was 0.2 ft, within the channel at the cross-section 225 ft below the GCS and maximum sediment erosion was 1.4 ft at the cross-section 125 ft below the GCS (Figure A-3.7-1).

On average, the stream channel upstream of the GCS aggraded by 0.4 ft in 2013 compared with 0.2 ft of aggradation in 2012 (Table A-3.7-1). Downstream of the GCS, the channel incised by an average of 0.7 ft in 2013, compared with 0.1 ft of aggradation in 2012 (Table A-3.7-2). As shown in Figure A-3.7-3, the channel thalweg gradient increased slightly both above and below the GCS in 2012.

A-3.8 Los Alamos Canyon Low-Head Weir

The sediment retention basins above the Los Alamos Canyon low-head weir (LA weir) were excavated from July 8 to July 11, 2011, following the Las Conchas fire (LANL 2011, 206488). The upper two basins (Basins 1 and 2) were resurveyed in October 2011 after the 2011 monsoon season, and the lower basin (Basin 3) was resurveyed in March 2012 after ponded water had evaporated (LANL 2012, 218411). Basins 1 and 3 were resurveyed in November 2012; Basin 2 had standing water and was not resurveyed in November 2012 (LANL 2013, 239233, Appendix C). All three basins were resurveyed in May 2013 following excavation in March–April 2013. Basins 1 and 2 were resurveyed in December 2013, and Basin 3 was resurveyed in February 2014. Figure A-3.8-1 shows variations in total sediment thicknesses in LA weir sediment basins, determined by subtracting the May 2013 surface from the December 2013–February 2014 surface (sediment deposition between December 2013 and February 2014 is inferred to be negligible because of the absence of runoff or minimal runoff that occurred during this time interval). Maximum sediment thickness in Basin 3 resulting from the 2013 monsoon season is 2.16 m (7.1 ft). This maximum sediment thickness is in an area where a delta prograded from Basin 2 into the western end of Basin 3. An estimated 2694 m³ of sediment accumulated in Basin 3 during the summer 2013 monsoon season. Maximum sediment thickness in Basin 2 resulting from the 2013 monsoon season is 2.1 m (6.9 ft), and is in the central part of the basin (Figure A-3.8-1). An estimated 1932 m³ of sediment accumulated in Basin 2 during the summer 2013 monsoon season. Maximum sediment thickness in Basin 1 resulting from the 2013 monsoon season is 1.4 m (4.6 ft), and is in the central part of the basin (Figure A-3.8-1). An estimated 540 m³ of sediment accumulated in Basin 1 during the summer 2013 monsoon season. Table A-3.8-1 summarizes volume changes in each of the three sediment retention basins during this period. The weir is shown in Photo A1-22, Attachment A-1; the delta in the lower retention basin is shown in Photo A1-23, Attachment A-1. As a point of reference, approximately 6000 yd³ of sediment was removed from the LA weir in 2013 (LANL 2013, 251741).

Field observations indicate that approximately 100% of the 2013 sediment deposited in Basins 1 and 2 was coarse-grained sediment transported as bed load. This is in contrast to 2012 sediment deposits in Basin 1, which were approximately 20% coarse-grained sediment that was transported as bed load and 80% fine-grained sediment transported as suspended load, and Basin 2, which was 100% fine-grained sediment transported as suspended load (LANL 2013, 239233, Appendix C). In Basin 3, 2013 deposits comprised approximately 40% coarse-grained sediment and 60% fine-grained sediment, compared with 100% fine-grained sediment in 2011 and 2012. The total sediment accumulation rate in the basins above the weir during the 2013 monsoon season was greater than measured in previous years, as shown in Table A-3.8-2. Annual sediment deposition at the LA weir in 2011, 2012, and 2013 was approximately an order of magnitude greater than the annual sediment deposition recorded in 2010, the year before the Las Conchas fire (Table A-3.8-2). The high sedimentation rate after the Las Conchas fire is probably related to operation of the Los Alamos Reservoir. After the Cerro Grande fire, the reservoir was maintained to impound floodwaters, which let most of the sediment from the burn area settle out (Lavine et al. 2006, 213454; Reneau et al. 2007, 102886). In contrast, after the Las Conchas fire, floodwaters were allowed to bypass the dam because it was being rebuilt when the fire occurred and was not considered able to withstand large floods. The predominance of coarse sediment accumulated above the weir in 2013 differs from observations after the Las Conchas and Cerro Grande fires when the transport of fine-grained sediment was much higher than that of coarse-grained sediment in the first two to three years, and the transport distance greater for fine-grained sediment (Lavine et al. 2006, 213454; Reneau

et al. 2007, 102886). The predominance of coarse sediment at the weir in 2013 is likely from the large runoff events that occurred in September 2013, during which small tributary drainages appear to have contributed significant volumes of coarse sediment. The large increase in sediment in Basins 1 and 2 in 2013 compared with 2012 is attributable to the higher volume of coarse sediment bedload in the flood waters, which was deposited in the upper basins where the floodwaters spread and the gradient decreased. This resulted in the basins filling to a higher level than in previous years. The decrease in sediment volume in Basin 3, field observations showing that the flood overtopped the weir, and the large increase in coarse sediment compared with fine-grained sediment indicate that fine sediment was transported downstream past the LA weir during the September 2013 flood event.

A-4.0 OBSERVATIONS OF WILLOWS IN PUEBLO CANYON

From 2008 to 2010, willows were planted in three areas in Pueblo Canyon downstream from the new Los Alamos WWTP, with the goal of enhancing riparian habitat, stabilizing surfaces, and slowing floodwaters. These areas are referred to as the upper Pueblo Canyon willow-planting area (section A-3.2), the lower Pueblo Canyon willow-planting area (section A-3.4), and the Pueblo Canyon GCS (section A-3.5). Observations were made of willows in these areas during fall 2011, winter 2013, and spring 2014. Willow success was variable in these areas and appears to be related to substrate conditions and preexisting vegetation as well as to the occurrence and persistence of water and substrate stability, as discussed below. Willow success was also affected by the large September 2013, flood event, which laid down and/or uprooted many willows, resulting in substantial willow mortality.

In 2014, the upper Pueblo Canyon willow-planting area had the tallest willows and the thickest stands of willows in the surveyed areas. In the upper third of the upper willow planting area the monsoon floods of summer 2013 either completely uprooted or laid down existing willows (Photo A1-24, Attachment A-1). Because of the unobstructed impact of flood waters at the upstream segment of the upper planting area, more willows were uprooted at the upstream end of the planting. Willows that were laid down but were not uprooted appear to have a good survival rate, and many laid-down willows were observed to be resprouting during a May 2014 site visit (Photo A1-25, Attachment A-1). The greatest number of laid-down and resprouting willows were observed at the center and downstream end of an island in the channel at the UW-5 cross-section (Figure A-3.2-1). Few laid-down survivors are present upstream of the island. The middle third of the upper Pueblo Canyon willow planting area fared better with numerous survivors present between cross-sections MW-1 and MW-4 (Figure A-3.2-1 and Photo A1-26, Attachment A-1). Downstream of MW-4, the channel was completely scoured and few if any willows survived (Figure A-3.2-1). At the lower third of the upper Pueblo Canyon willow planting area, willows were completely scoured from the channel and only a few willows survived on the banks of the current incised channel (Figure A-3.2-1 and Photo A1-27, Attachment A-1). This is similar to previous findings: In the lower third of the upper Pueblo Canyon willow-planting area, willows were less continuous, and generally gaps were observed between the foliage from nearby stems. No willows were observed in 2014 (following 2013 monsoon floods) in most of the area between the LW-3 and LW-5 cross-sections, and they were sparse or nonexistent between the LW-5 and LW-6 cross-sections (Figure A-3.2-1), which is similar to the extent of willows observed in 2012 (LANL 2013, 239233, Appendix C). This corresponds to an area of unstable conditions from 2010 through 2012, with eroding banks and an incising channel (Figure A-3.2-5 and Photo A1-5, Attachment A-1).

It appears that willow flood survival was greatest in areas where the channel has bends or contains islands, whereas very few willows withstood the force of the flood waters in straight reaches. Overall, the upper two-thirds of the upper Pueblo Canyon willow-planting area has continuous surface-water flow and a sandy or gravelly, aggrading substrate, and the willows were planted in generally bare ground with little competition from other vegetation. These conditions appear to be ideal for the success of willow

plantings, barring major flood events. Many willows that were laid down have resprouted and will likely revegetate areas that were damaged by 2013 floods. In the lower third of the upper Pueblo willow planting area willow success has been poor. The poor willow success in this area appears to be directly related to the unstable substrate conditions.

In the upper half of the lower Pueblo Canyon willow-planting area (Figures A-1.0-1 and A-3.4-1), above the transition zone, willows were planted in a thin strip along the main channel and locally along a side channel. This was an area with thick preexisting vegetation dominated by reed canary grass (*Phalaris arundinacea*), and much of the area has a fine-grained substrate. Most planted willow stalks did not survive, with willow success estimated to be less than 1% in this area in 2014 (compared with willow success ranging from 0% to about 30% in 2012 and 0% to about 50% observed in 2011). Poor success in this area was related to the thick preexisting vegetation, which would compete with the willows. The commonly fine-grained substrate and damage to willow stalks by animals observed during the previous willow surveys may also have contributed to the poor success rate in this area.

In the lower half of the lower Pueblo Canyon willow-planting area (Figures A-1.0-1 and A-3.4-1), below the transition zone, willows were also planted with a typical spacing of 1 m to 10 m in a thin strip along the main channel, and the success rate here was also generally low based on May 2014 observations. As noted in the 2011 and 2012 surveys, willow success was best near the lower end of the planting area, where the area between incised banks widens and coarse sediment was deposited (LANL 2011, 200902). However, September 2013 floods eroded the willows from this area (Photo 1-28, Attachment A-1). Willows also had been successfully established in an area of seepage in the transition zone near PU 0, but these were also eroded during the September 2013 floods.

One dense native willow patch is located on a post-1942 geomorphic surface near the PU +100 ft cross-section. This patch was partially eroded during September 2013 floods, with remaining willows up to 3 m tall. These willows were established before the September 2013 flood and indicate locally favorable conditions on higher surfaces, at least at the time they were established.

Upstream from the Pueblo Canyon GCS, willows were planted in the disturbed area along the channel for a distance of approximately 250 ft. Approximately 10% to 20% of these willows were surviving in 2013, often consisting of short sprouts from the base of the stems or the roots. The 2013 flood event further reduced the number of surviving plants; very few surviving willows remain in this entire reach. Stream incision and an associated lowering of the water table may further reduce survival rates of both willows and reed canary grass. It appears that reed canary grass will reestablish on the newly eroded surfaces since several healthy clumps were observed in this reach in spring 2014.

A-5.0 SOUTH FORK OF ACID CANYON INSPECTION

The stream bank armoring that was emplaced in the south fork of Acid Canyon in April 2010 (LANL 2010, 109280) was inspected after the 2011 monsoon season (LANL 2012, 218411), after the 2012 monsoon season (LANL 2011, 200902, Appendix C; LANL 2013, 239233) LANL 2013, 239233, Appendix C), and again after the 2013 monsoon season. The rock armoring remained intact, as shown in Photo A1-30, Attachment A-1.

A-6.0 SUMMARY

Net erosion occurred in most surveyed areas in the Pueblo Canyon watershed during monsoonal flood events in 2013. This is in contrast to net deposition measured in most surveyed areas in 2010, 2011, and 2012. The CVS, upper Pueblo willow, lower Pueblo willow, and Pueblo Canyon GCS sediment mitigation

areas all experience net erosion, whereas the wing ditch area experienced net deposition. The relatively large magnitude of the September 2013 flood event resulted in significant channel widening and incision in the areas that experienced net erosion. Many previously established willows were uprooted and washed downstream, reducing the density of willows in all willow planting areas. However, in areas with previously established thick willow patches (the upper two-thirds of the upper Pueblo willow planting area), willows that were laid down by monsoonal floods have resprouted and should effectively recolonize the area. The Pueblo Canyon GCS was effective in causing sediment deposition in the lower part of the Pueblo Canyon GCS monitoring area. The survival of thick willow patches and sedimentation above the Pueblo Canyon GCS and in the wing ditch area is consistent with the goal of the sediment transport mitigation work plans (LANL 2008, 101714; LANL 2008, 105716). Field observations indicate that much of the eroded sediment in Pueblo Canyon was originally deposited in the floods that occurred after the Cerro Grande fire, which contains relatively low contaminant concentrations. In addition, some of the bank erosion includes uncontaminated pre-1943 sediment, and erosion of these areas does not contribute to the contaminant load in storm water. However, some areas of post-1942, pre-Cerro Grande sediment deposits were also eroded, adding to the contaminant load in storm water.

Net sediment deposition occurred in most surveyed areas in the Los Alamos Canyon watershed in 2013, which is consistent with the goal of the sediment transport mitigation work plans (LANL 2008, 101714; LANL 2008, 105716). Net sediment deposition in DP Canyon, the upper Los Alamos Canyon sediment detention basins, and the LA weir in 2013 is greater than recorded in 2012 (or in previous years). It appears that sediment deposition behind the engineered structures in the Los Alamos Canyon watershed has been enhanced by the construction of these structures, although how far this effect propagates upstream behind the DP Canyon GCS is uncertain.

Although the September 2013 flood event resulted in significant erosion in most surveyed areas in Pueblo Canyon, the magnitude of the erosion was likely reduced by the sediment mitigation structures and willow plantings. The engineered structures in Los Alamos and DP Canyons appear to have enhanced sediment deposition in these areas. No actions are recommended at this time except for continued annual resurveys.

A-7.0 REFERENCES AND MAP DATA SOURCES

A-7.1 References

The following list includes all documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ER ID or ESH ID. This information is also included in text citations. ER IDs were assigned by the Environmental Programs Directorate's Records Processing Facility (IDs through 599999), and ESH IDs are assigned by the Environment, Safety, and Health (ESH) Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the ESH Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

LANL (Los Alamos National Laboratory), April 2004. "Los Alamos and Pueblo Canyons Investigation Report," Los Alamos National Laboratory document LA-UR-04-2714, Los Alamos, New Mexico. (LANL 2004, 087390)

- LANL (Los Alamos National Laboratory), February 2008. "Interim Measure Work Plan to Mitigate Contaminated Sediment Transport in Los Alamos and Pueblo Canyons," Los Alamos National Laboratory document LA-UR-08-1071, Los Alamos, New Mexico. (LANL 2008, 101714)
- LANL (Los Alamos National Laboratory), October 2008. "Supplemental Interim Measures Work Plan to Mitigate Contaminated Sediment Transport in Los Alamos and Pueblo Canyons," Los Alamos National Laboratory document LA-UR-08-6588, Los Alamos, New Mexico. (LANL 2008, 105716)
- LANL (Los Alamos National Laboratory), April 2010. "Documentation of Completion of Stream Bank Stabilization in the South Fork of Acid Canyon," Los Alamos National Laboratory document LA-UR-10-1877, Los Alamos, New Mexico. (LANL 2010, 109280)
- LANL (Los Alamos National Laboratory), February 2011. "Baseline Geomorphic Conditions at Sediment Transport Mitigation Sites in the Los Alamos and Pueblo Canyon Watersheds, Revision 1," Los Alamos National Laboratory document LA-UR-11-0936, Los Alamos, New Mexico. (LANL 2011, 200902)
- LANL (Los Alamos National Laboratory), September 2011. "Las Conchas Wildfire Effects and Mitigation Actions in Affected Canyons," Los Alamos National Laboratory document LA-UR-11-4793, Los Alamos, New Mexico. (LANL 2011, 206488)
- LANL (Los Alamos National Laboratory), March 2012. "Los Alamos National Laboratory Environmental Surveillance Program Sampling and Analysis Plan for Sediment, 2012," Los Alamos National Laboratory document LA-UR-12-1132, Los Alamos, New Mexico. (LANL 2012, 213568)
- LANL (Los Alamos National Laboratory), May 2012. "2011 Geomorphic Changes at Sediment Transport Mitigation Sites in the Los Alamos and Pueblo Canyon Watersheds," Los Alamos National Laboratory document LA-UR-12-21330, Los Alamos, New Mexico. (LANL 2012, 218411)
- LANL (Los Alamos National Laboratory), March 2013. "Storm Water Performance Monitoring in the Los Alamos/Pueblo Watershed during 2012," Los Alamos National Laboratory document LA-UR-13-22113, Los Alamos, New Mexico. (LANL 2013, 239233)
- LANL (Los Alamos National Laboratory), December 2013. "2013 Excavation of the Los Alamos Canyon Low-Head Weir," Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 2013, 251741)
- Lavine, A., G.A. Kuyumjian, S.L. Reneau, D. Katzman, and D.V. Malmon, April 2006. "A Five-Year Record of Sedimentation in the Los Alamos Reservoir, New Mexico, Following the Cerro Grande Fire," Proceedings of the Joint Eighth Federal Interagency Sedimentation Conference and Third Federal Interagency Hydrologic Modeling Conference, April 2–6, 2006, Reno, Nevada, pp. 951–959. (Lavine et al. 2006, 213454)
- NMED (New Mexico Environment Department), May 11, 2010. "Approval, Documentation of Completion of Armoring of Stream Banks in South Fork Acid Canyon," New Mexico Environment Department letter to G.J. Rael (DOE-LASO) and M.J. Graham (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2010, 109693)

NMED (New Mexico Environment Department), July 1, 2011. "Approval with Modifications, 2010 Geomorphic Changes at Sediment Transport Mitigation Sites in the Los Alamos and Pueblo Canyon Watersheds," New Mexico Environment Department letter to G.J. Rael (DOE-LASO) and M.J. Graham (LANL) from J.E. Kielling (NMED-HWB), Santa Fe, New Mexico. (NMED 2011, 204349)

Reneau, S.L., D. Katzman, G.A. Kuyumjian, A. Lavine, and D.V. Malm, February 2007. "Sediment Delivery After a Wildfire," *Geology*, Vol. 35, No. 2, pp. 151–154. (Reneau et al. 2007, 102886)

A-7.2 Map Data Sources

The following list provides data sources for maps included in the main body of this report.

2000 LIDAR Hypsography; Los Alamos National Laboratory, Earth and Environmental Sciences GIS Lab; 1:1,200; Work in progress.

Drainage; Los Alamos National Laboratory, Environment and Remediation Support Services; 1:24,000; May 15, 2006.

Gaging stations; Los Alamos National Laboratory, Waste and Environmental Services Division; 1:2,500; March 19, 2011.

Grade control structures; Los Alamos National Laboratory, Environment and Remediation Support Services; Unknown; May 17, 2011.

LANL boundary; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; Unknown; August 16, 2010.

LANL area orthophoto; Los Alamos National Laboratory, Earth and Environmental Sciences GIS Lab; 1'=200'; February 25, 2009.

Location IDs; Los Alamos National Laboratory, ESH&Q Waste and Environmental Services Division; 1:2,500; May 19, 2011.

Other property boundary; Los Alamos National Laboratory, Earth and Environmental Sciences GIS Lab; Unknown; August 16, 2010.

Pueblo and DP Canyon cross sections and thalwegs; Los Alamos National Laboratories, Earth and Environmental Sciences GIS Lab; Unknown; May 2011.

Roads, surfaced; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; Unknown; November 30, 2010.

Technical area boundary; Los Alamos National Laboratory, Site Planning and Project Initiation Group, Infrastructure Planning Office; Unknown; August 16, 2010.

Watershed; Los Alamos National Laboratory, Environment and Remediation Support Services; 1:2,500; November 2, 2006.

Wells; Los Alamos National Laboratory, ESH&Q Waste and Environmental Services Division; 1:2,500; May 19, 2011.

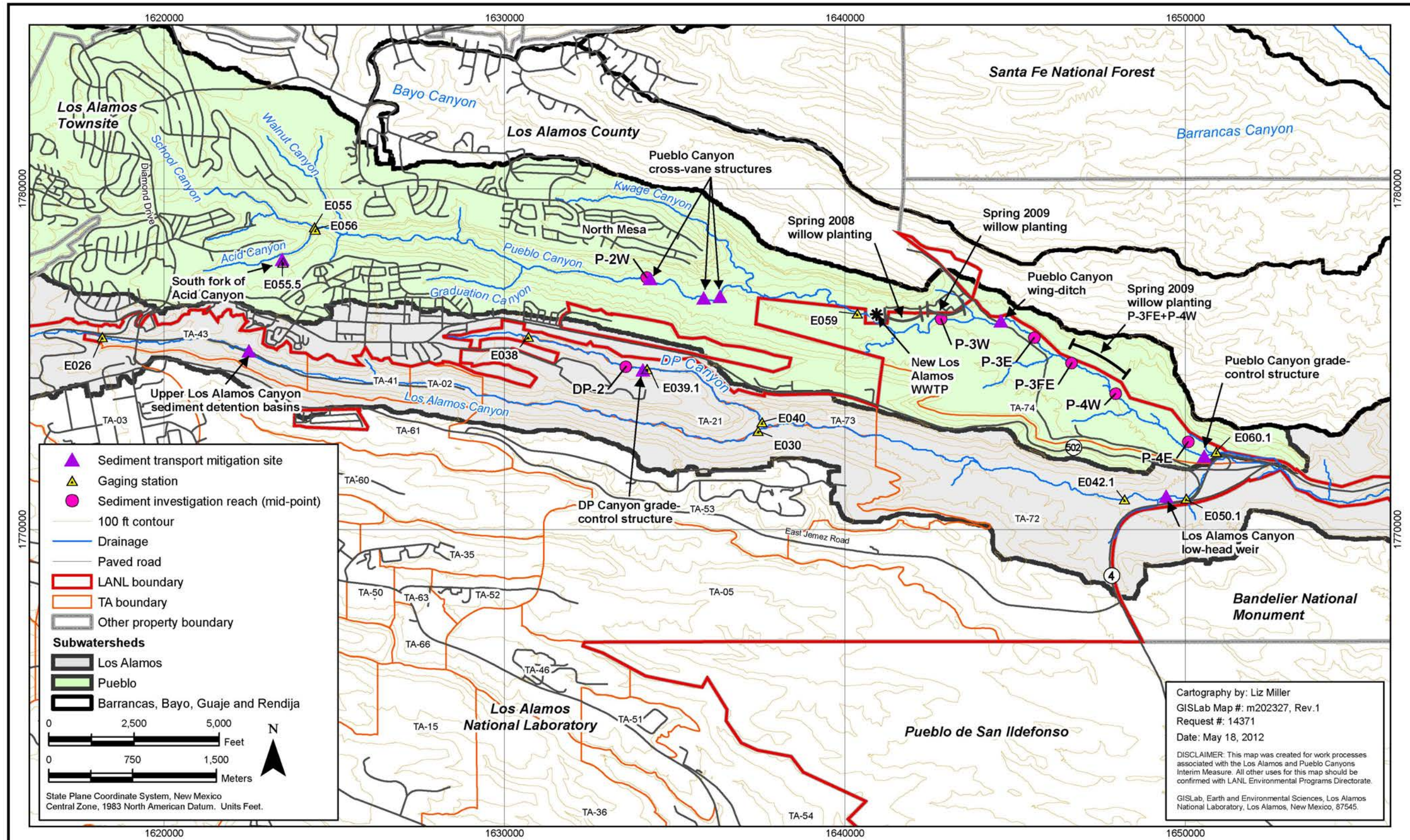


Figure A-1.0-1 Los Alamos and Pueblo Canyon watersheds, showing sediment transport mitigation sites and stream gages



Figure A-3.1-1 Orthophoto showing the locations of surveyed cross-sections and thalweg profiles at the Pueblo Canyon CVSs

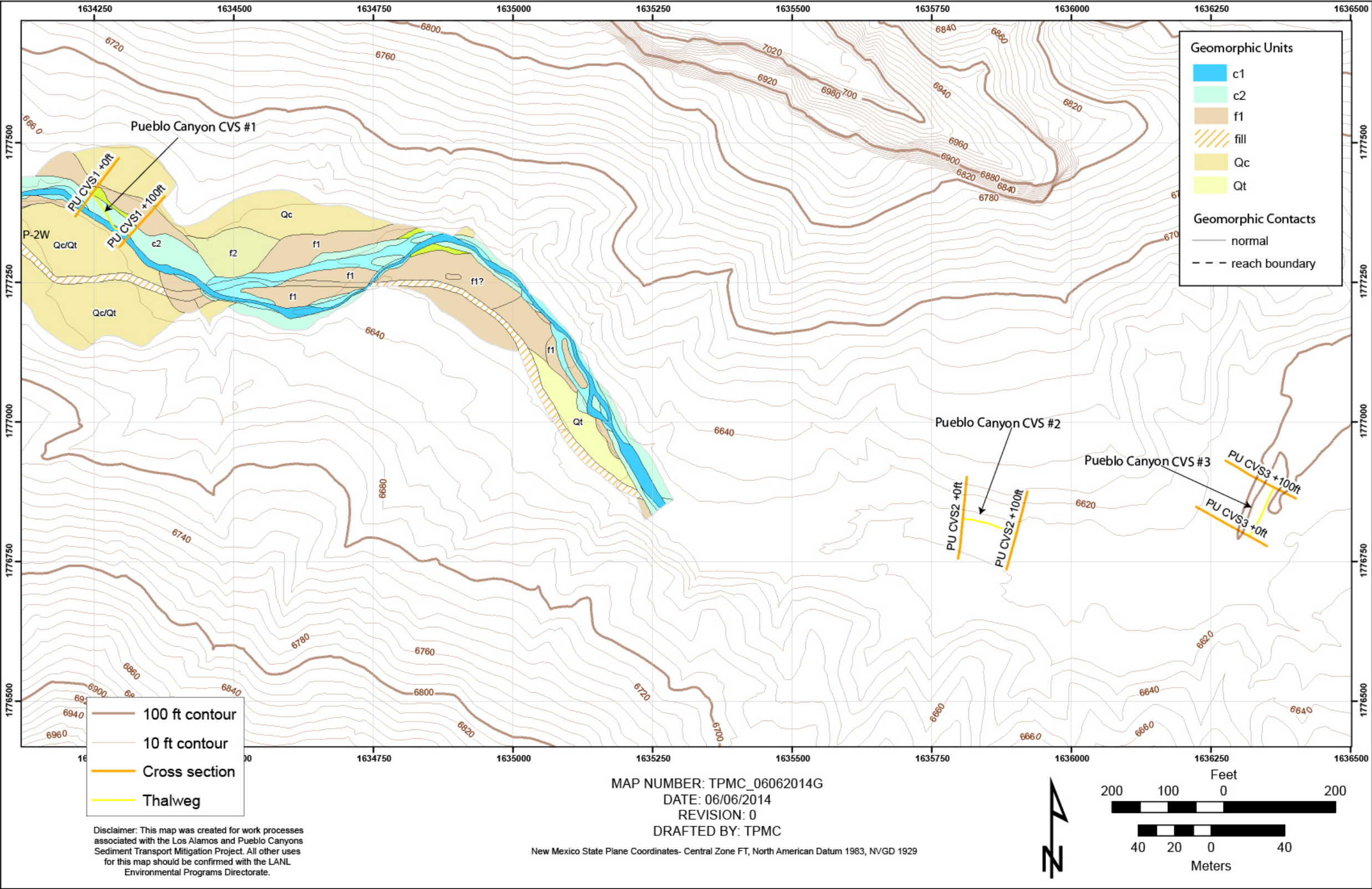


Figure A-3.1-2 Geomorphic map showing the locations of surveyed cross-sections and thalweg profile at Pueblo Canyon CVS #1; geomorphic mapping from 1997

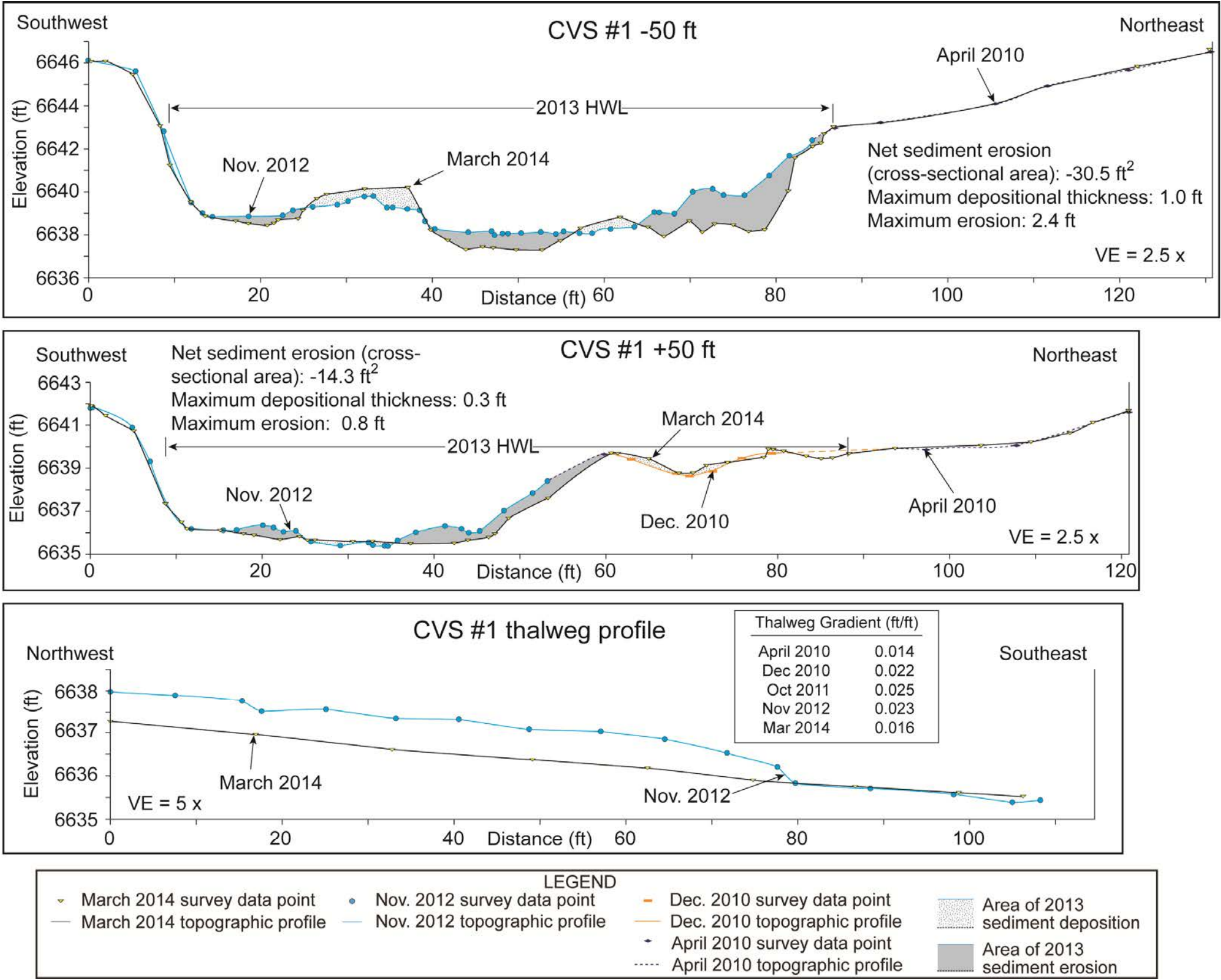


Figure A-3.1-3 Cross-sections and thalweg profile at Pueblo Canyon CVS #1

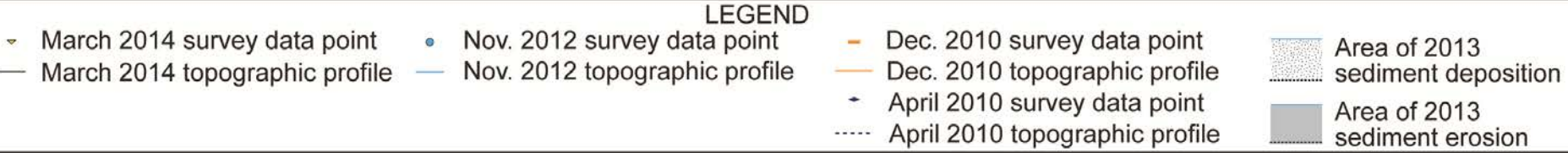
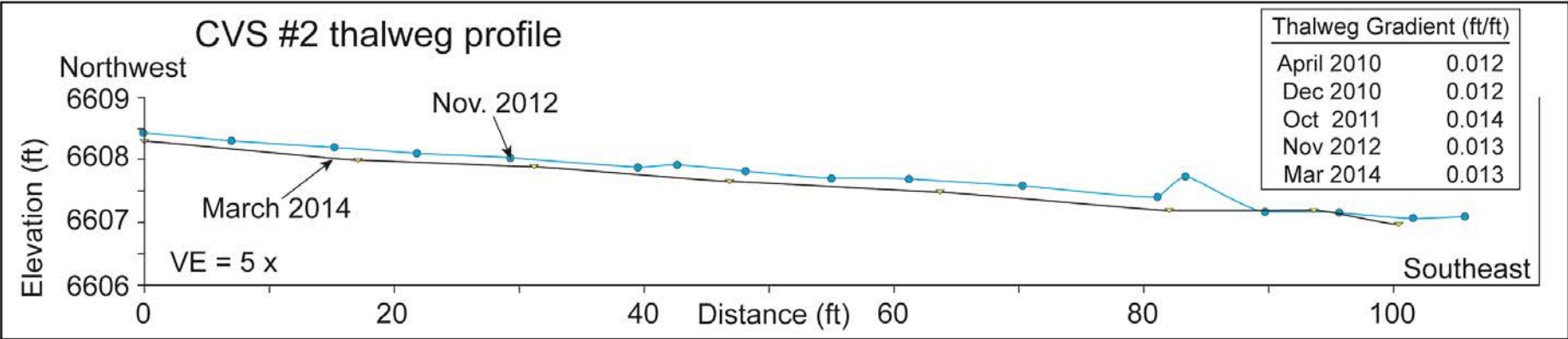
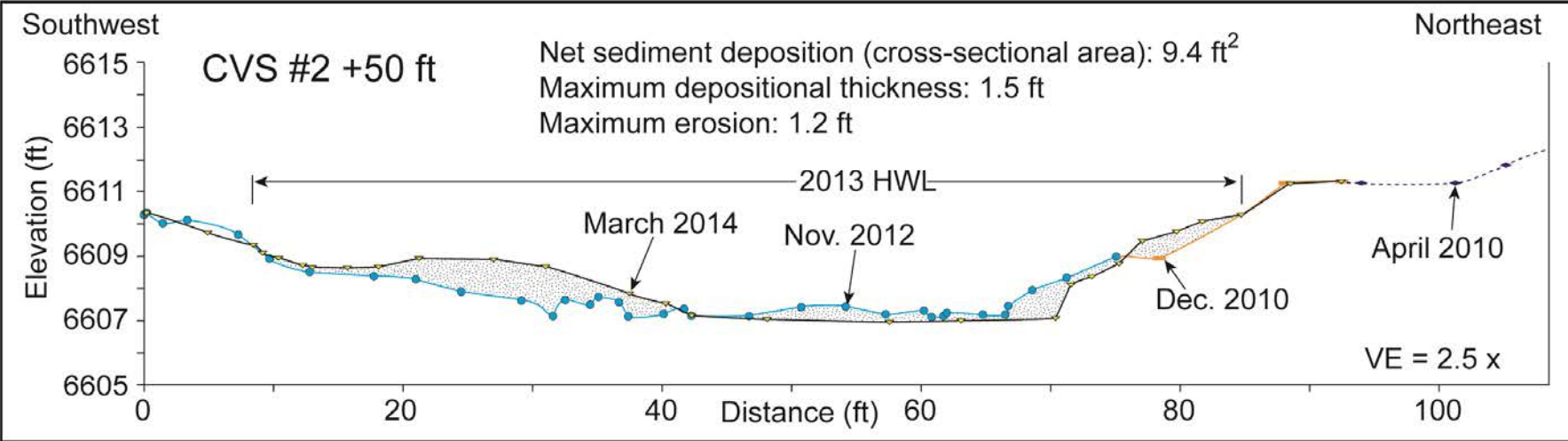
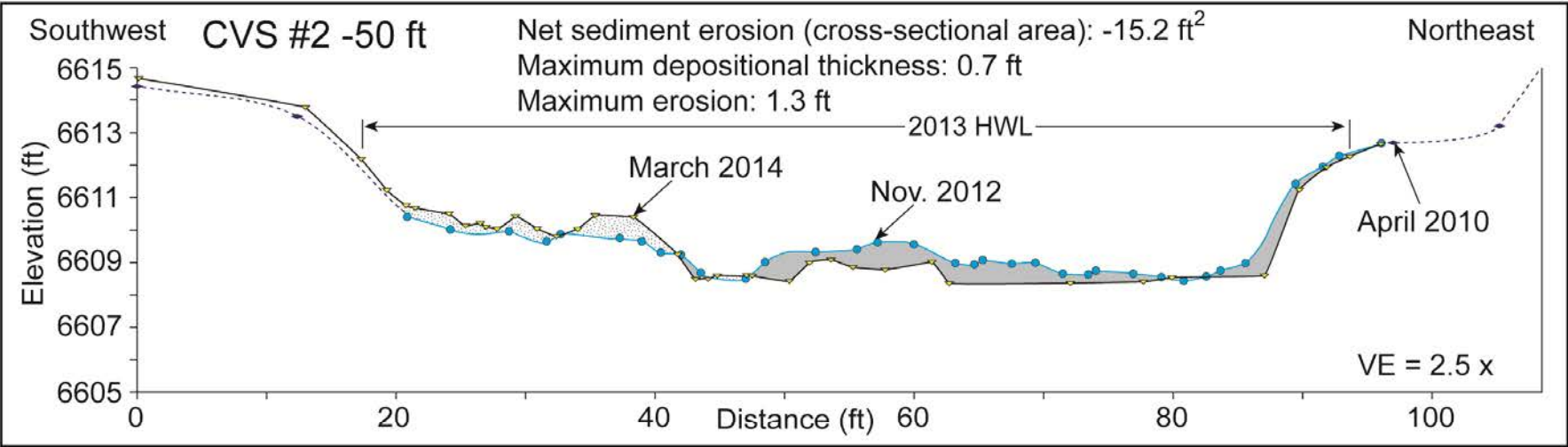


Figure A-3.1-4 Cross-sections and thalweg profile at Pueblo Canyon CVS #2

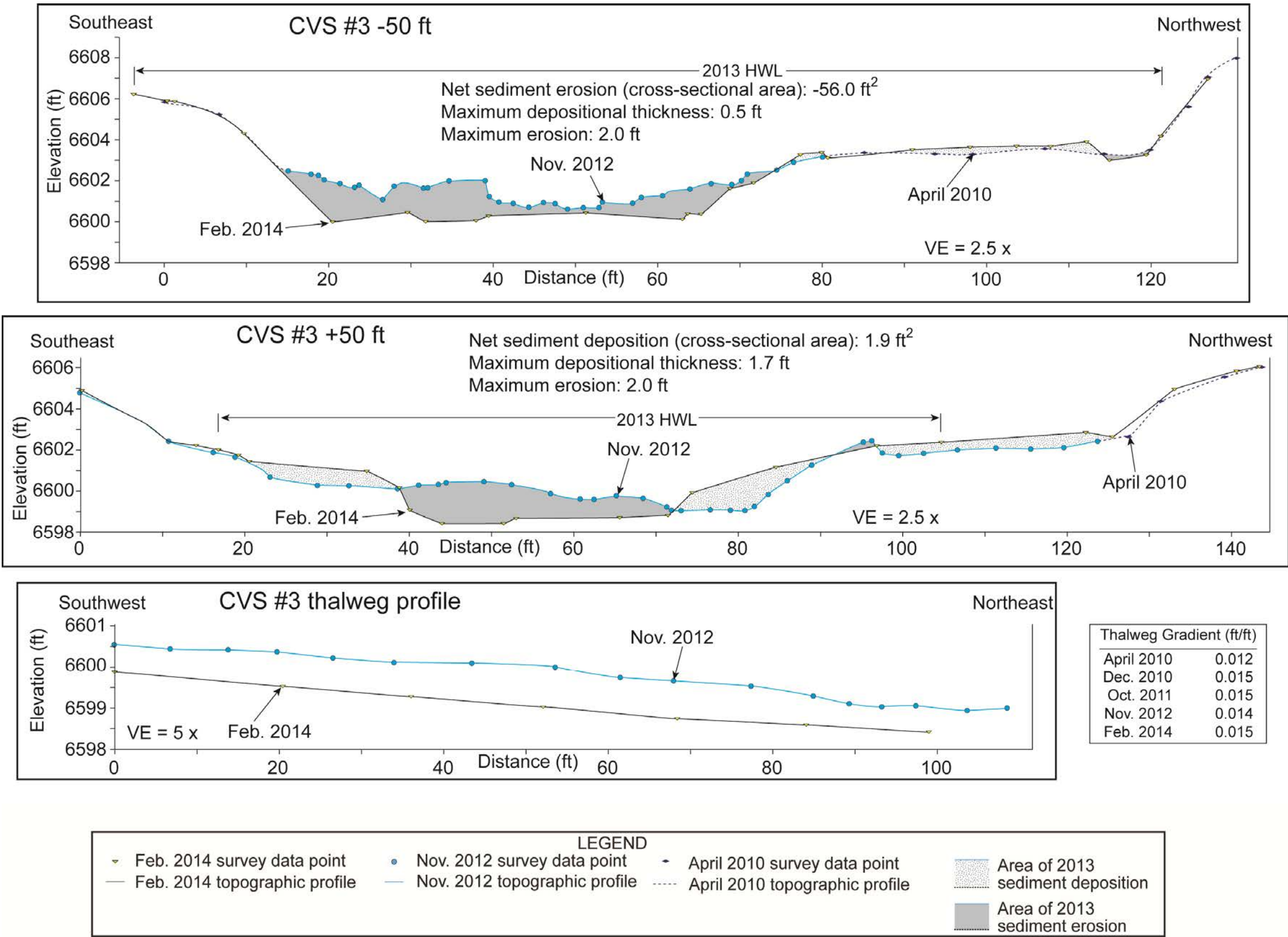


Figure A-3.1-5 Cross-sections and thalweg profile at Pueblo Canyon CVS #3

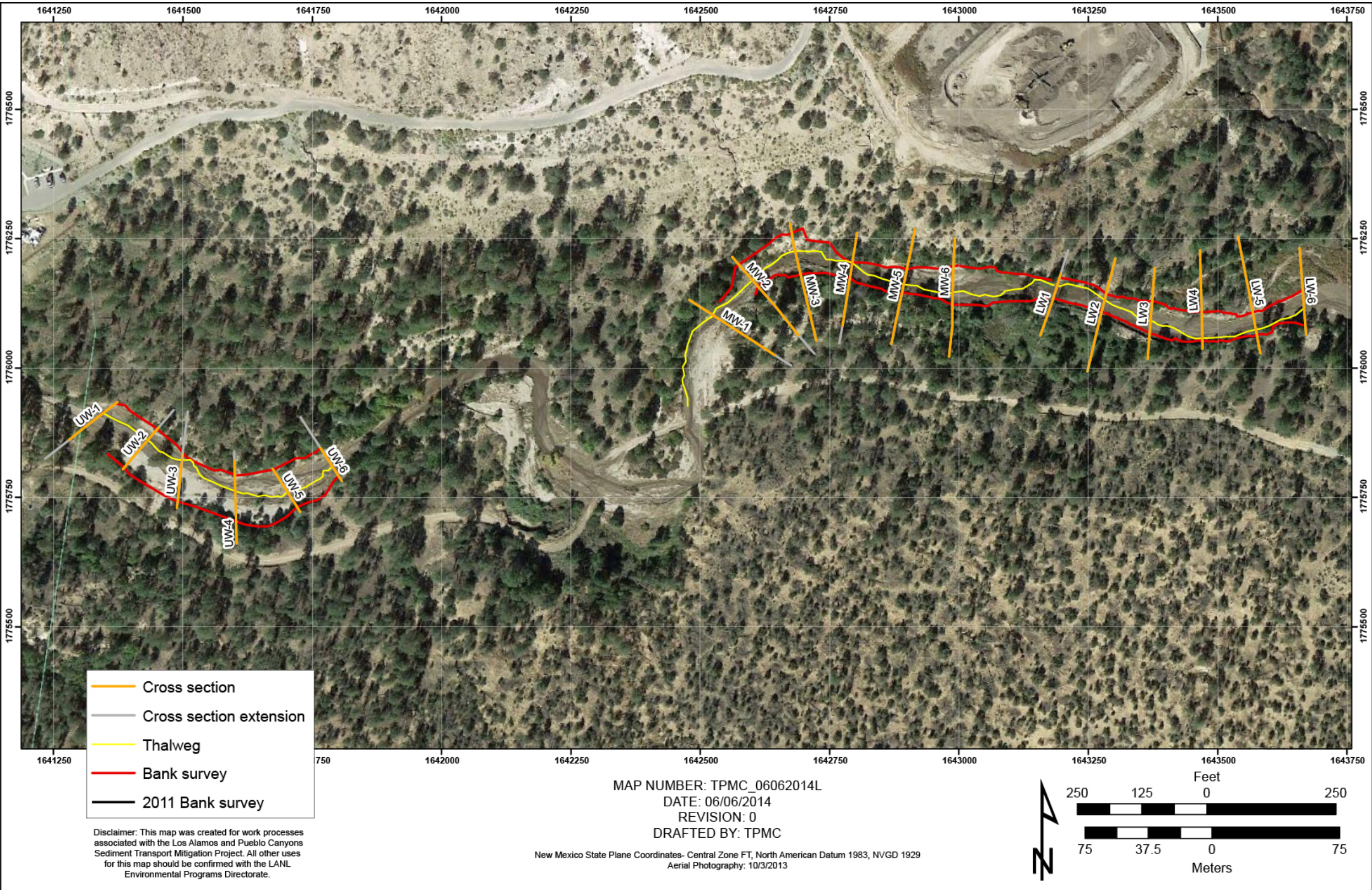


Figure A-3.2-1 Orthophoto showing the locations of surveyed cross-sections and thalweg profiles in the upper Pueblo Canyon willow-planting area

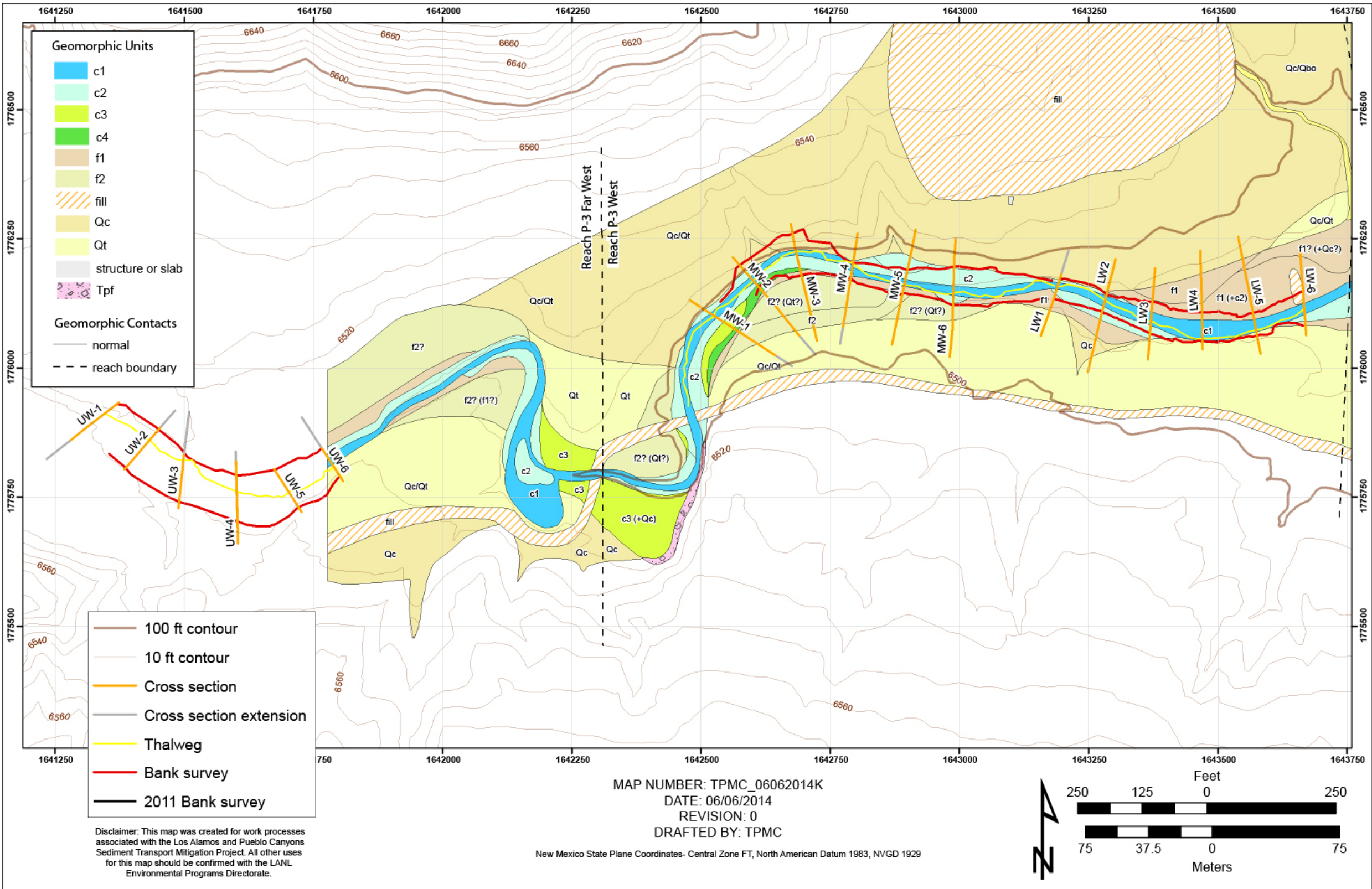


Figure A-3.2-2 Geomorphic map showing the locations of surveyed cross-sections and thalweg profiles in the upper Pueblo Canyon willow-planting area; geomorphic mapping from 1997

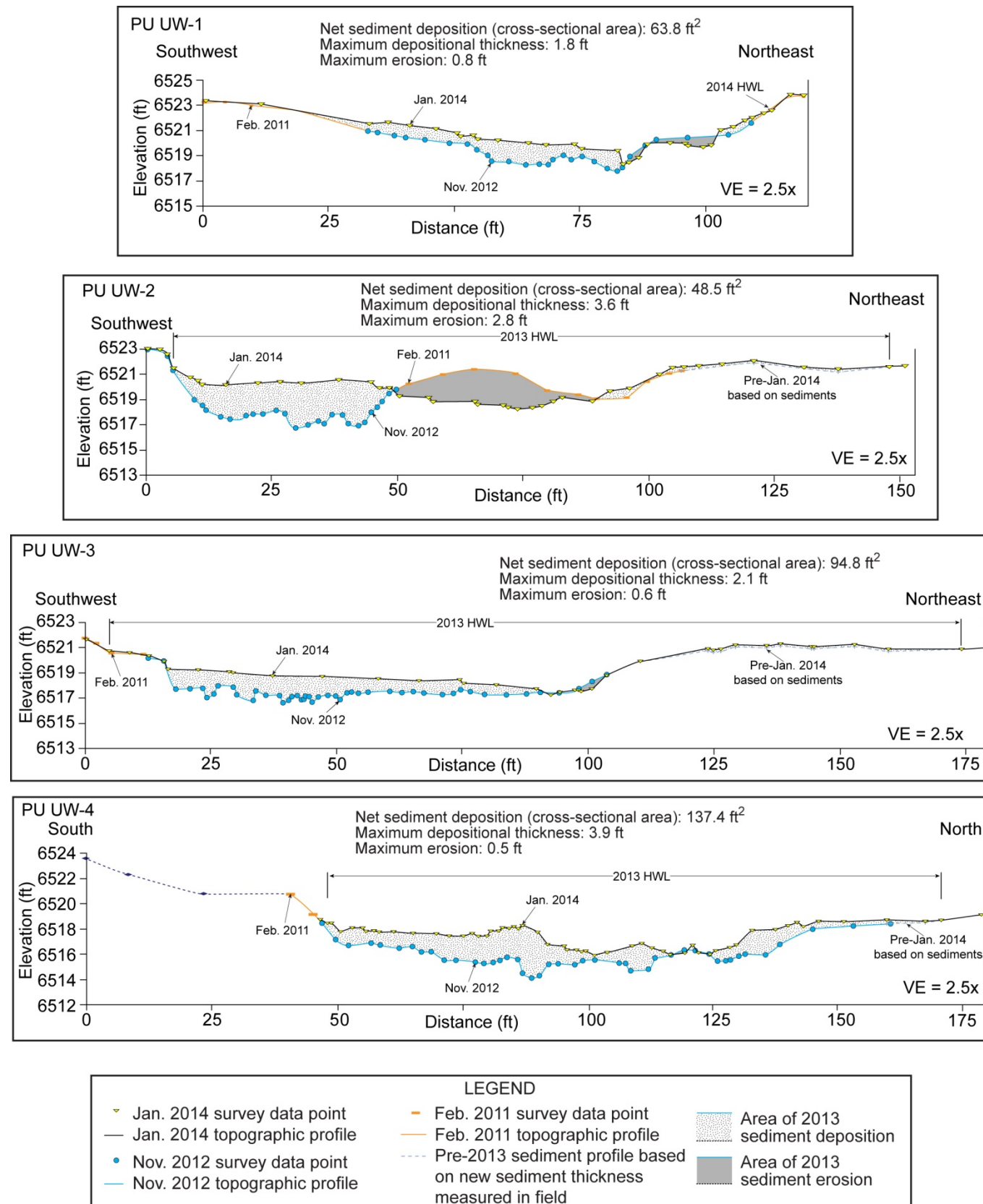


Figure A-3.2-3 Cross-sections and thalweg profile in upper third of upper Pueblo Canyon willow-planting area

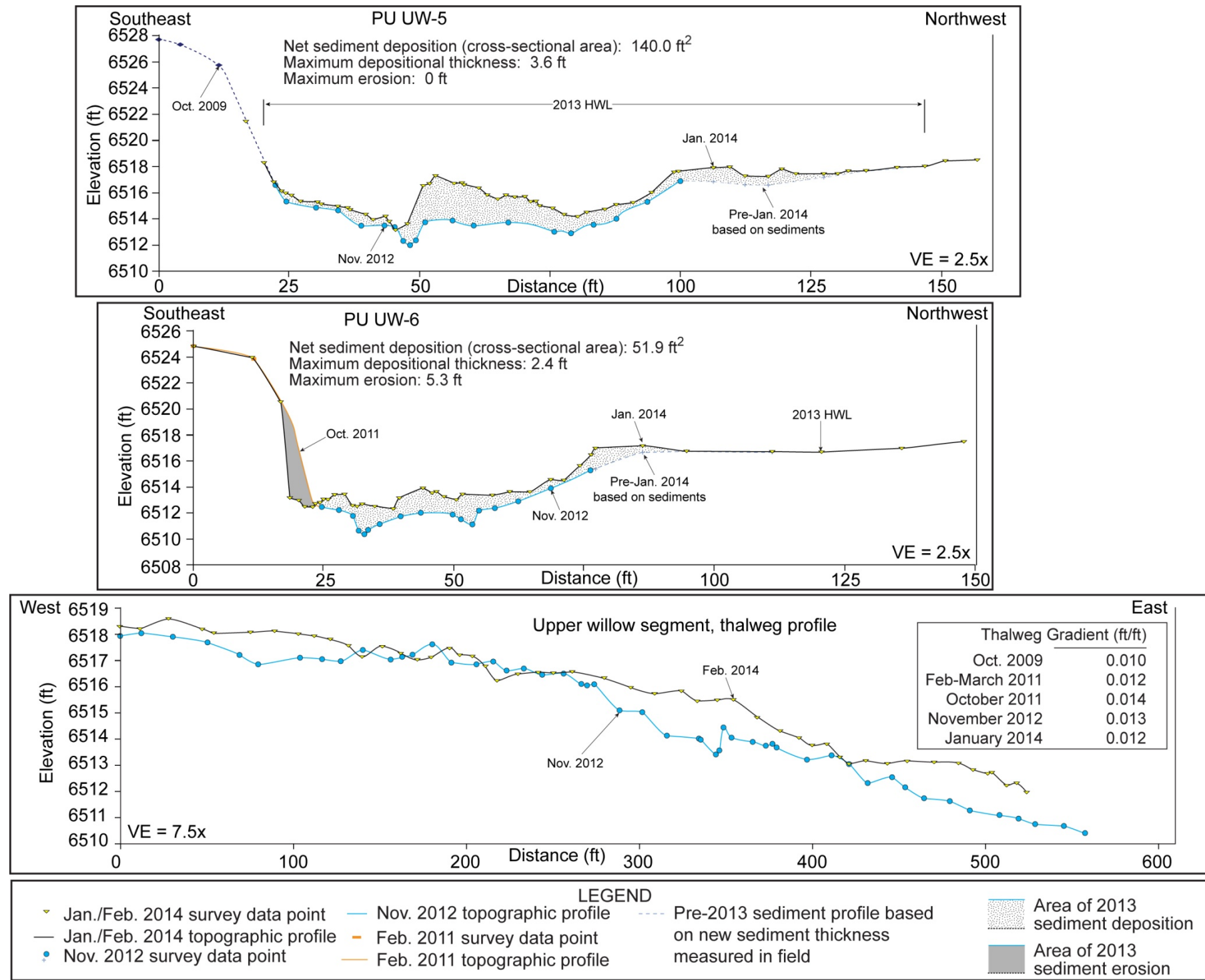


Figure A-3.2-3 (continued) Cross-sections and thalweg profile in upper third of upper Pueblo Canyon willow-planting area

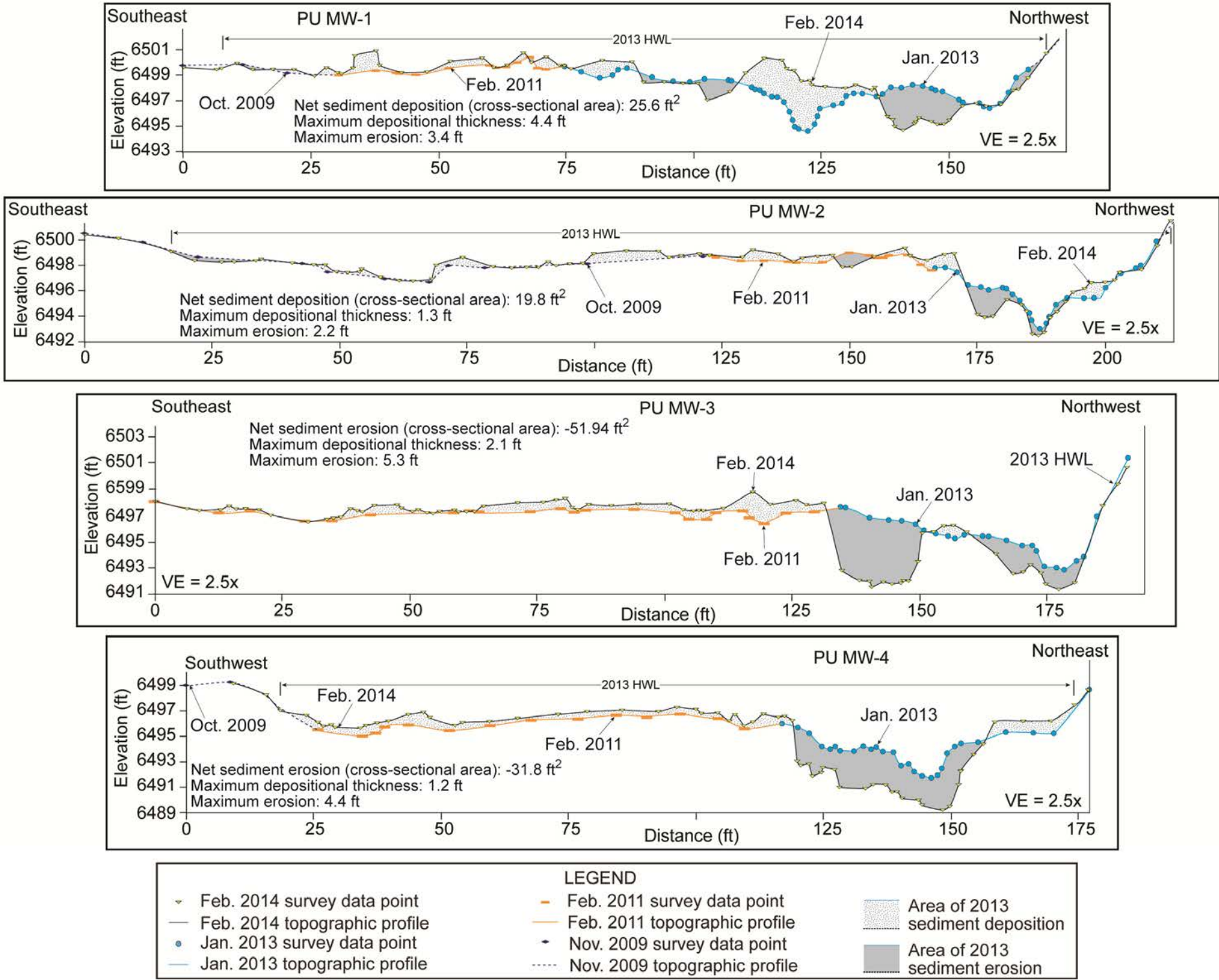


Figure A-3.2-4 Cross-sections and thalweg profile in middle third of upper Pueblo Canyon willow-planting area

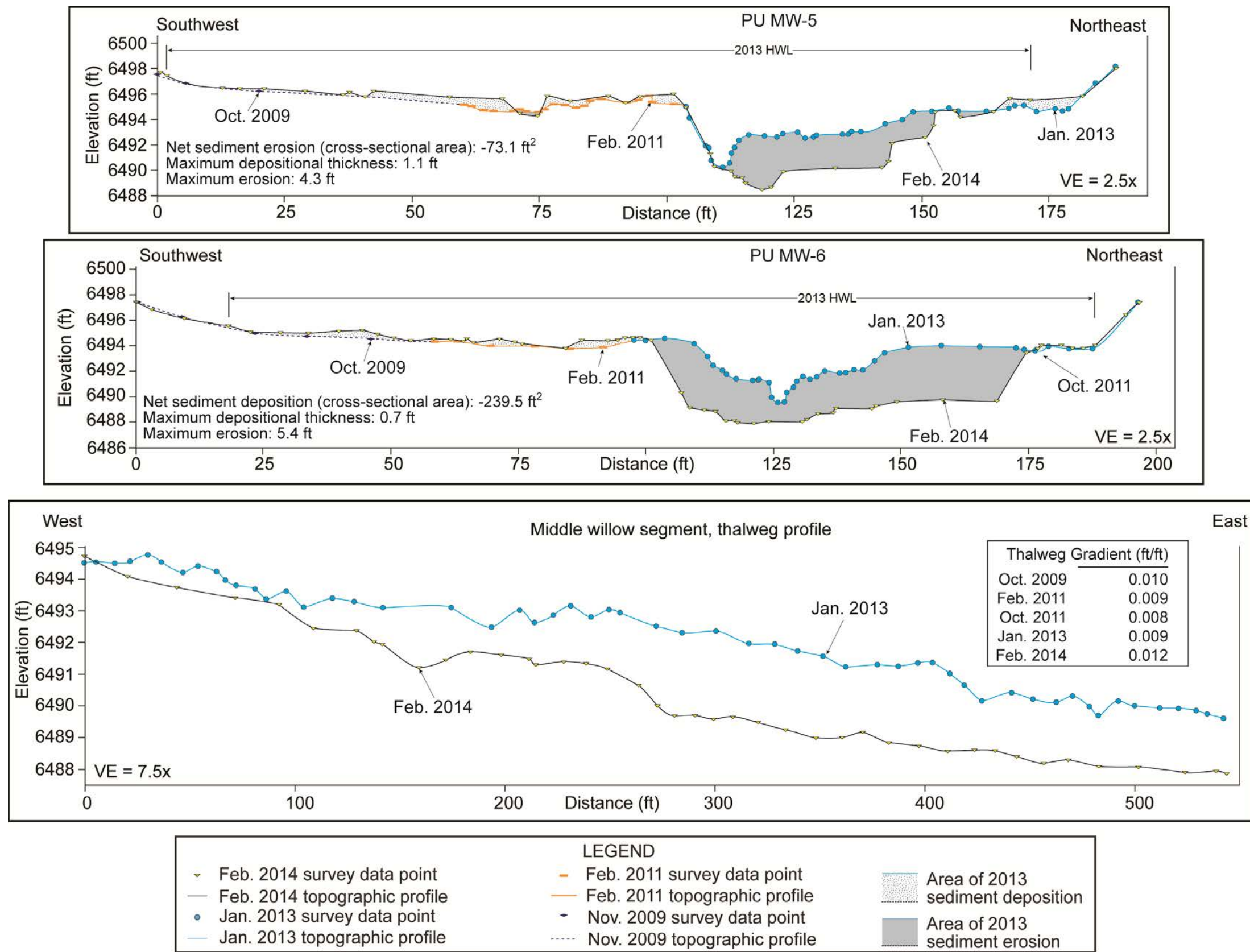


Figure A-3.2-4 (continued) Cross-sections and thalweg profile in middle third of upper Pueblo Canyon willow-planting area

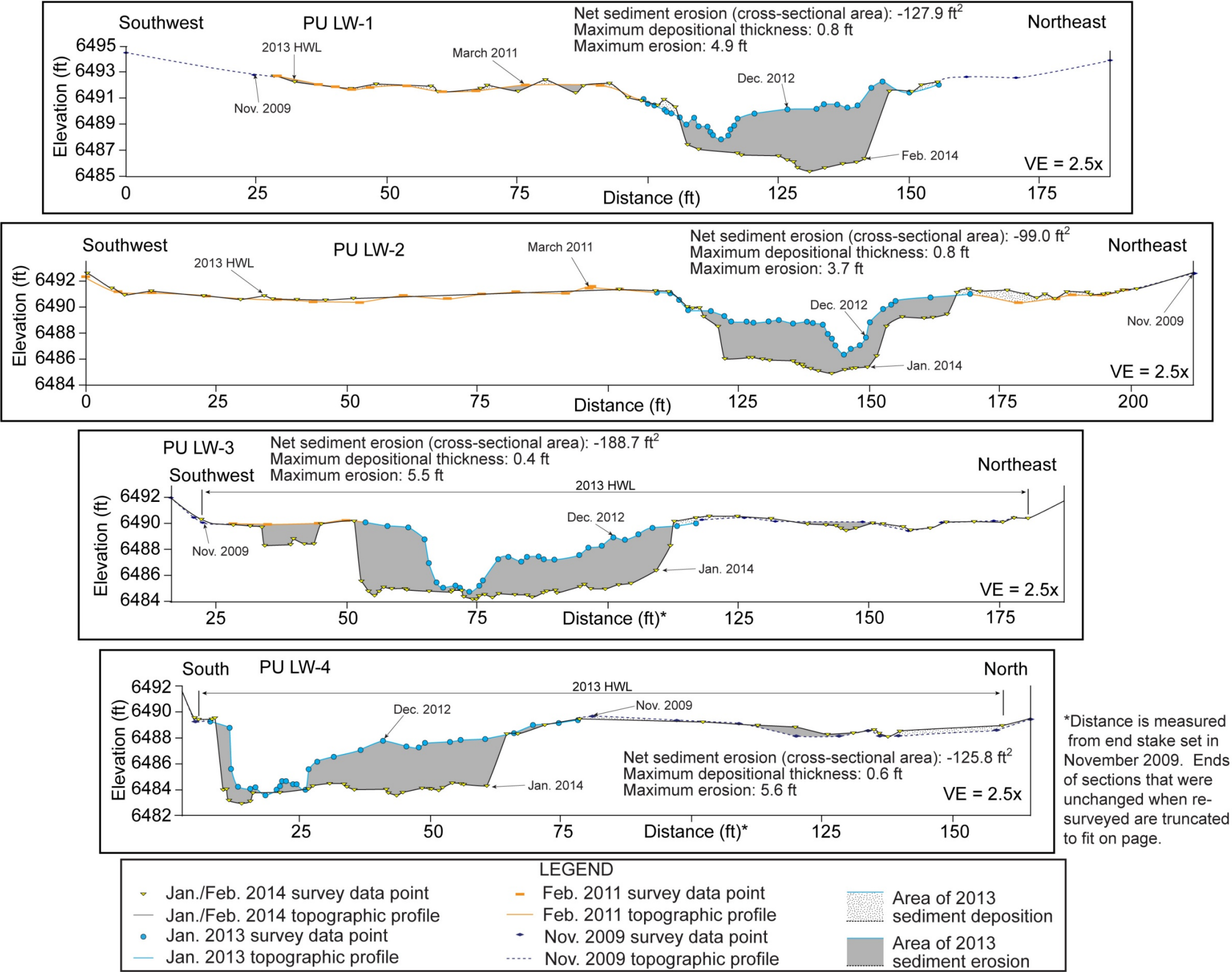
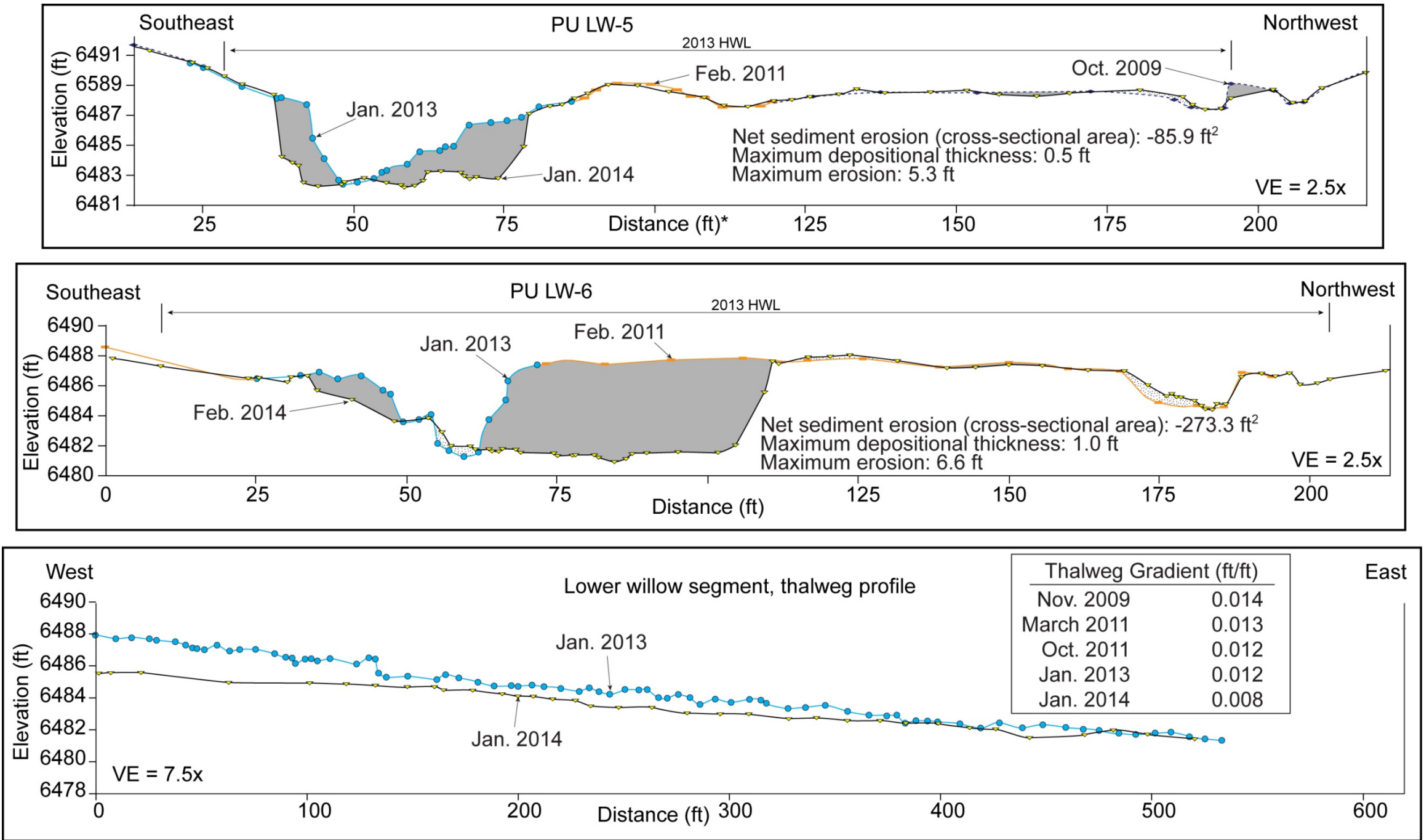


Figure A-3.2-5 Cross-sections and thalweg profile in lower third of upper Pueblo Canyon willow-planting area



*Distance is measured from end stake set in April, 2010. Ends of sections that were unchanged when re-surveyed are truncated to fit on page.

Figure A-3.2-5 (continued) Cross-sections and thalweg profile in lower third of upper Pueblo Canyon willow-planting area

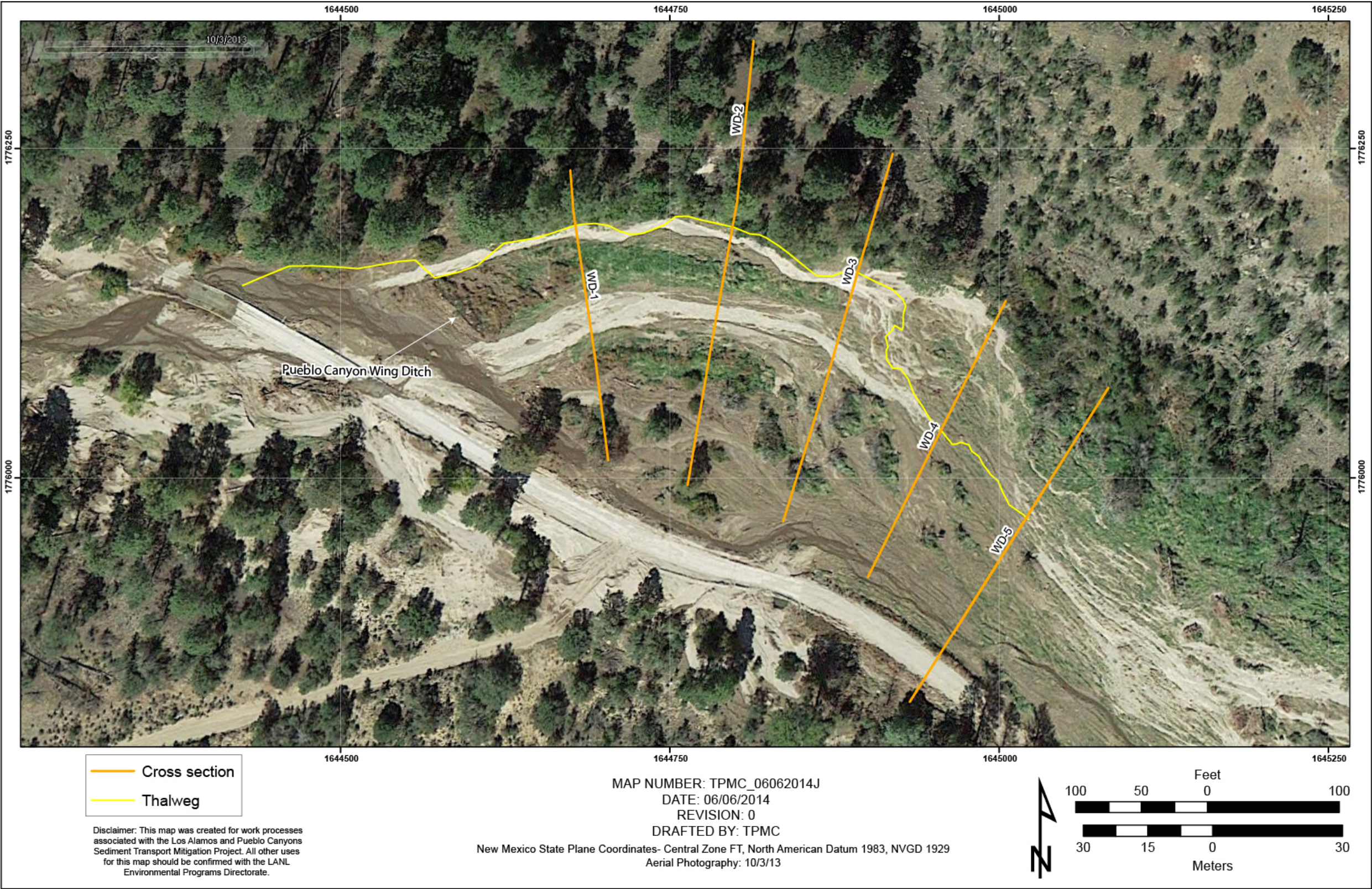


Figure A-3.3-1 Orthophoto showing the locations of surveyed cross-sections and thalweg profiles near the Pueblo Canyon wing ditch

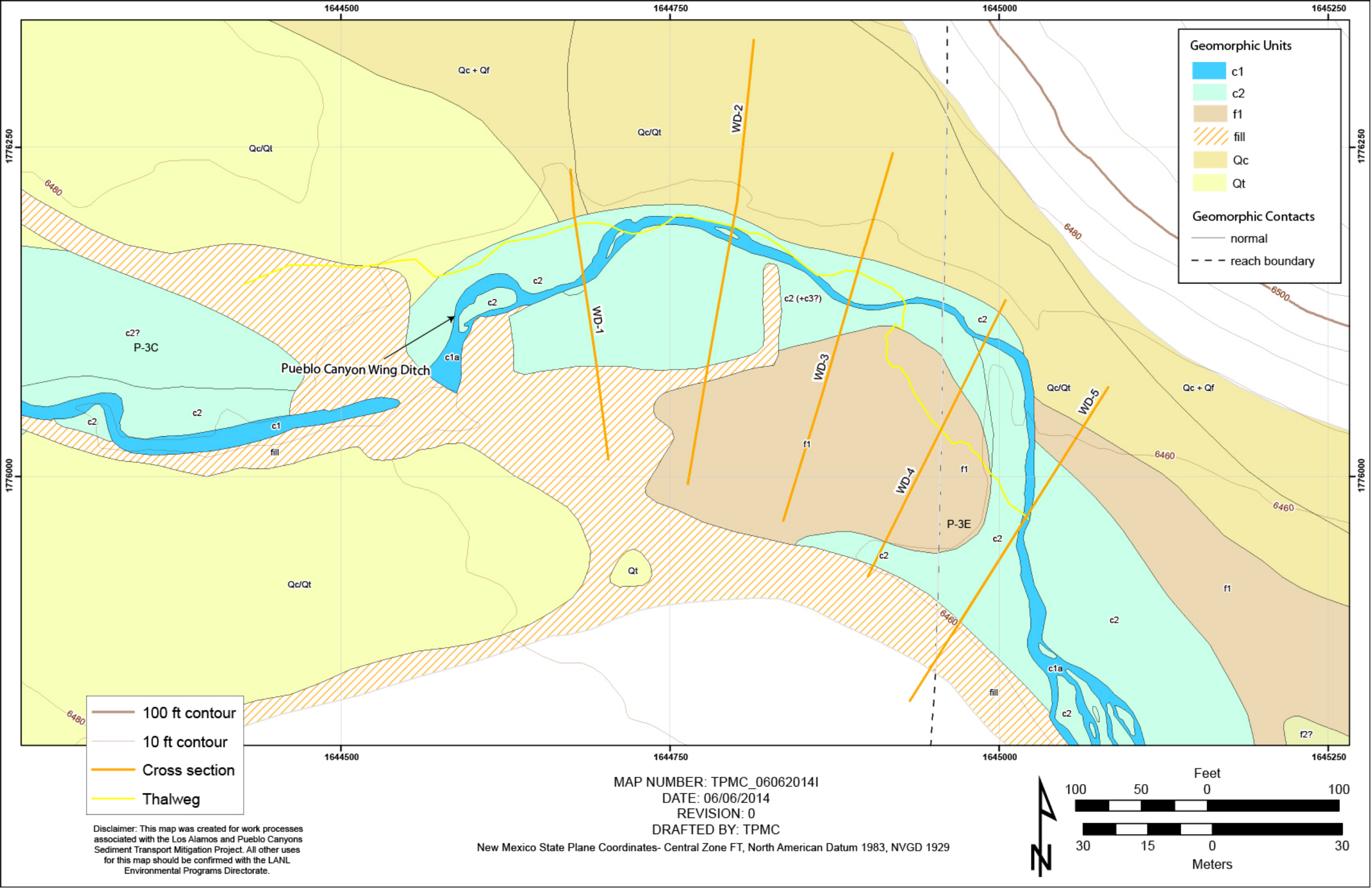


Figure A-3.3-2 Geomorphic map showing the locations of surveyed cross-sections and thalweg profiles near the Pueblo Canyon wing ditch; geomorphic mapping from 1997

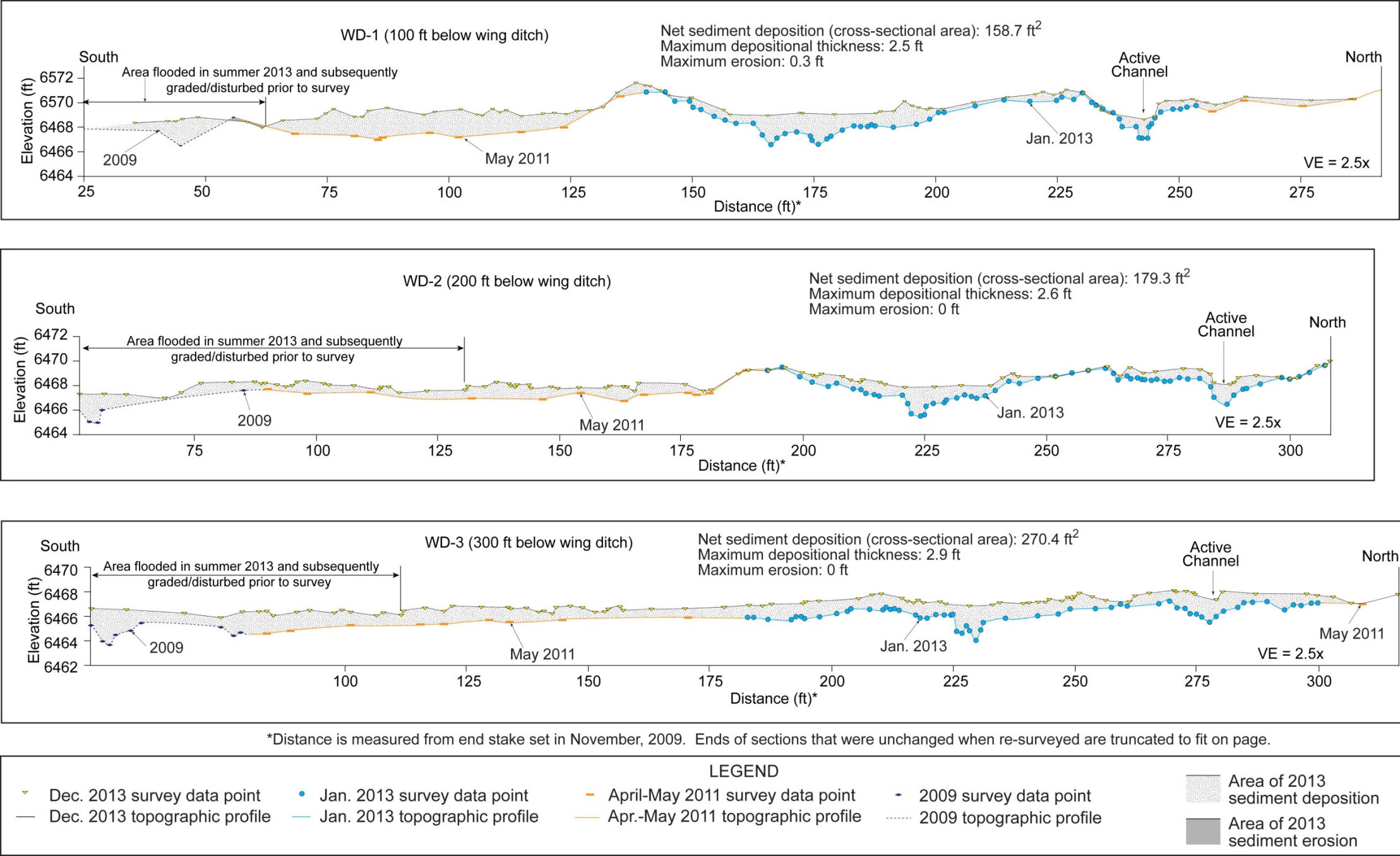
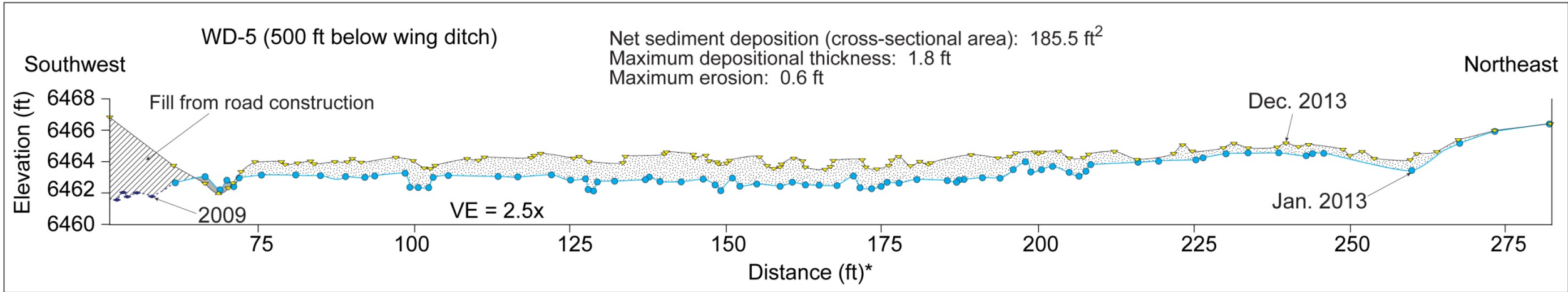
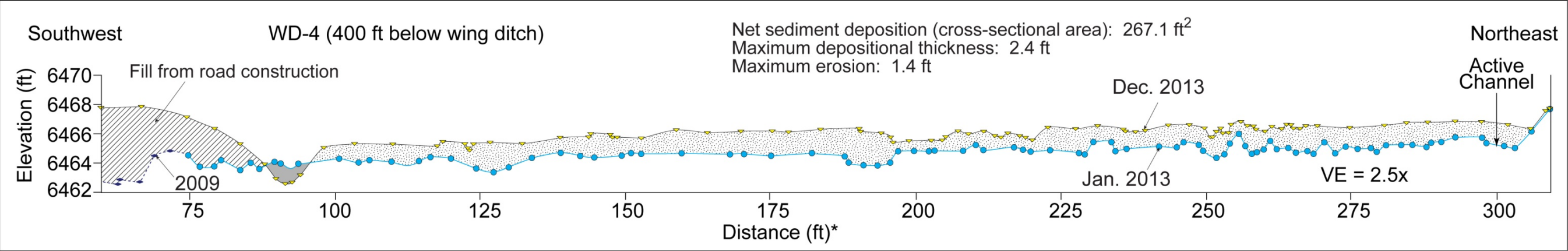


Figure A-3.3-3 Cross-sections below the Pueblo Canyon wing ditch



*Distance is measured from end stake set in November, 2009. Ends of sections that were unchanged when re-surveyed are truncated to fit on page.

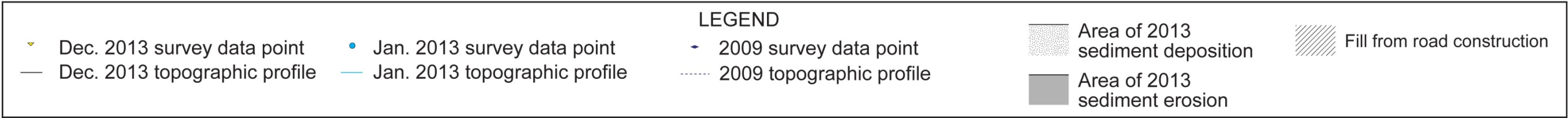


Figure A-3.3-3 (continued) Cross-sections below the Pueblo Canyon wing ditch

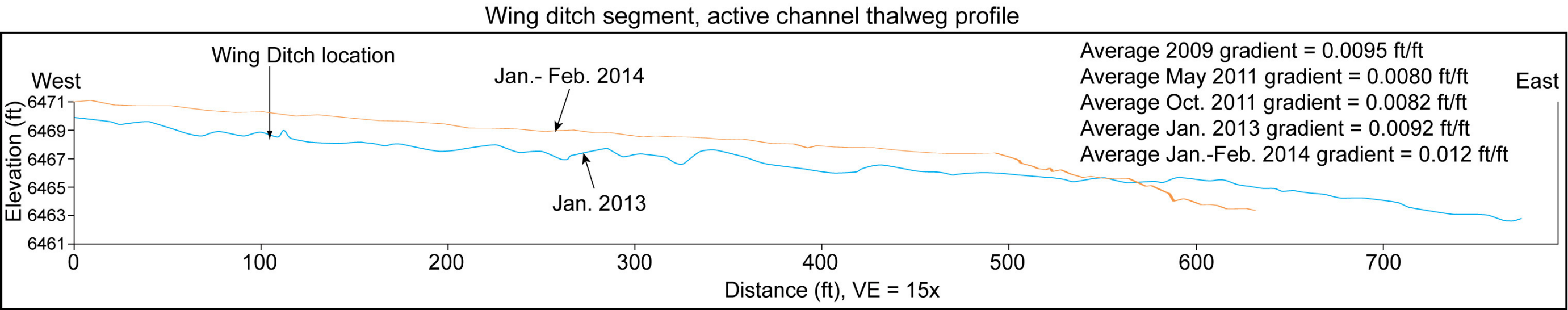


Figure A-3.3-4 Thalweg profiles near the Pueblo Canyon wing ditch

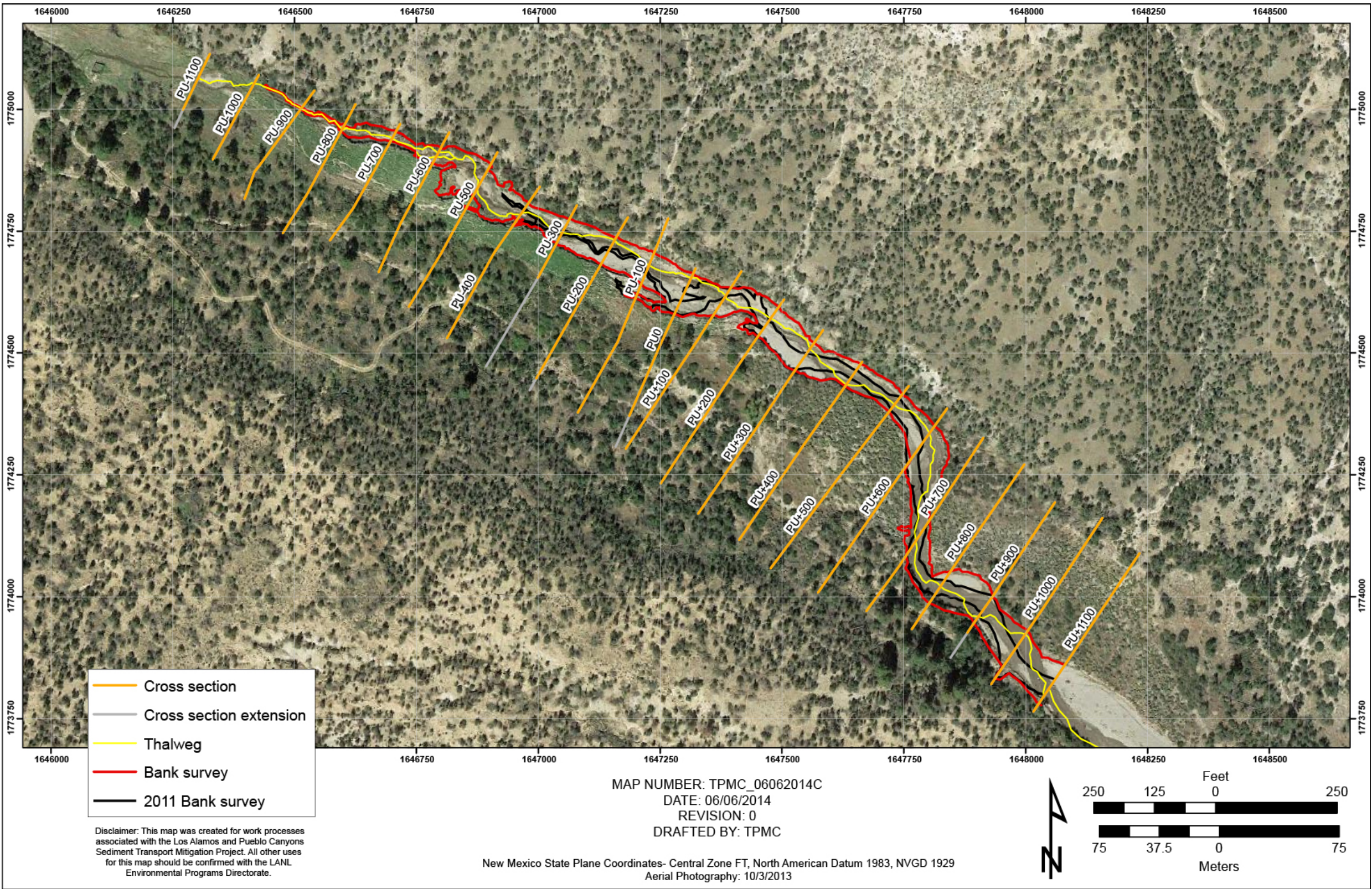


Figure A-3.4-1 Orthophoto showing the locations of surveyed cross-sections and stream banks in the lower Pueblo Canyon willow-planting area

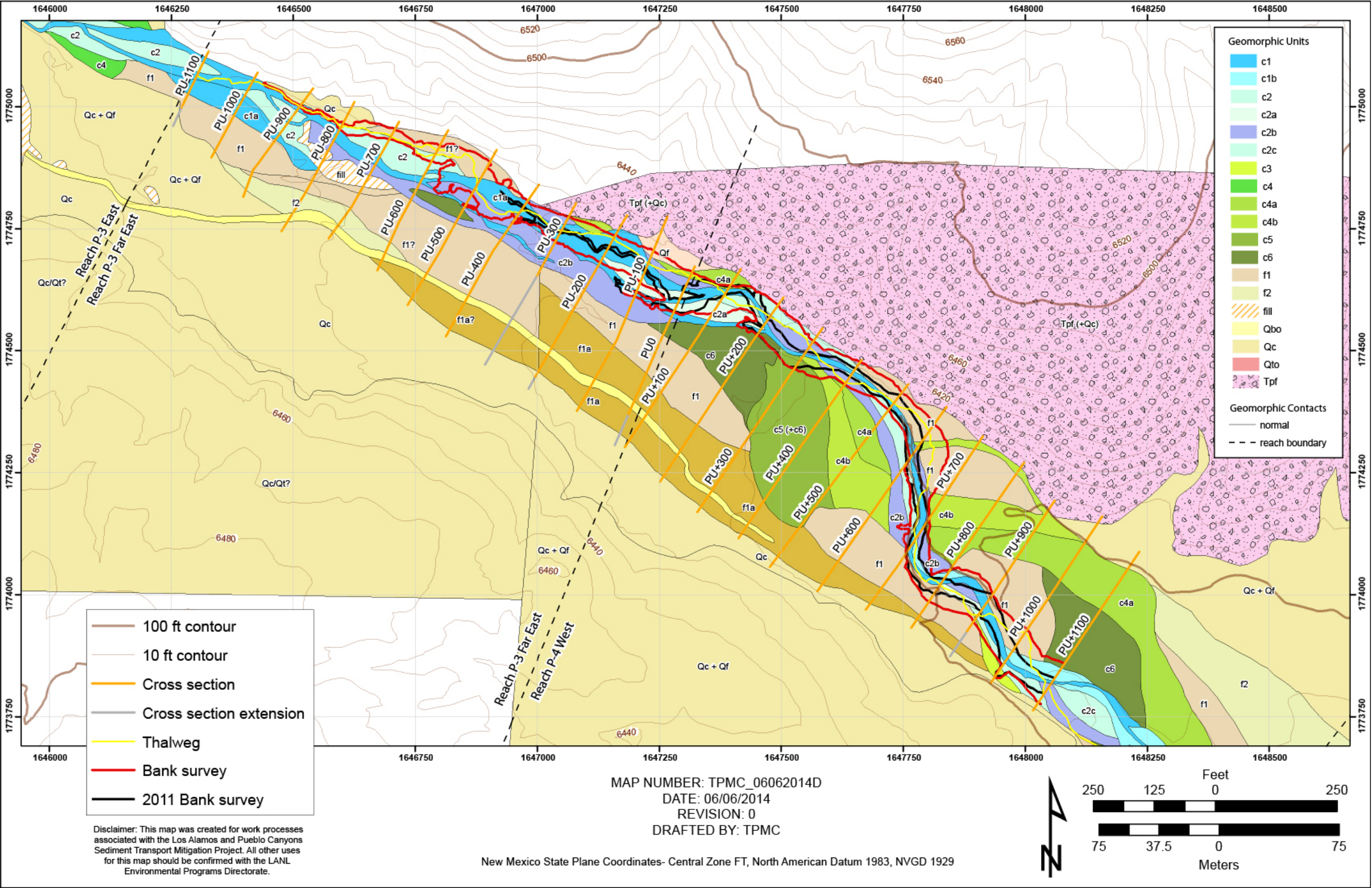


Figure A-3.4-2 Geomorphic map showing the locations of surveyed cross-sections and stream banks in the lower Pueblo Canyon willow-planting area; geomorphic mapping from 1996–1997

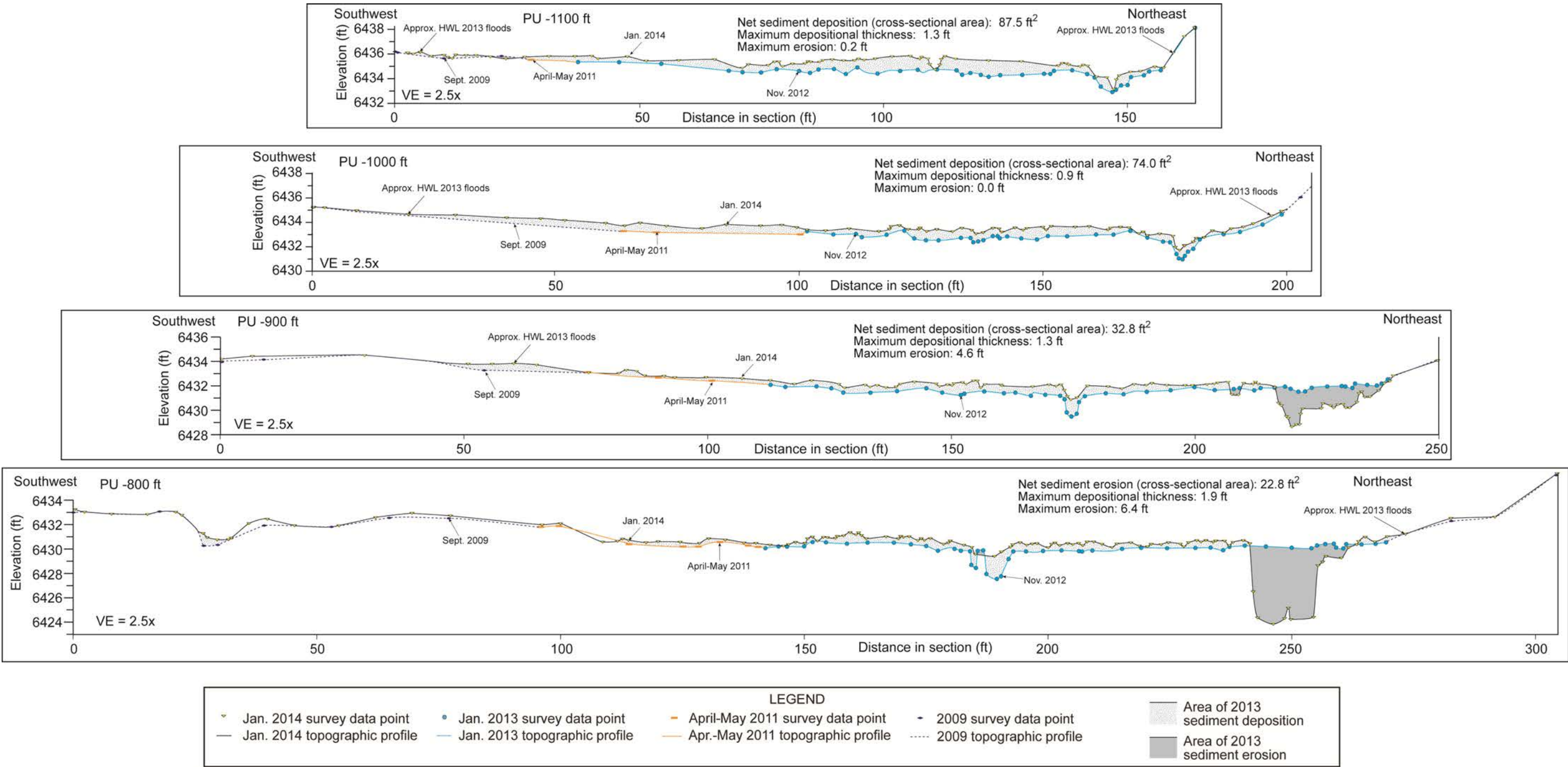


Figure A-3.4-3 Cross-sections in the lower Pueblo Canyon willow-planting area

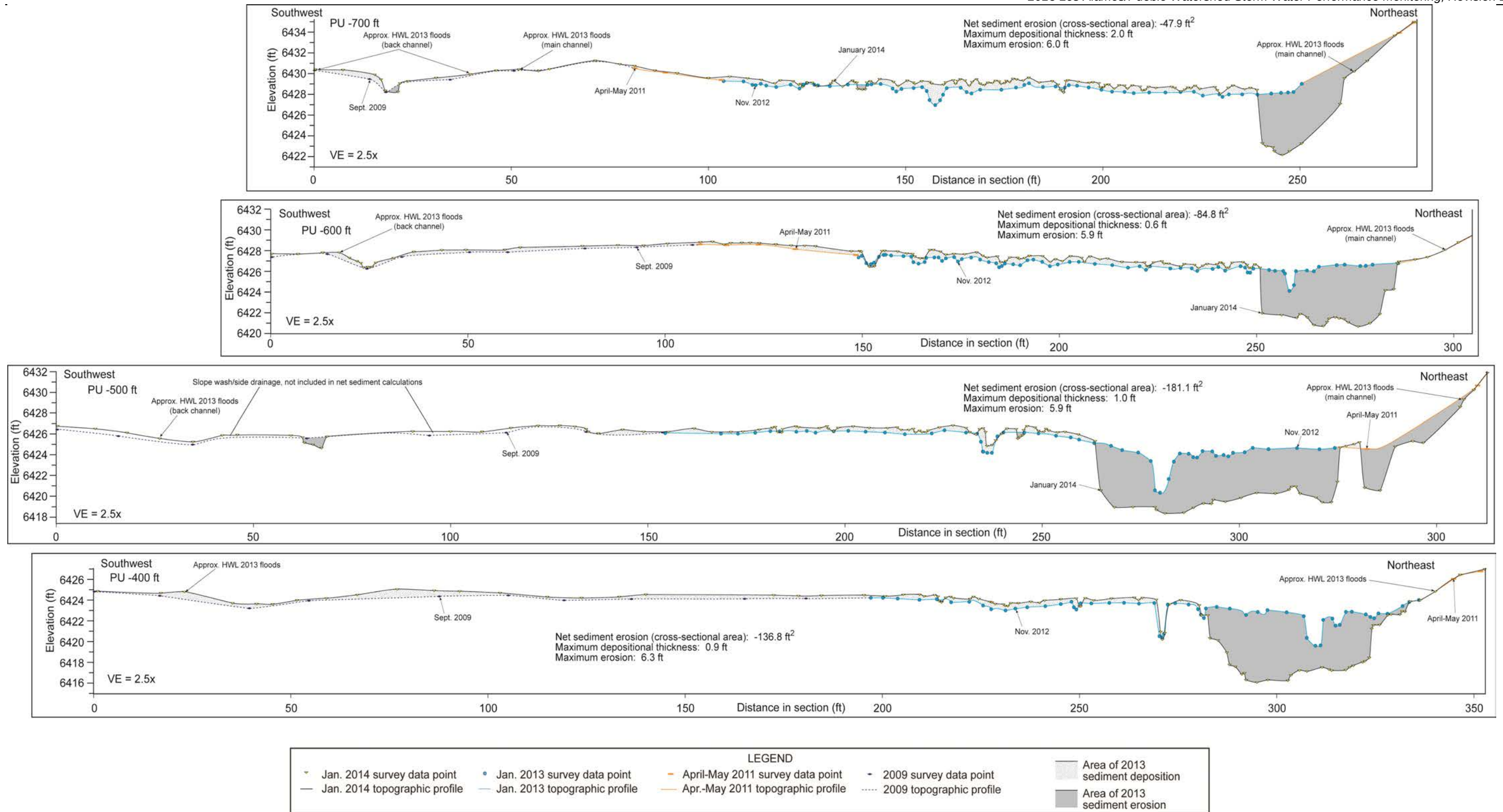


Figure A-3.4-3 (continued) Cross-sections in the lower Pueblo Canyon willow-planting area

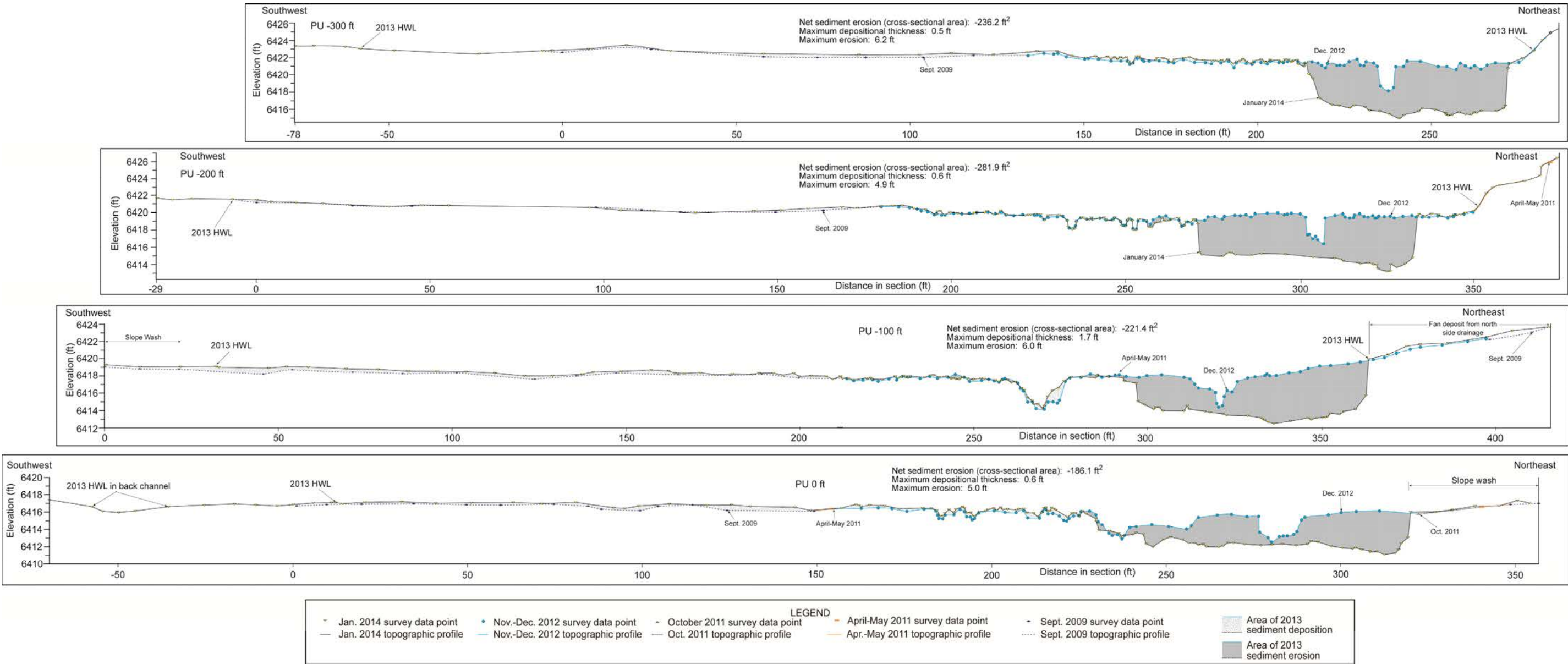


Figure A-3.4-3 (continued) Cross-sections in the lower Pueblo Canyon willow-planting area

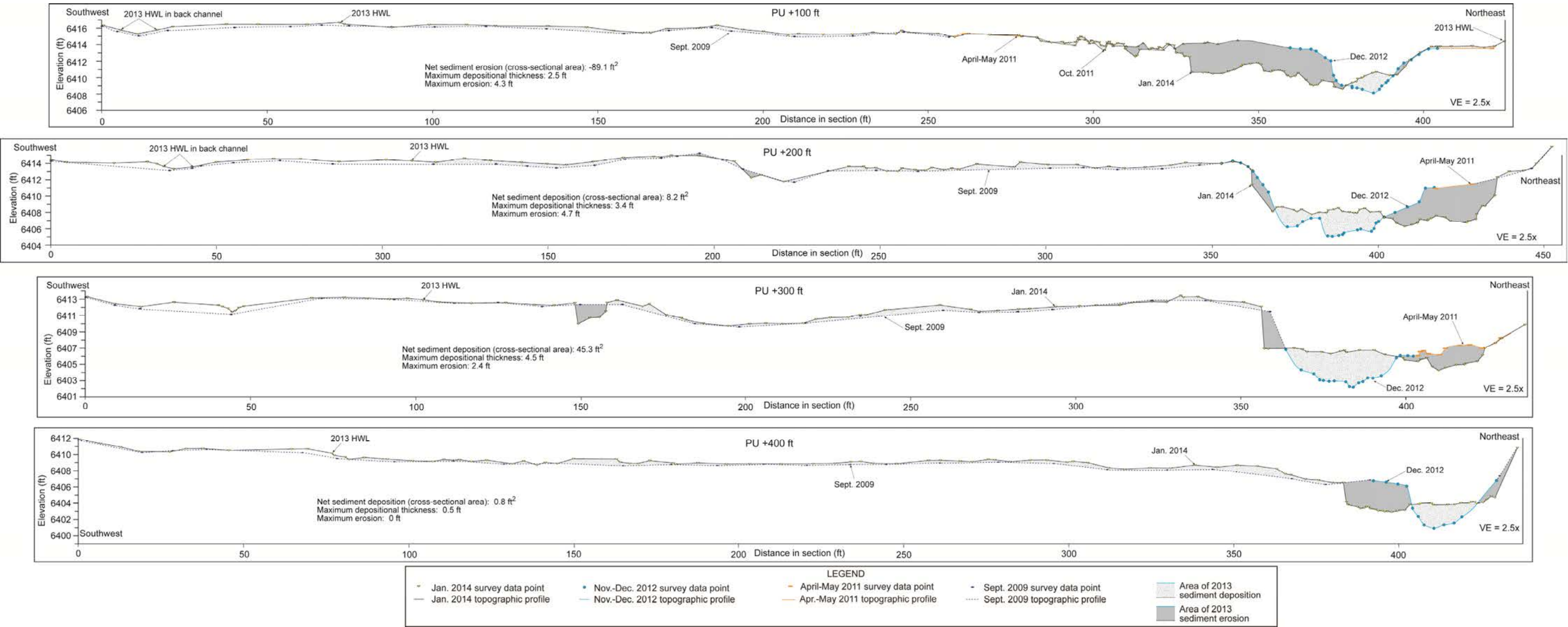


Figure A-3.4-3 (continued) Cross-sections in the lower Pueblo Canyon willow-planting area

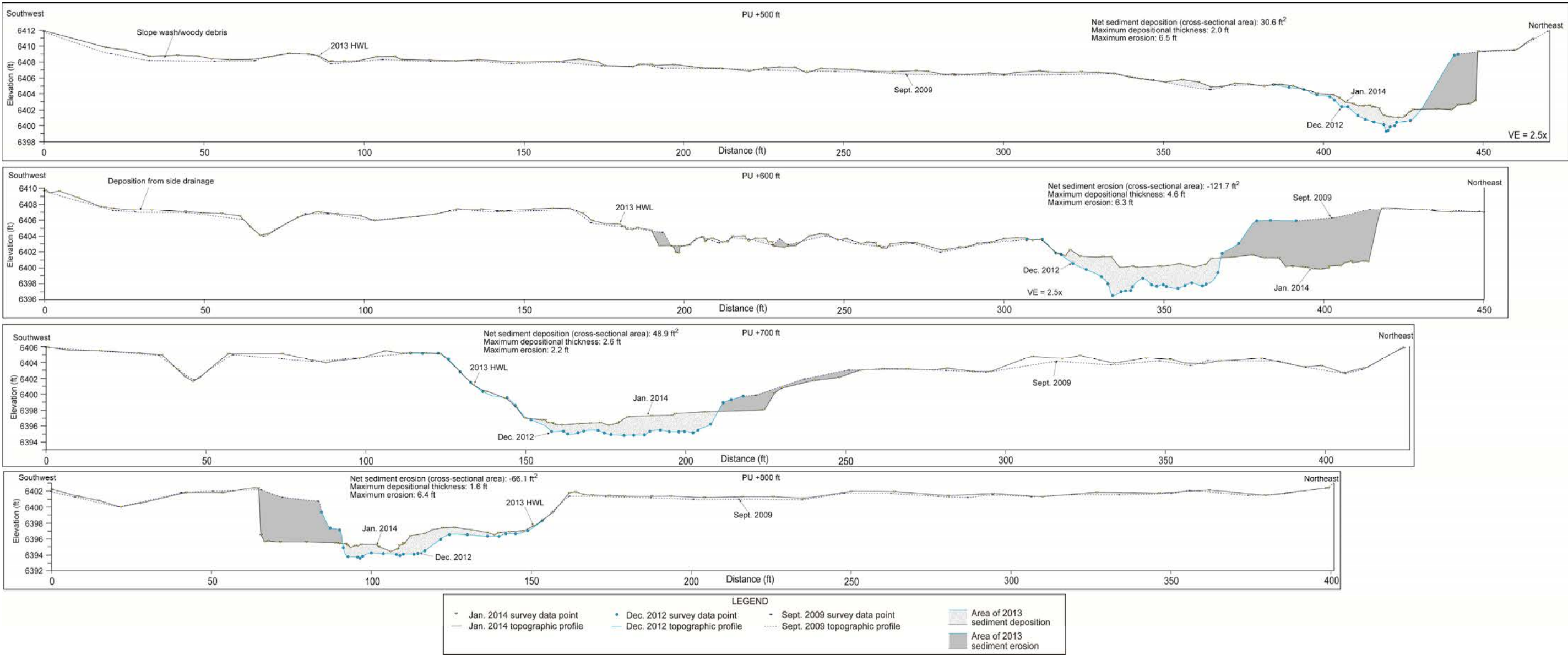


Figure A-3.4-3 (continued) Cross-sections in the lower Pueblo Canyon willow-planting area

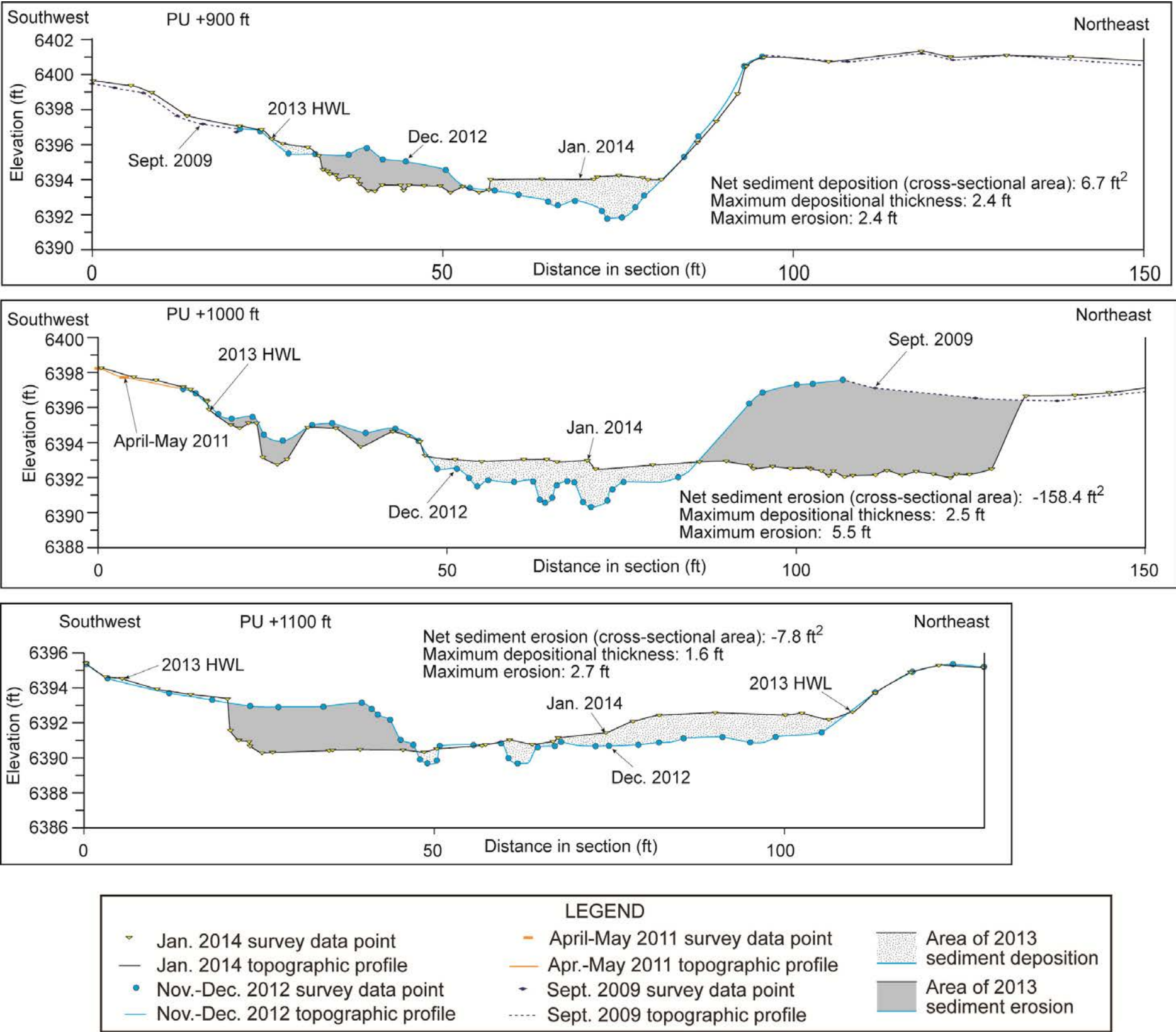


Figure A-3.4-3 (continued) Cross-sections in the lower Pueblo Canyon willow-planting area

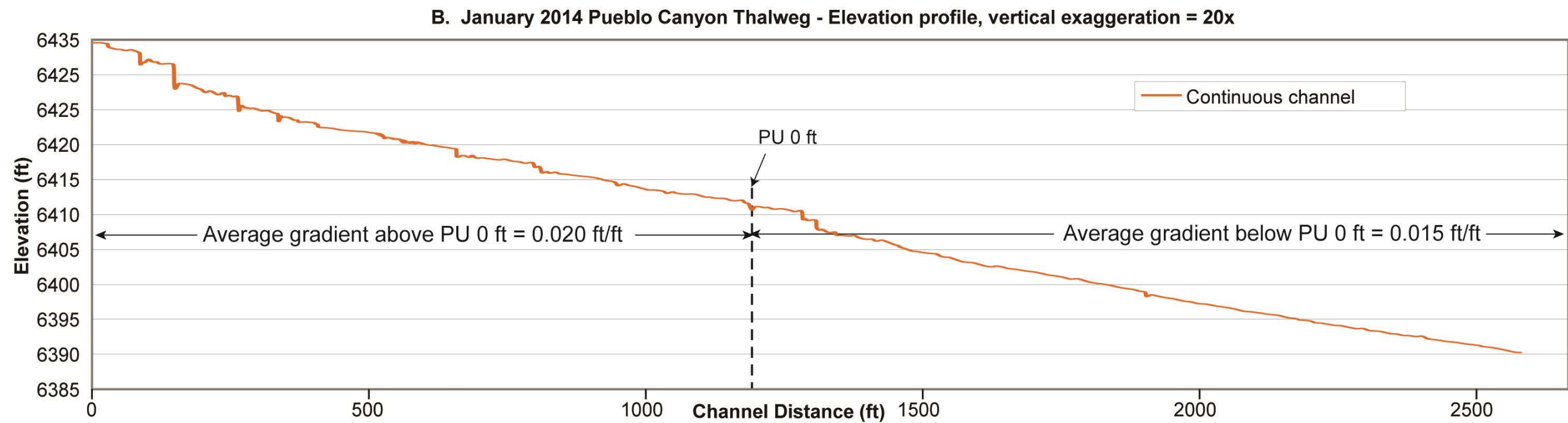
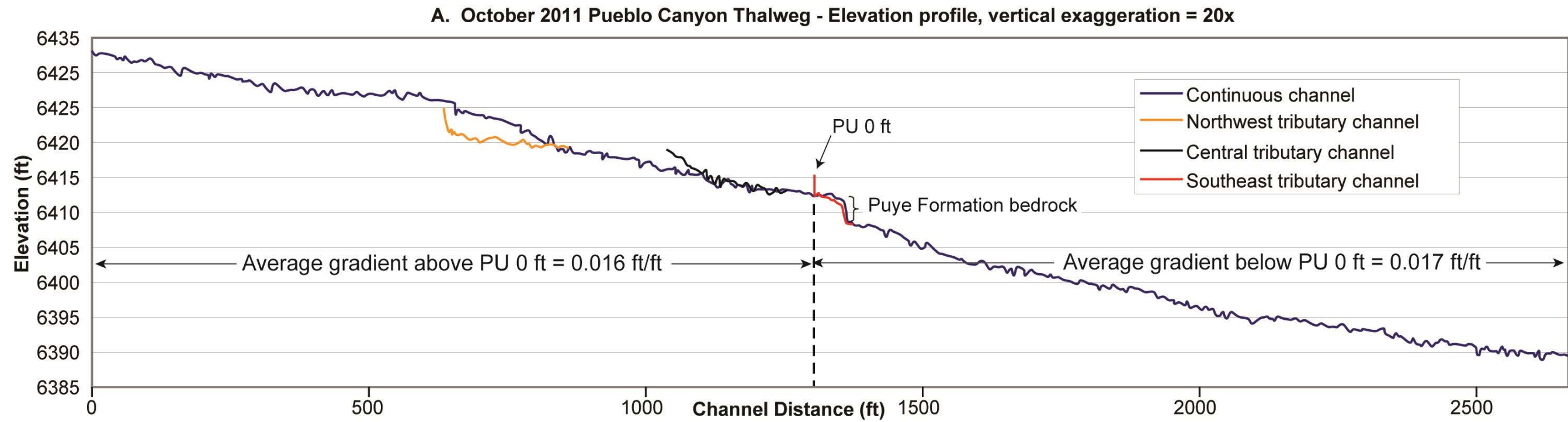


Figure A-3.4-4 Thalweg profile in the lower Pueblo Canyon willow-planting area

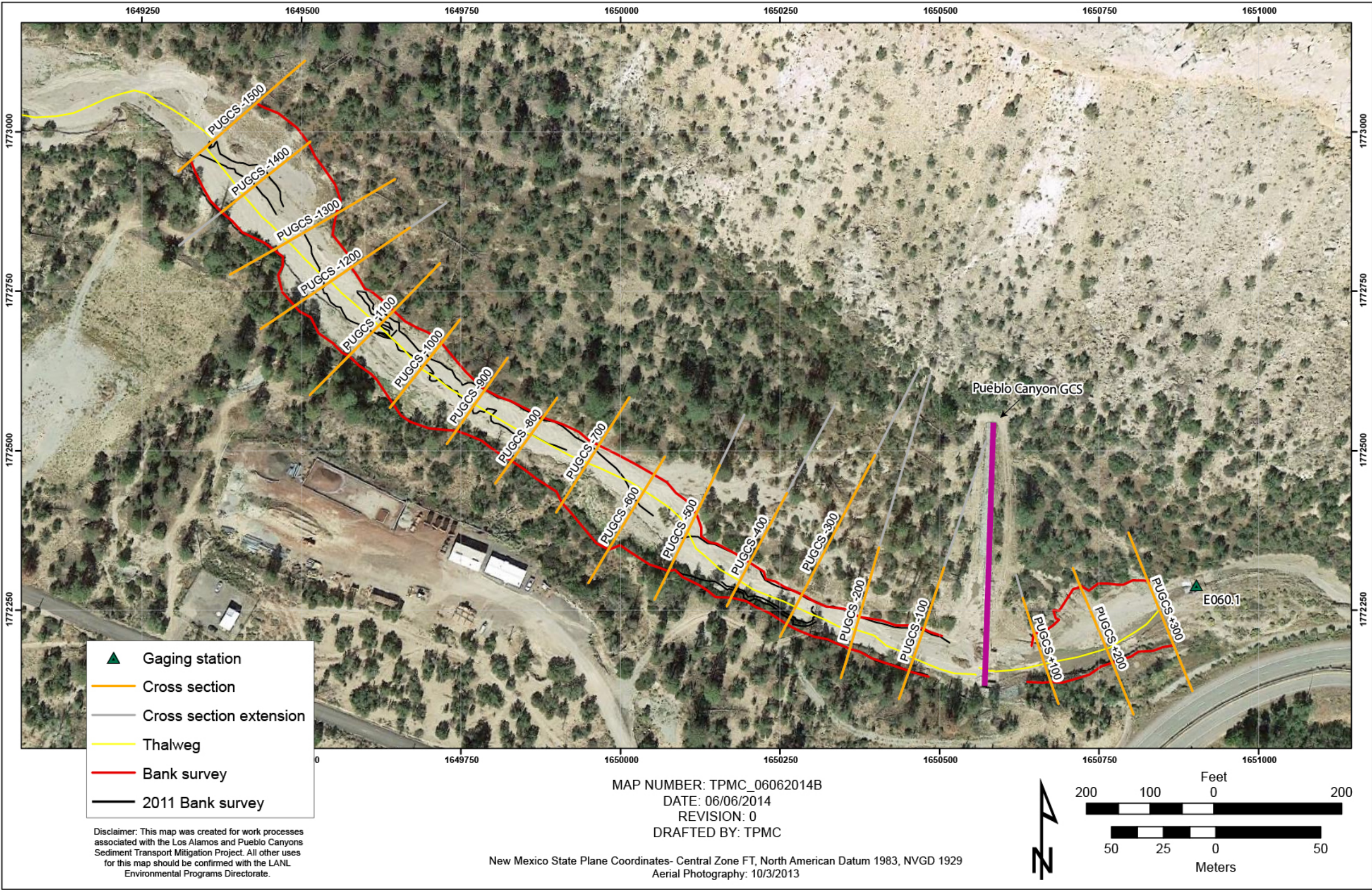


Figure A-3.5-1 Orthophoto showing the locations of surveyed cross-sections and stream banks in the Pueblo Canyon GCS area

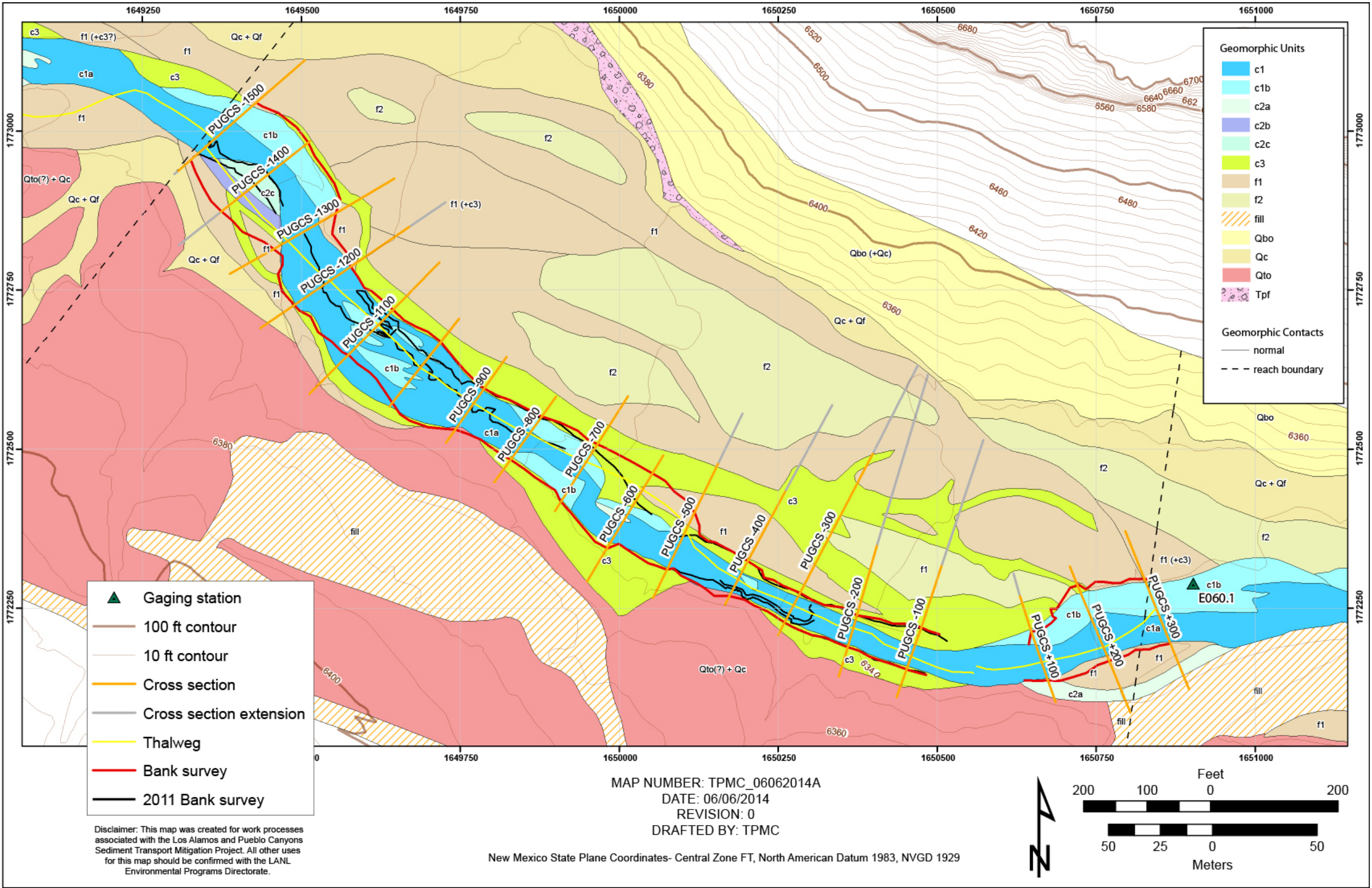


Figure A-3.5-2 Geomorphic map showing the locations of surveyed cross-sections and stream banks in the Pueblo Canyon GCS area; geomorphic mapping from 1996–1997

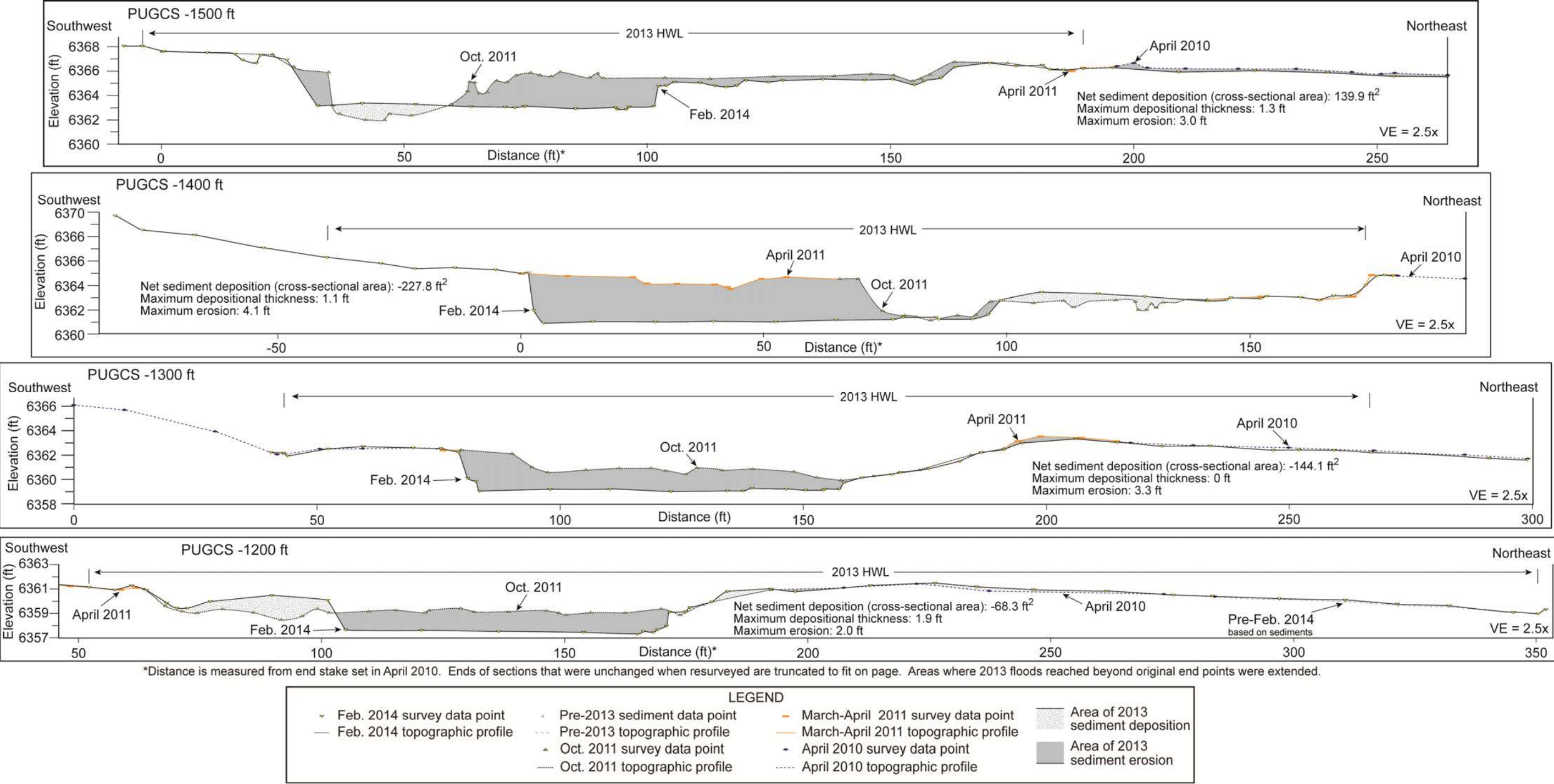


Figure A-3.5-3 Cross-sections and thalweg profile in the Pueblo Canyon GCS area

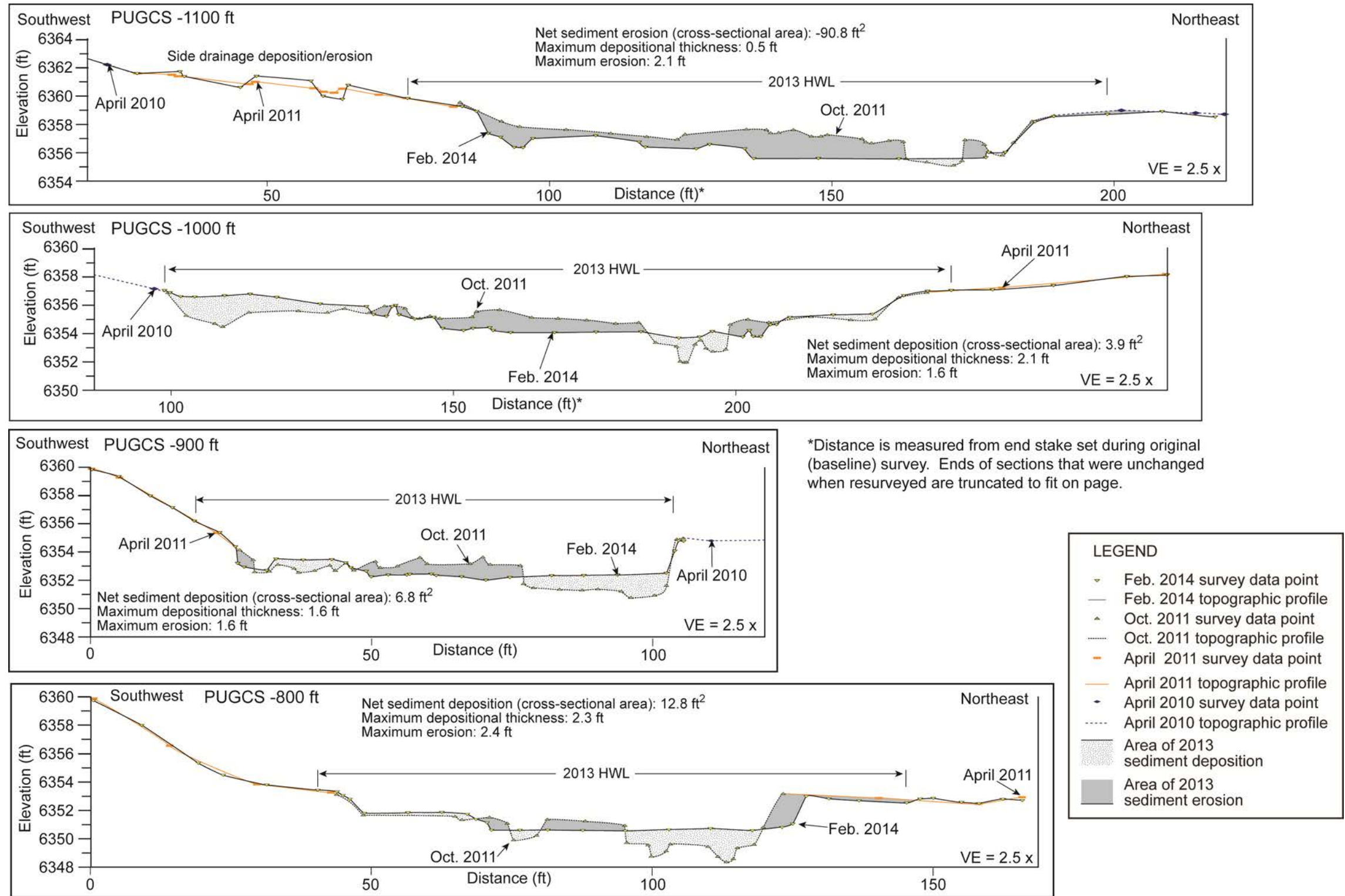


Figure A-3.5-3 (continued) Cross-sections and thalweg profile in the Pueblo Canyon GCS area

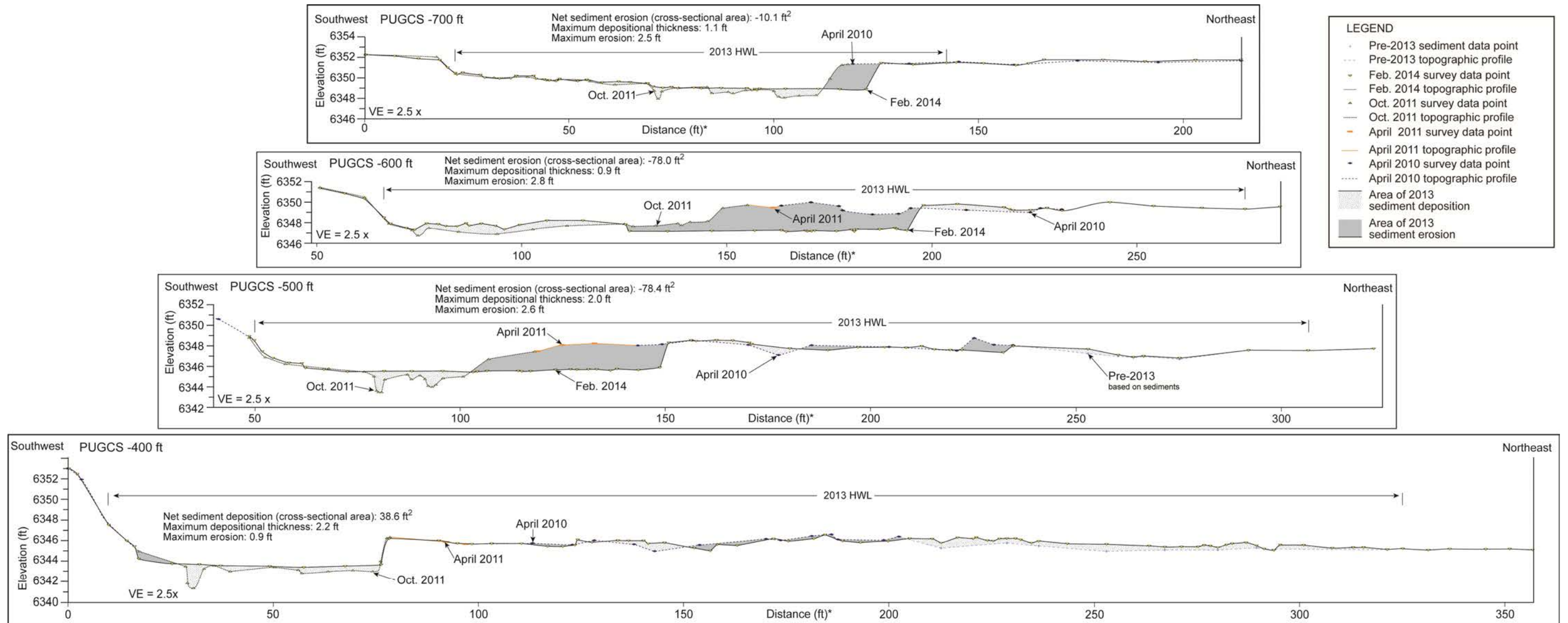


Figure A-3.5-3 (continued) Cross-sections and thalweg profile in the Pueblo Canyon GCS area

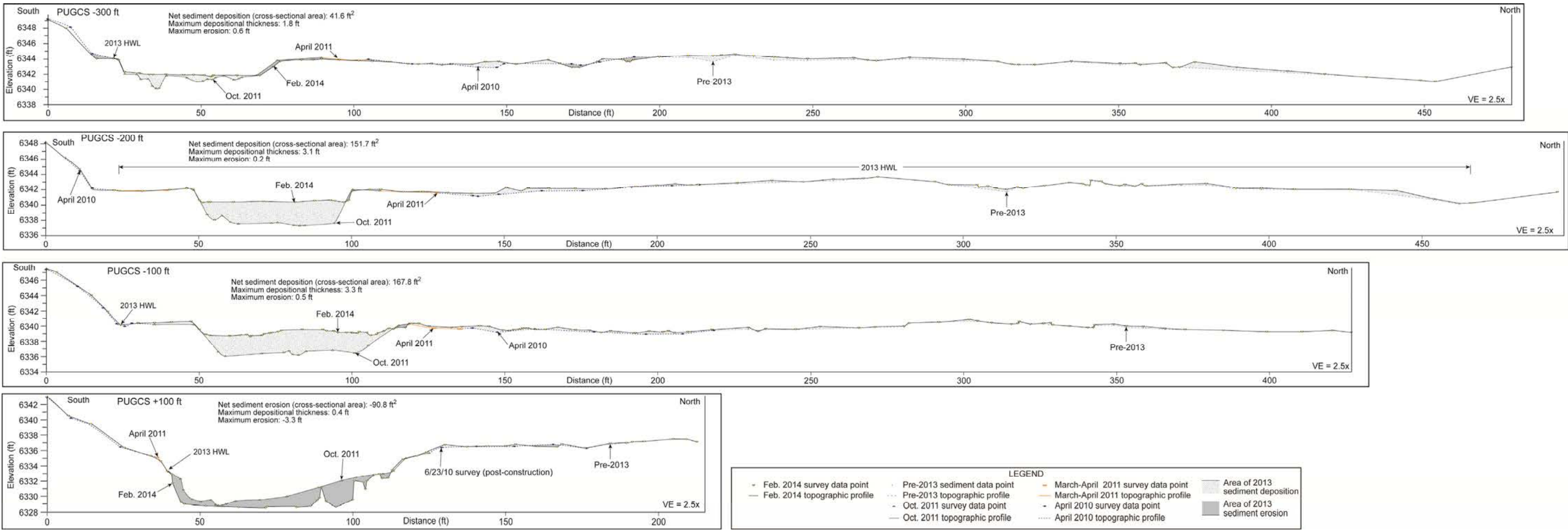


Figure A-3.5-3 (continued) Cross-sections and thalweg profile in the Pueblo Canyon GCS area

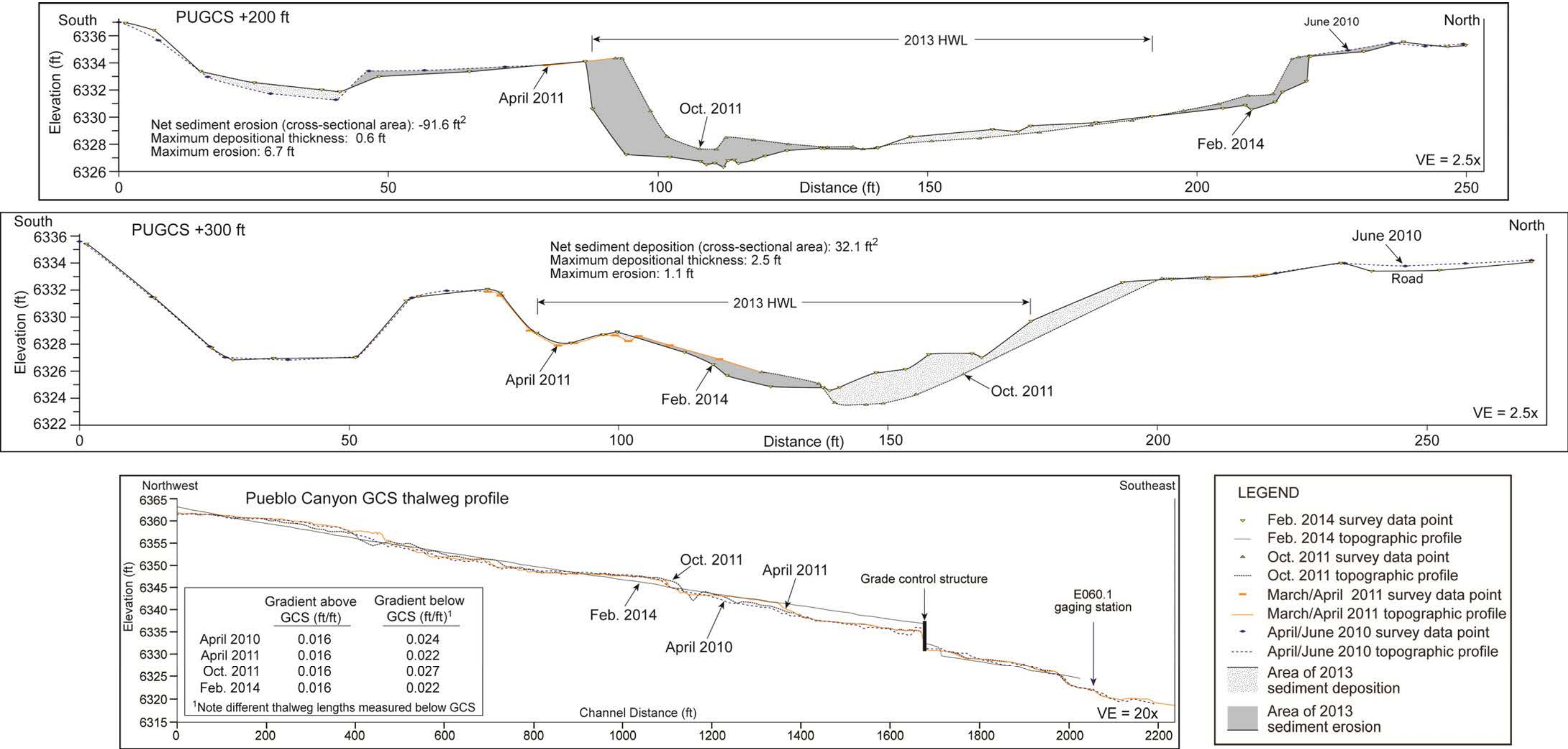


Figure A-3.5-3 (continued) Cross-sections and thalweg profile in the Pueblo Canyon GCS area

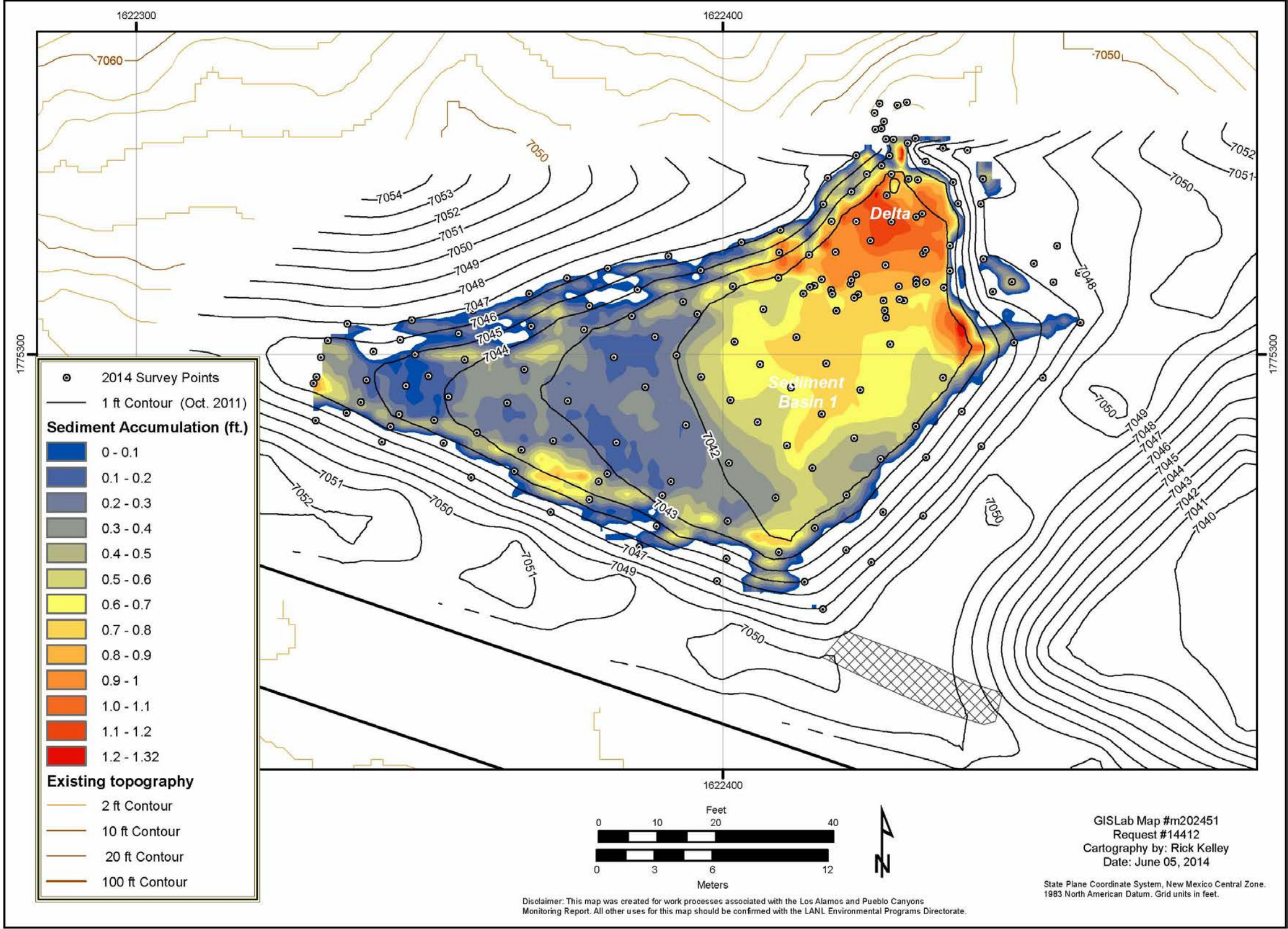


Figure A-3.6-1 October 2011 topography and isopachs of total thickness of accumulated sediment in Basin 1 from 2013 monsoon season at the upper Los Alamos Canyon sediment detention basins



Figure A-3.7-1 Orthophoto showing the locations of surveyed cross-sections and thalweg profile near the DP Canyon GCS

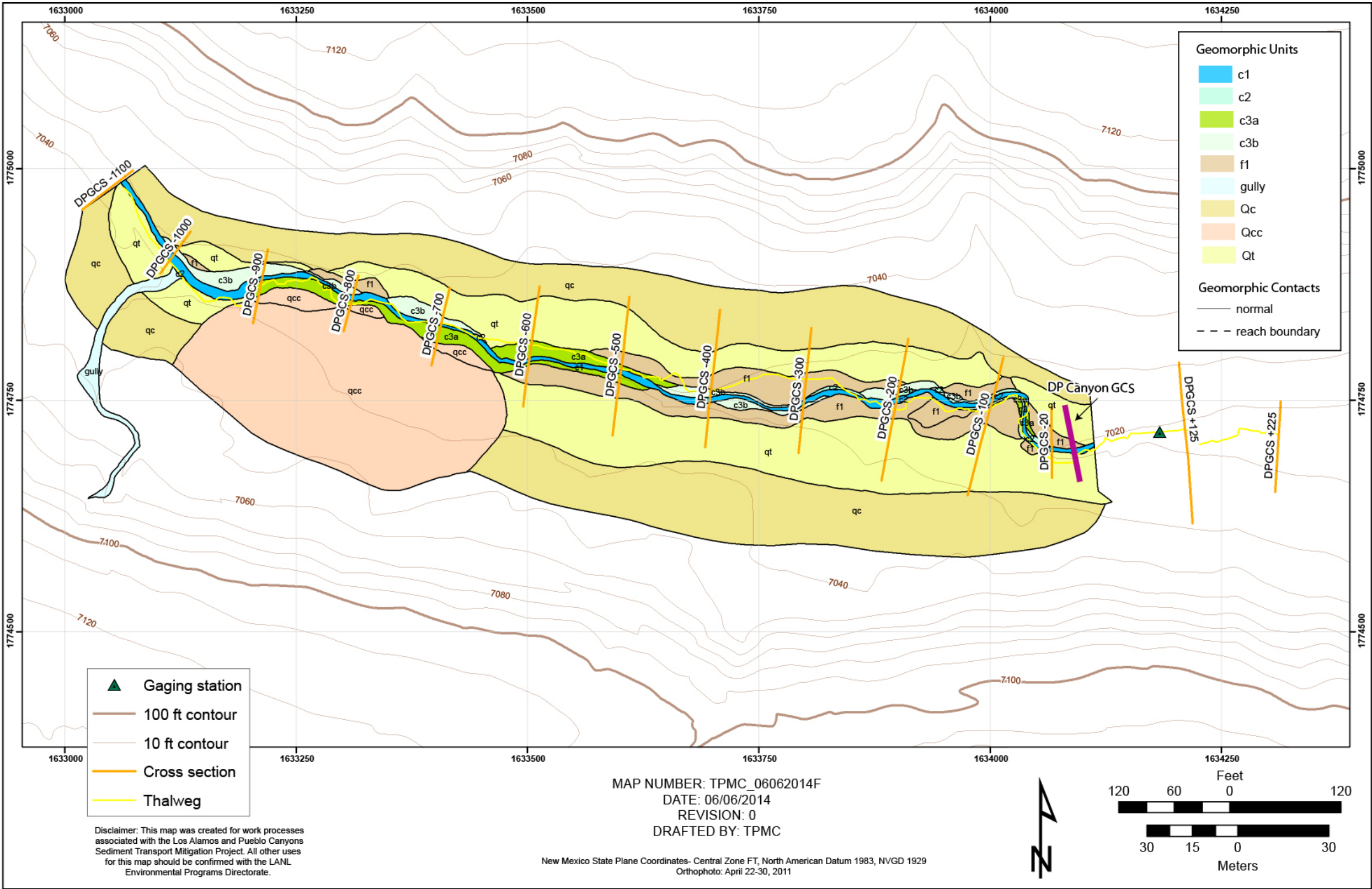


Figure A-3.7-2 Geomorphic map showing the locations of surveyed cross-sections and thalweg profile near the DP Canyon GCS; geomorphic mapping from 1998

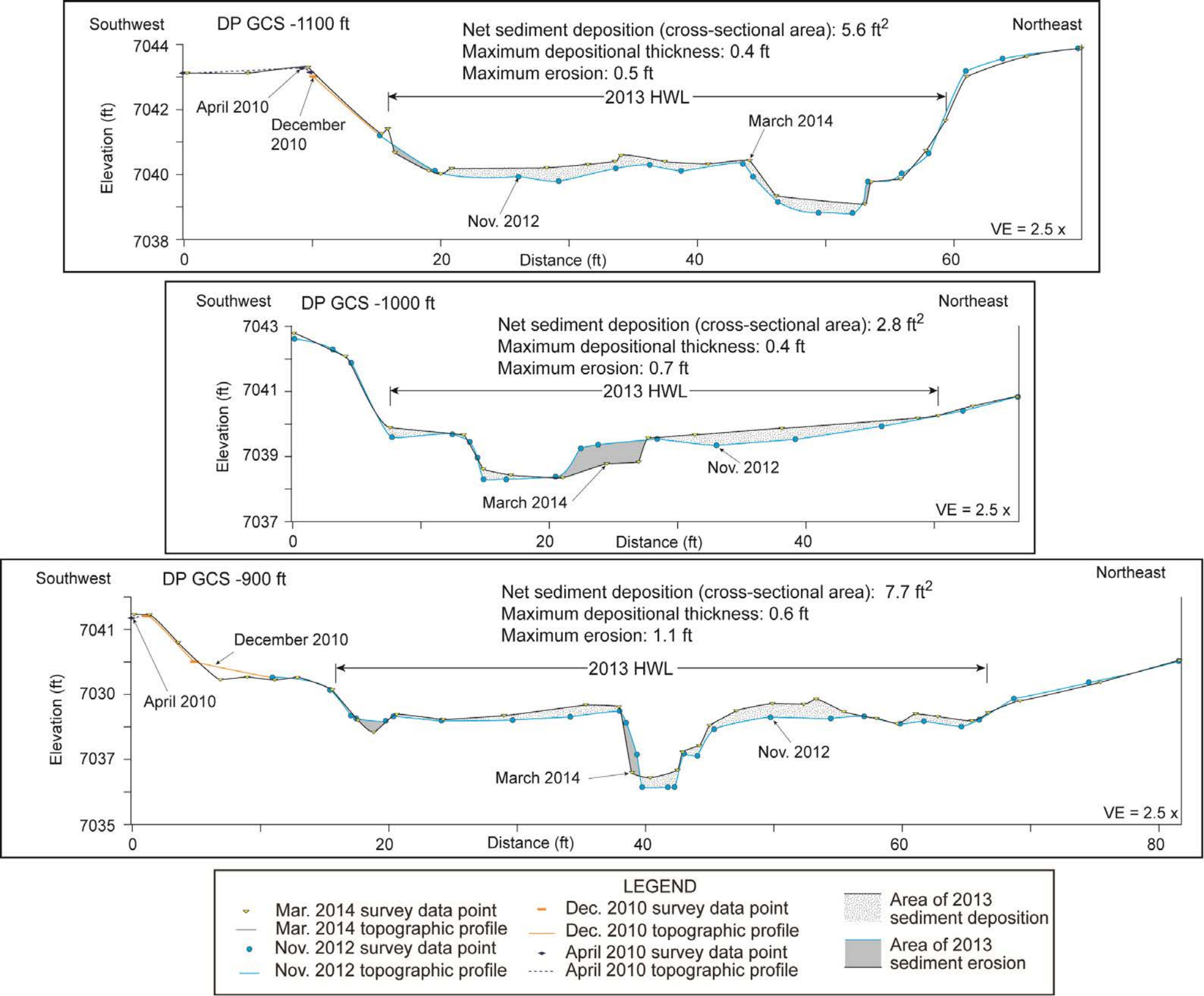


Figure A-3.7-3 Cross-sections and thalweg profile near the DP Canyon GCS

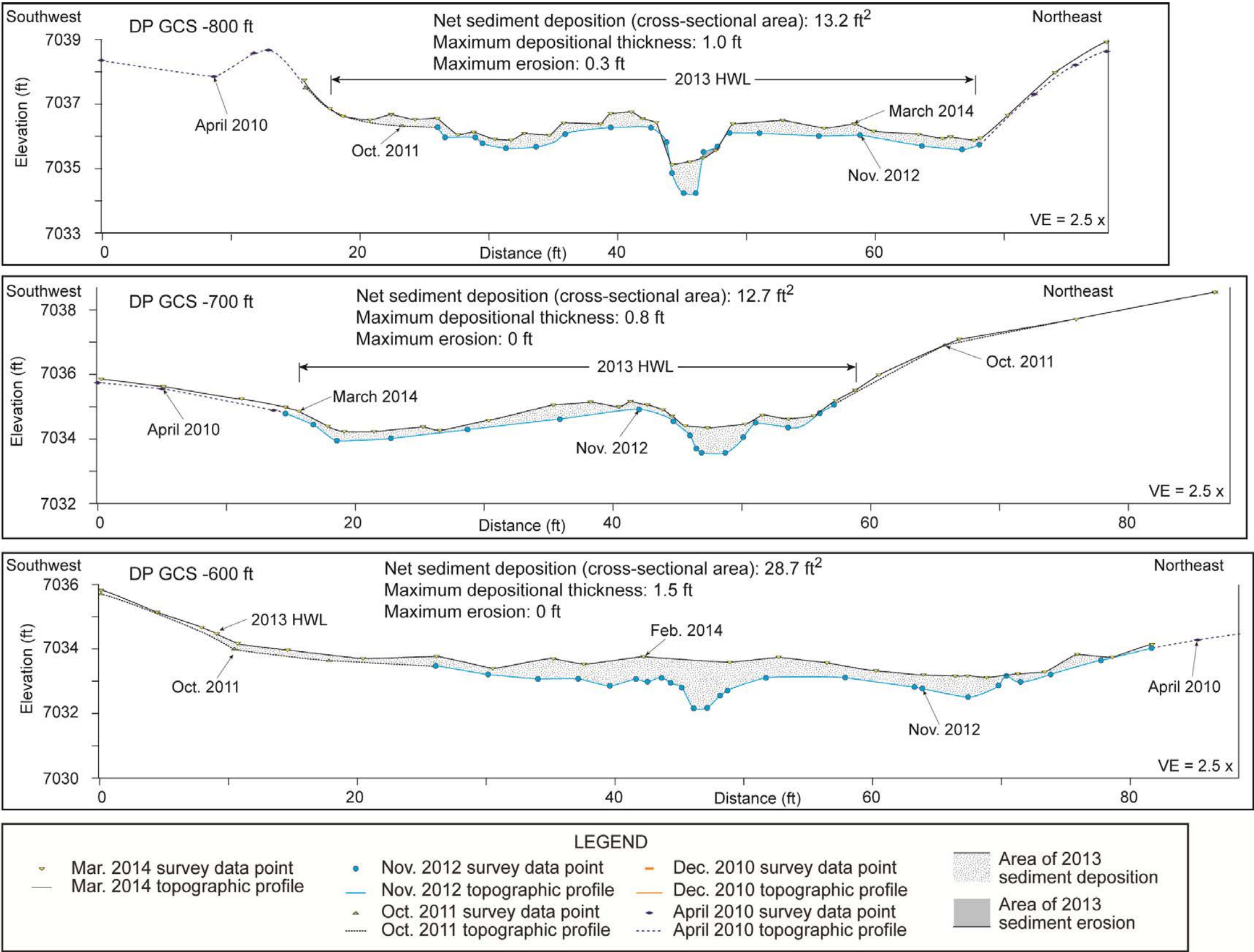


Figure A-3.7-3 (continued) Cross-sections and thalweg profile near the DP Canyon GCS

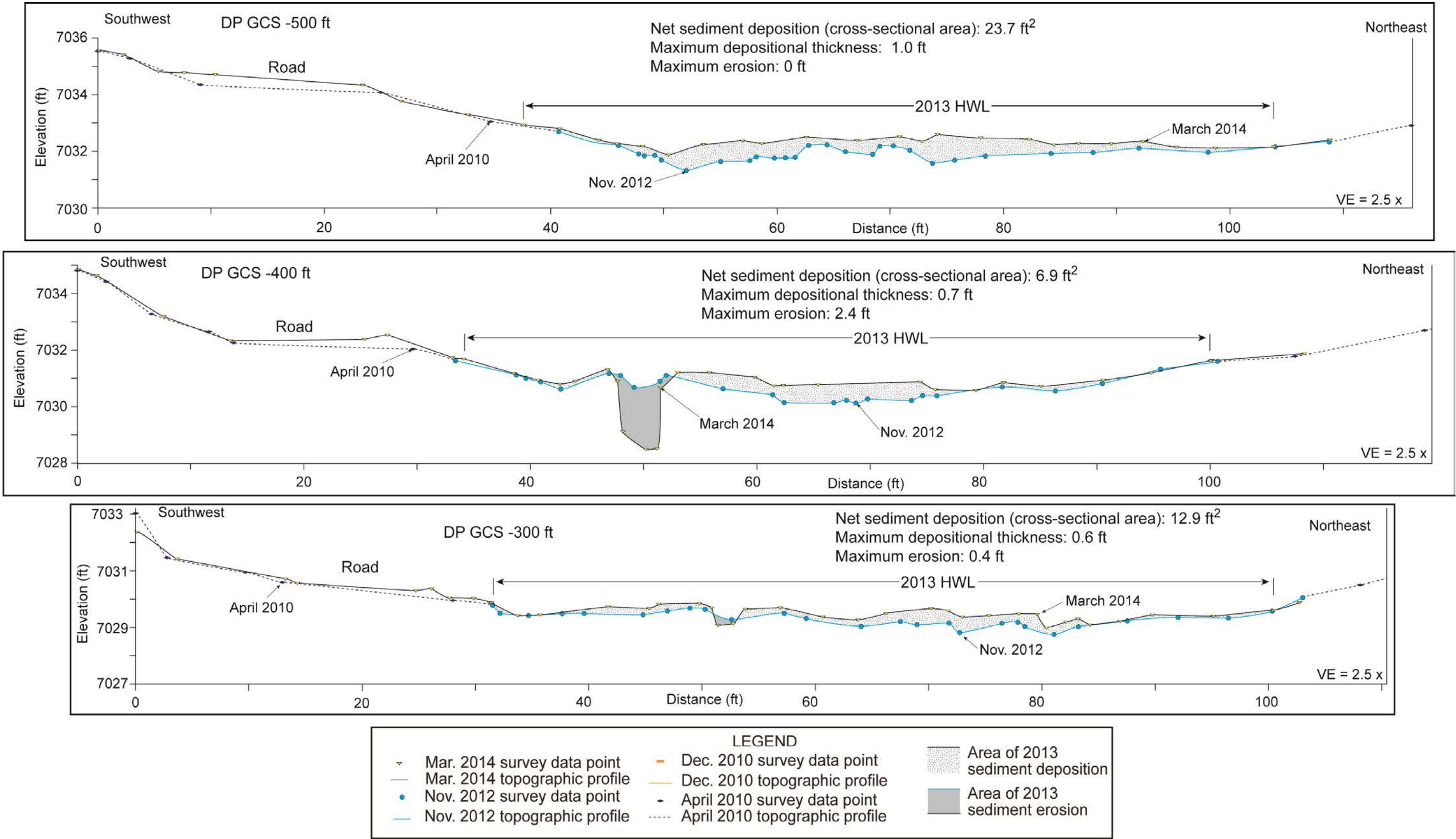


Figure A-3.7-3 (continued) Cross-sections and thalweg profile near the DP Canyon GCS

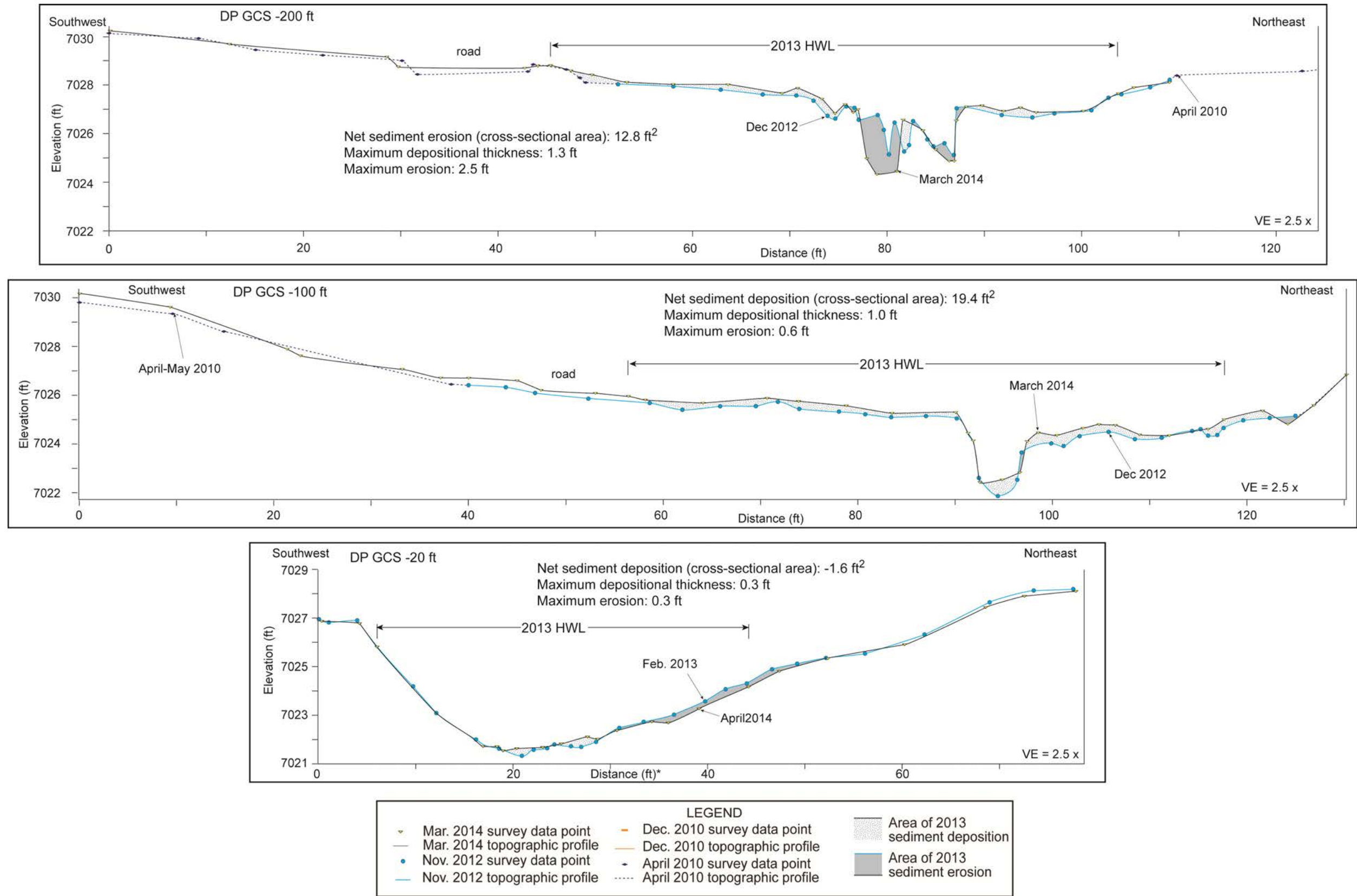


Figure A-3.7-3 (continued) Cross-sections and thalweg profile near the DP Canyon GCS

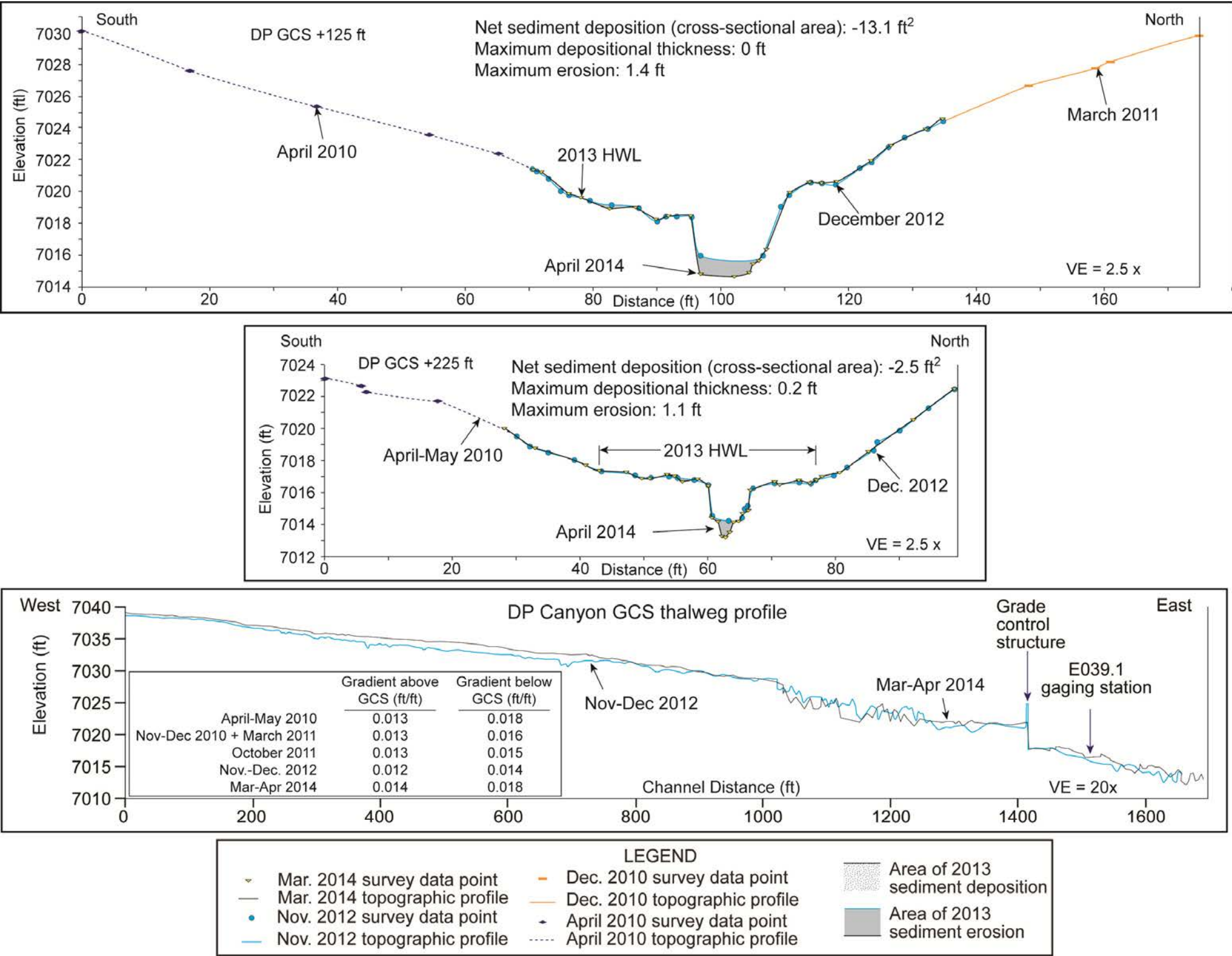


Figure A-3.7-3 (continued) Cross-sections and thalweg profile near the DP Canyon GCS

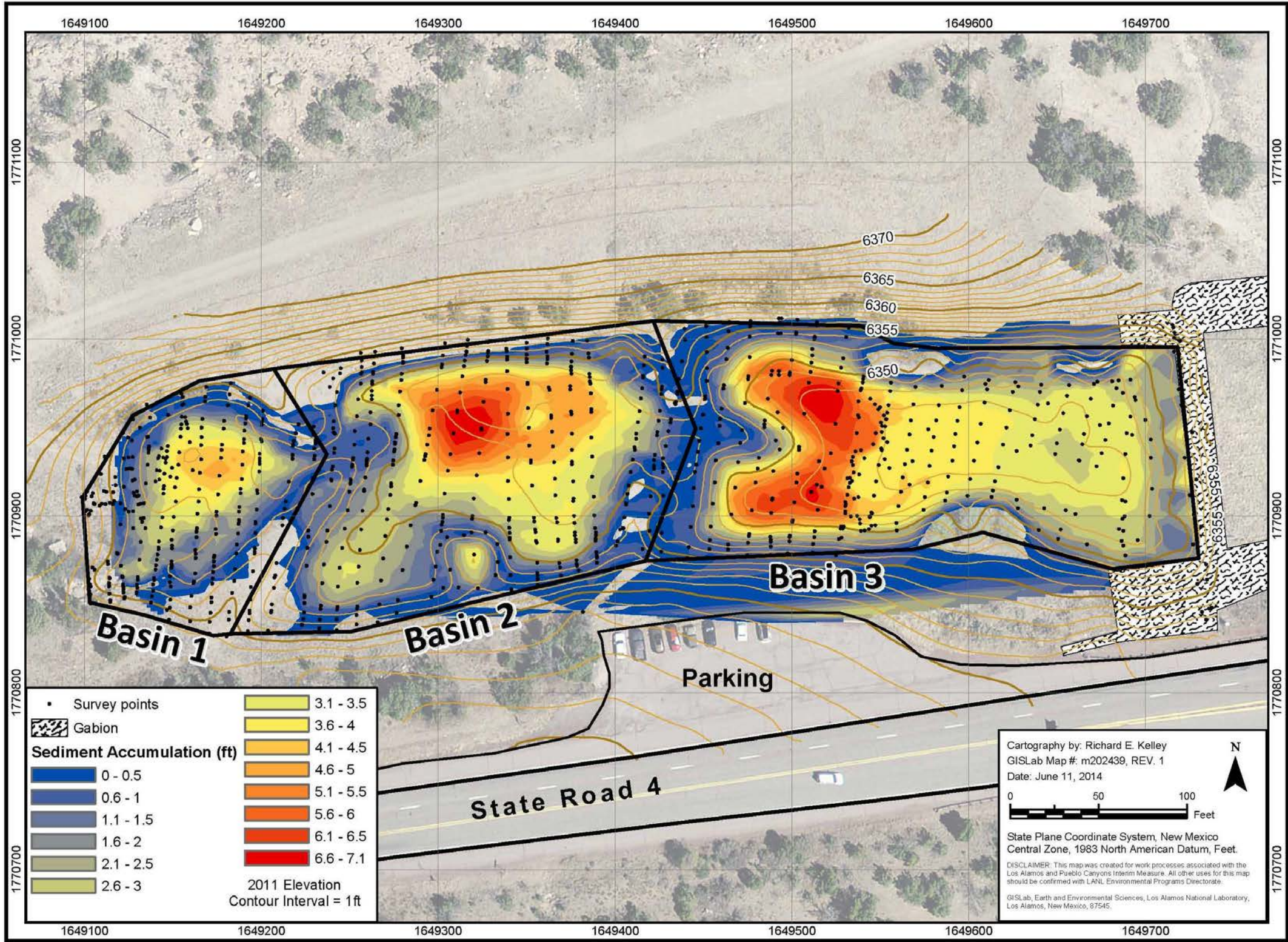


Figure A-3.8-1 Topographic map of sediment retention basins above the Los Alamos Canyon low-head weir and isopachs of total thickness of accumulated sediment in Basin 3 from 2013 monsoon seasons

Table A-3.1-1
Summary of Geomorphic Changes at Pueblo Canyon CVS Cross-Sections

Section Name	2013 Maximum New Sediment Thickness (ft)	2013 Maximum Erosion (ft)	2013 Net Sediment Cross- Sectional Area (ft ²)	2013 Normalized Net Sediment Deposition (m ³ /100 m)*	2012 Normalized Net Sediment Deposition (m ³ /100 m)*	2011 Normalized Net Sediment Deposition (m ³ /100 m)*	2010 Normalized Net Sediment Deposition (m ³ /100 m)*	2013 Thalweg Elevation Change (ft)	2012 Thalweg Elevation Change (ft)	2011 Thalweg Elevation Change (ft)	2010 Thalweg Elevation Change (ft)
CVS#1 -50 ft	1.0	2.4	-30.5	-283	-33	33	207	-0.7	-0.2	0.2	0.5
CVS#1 +50 ft	0.3	0.8	-14.3	-132	-36	44	101	0.2	0.0	-0.1	-0.3
CVS#2 -50 ft	0.7	1.3	-15.2	-141	3	40	281	-0.1	-0.1	0.4	0.3
CVS#2 +50 ft	1.5	1.2	9.4	88	6	30	81	-0.1	0.0	0.1	0.4
CVS#3 -50 ft	0.5	2.0	-56.0	-519	-7	-15	112	-0.7	-0.2	0.0	0.2
CVS#3 +50 ft	1.7	2.1	1.9	18	-15	29	118	-0.6	-0.2	0.1	0.0
Average			-17.4	-162	-14	27	150	-0.3	-0.1	0.1	0.2

* Normalized net sediment deposition is total estimated volume per 100 ft divided by distance between surveyed cross-sections (100 ft = 0.0305 km).

Table A-3.2-1
Summary of Geomorphic Changes at the Upper Pueblo Canyon Willow-Planting Area Cross-Sections

Section Name	2013 Maximum New Sediment Thickness (ft)	2013 Maximum Erosion (ft)	2013 Net Sediment Cross- Sectional Area (ft ²)	2013 Normalized Net Sediment Deposition (m ³ /100 m)*	2012 Normalized Net Sediment Deposition (m ³ /100 m)*	2011 Normalized Net Sediment Deposition (m ³ /100 m)*	2010 Normalized Net Sediment Deposition (m ³ /100 m)*	2013 Thalweg Elevation Change (ft)	2012 Thalweg Elevation Change (ft)	2011 Thalweg Elevation Change (ft)	2010 Thalweg Elevation Change (ft)
Upper Third of Upper Willow-Planting Area											
PU UW-1	1.8	0.8	63.8	592	18	200	276	0.6	-0.1	1.2	1.0
PU UW-2	3.6	2.8	48.5	451	32	175	95	1.5	0.2	0.3	1.1
PU UW-3	2.1	0.6	94.8	880	218	141	371	0.6	0.7	0.8	1.0
PU UW-4	3.9	0.5	137.4	1275	97	125	415	1.8	-0.1	0.5	0.6
PU UW-5	3.6	0	140.0	1299	0	154	175	1.2	0.2	-0.2	0.4
PU UW-6	2.4	5.3	51.9	482	9	28	151	2.0	0.1	0.0	0.2
Average, Upper Third			89.4	830	62	137	247	1.3	0.2	0.4	0.7
Middle Third of Upper Willow-Planting Area											
PU MW-1	4.4	3.4	25.6	238	59	25	187	0.1	1.1	-0.9	-0.4
PU MW-2	1.3	2.2	19.8	184	5	34	90	-0.4	0.1	-0.8	0.1
PU MW-3	2.1	5.3	-51.9	-482	17	1	265	-1.6	0.2	-0.1	-0.3
PU MW-4	1.2	4.4	-31.8	-295	0	30	162	-2.7	0.1	-0.2	0.4
PU MW-5	1.1	4.3	-73.1	-678	0	0	388	-1.8	0.0	0.1	0.0
PU MW-6	0.7	5.4	-239.5	-2224	17	12	-41	-1.7	0.2	0.0	-0.5
Average, Middle Third			-58.5	-543	16	17	175	-1.4	0.3	-0.3	-0.1

Table A-3.2-1 (continued)

Section Name	2013 Maximum New Sediment Thickness (ft)	2013 Maximum Erosion (ft)	2013 Net Sediment Cross- Sectional Area (ft ²)	2013 Normalized Net Sediment Deposition (m ³ /100 m)*	2012 Normalized Net Sediment Deposition (m ³ /100 m)*	2011 Normalized Net Sediment Deposition (m ³ /100 m)*	2010 Normalized Net Sediment Deposition (m ³ /100 m)*	2013 Thalweg Elevation Change (ft)	2012 Thalweg Elevation Change (ft)	2011 Thalweg Elevation Change (ft)	2010 Thalweg Elevation Change (ft)
Lower Third of Upper Willow-Planting Area											
PU LW-1	0.8	4.9	-127.9	-1187	0	12	129	-2.5	0.0	-0.1	0.1
PU LW-2	0.8	3.7	-99.0	-919	6	-36	70	-1.5	0.0	-0.2	-0.3
PU LW-3	0.4	5.5	-188.7	-1752	5	-212	2	-0.5	0.1	-0.8	-0.5
PU LW-4	0.6	5.6	-125.8	-1168	-70	-197	-147	-0.7	-0.1	0.1	-0.7
PU LW-5	0.5	5.3	-85.9	-797	16	-388	-4	-0.1	-0.1	-0.4	-0.3
PU LW-6	1.0	6.6	-273.3	-2537	-19	-82	-123	-0.3	0.1	0.2	-1.0
Average, Lower Third			-150.1	-1393	-10	-150	-12	-0.9	0.0	-0.2	-0.4
Average, Upper Pueblo Canyon			-39.7	-369	23	1	137	-0.3	0.2	0.0	0.0

* Normalized net sediment deposition is total estimated volume per 100 ft divided by distance between surveyed cross-sections (100 ft = 0.0305 km).

Table A-3.3-1
Summary of Geomorphic Changes at the Pueblo Canyon Wing Ditch Cross-Sections

Section Name	2013 Maximum New Sediment Thickness (ft)	2013 Maximum Erosion (ft)	2013 Net Sediment Cross- Sectional Area (ft ²)	2013 Normalized Net Sediment Deposition (m ³ /100 m)*	2012 Normalized Net Sediment Deposition (m ³ /100 m)*	2011 Normalized Net Sediment Deposition (m ³ /100 m)*	2010 Normalized Net Sediment Deposition (m ³ /100 m)*	2013 Thalweg Elevation Change (ft)	2012 Thalweg Elevation Change (ft)	2011 Thalweg Elevation Change (ft)	2010 Thalweg Elevation Change (ft)
WD-1	2.5	0.3	239.4	2222	-11	67	219	1.5	-0.6	1.3	1.0
WD-2	2.6	0	179.3	1664	-6	25	424	1.8	-0.2	0.0	1.7
WD-3	2.9	0	270.4	2510	-11	-39	50	2.0	-0.6	0.7	1.3
WD-4	2.4	1.4	267.1	2479	-72	0	-125	-2.4	0.2	0.1	1.4
WD-5	1.8	0.6	185.5	1722	-157	16	58	-0.5	-1.1	0.0	1.1
Average			228.3	2120	-52	14	125	0.5	-0.5	0.4	1.3

* Normalized net sediment deposition is total estimated volume per 100 ft divided by distance between surveyed cross-sections (100 ft = 0.0305 km).

Table A-3.4-1
Summary of Geomorphic Changes at the Lower Pueblo Canyon Willow-Planting Area Cross-Sections

Section Name	2013 Maximum New Sediment Thickness (ft)	2013 Maximum Erosion (ft)	2013 Net Sediment Cross- Sectional Area (ft ²)	2013 Normalized Net Sediment Deposition or Erosion (m ³ /100 m)*	2012 Normalized Net Sediment Deposition or Erosion (m ³ /100 m)*	2011 Normalized Net Sediment Deposition or Erosion (m ³ /100 m)*	2010 Normalized Net Sediment Deposition or Erosion (m ³ /100 m)*	2013 Thalweg Elevation Change (ft)	2012 Thalweg Elevation Change (ft)	2011 Thalweg Elevation Change (ft)	2010 Thalweg Elevation Change (ft)
Upper Half of Lower Willow-Planting Area (P-3FE)											
PU -1100 ft	1.3	0.2	86.6	804	11	-7	68	0.2	-0.1	0.1	0.1
PU -1000 ft	0.9	0— ^b	74.0	687	0	66	-45	0.7	0.0	0.2	0.0
PU -900 ft	1.3	4.6	32.8	304	0	13	119	-2.3	0.1	-0.2	0.3
PU -800 ft	1.9	6.4	-23.8	-221	-14	-7	236	-3.8	0.1	-0.2	0.1
PU -700 ft	2.0	6.0	-47.9	-445	18	-8	252	-4.8	-0.1	-0.5	0.8
PU -600 ft	0.6	5.9	-84.8	-787	0	0	179	-3.4	-0.1	2.3	0.3
PU -500 ft	1.0	5.9	-181.1	-1681	-12	-4	110	-2.0	0.0	2.8	0.5
PU -400 ft	0.9	6.3	-136.8	-1270	-31	-3	130	-3.6	0.2	1.3	0.5
PU -300 ft	0.5	6.2	-236.2	-2193	-6	-18	97	-3.2	-0.1	-0.9	0.3
PU -200 ft	0.6	4.9	-281.9	-2617	15	-6	255	-3.2	0.2	-0.3	0.3
PU -100 ft	1.7	6.0	-221.4	-2055	1	3	142	-1.9	-0.1	-0.4	0.4
Average, Upper Half			-92.8	-861	-1.6	2.6	140	-2.5	0.0	0.4	0.3

Table A-3.4-1 (continued)

Section Name	2013 Maximum New Sediment Thickness (ft)	2013 Maximum Erosion (ft)	2013 Net Sediment Cross- Sectional Area (ft ²)	2013 Normalized Net Sediment Deposition or Erosion (m ³ /100 m)*	2012 Normalized Net Sediment Deposition or Erosion (m ³ /100 m)*	2011 Normalized Net Sediment Deposition or Erosion (m ³ /100 m)*	2010 Normalized Net Sediment Deposition or Erosion (m ³ /100 m)*	2013 Thalweg Elevation Change (ft)	2012 Thalweg Elevation Change (ft)	2011 Thalweg Elevation Change (ft)	2010 Thalweg Elevation Change (ft)
Lower Half of Lower Willow-Planting Area(P-4W)											
PU 0 ft	0.6	5.0	-186.1	-1728	-3	-140	-16	-1.8	-0.1	-0.2	1.0
PU +100 ft	2.5	4.3	-89.1	-827	31	9	94	0.5	0.5	0.4	0.2
PU +200 ft	3.4	4.7	8.2	76	-4	6	9	1.2	0.3	0.0	0.4
PU +300 ft	4.5	2.4	45.3	421	6	2	96	2.1	-0.1	0.1	0.4
PU +400 ft	2.9	3.7	17.6	164	7	39	15	2.0	0.2	0.4	0.4
PU +500 ft	2.0	6.5	30.6	284	10	0	93	1.8	-0.1	-0.2	0.4
PU +600 ft	4.6	6.3	-121.7	-1129	38	-230	-298	3.3	0.2	1.2	-0.2
PU +700 ft	2.6	2.2	48.9	454	78	-80	140	1.3	0.4	0.2	1.1
PU +800 ft	1.6	6.4	-66.1	-614	32	31	-24	0.8	0.3	0.4	-0.4
PU +900 ft	2.4	2.4	6.7	62	32	24	-6	1.4	0.0	0.6	-0.5
PU +1000 ft	2.5	5.5	-158.4	-1471	6	30	-18	1.6	0.0	0.2	0.6
PU +1100 ft	1.6	2.7	-7.8	-72	7	81	-116	0.6	0.2	0.1	0.1
Average, Lower Half			-39.3	-365	22	-8.1	-1.4	1.2	0.2	0.3	0.2

* Normalized net sediment deposition is total estimated volume per 100 ft divided by distance between surveyed cross-sections (100 ft = 0.0305 km).

Table A-3.5-1
Summary of Geomorphic Changes at Cross-Sections above the Pueblo Canyon GCS

Section Name	2013 Maximum New Sediment Thickness (ft)	2013 Maximum Erosion (ft)	2013 Net Sediment Cross- Sectional Area (ft ²)	2013 Normalized Net Sediment Deposition or Erosion (m ³ /100 m) ^a	2012 Normalized Net Sediment Deposition or Erosion (m ³ /100 m) ^a	2011 Normalized Net Sediment Deposition or Erosion (m ³ /100 m) ^a	2010 Normalized Net Sediment Deposition or Erosion (m ³ /100 m) ^a	2013 Thalweg Elevation Change (ft)	2011 Thalweg Elevation Change (ft)	2010 Thalweg Elevation Change (ft)
PUGCS -1500 ft	1.3	3.0	-139.9	-1299	na ^b	269	-2785	1.0	0.1	0.2
PUGCS -1400 ft	1.1	4.1	-227.8	-2115	na	139	121	-0.1	0.2	0.4
PUGCS -1300 ft	0.0	3.3	-144.1	-1310	na	37	2813	-0.9	0.0	0.3
PUGCS -1200 ft	1.9	2.0	-68.3	-634	na	408	1968	-1.6	0.6	0.1
PUGCS -1100 ft	0.5	2.1	-90.8	-843	na	269	-678	0.6	-0.1	-0.4
PUGCS -1000 ft	2.1	1.6	3.9	36	na	-56	678	1.6	0.1	0.1
PUGCS -900 ft	1.6	1.6	6.8	63	na	-316	1903	0.7	0.6	0.8
PUGCS -800 ft	2.3	2.4	12.8	119	na	-74	-232	2.1	0.2	-1.2
PUGCS -700 ft	1.1	2.5	-10.1	-94	na	0	-390	0.7	0.1	-0.5
PUGCS -600 ft	0.9	2.8	-78.0	-724	na	0	-121	-0.4	0.7	0.1
PUGCS -500 ft	2.0	2.6	-78.4	-728	na	93	28	1.9	-0.1	-0.5
PUGCS -400 ft	2.2	0.9	38.6	358	na	353	-1170	1.9	0.1	-0.2
PUGCS -300 ft	1.8	0.6	41.6	386	na	-56	371	1.5	0.1	0.2
PUGCS -200 ft	3.1	0.2	151.7	1408	na	9	-111	3.0	0.1	-0.3
PUGCS -100 ft	3.3	0.5	167.8	1557	na	0	808	2.3	0.1	0.2
Average			-27.6	-256	na	72	214	0.9	0.2	-0.1

^a Normalized net sediment deposition is total estimated volume per 100 ft divided by distance between surveyed cross-sections (100 ft = 0.0305 km).

^b na = Not available. The Pueblo Canyon GCS was not surveyed in 2012 because of a lack of monsoonal flow in this area.

Table A-3.5-2
Summary of Geomorphic Changes at Cross-Sections below the Pueblo Canyon GCS

Section Name	2013 Maximum New Sediment Thickness (ft)	2013 Maximum Erosion (ft)	2013 Net Sediment Cross- Sectional Area (ft ²)	2013 Normalized Net Sediment Deposition or Erosion (m ³ /100 m) ^a	2012 Normalized Net Sediment Deposition or Erosion (m ³ /100 m) ^a	2011 Normalized Net Sediment Deposition or Erosion (m ³ /100 m) ^a	2010 Normalized Net Sediment Deposition or Erosion (m ³ /100 m) ^a	2013 Thalweg Elevation Change (ft)	2011 Thalweg Elevation Change (ft)	2010 Thalweg Elevation Change (ft)
PUGCS +100 ft	0.4	3.3	-90.8	-843	na ^b	0	-260	-0.3	0.1	-0.8
PUGCS +100 ft	0.6	6.7	-91.6	-850	na	74	-1448	-1.3	0.1	0.1
PUGCS +300 ft	2.5	1.1	32.1	298	na	0	-826	1.3	-0.1	0.0
Average			-150.2	-1395	na	25	-845	-0.3	0.0	-0.2

^a Normalized net sediment deposition is total estimated volume per 100 ft divided by distance between surveyed cross-sections (100 ft = 0.0305 km).

^b na = Not available. The Pueblo Canyon GCS was not surveyed in 2012 because of a lack of monsoonal flow in this area.

Table A-3.7-1
Summary of Geomorphic Changes at Cross-Sections above the DP Canyon GCS

Section Name	2013 Maximum New Sediment Thickness (ft)	2013 Maximum Erosion (ft)	2013 Net Sediment Cross- Sectional Area (ft ²)	2013 Normalized Net Sediment Deposition or Erosion (m ³ /100 m) ^a	2012 Normalized Net Sediment Deposition or Erosion (m ³ /100 m) ^a	2011 Normalized Net Sediment Deposition or Erosion (m ³ /100 m) ^a	2010 Normalized Net Sediment Deposition or Erosion (m ³ /100 m) ^a	2013 Thalweg Elevation Change (ft)	2012 Thalweg Elevation Change (ft)	2011 Thalweg Elevation Change (ft)	2010 Thalweg Elevation Change (ft)
DPGCS -1100 ft	0.4	0.5	5.6	52	0	2	50	0.2	0.2	-0.4	0.2
DPGCS -1000 ft	0.4	0.7	2.8	26	22	39	26	0.0	0.1	0.1	0.1
DPGCS -900 ft	0.6	1.1	7.7	71	71	57	110	0.3	0.5	-0.8	0.7
DPGCS -800 ft	1.0	0.3	13.2	123	27	100	30	0.9	0.0	1.1	-0.8
DPGCS -700 ft	0.8	0	12.7	117	45	38	59	0.8	0.5	0.6	-0.5
DPGCS -600 ft	1.5	0	28.7	267	61	1	93	0.9	0.3	0.5	0.2
DPGCS -500 ft	1.0	0	23.7	220	117	6	130	1.0	0.3	0.5	0.2
DPGCS -400 ft	0.7	2.4	6.9	64	87	15	100	0.6	-0.4	0.7	0.4
DPGCS -300 ft	0.6	0.4	12.9	119	57	45	150	0.2	-0.4	0.1	0.8
DPGCS -200 ft	1.3	2.5	12.8	119	-6	-52	50	-0.8	1.4	-1.7	-0.3
DPGCS -100 ft	1.0	0.6	19.4	141 ^c	29	-67	18	0.6 ^c	-0.2	-0.2	-0.6
DPGCS -20 ft	0.3	0.3	-1.6		na ^b	na	na		na	na	na
Average				120	46	17	74	0.4	0.2	0.1	0.0

^a Normalized net sediment deposition is total estimated volume per 100 ft divided by distance between surveyed cross-sections (100 ft = 0.0305 km).

^b na = Not available. Cross-section line DPGCS -20 ft was established in February 2013.

^c Average value of normalized net sediment deposition for DPGCS -100 ft and DPGCS -20 ft, projected over the 100 ft distance to the GCS. This 2013 average value is not comparable with previous years because of the addition of the DPGCS -20-ft line in February 2013.

Table A-3.7-2
Summary of Geomorphic Changes at Cross-Sections below the DP Canyon GCS

Section Name	2013 Maximum New Sediment Thickness (ft)	2013 Maximum Erosion (ft)	2013 Net Sediment Cross- Sectional Area (ft ²)	2013 Normalized Net Sediment Deposition or Erosion (m ³ /100 m)*	2012 Normalized Net Sediment Deposition or Erosion (m ³ /100 m)*	2011 Normalized Net Sediment Deposition or Erosion (m ³ /100 m)*	2010 Normalized Net Sediment Deposition or Erosion (m ³ /100 m)*	2013 Thalweg Elevation Change (ft)	2012 Thalweg Elevation Change (ft)	2011 Thalweg Elevation Change (ft)	2010 Thalweg Elevation Change (ft)
DPGCS +125 ft	0—	1.4	-13.1	-121	0.0	-113	189	-0.4	0.0	-0.9	1.7
DPGCS +225 ft	0.2	1.1	-2.5	-23	15.8	-35	20	-1.0	0.3	-0.1	0.0
Average			-7.8	-72	7.9	-74	105	-0.7	0.1	-0.5	0.8

* Normalized net sediment deposition is total estimated volume per 100 ft divided by distance between surveyed cross-sections (100 ft = 0.0305 km).

Table A-3.8-1
Sediment Volume Changes at Los Alamos Canyon Low-Head Weir

Site	Total Net Change (ft ³)	Total Net Change (m ³)	Estimated Percent Coarse Sediment	Estimated Percent Fine Sediment	Estimated Volume Coarse Sediment (m ³)	Estimated Volume Fine Sediment (m ³)
July 2011 to March 2012						
Basin 1 (west)	8400	240	50%	50%	120	120
Basin 2 (central)	15,500	440	5%	95%	22	418
Basin 3 (east)	50,600	1430	0%	100%	0	1430
Total	74,500	2110	n/a*	n/a	142	1968
March 2012 to November 2012						
Basin 1 (west)	700	20	20%	80%	4	16
Basin 2 (central)	8800	250	0%	100%	0	250
Basin 3 (east)	81,100	2300	0%	100%	0	2300
Total	90,600	2570	n/a	n/a	4	2566
May 2013 to February 2014						
Basin 1 (west)	19,057	540	100%	0%	540	0
Basin 2 (central)	67,917	1923	100%	0%	1923	0
Basin 3 (east)	95,133	2694	40%	60%	1078	1616
Total	182,106	5157	n/a	n/a	3541	1616

* n/a = Not applicable.

Table A-3.8-2
Sediment Accumulation at Los Alamos Canyon Low-Head Weir, 2000–2014

Period	Total Sedimentation (m ³)	Approximate Annual Sedimentation (m ³ /yr)
June 2000 to May 2002	822	411
May 2002 to August 2005	3377	1126
August 2005 to July 2007	2555	1278
July 2007 to September 2008	138	138
September 2008 to May 2009	0	—*
May 2009 to July 2010	510	510
July 2010 to March 2011	274	274
March 2011 to July 2011	0	—
July 2011 to March 2012	2110	2110
March 2012 to November 2012	2570	2570
May 2013 to February 2014	5157	5157
June 2000 to February 2014	17,513	1250

*— = Not calculated; not in storm water runoff season.

Attachment A-1

*Photographs of Sediment Transport Mitigation Sites
in the Los Alamos and Pueblo Canyons Watershed*

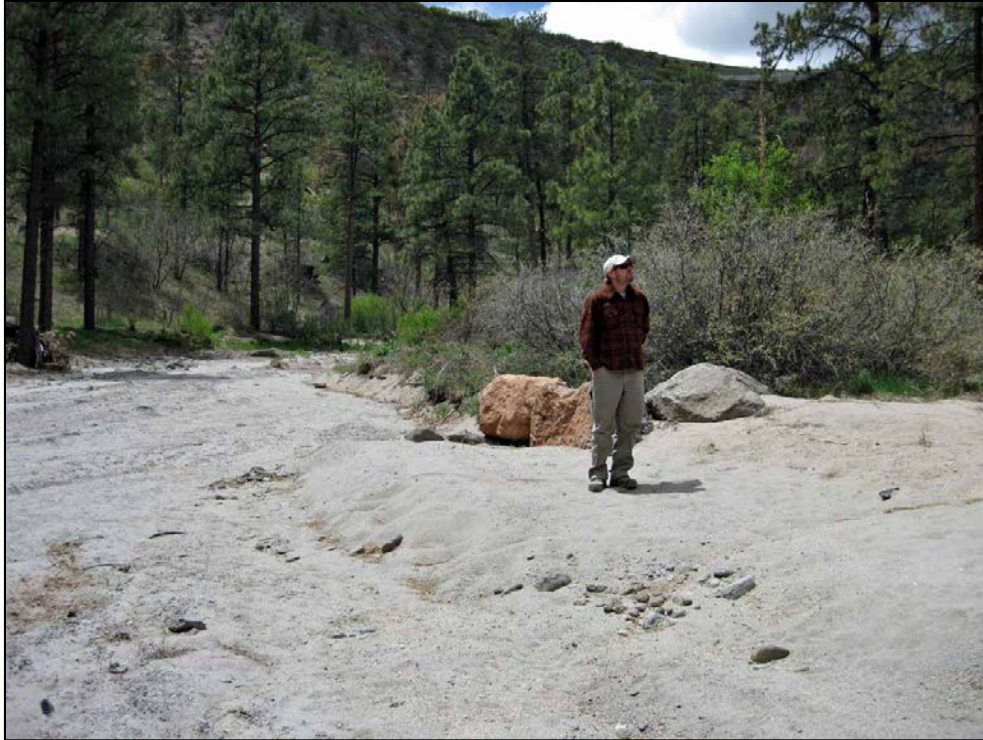


Photo A1-1 May 2014 photograph of sand lobe in the area of maximum sediment deposition at cross-section CVS#3 + 50 ft below Pueblo Canyon CVS #3, looking upstream



Photo A1-2 May 2014 photograph of area of maximum sediment erosion at CVS1-50, above Pueblo Canyon CVS #1, looking upstream



(a)



(b)

**Photo A1-3 Repeat photographs of CVS1-50, looking upstream:
(a) March 2012 (b) May 2014**



Photo A1-4 May 2014 photograph of sand lobe in the area of maximum sediment deposition at cross-section MW-1, looking upstream



Photo A1-5 May 2014 photograph of lateral bank migration in the area of maximum sediment erosion at cross-section LW-6, looking downstream



Photo A1-6 May 2014 photograph of area of maximum sediment deposition below the Pueblo Canyon wing ditch at cross-section WD-3, looking upstream



Photo A1-7 May 2014 photograph of area of maximum sediment erosion below the Pueblo Canyon wing ditch at cross-section WD-4, looking upstream



(a)



(b)

Photo A1-8 Repeat photographs of WD-4 (northern part of cross-section), looking upstream: (a) January 2013, (b) May 2014



Photo A1-9 May 2014 photograph of area of maximum sediment deposition in the upper half of the lower Pueblo Canyon willow sections, PU-700 ft, looking upstream



Photo A1-10 May 2014 photograph of area of maximum sediment erosion in the upper half of the lower Pueblo willow sections, PU-800 ft, looking upstream



(a)



(b)

Photo A1-11 Repeat photographs of PU-300, looking upstream: (a) March 2012, (b) May 2014



Photo A1-12 May 2014 photograph of area of maximum sediment erosion in the lower half of the lower Pueblo willow sections, PU+500 ft, looking downstream



(a)



(b)

Photo A1-13 Repeat photographs of PU0, looking upstream: (a) January 2013, (b) May 2014



(a)



(b)

Photo A1-14 February 2014 photographs of the Pueblo Canyon grade control structure: (a) looking downstream, (b) looking upstream



Photo A1-15 May 2014 photograph of area of maximum sediment erosion above the Pueblo Canyon grade-control structure, PUGCS-1400 ft, looking downstream



Photo A1-16 May 2014 photograph of area of maximum sediment deposition above the Pueblo Canyon grade control structure, PUGCS-100 ft, looking upstream. Surface modified after surveying during excavation of the intake above the PUGCS.



(a)



(b)

**Photo A1-17 Repeat photographs of PUGCS-1100, looking upstream:
(a) March 2012, (b) May 2014**



(a)



(b)

Photo A1-18 May 2014 photographs of LA-SMA-2 sediment detention basins, looking downstream: (a) upper sediment retention basin, (b) lower sediment retention basin



(a)



(b)

Photo A1-19 November 2013 photographs of the DP Canyon grade control structure: (a) looking downstream, (b) looking upstream

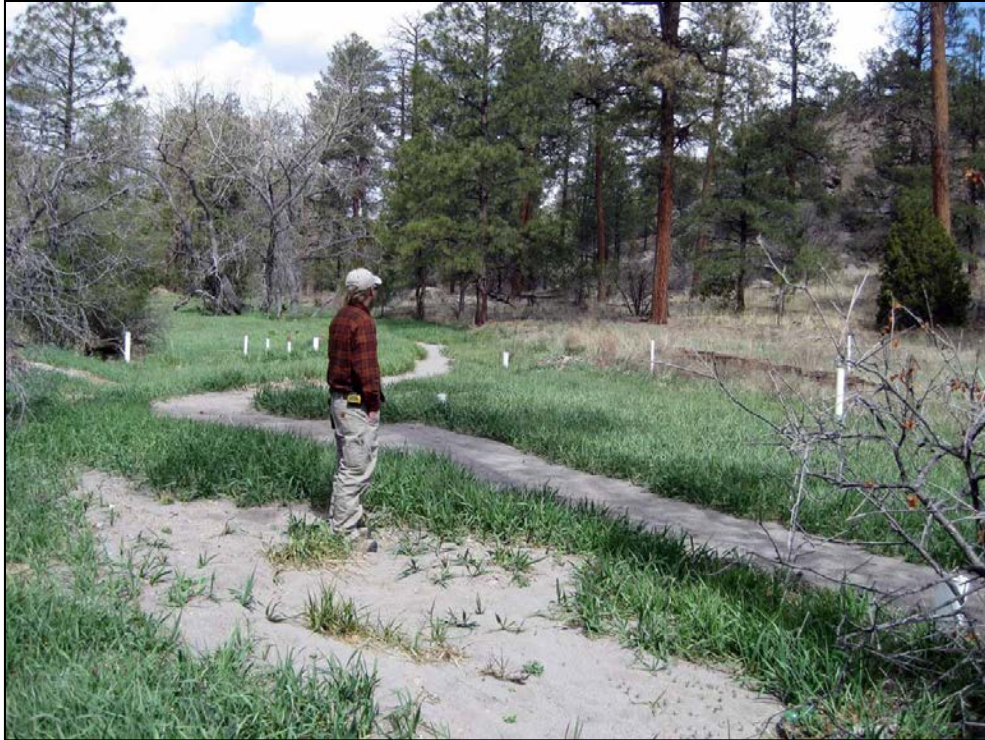


Photo A1-20 May 2014 photograph of maximum sediment deposition and erosion at DP, 600-ft section looking upstream



Photo A1-21 November 2011 photograph of maximum incision at DP, 200-ft section looking upstream



Photo A1-22 April 2014 photograph of the Los Alamos Canyon low-head weir looking upstream



Photo A1-23 April 2014 photograph of sediment accumulation and delta in the lower basin at the Los Alamos Canyon low-head weir



(a)



(b)

Photo A1-24 Repeat photographs of thick willow patches in upper third of upper Pueblo Canyon willow-planting area looking downstream near UW-5 section: (a) October 2011, (b) May 2014



Photo A1-25 May 2014 photograph showing willows laid down in the upper Pueblo willow section that have survived and are resprouting



(a)



(b)

Photo A1-26 Repeat photographs of thick willow patches in middle third of upper Pueblo Canyon willow-planting area looking upstream near MW-2 section: (a) November 2011, (b) May 2014



Photo A1-27 LW1 showing absence of willows in channel, view downstream



(a)



(b)

**Photo A1-28 Repeat photographs of lower Pueblo Canyon willow-planting area looking downstream near PU+900 section:
(a) November 2011, (b) May 2014**



Photo A1-29 New willow plantings at PU+600 ft, view upstream



Photo A1-30 April 2014 photograph of rock armoring along stream banks in the south fork of Acid Canyon looking upstream

Attachment A-2

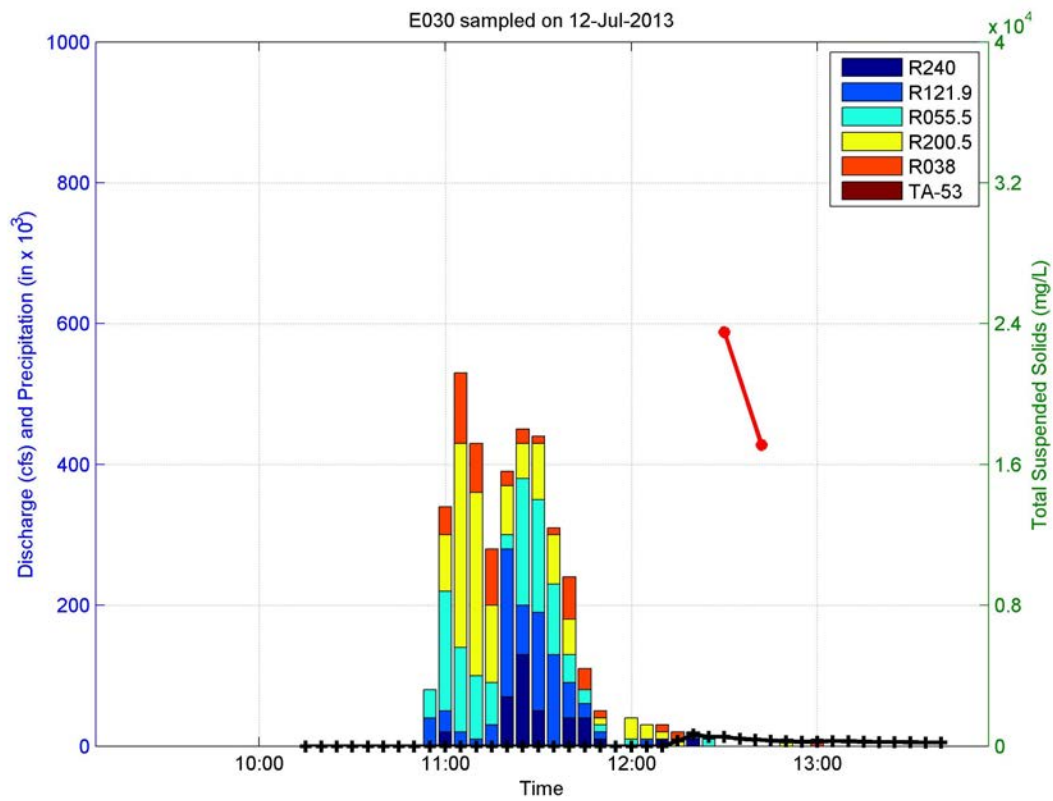
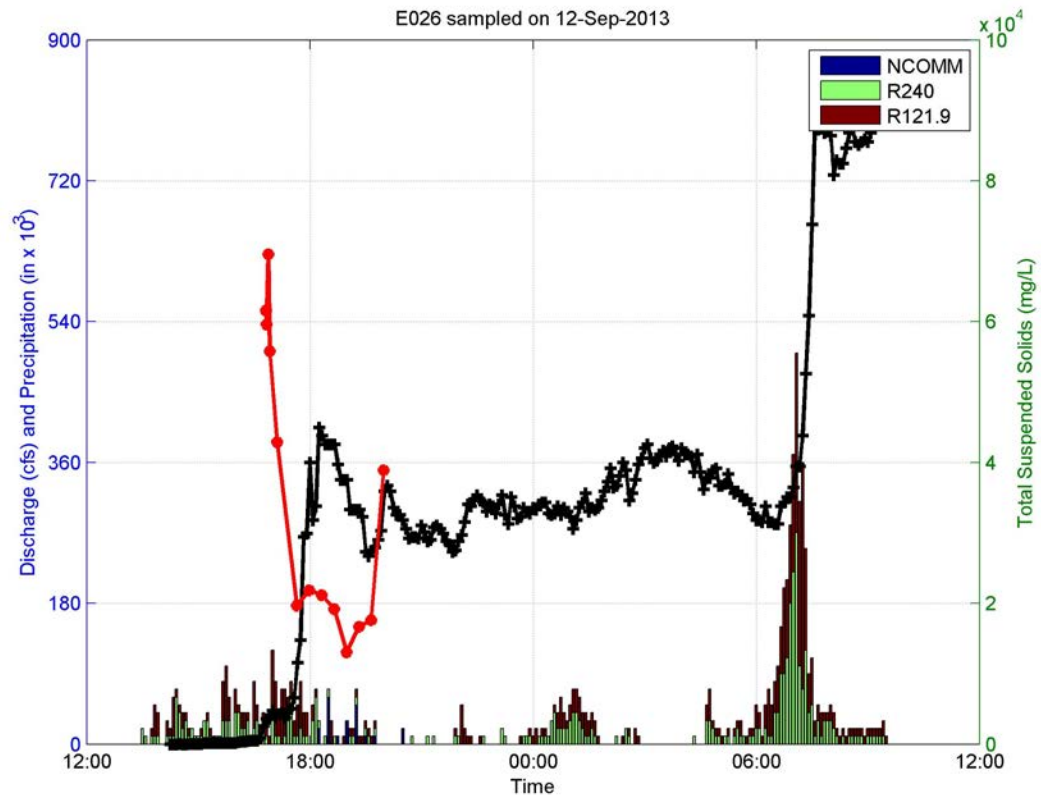
*Cross-Section Survey Data
(on CD included with this document)*

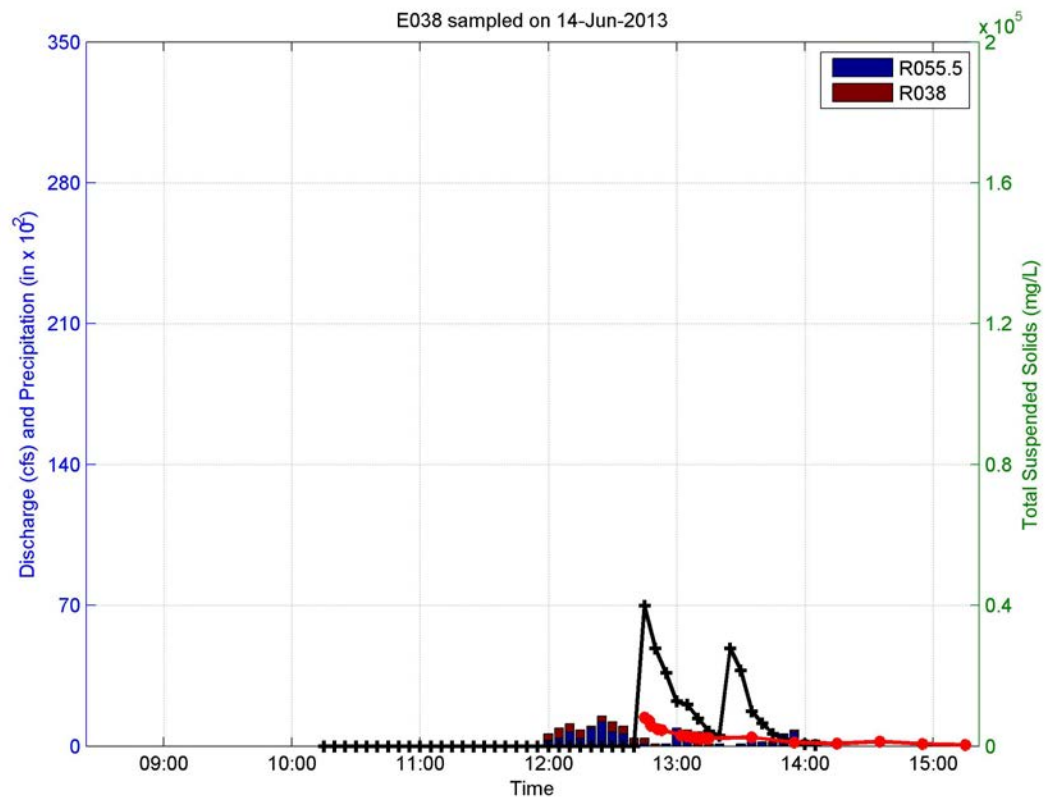
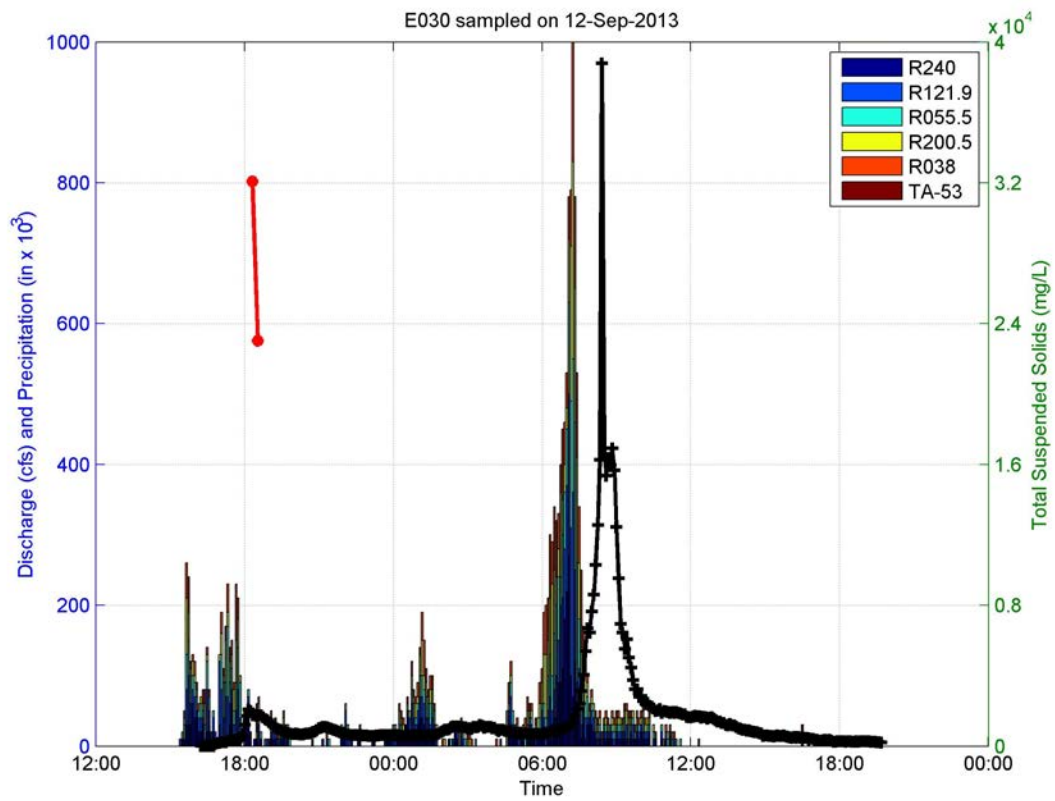
Appendix B

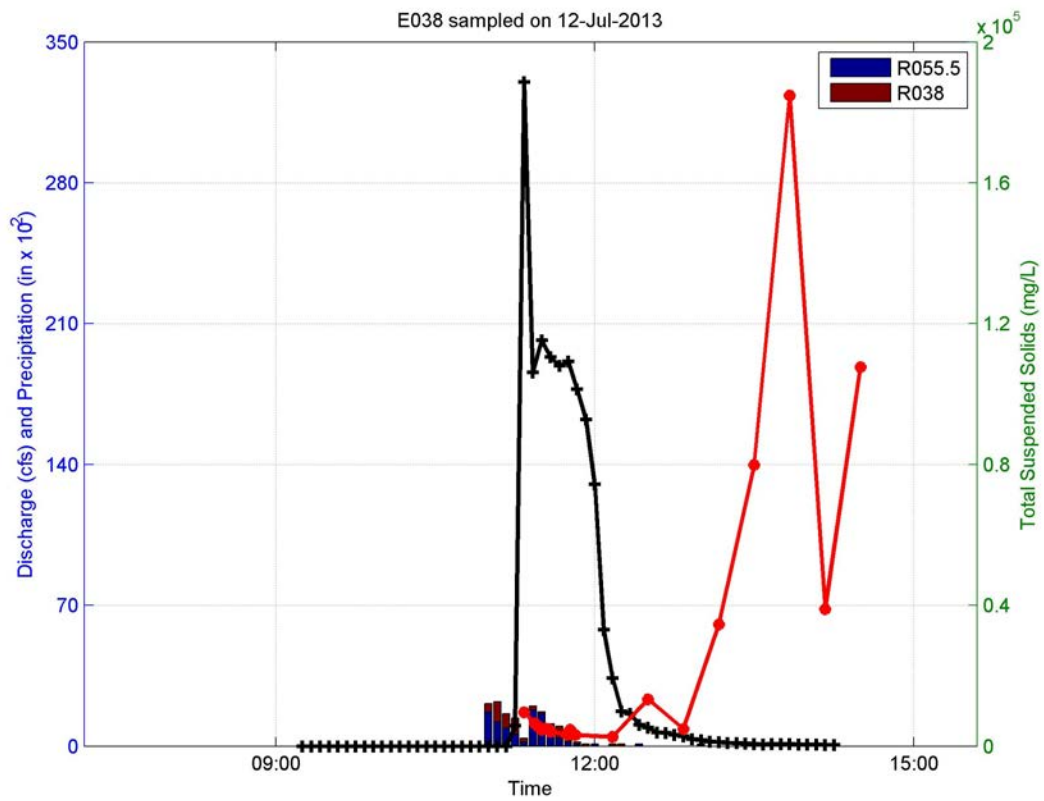
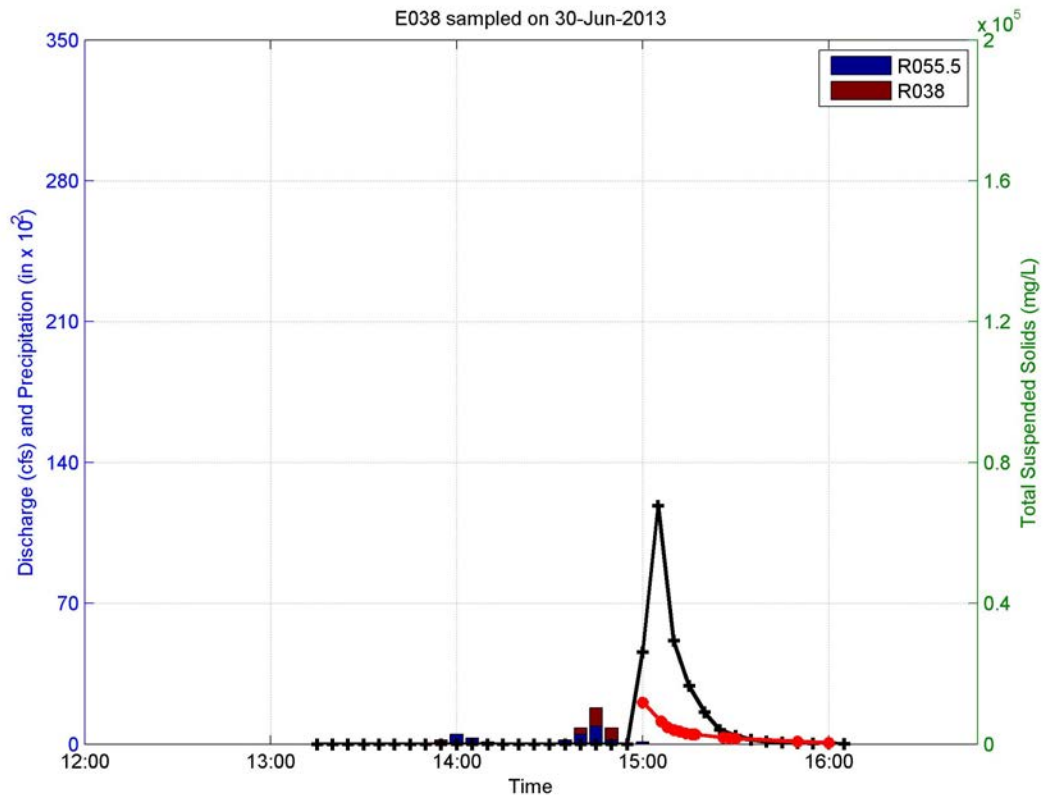
*Hydrographs, Hyetographs, and Sedigraphs
for Samples Collected*

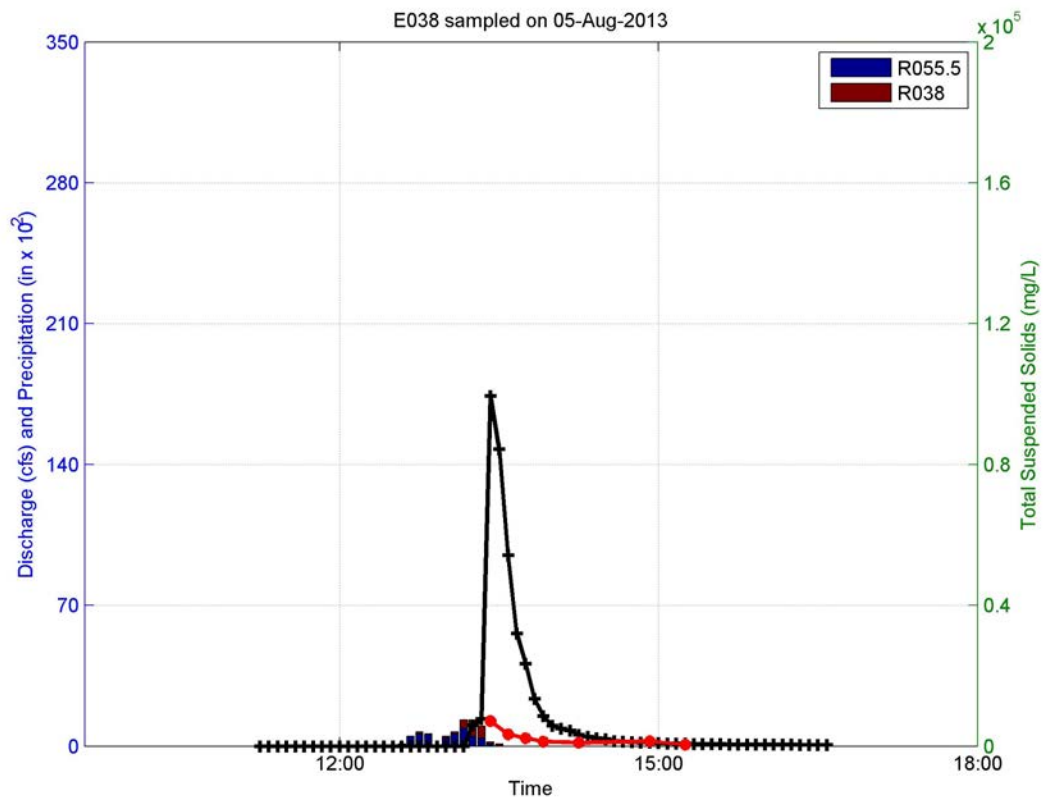
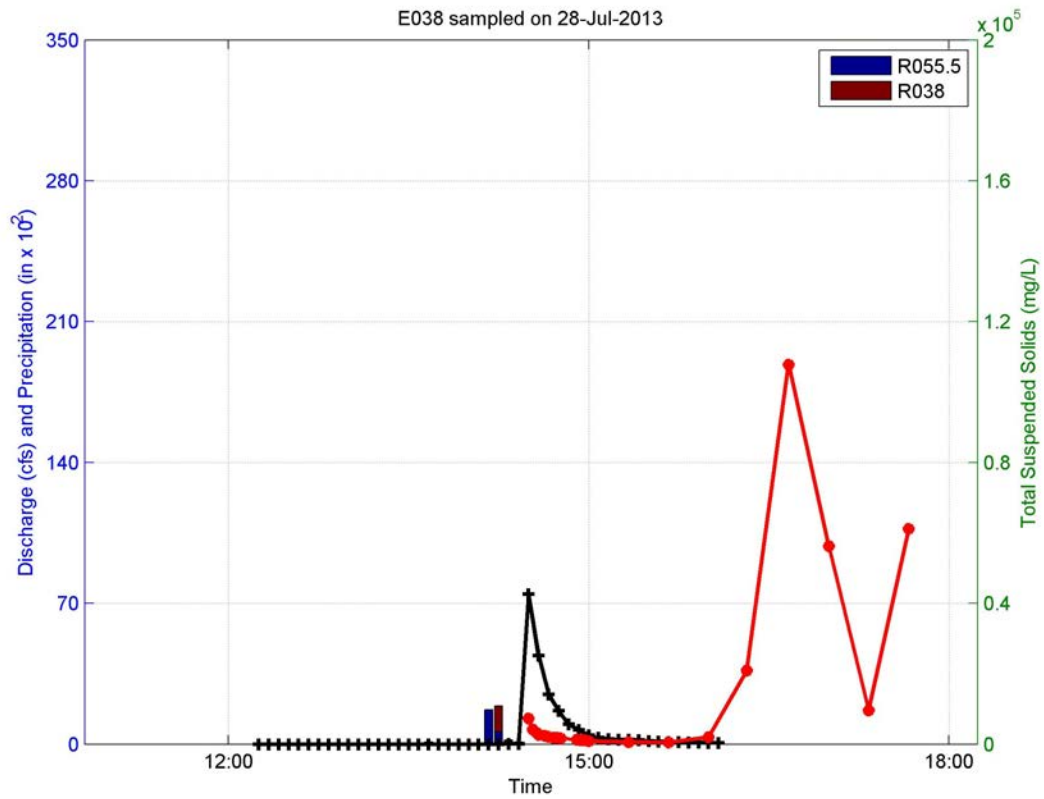
This appendix summarizes the relationships between precipitation, discharge, and total suspended solids (TSS) determined for each storm runoff event sampled. Plots of discharge versus time (hydrographs) at gages from each storm runoff event resulting in sample collection are presented, with the exception of events with missing or questionable discharge data as stated in Section 2. These hydrographs are overlaid with precipitation measured at associated rain gages (hyetographs) and TSS measured from storm water samples collected during runoff events (sedigraphs).

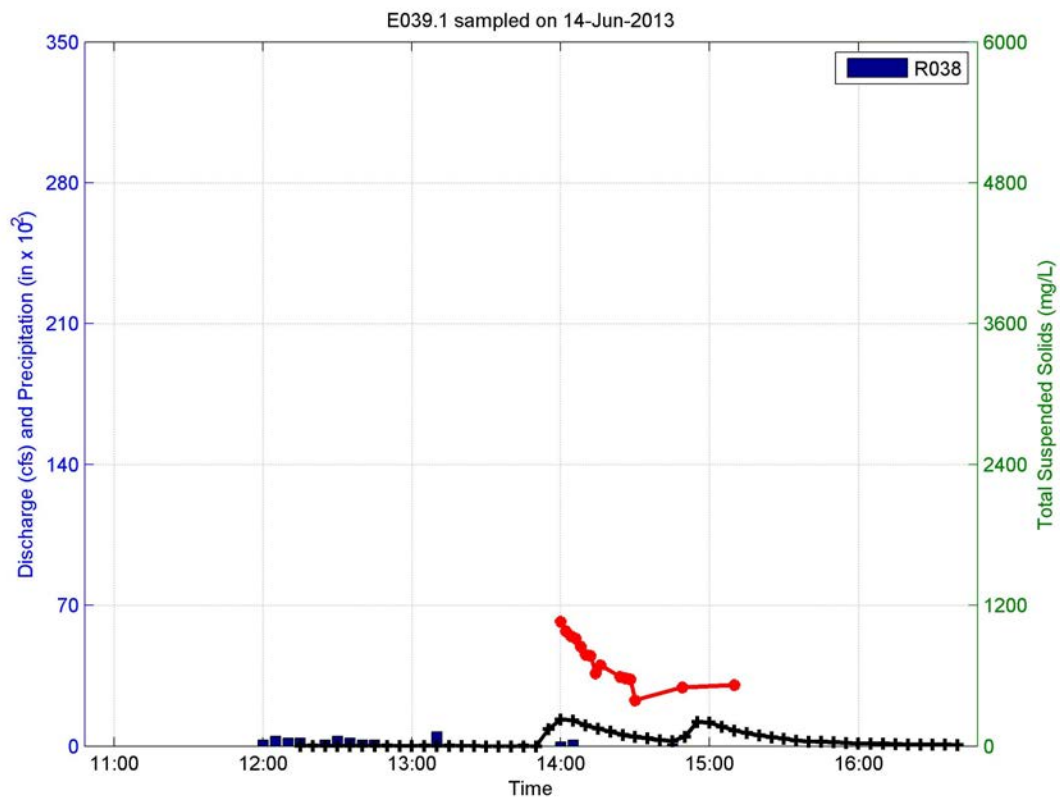
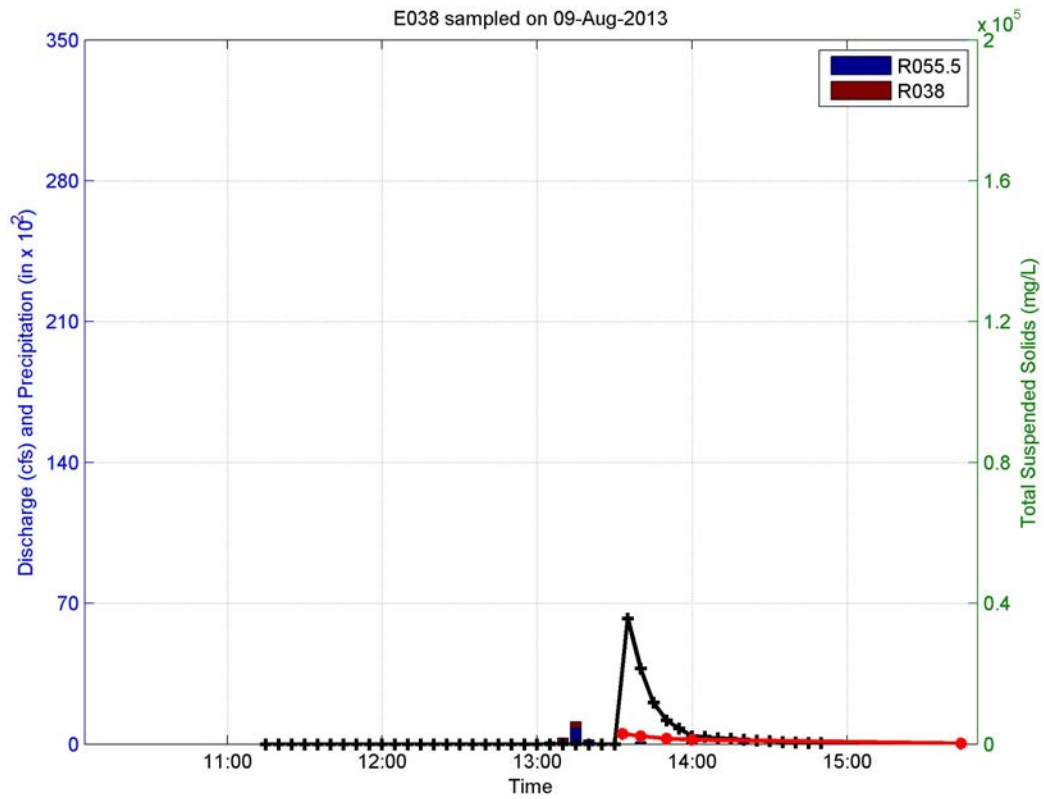
Hydrographs (+), hyetographs (assorted colors of stacked bars), and sedigraphs (●) for storm runoff events during which sampling was performed are displayed.

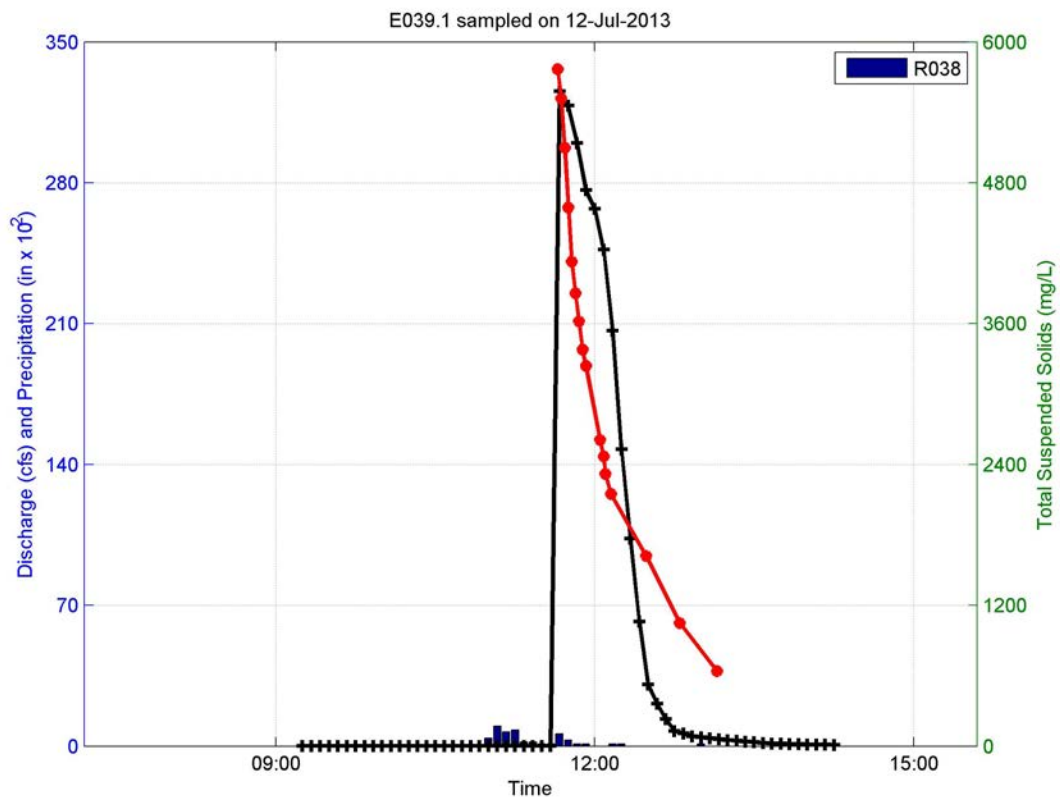
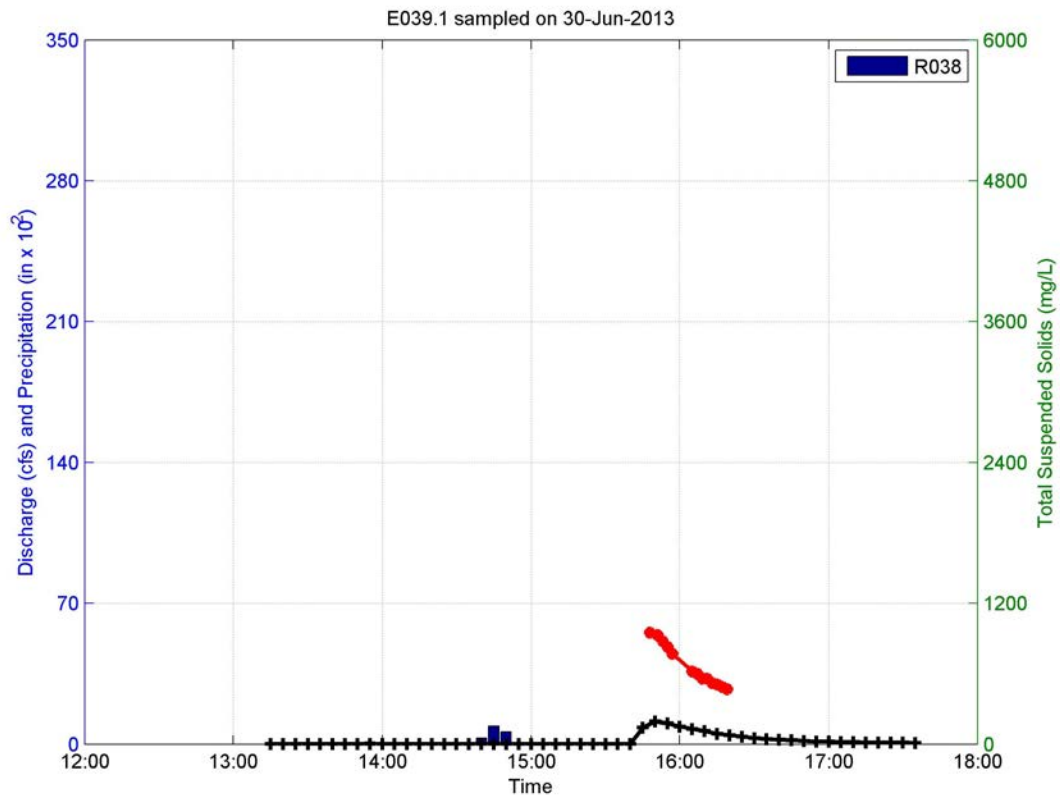


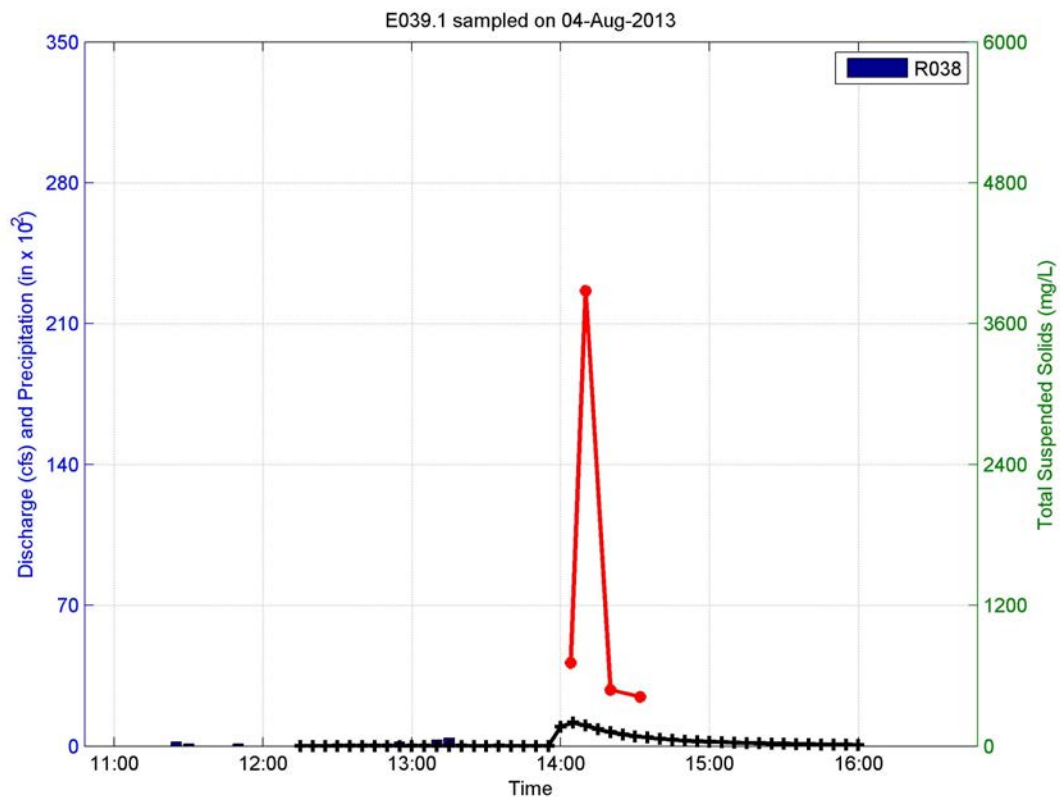
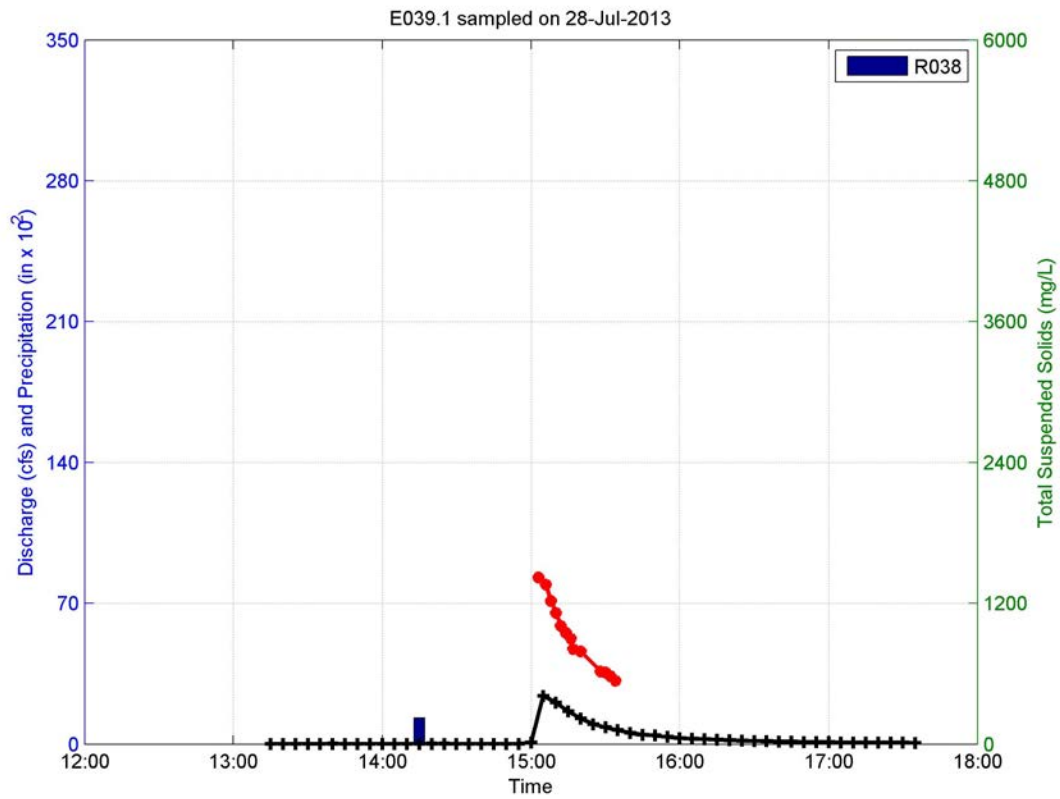


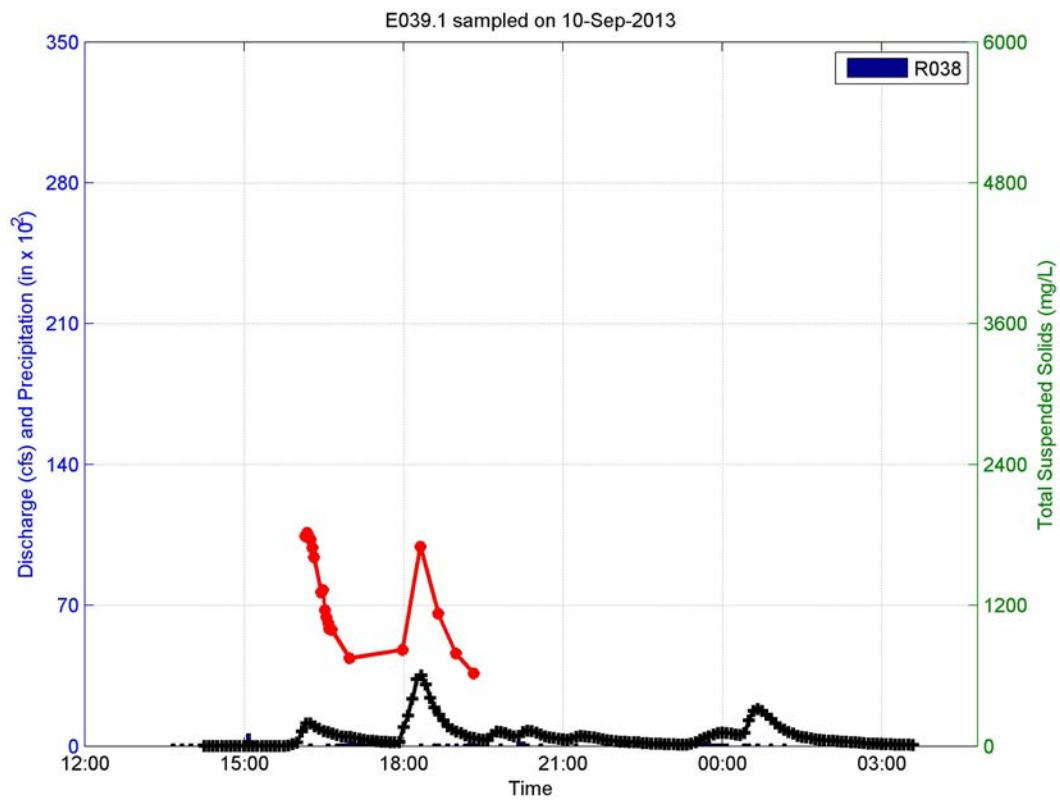
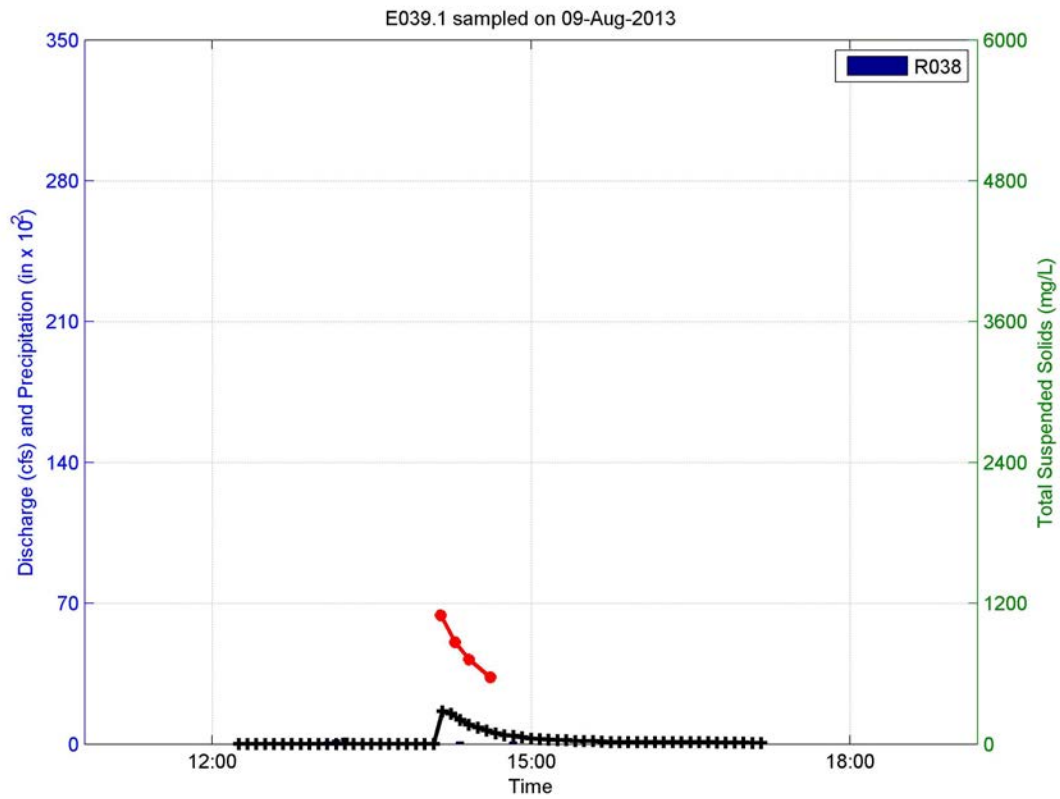


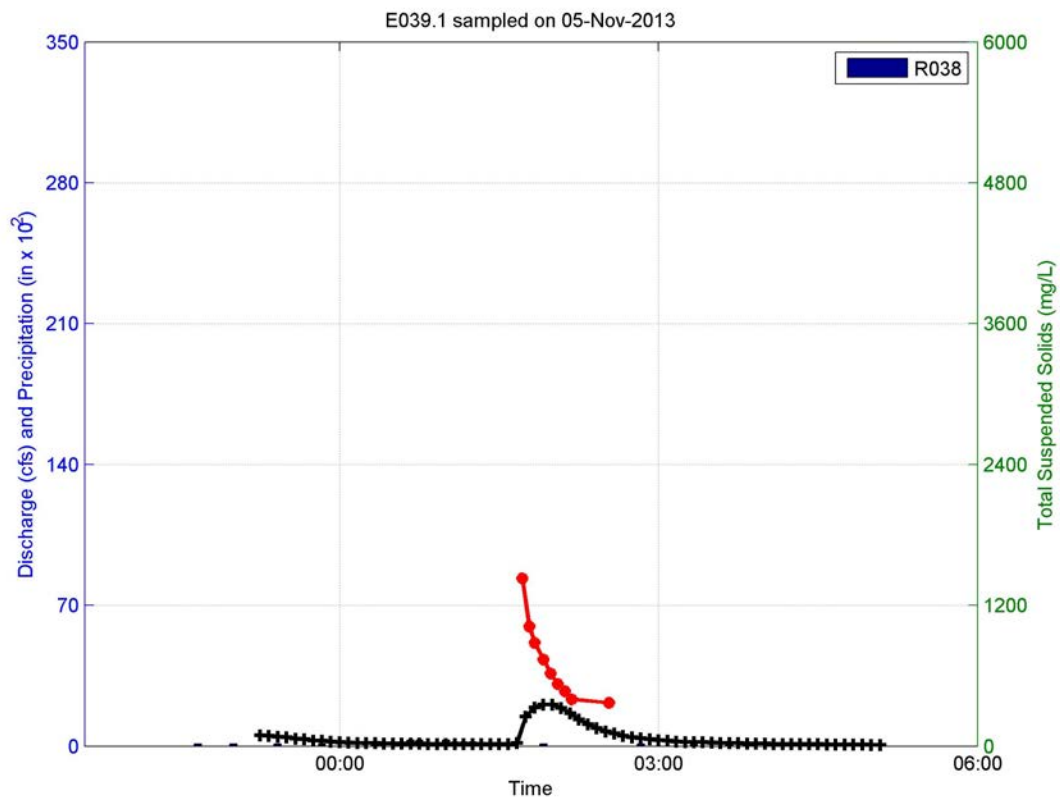
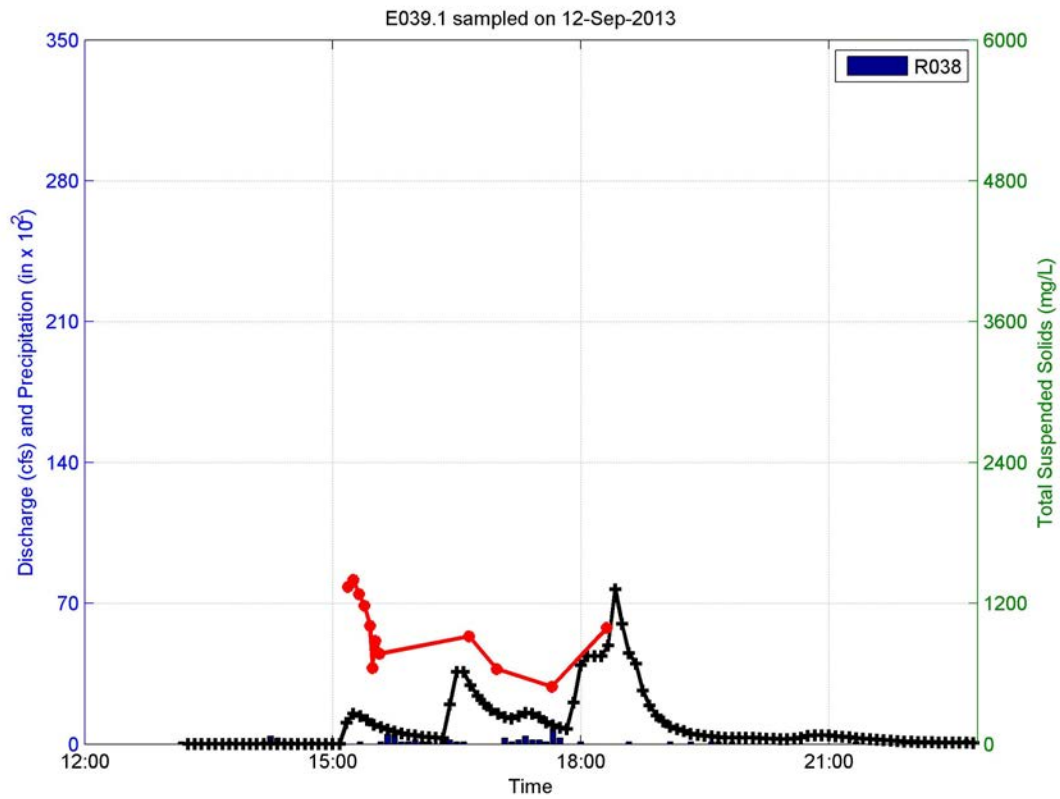


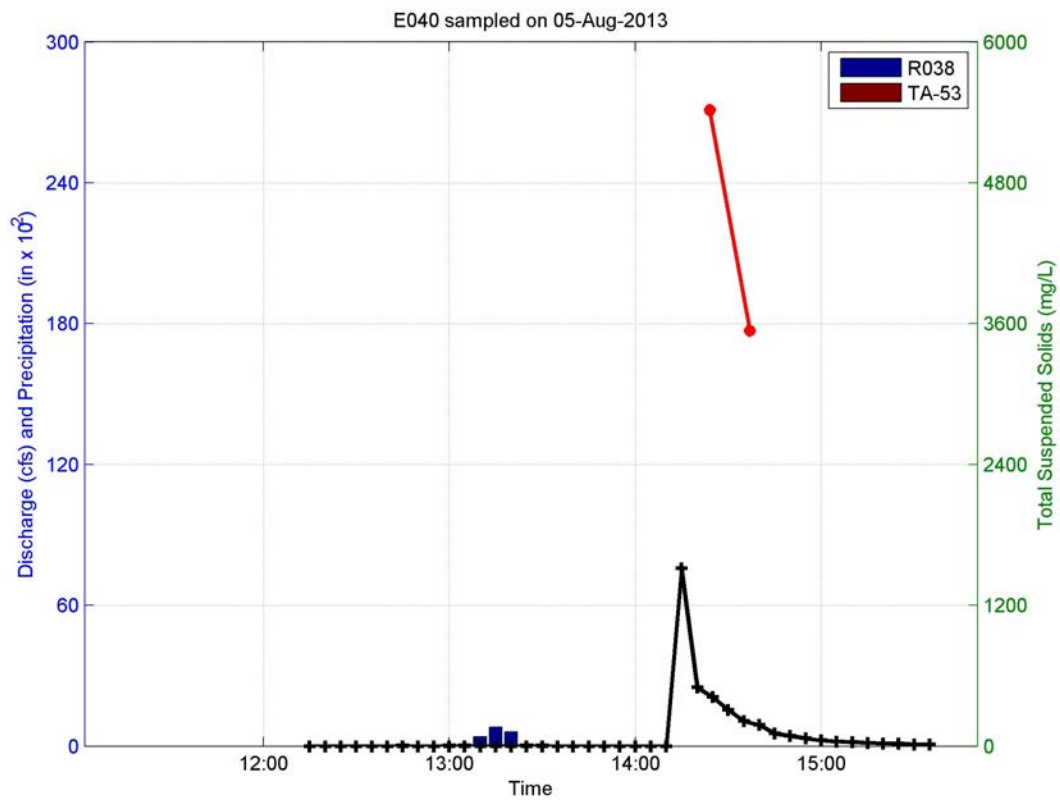
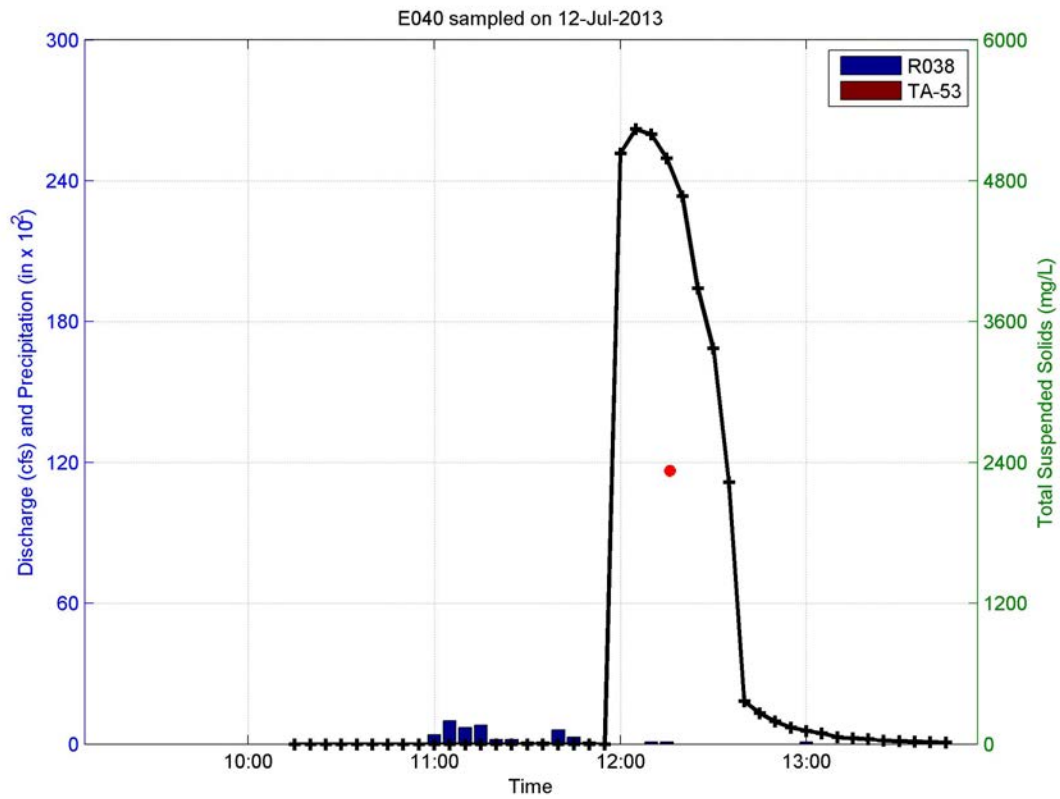


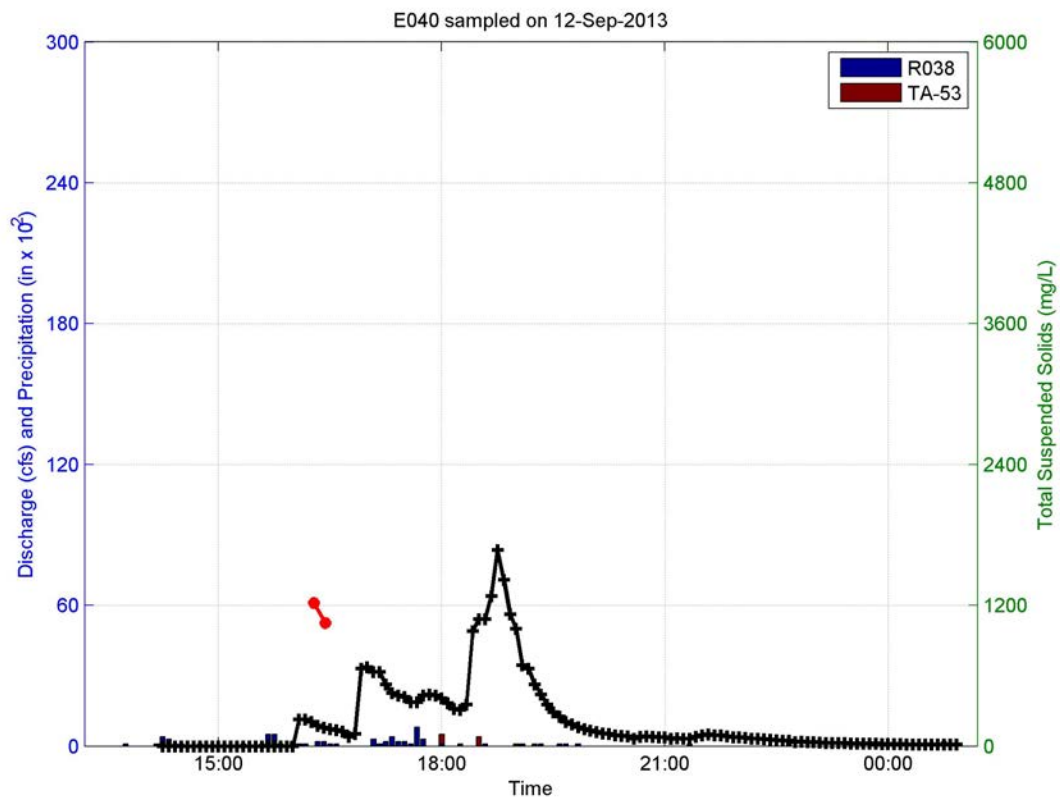
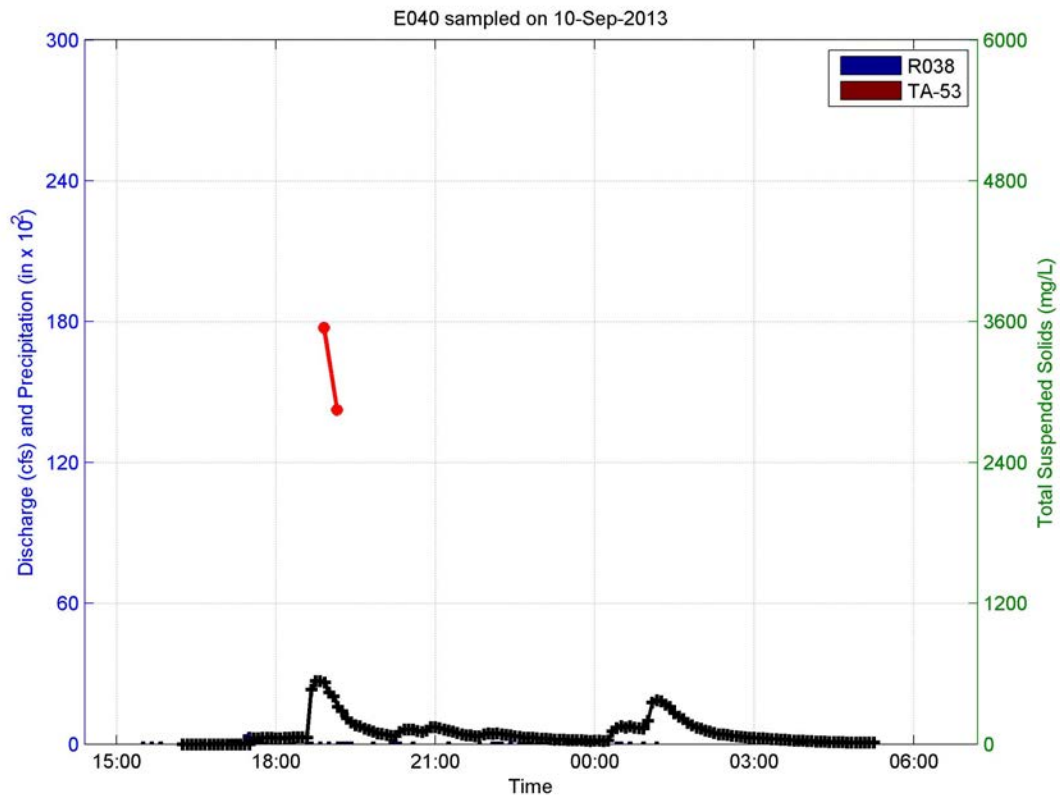


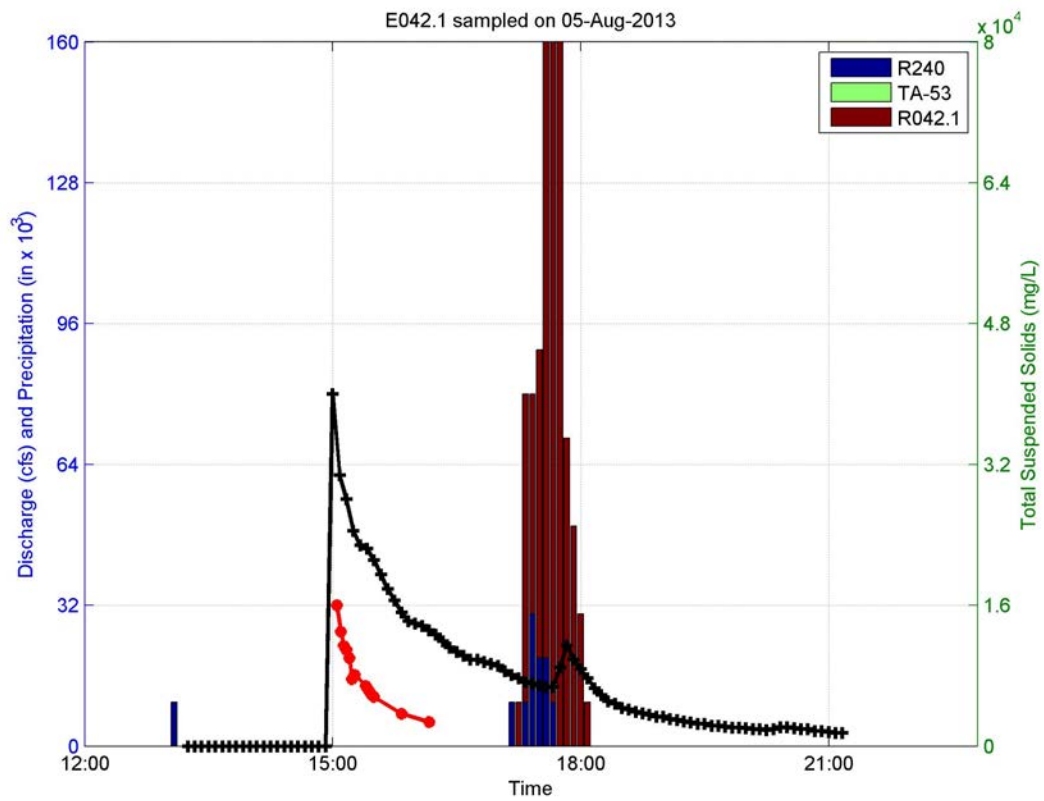
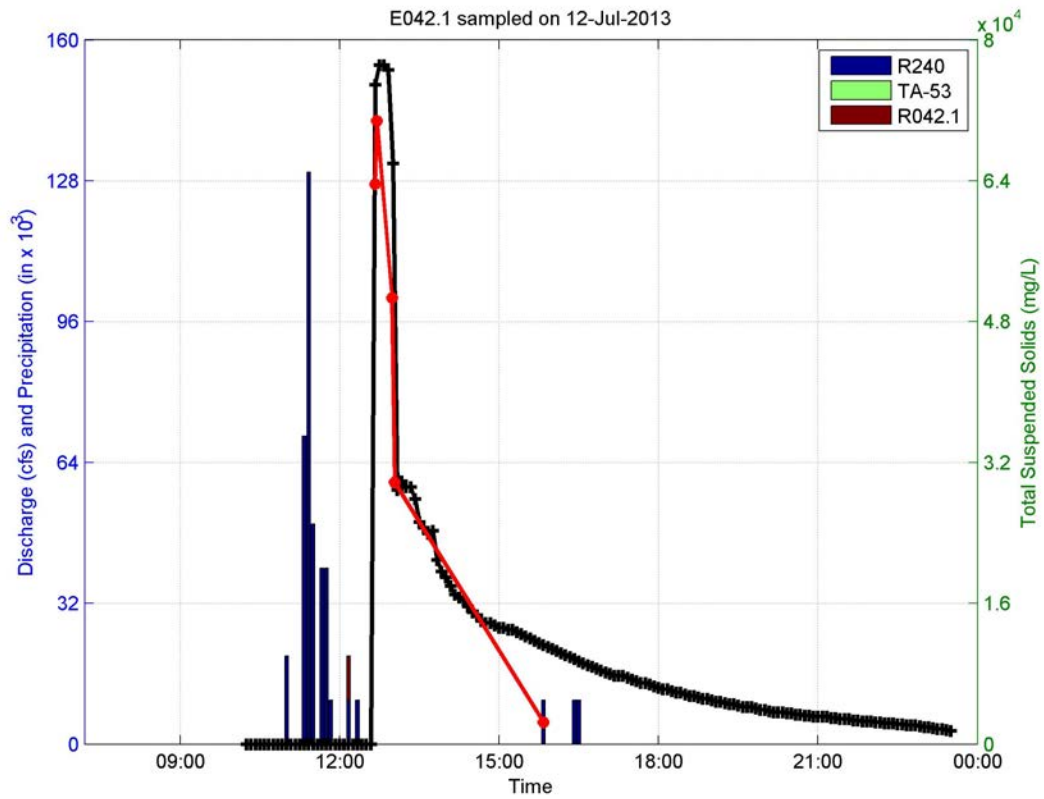


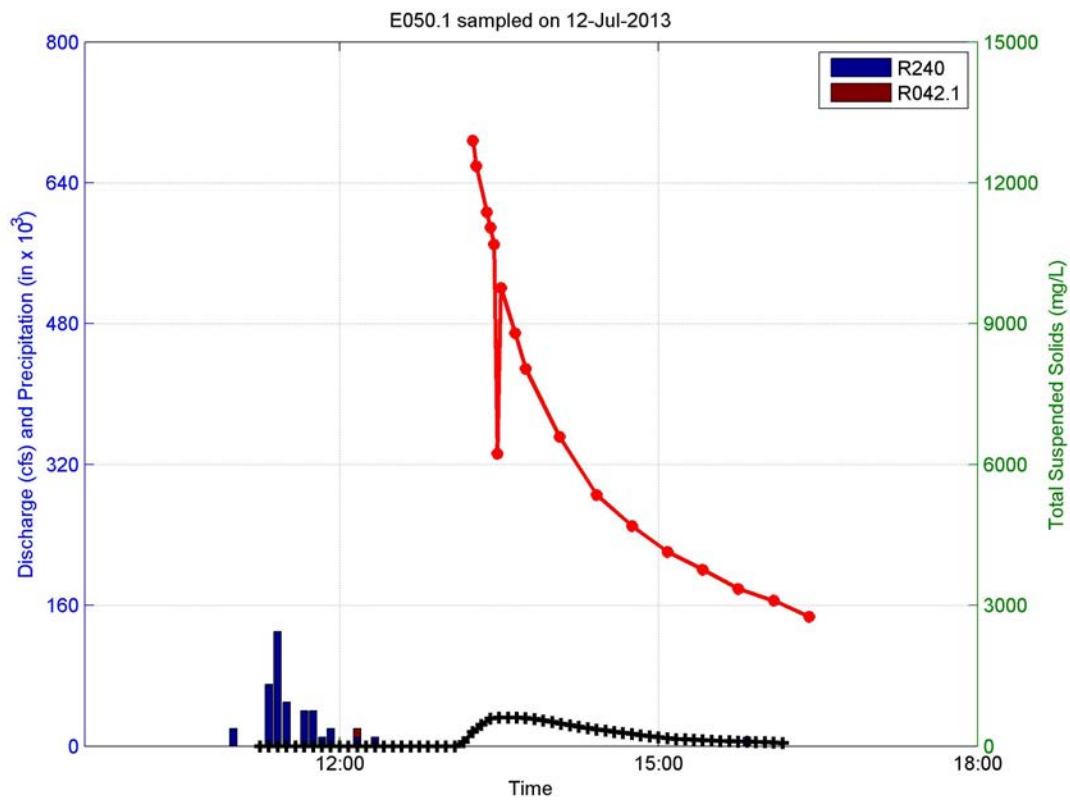
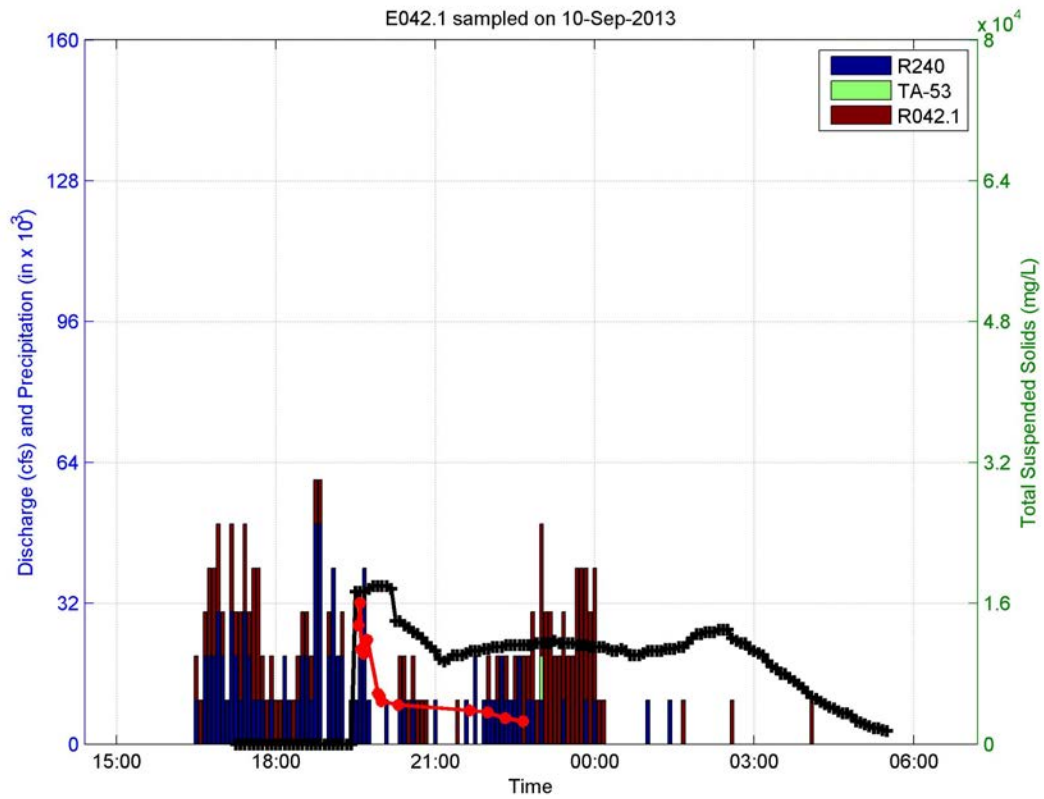


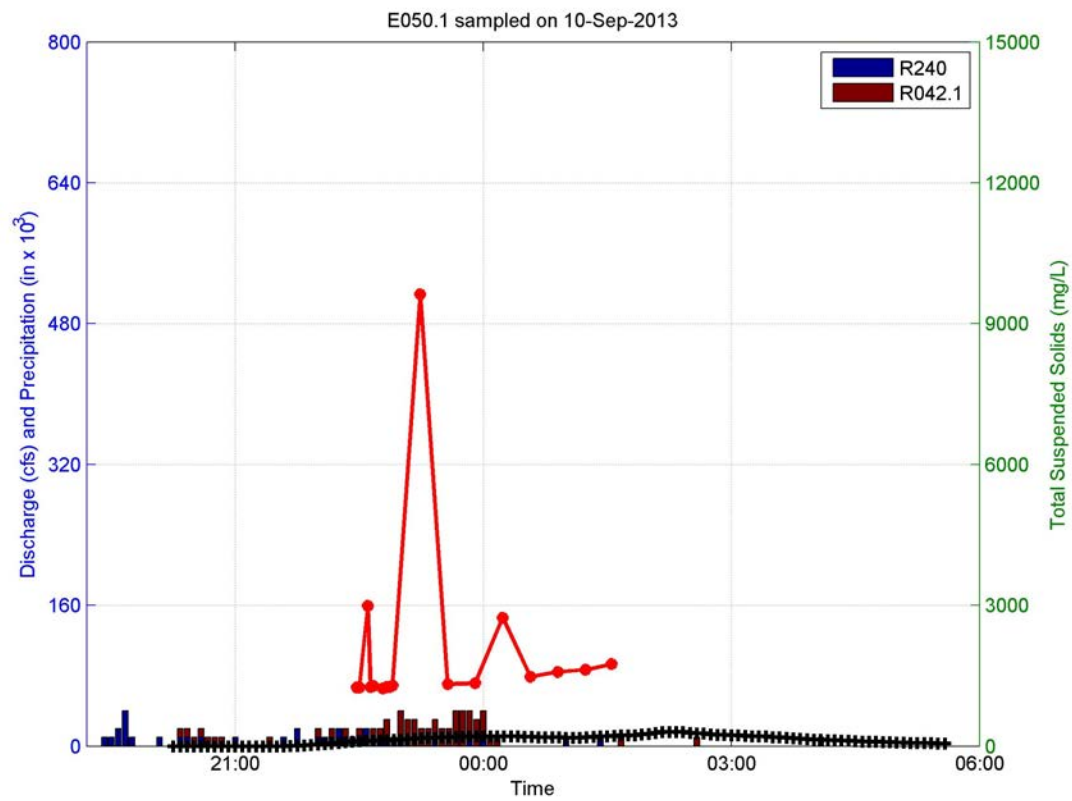
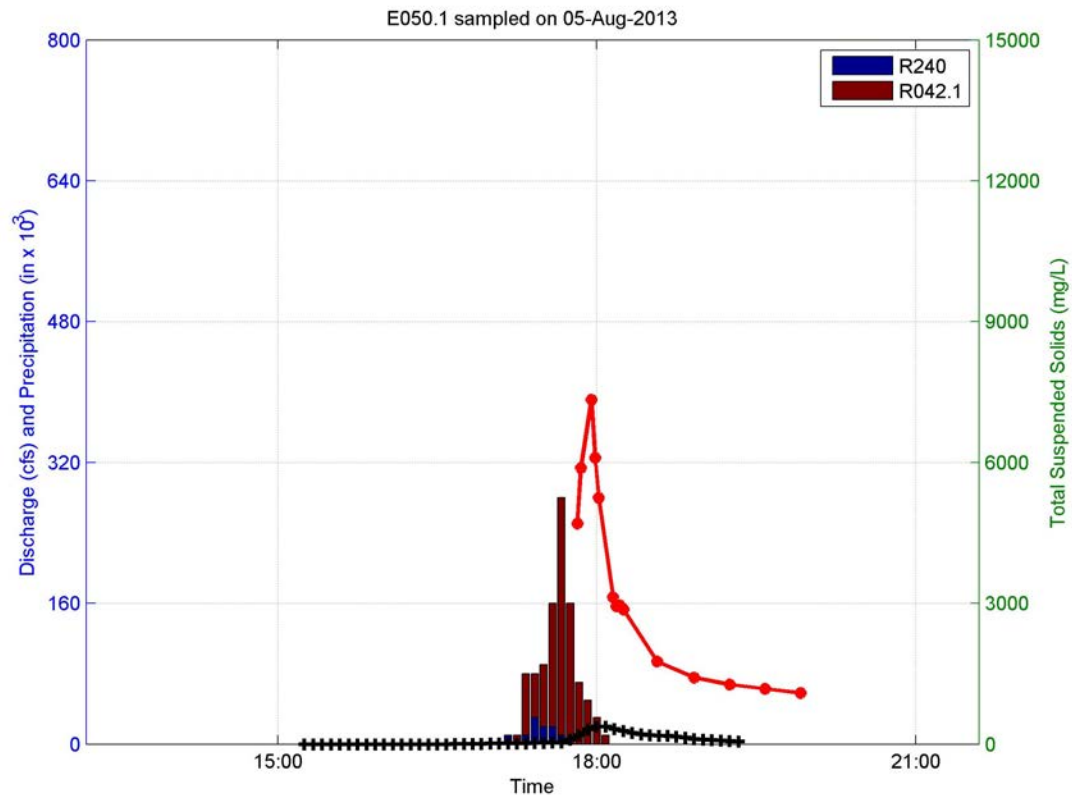


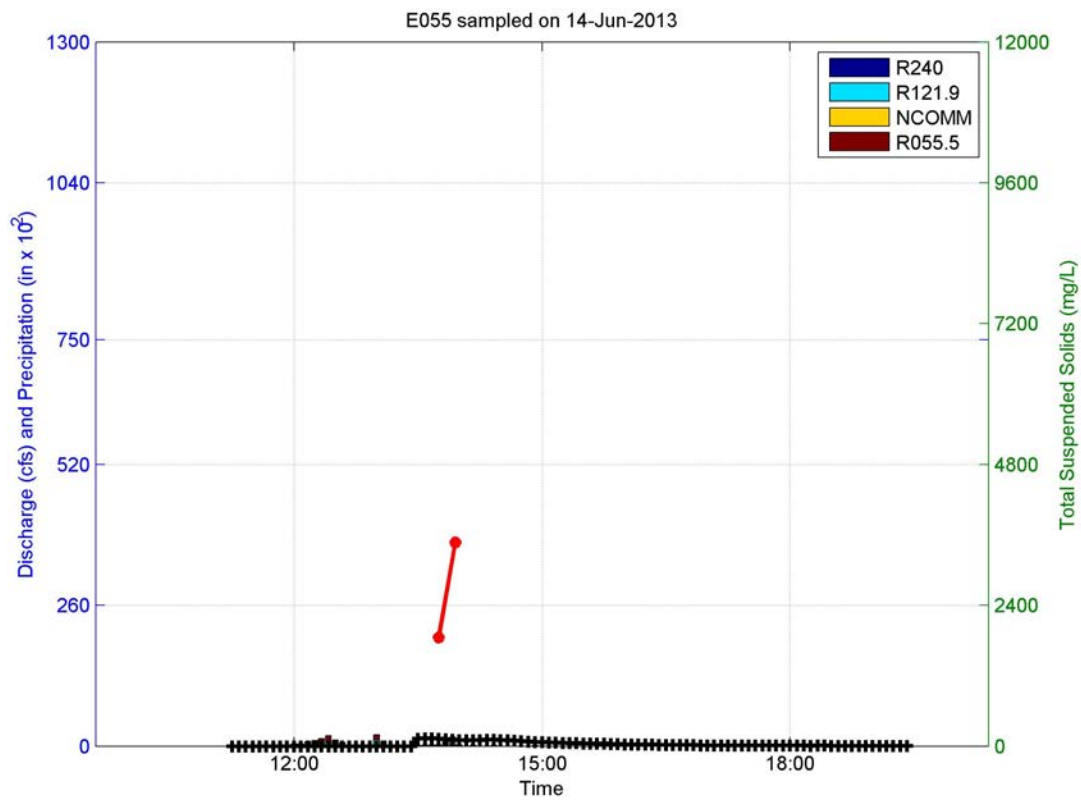
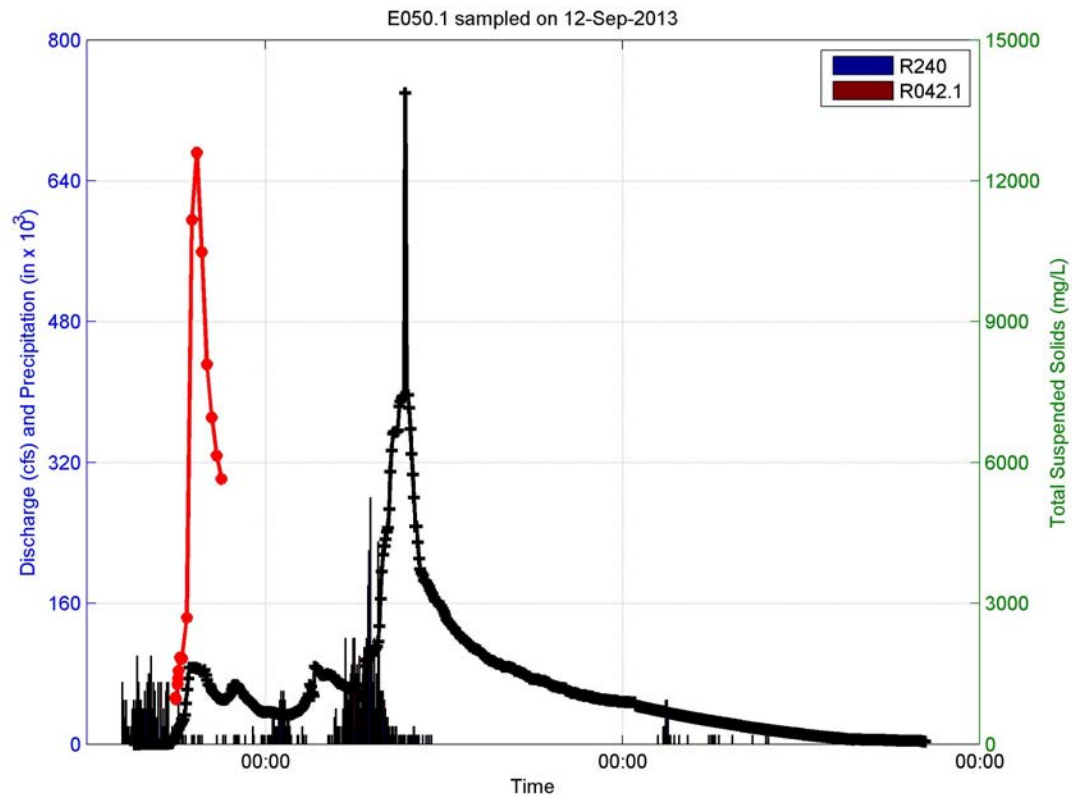


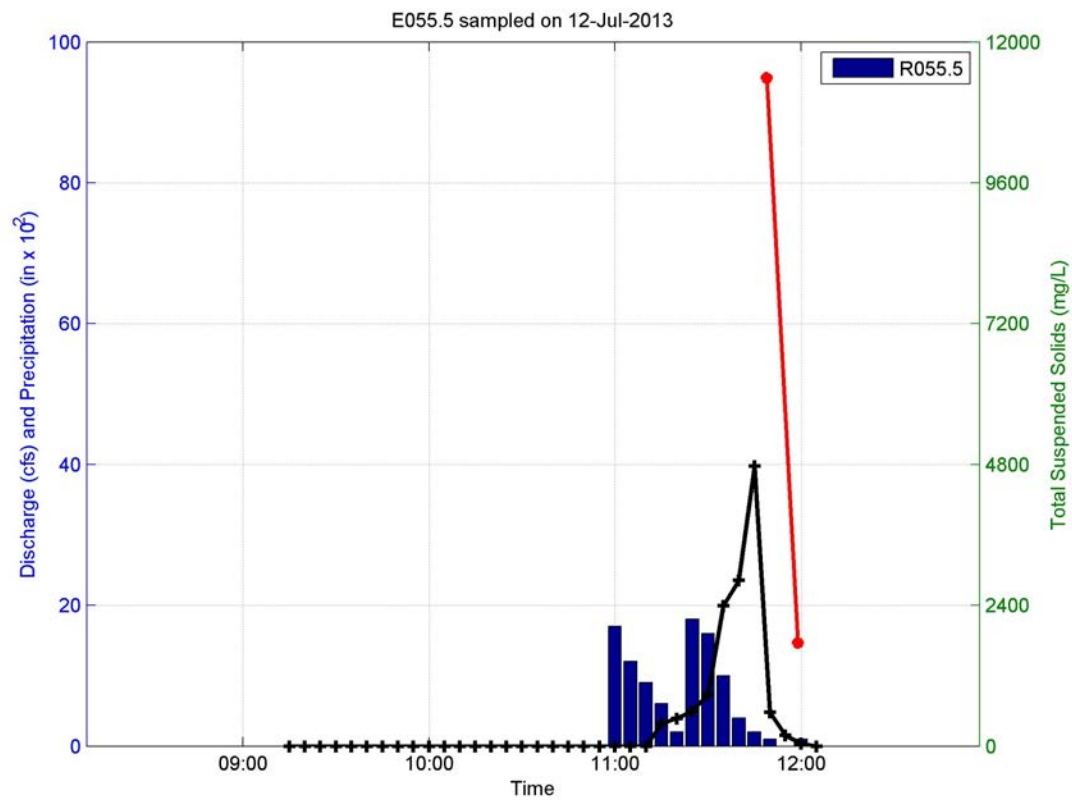
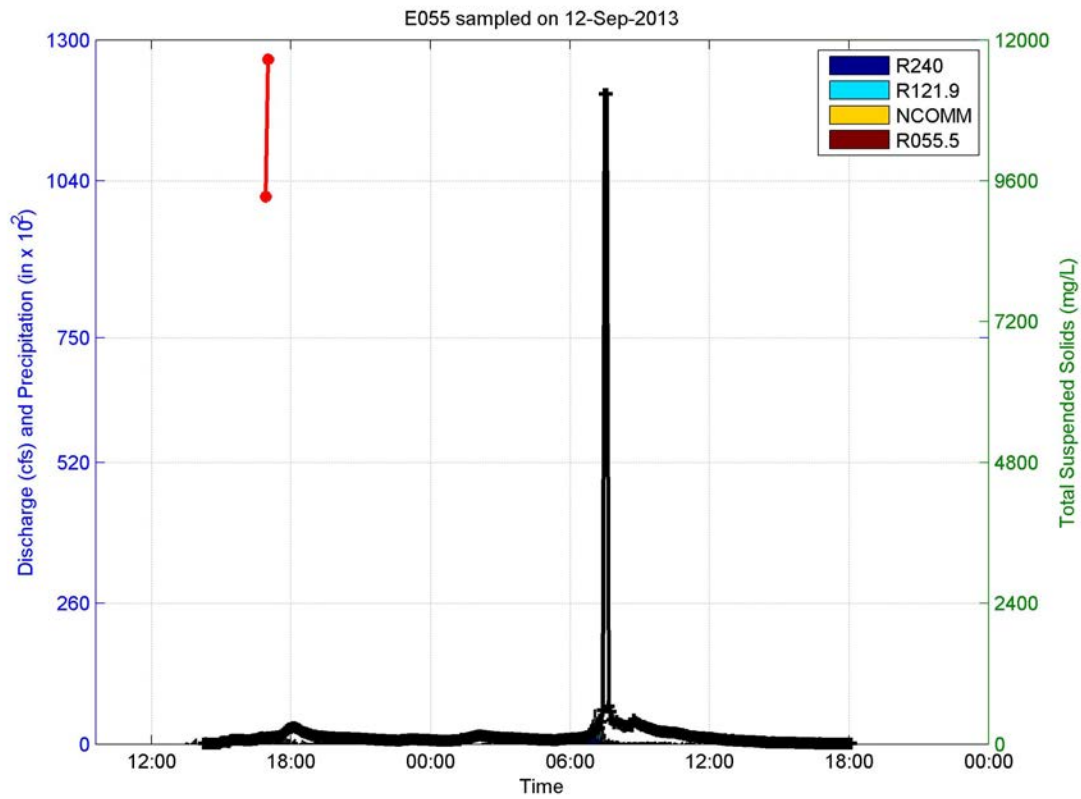


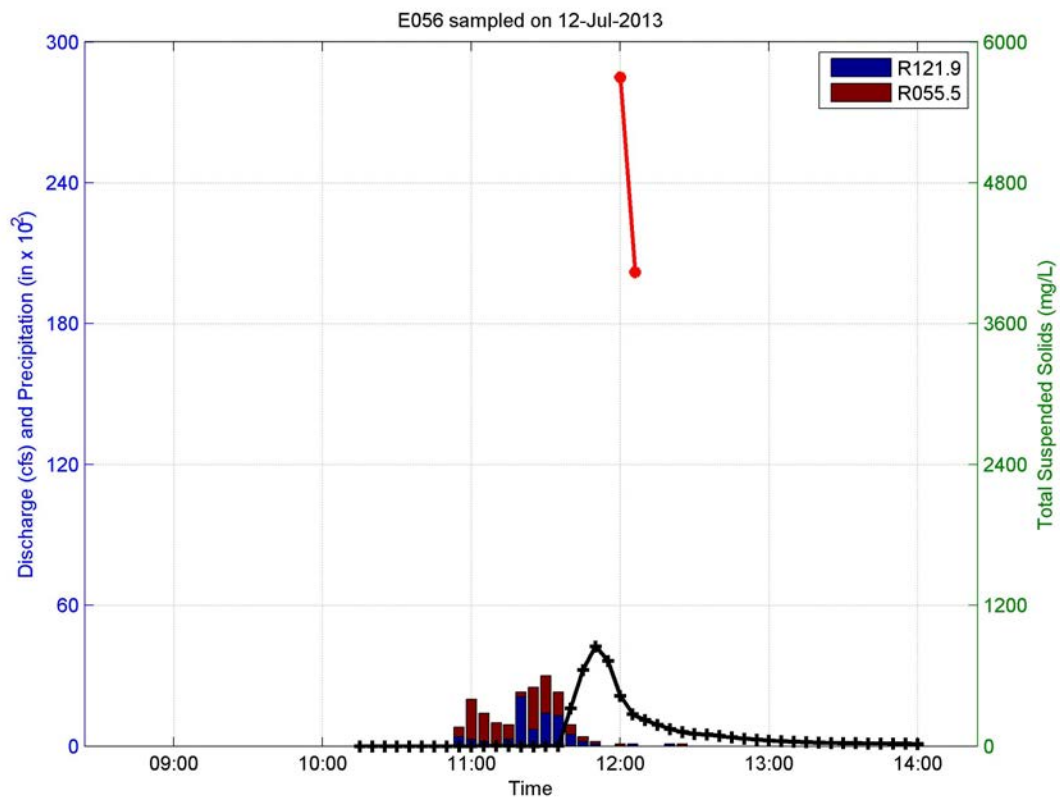
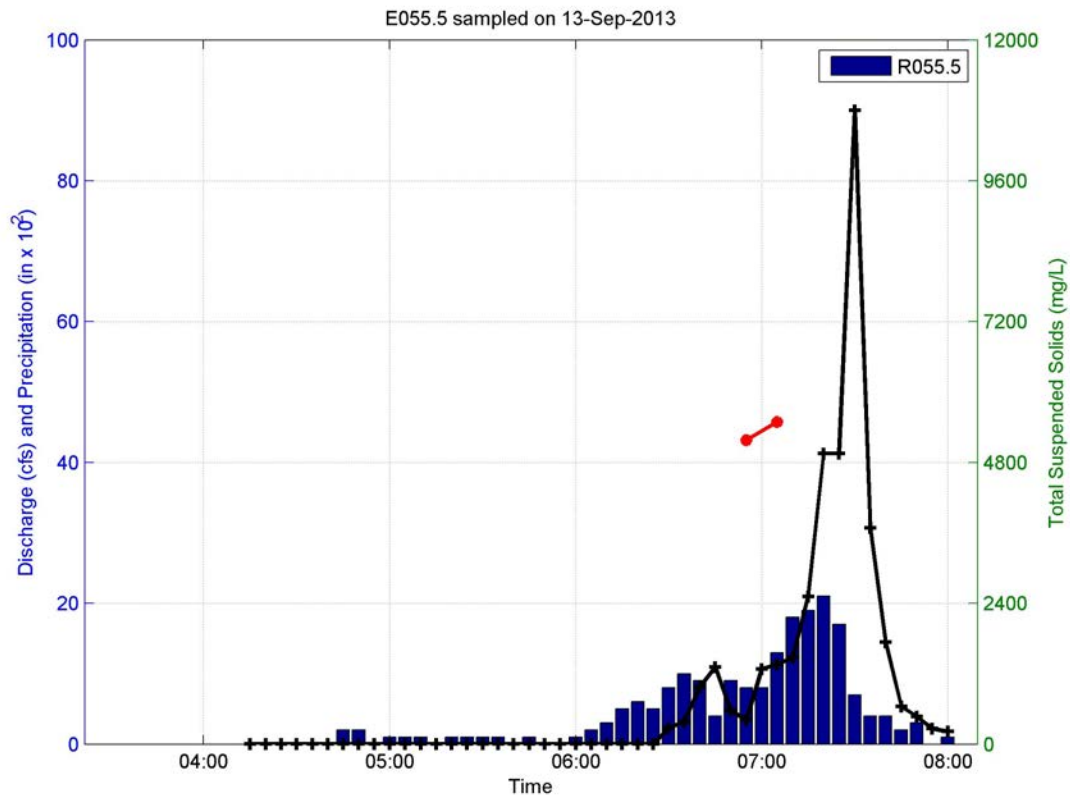


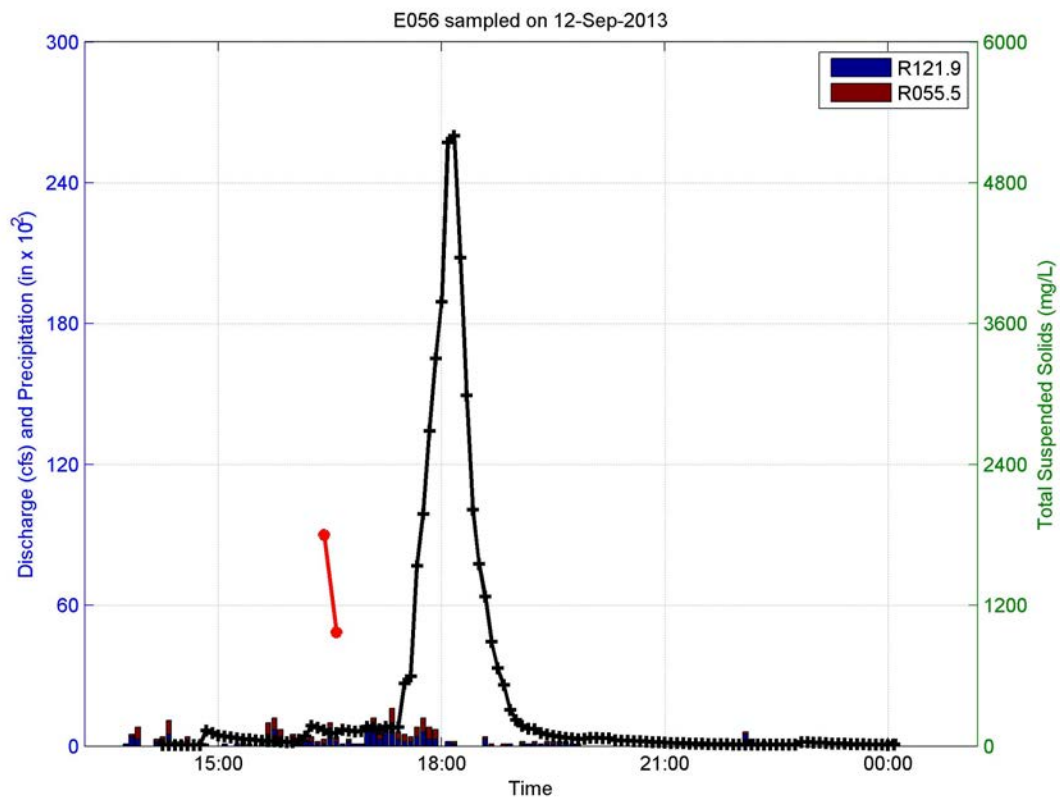
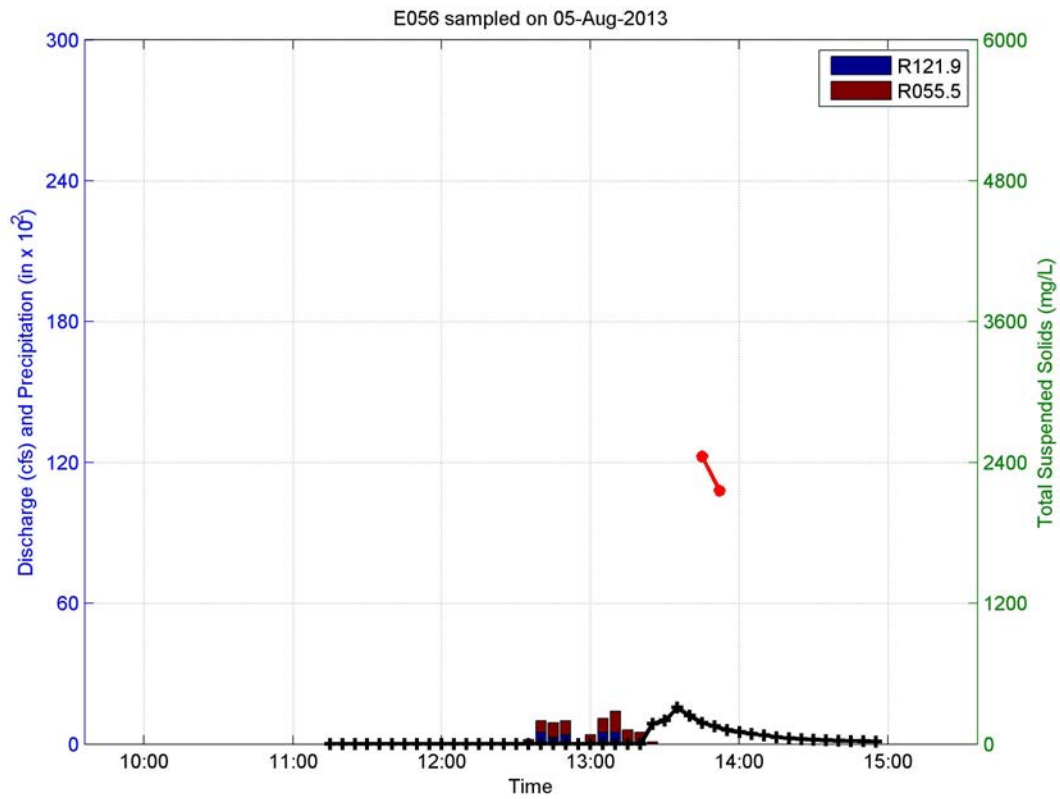


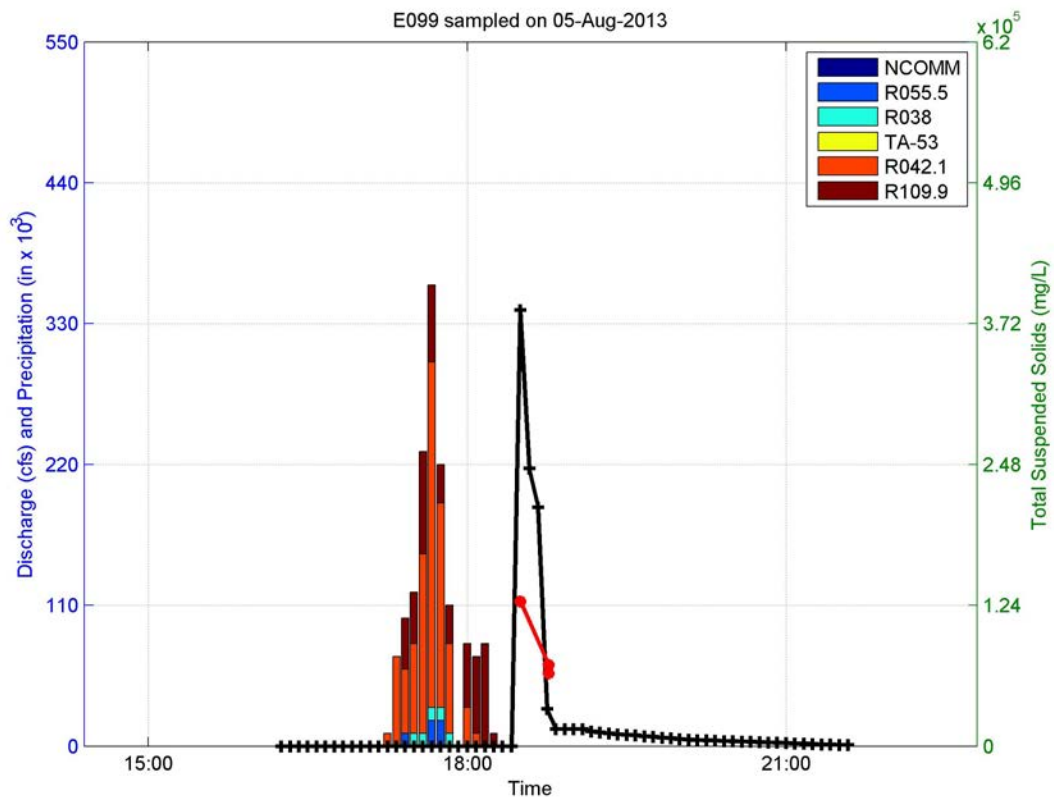
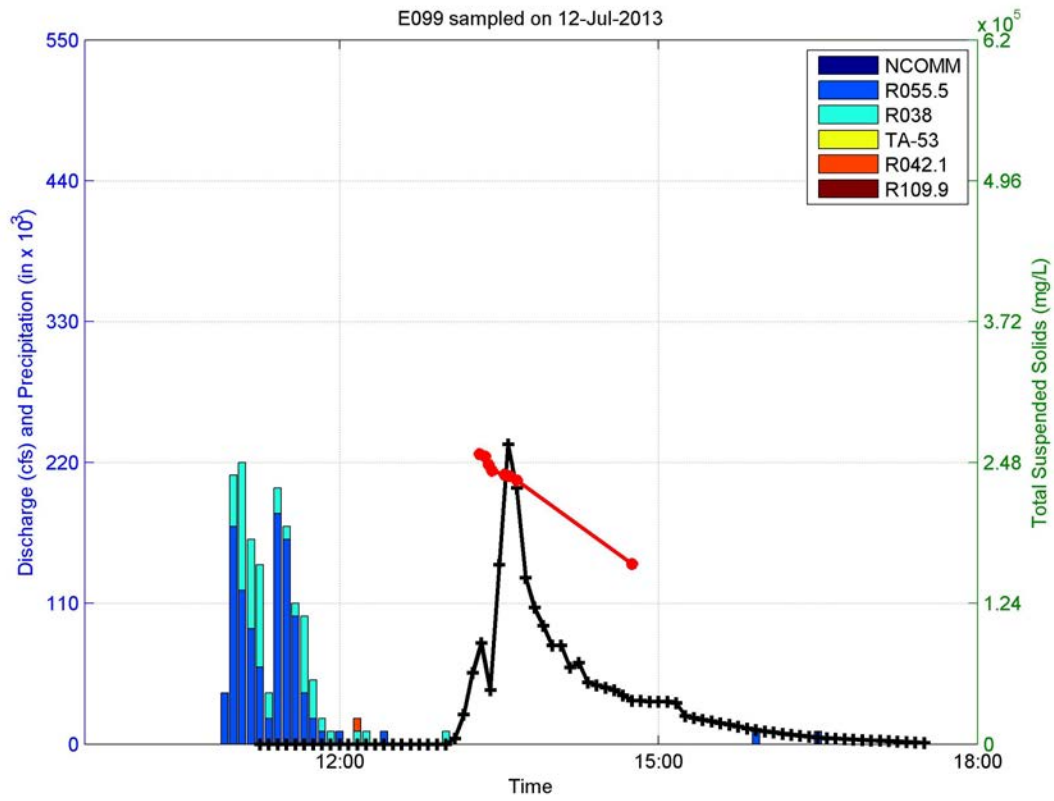


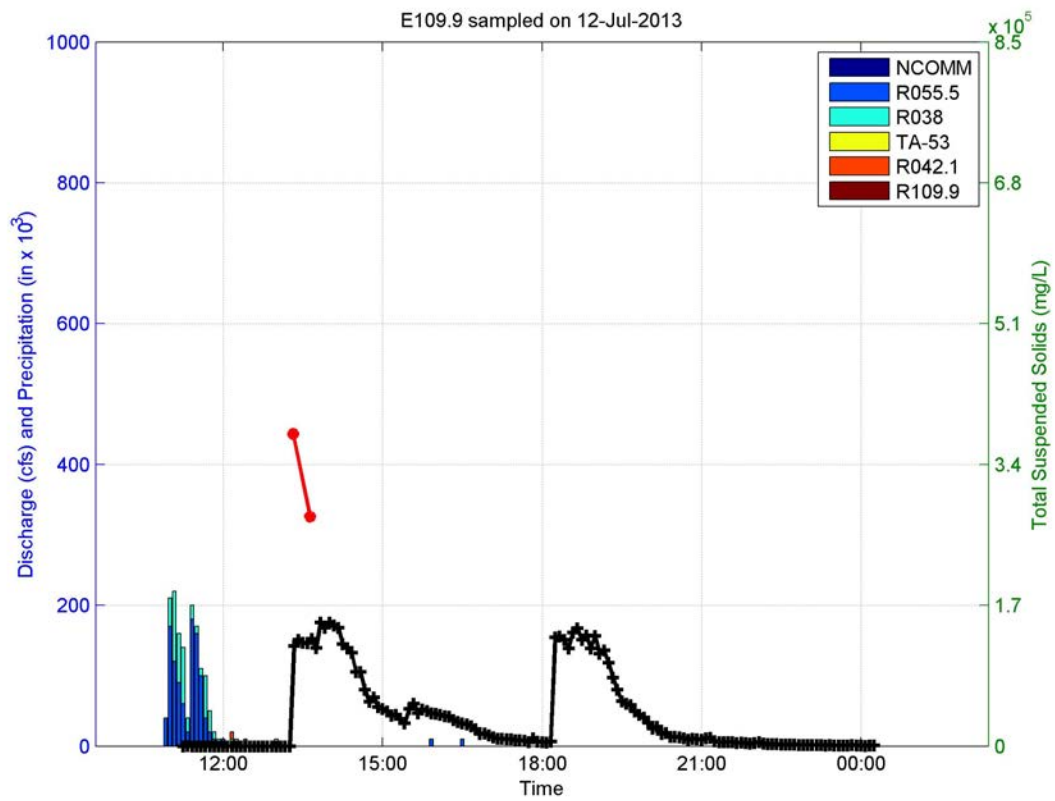
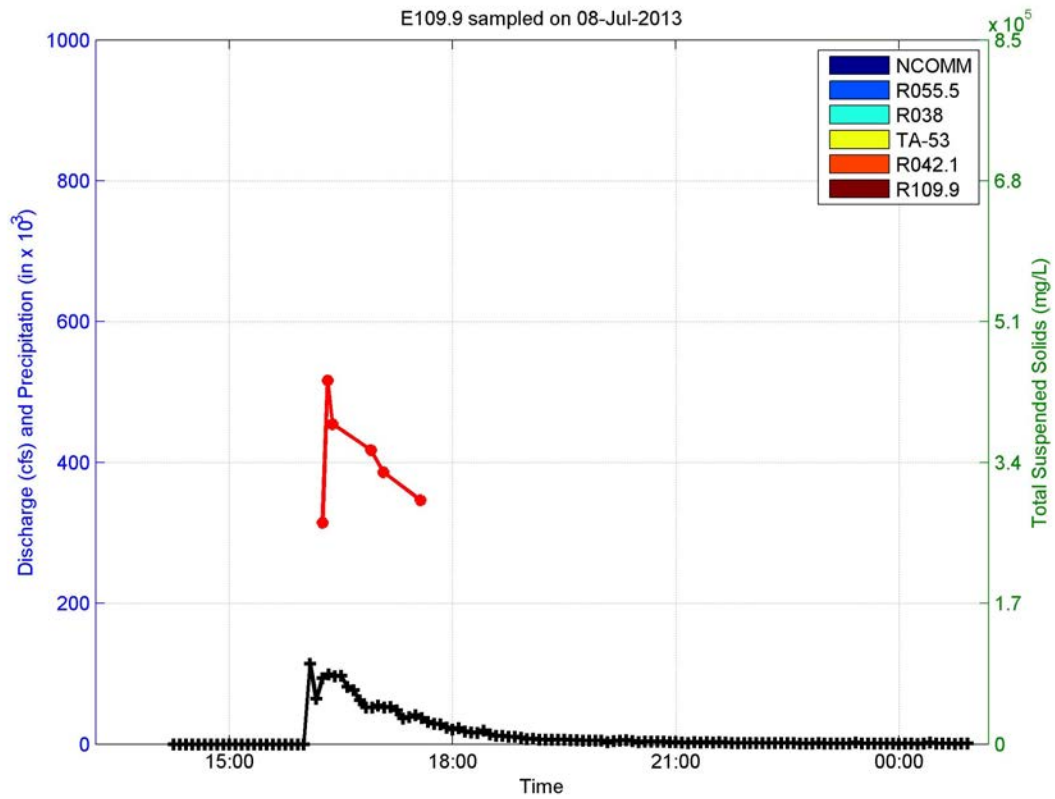


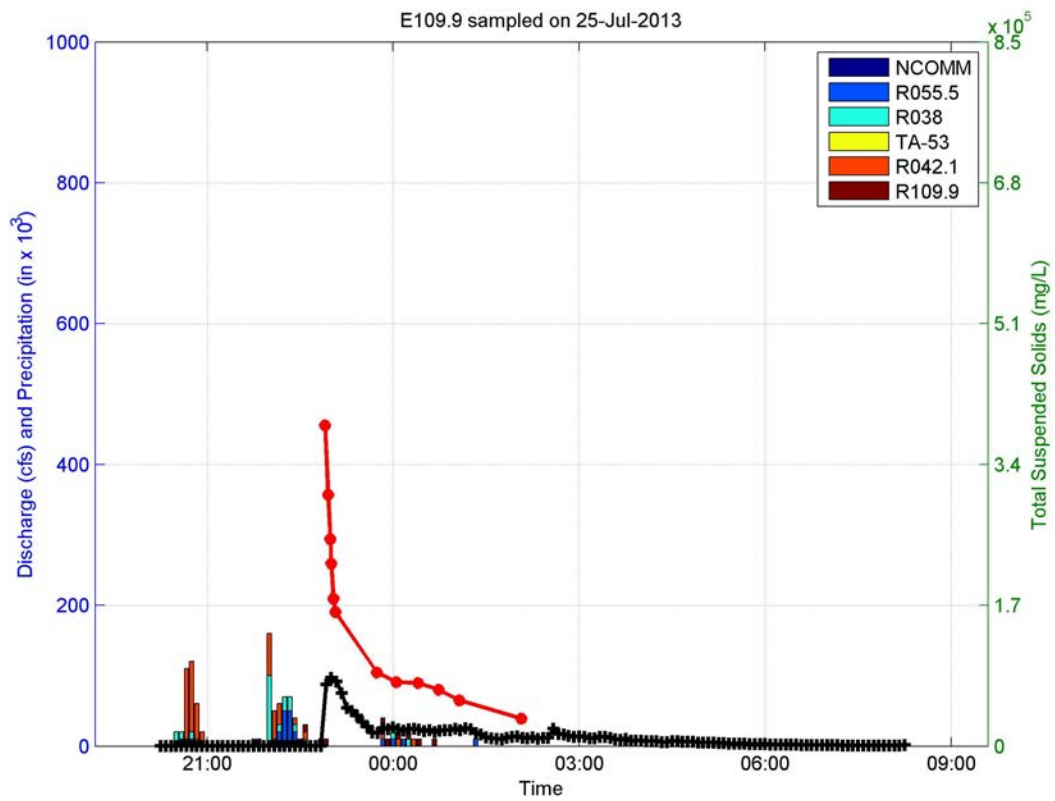
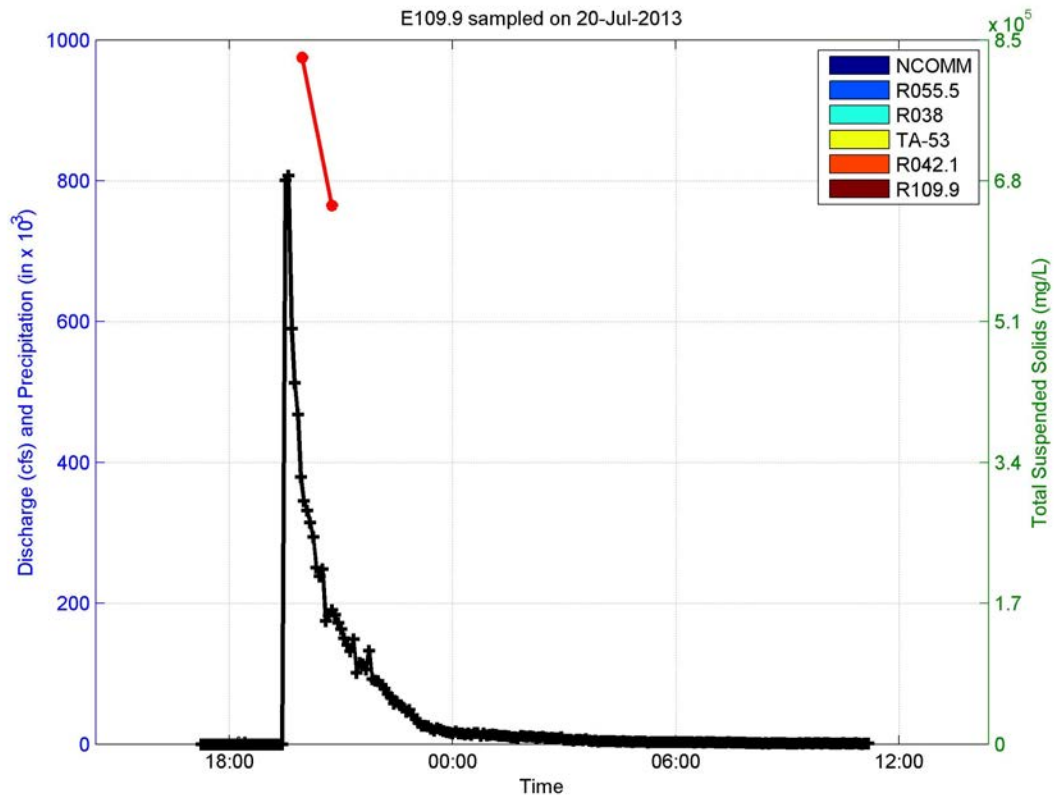


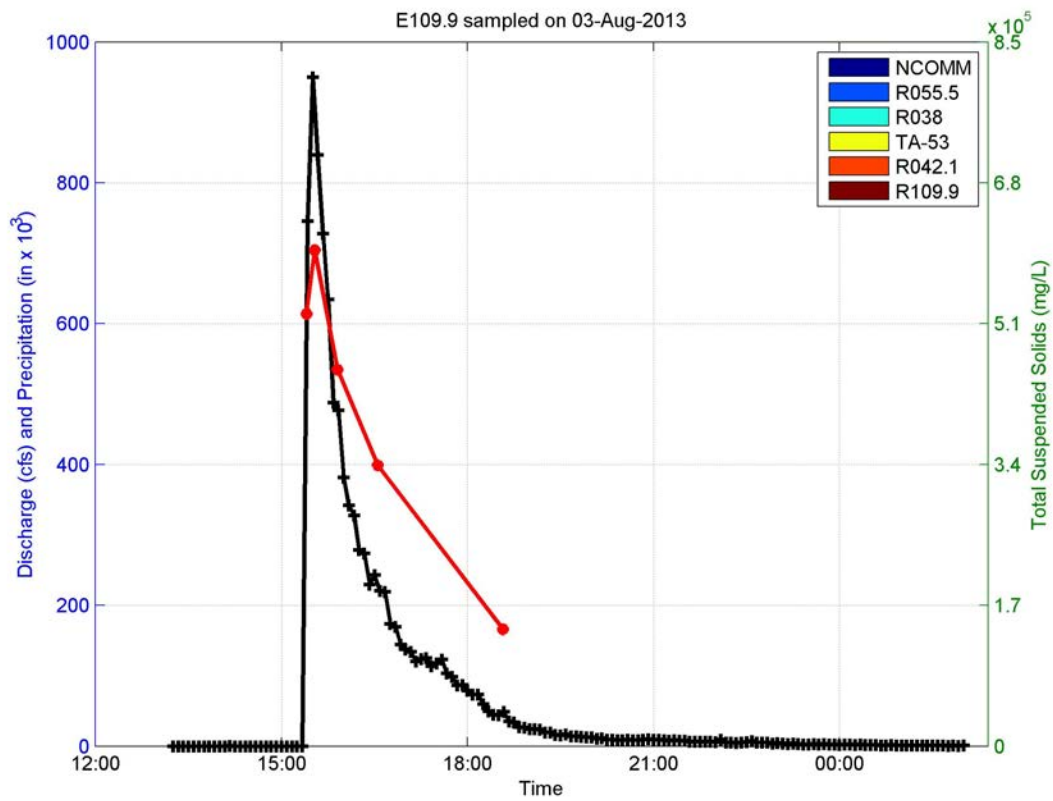
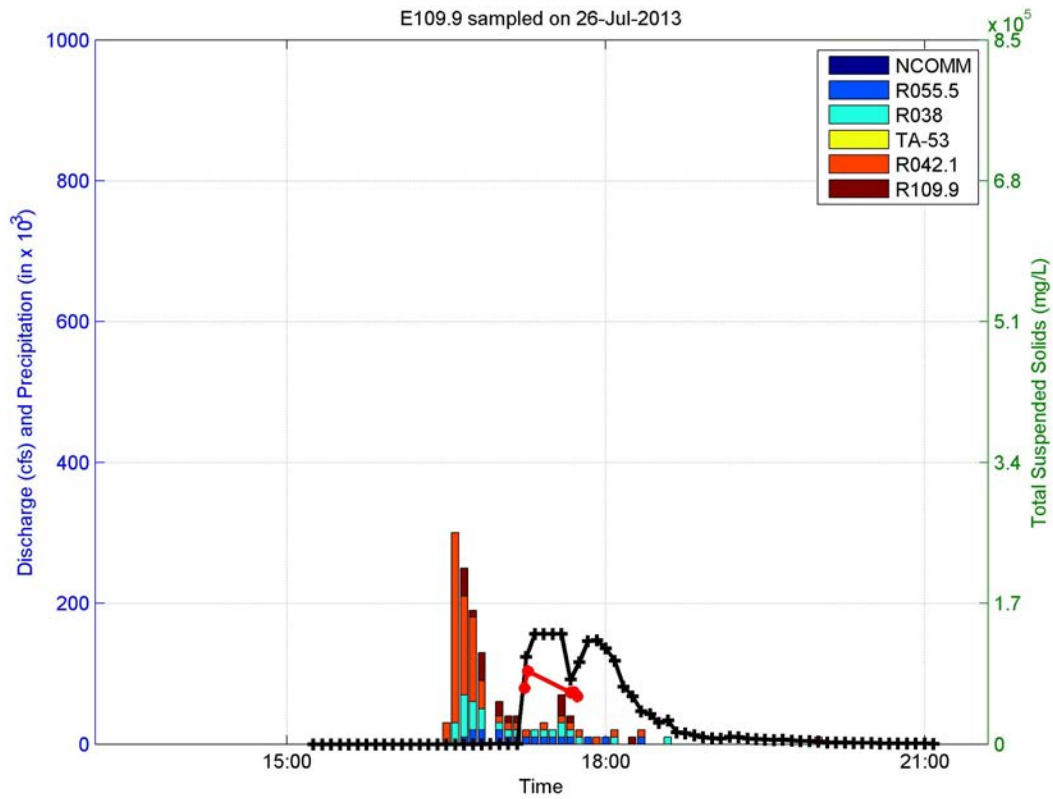


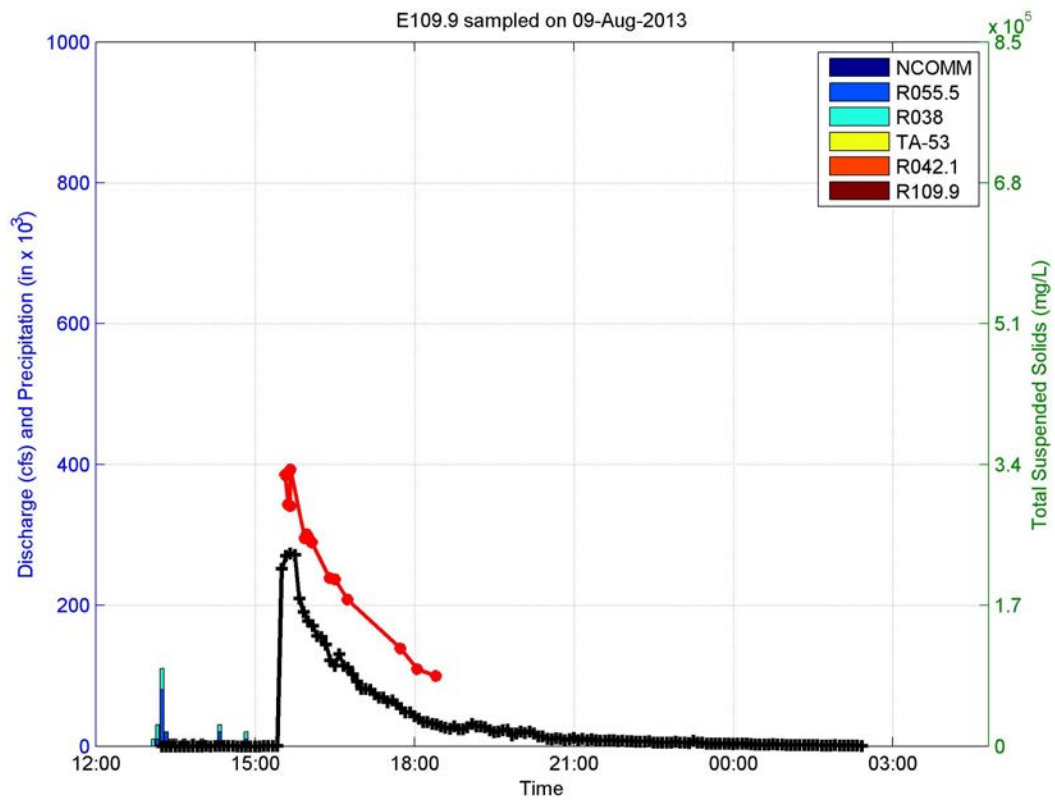
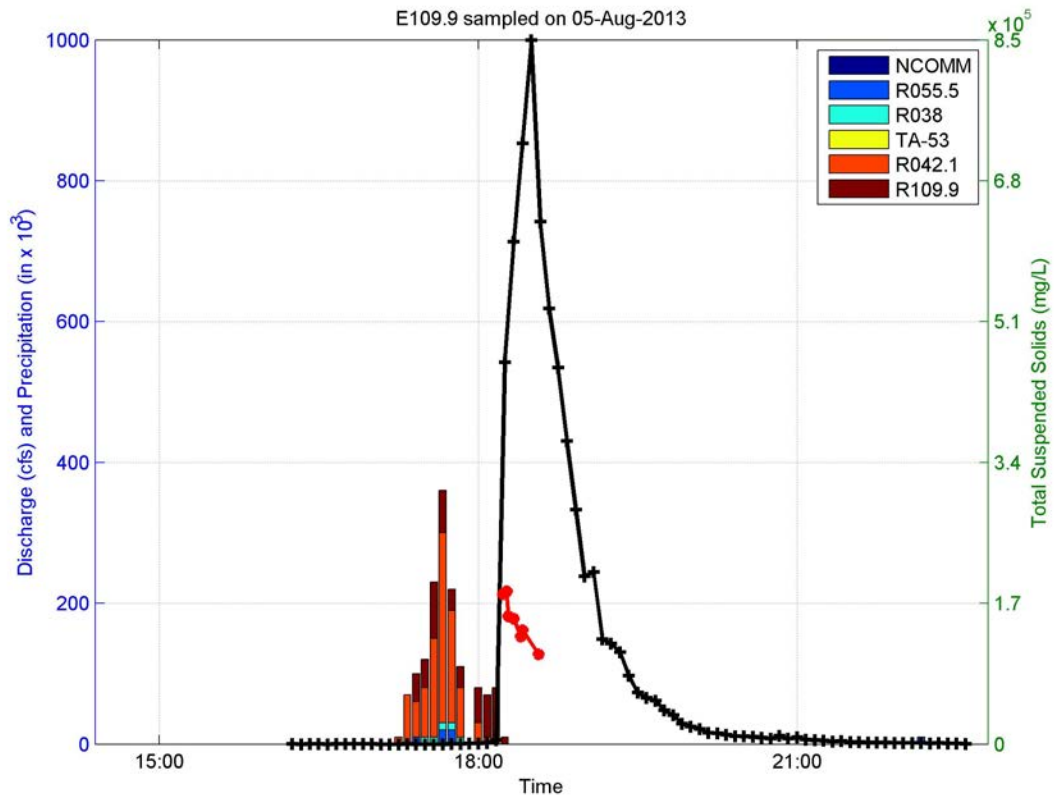


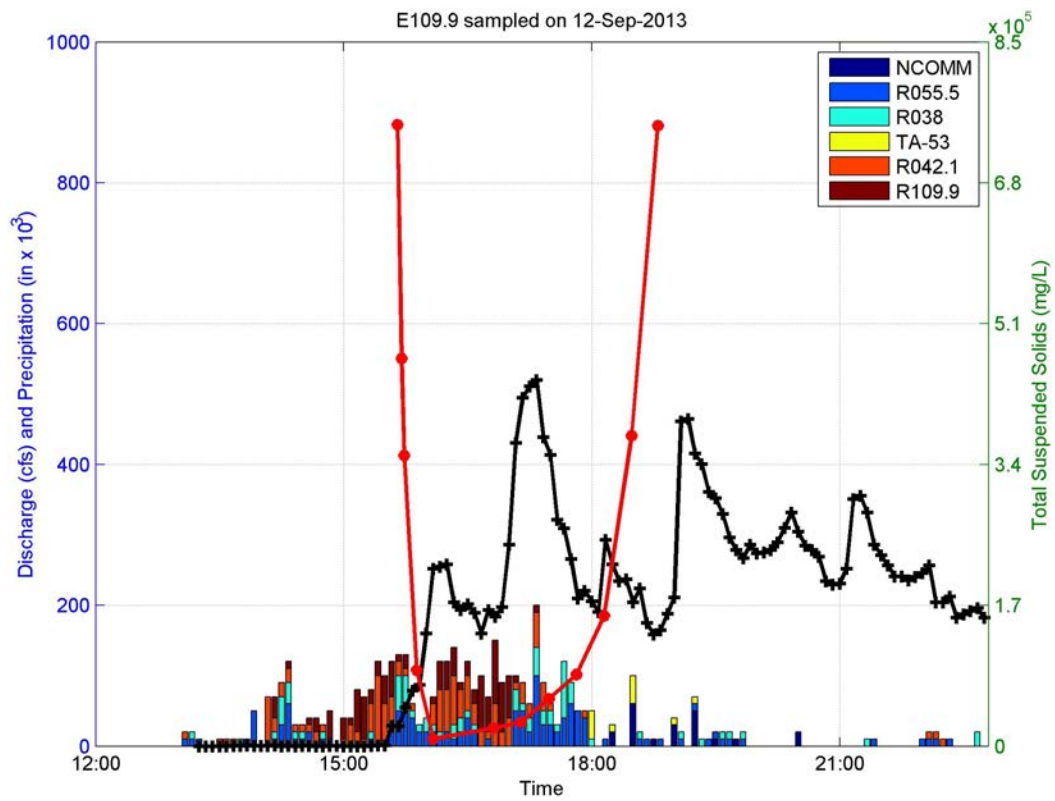












Appendix C

*Analytical Results, Analytical Reports, and 5-Minute Discharge
Results (on CD included with this document)*

