TA00

Los Alamos
NATIONAL LABORATORY
EST.1943
Environmental Programs
P.O. Box 1663, MS M991
Los Alamos, New Mexico 87545
505-606-2337FAX 505-665-1812

ENTERED

OCT. 2009

National Nuclear Security Administration
Los Alamos Site Office, MS A316
Environmental Restoration Program
Los Alamos, New Mexico 87544
505-667-4255/FAX 505-606-2132

Date: October 15, 2009
Refer To: EP2009-0520

James Bearzi, 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 Monitoring Plan for Los Alamos and Pueblo Canyons Sediment Transport Mitigation Project

Dear Mr. Bearzi:

Enclosed please find two hard copies with electronic files of the Monitoring Plan for Los Alamos and Pueblo Canyons Sediment Transport Mitigation Project. Submittal of this plan meets the due date of October 15, 2009, as approved by the New Mexico Environment Department's (NMED's) approval of extension request letter dated May 5, 2009. This submittal also includes the documentation of surveyed cross-sections in Reach P4-W, as discussed in NMED's above-mentioned approval letter.

This monitoring plan also incorporates scope and specific details for monitoring at locations E110, E050, and E060 in support of the City of Santa Fe's Buckman Direct Diversion (BDD) Project. Data from these stations will provide key stormwater inputs to operational aspects of the BDD project.

If you have any questions, please contact Danny Katzman at (505) 667-6333 (katzman@lanl.gov) or Nancy Werdel at (505) 665-3619 (nwerdel@doeal.gov).

Sincerely,

Michael J. Graham, Associate Director
Environmental Programs
Los Alamos National Laboratory

Sincerely,

David R. Gregory, Project Director
Environmental Operations
Los Alamos Site Office

32100

MG/DG/PH/DK:sm

Enclosures: Two hard copies with electronic files – Monitoring Plan for Los Alamos and Pueblo Canyons Sediment Transport Mitigation Project (LA-UR-09-6563)

Cy: (w/enc.)
Neil Weber, San Ildefonso Pueblo
Nancy Werdel, DOE-LASO, MS A316
Danny Katzman, EP-LWSP, MS M992
RPF, MS M707 (with two CDs)
Public Reading Room, MS M992

Cy: (Letter and CD only)
Laurie King, EPA Region 6, Dallas, TX
Steve Yanicak, NMED-DOE-OB, MS M894
Kristine Smeltz, EP-WES, MS M992

Cy: (w/o enc.)
Tom Skibitski, NMED-OB, Santa Fe, NM
Keyana DeAguero, DOE-LASO (date-stamped letter emailed)
Michael Graham, ADEP, MS M991
Alison M. Dorries, EP-WES, MS M996
Paul R. Huber, EP-LWSP, MS M992
IRM-RMMSO, MS A150 (date-stamped letter emailed)

Monitoring Plan for Los Alamos and Pueblo Canyons Sediment Transport Mitigation Project

Introduction and Objective	This monitoring plan is submitted pursuant to the New Mexico Environment Department's (NMED's) approval with modification letter, dated February 20, 2009 (2009, 105014) and NMED's approval of a request for extension, dated May 5, 2009 (2009, 106081). The objective of this monitoring plan is to evaluate the effect of mitigation measures that were installed in the Los Alamos and Pueblo Canyons (LA/P) watersheds under the NMED-approved "Interim Measure Work Plan to Mitigate Contaminated Sediment Transport in Los Alamos and Pueblo Canyons" (LANL 2008, 101714) and the "Supplemental Interim Measures Work Plan to Mitigate Contaminated Sediment Transport in Los Alamos and Pueblo Canyons" (LANL 2008, 105716). In accordance with these work plans, several physical features have been built, modified, or are under construction to minimize flood energy and associated sediment transport. These features include cross-vane structures (CVSs), willow planting, a wing ditch, grade-control structures (GCSs), and modification of a sediment retention basin. The conceptual model that contaminants migrate with sediment entrained in runoff and that reduced sediment transport will thereby reduce contaminant transport forms the basis for the mitigation measures in the LA/Pueblo watershed. Two types of monitoring will be conducted to meet the objective: (1) monitoring of geomorphic changes in the valley floor and (2) collection and analysis of stormwater runoff samples at gage and monitoring stations located throughout the watershed. 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 U.S. Department of Energy policy.
Monitoring Geomorphic Changes	Monitoring of geomorphic (surficial) changes associated with the mitigation measures will be conducted using three methods: repeat cross-section surveys, channel thalweg surveys, and general area surveys. These surveys will be conducted at locations as described below. Surveys will be conducted annually in late fall, winter, or early spring to document geomorphic changes that may have occurred during the previous summer season. The optimal time will be selected dependent on weather and the ability to work in the wetland after dense vegetation is laid down. Additional surveys may be conducted locally at other times of the year, if deemed necessary, to document geomorphic changes associated with unique runoff events. Figure 1 shows the areas where surveys will be conducted as described below. Figure 2 shows the locations of cross-sections for surveys conducted in September 2009, and Figure 3 shows the surveyed cross sections. **Pueblo Canyon:** • Reaches P-3FE and P-4W in Pueblo Canyon—A total of 23 cross-sections were surveyed in September 2009 at 100-ft intervals, for a total of 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), as shown in Figures 2 and 3. A longitudinal survey of the thalweg elevation through this area was also conducted. This encompasses the area where willows were planted in spring 2009 and where repeat cross-sections will be surveyed annually. These surveys are intended to document geomorphic changes in this portion of the canyon, particularly related to potential changes in the transition area. • Upper willow-planting area—At least 18 cross-sections will be surveyed and divided between the upper, middle, and lower thirds of the area where willows were planted in spring 2008 and 2009 between the new Los Alamos County wastewater treatment plant outfall and the area just upcanyon of the installed wing ditch (Figure 1). At least six cross-sections will be surveyed in each of these three areas at approximately 100-ft intervals. A longitudinal channel thalweg profile will also be surveyed in each of these areas. These surveys are intended to document anticipated aggradation of floodplain surfaces where willows will slow flood water and trap sediment as well as any changes to thalweg elevation in this area.

Monitoring Geomorphic Changes (continued)	• Pueblo Canyon GCS—A minimum of 15 cross-sections will be surveyed at 100-ft intervals for a distance of 1500 ft above the planned Pueblo GCS. The distance of 1500 ft is selected based on the maximum upcanyon distance that could be affected by the GCS design, which includes the 100-yr flood event. Three cross-sections will also be surveyed below the Pueblo GCS at 100-ft intervals to document any changes to the channel downcanyon of the structure. • Pueblo Canyon CVSs—Two cross-sections will be surveyed in the vicinity of each of the three Pueblo Canyon CVSs: one 50 ft upcanyon and one 50 ft downcanyon of the apex rock of each structure. A longitudinal thalweg profile will also be surveyed over these 100-ft distances. These surveys are intended to document geomorphic changes in the channel associated with the CVSs. These structures are not intended to cause significant change to the channel bed except for scour pools that may form in larger floods. Such scour pools are an expected and acceptable consequence of the CVSs. • Pueblo Canyon wing ditch—Five cross-sections will be surveyed downcanyon from the wing ditch at 100-ft spacing, and a longitudinal channel thalweg profile will also be surveyed over this distance. These surveys are intended to document geomorphic changes in the channel and floodplain associated with the wing ditch. **Los Alamos Canyon:** • Reach DP-2 GCS (DP GCS)—A minimum of 11 cross-sections will be surveyed above the planned DP GCS at 100-ft intervals upcanyon of the structure. The distance of 1100 ft is selected based on the maximum upcanyon distance that could be affected by the GCS design, which includes the 100-yr flood event. Two cross-sections will also be surveyed below the DP GCS at 100-ft intervals to document any changes to the channel downcanyon of the structure. A longitudinal channel thalweg profile will also be surveyed over this area. • Los Alamos Canyon low-head weir—A general area survey will be conducted within the basin upcanyon of the gabion structure that comprises the weir. Irregular topography associated with basalt mounds and constructed modifications within the basin warrants a more detailed survey than can be conducted with repeat cross-sections. The general area survey will enable annual estimates of aggradation within the basin.
Monitoring Stormwater Runoff	Stormwater monitoring will be conducted at locations shown in Figure 1 and Table 1. These locations are collectively situated to compartmentalize monitoring data for evaluation of performance of each of the mitigation features within the watershed. Data will also be available to document background or baseline conditions upcanyon of the structures. The goals of the sampling strategy are to collect data that represent variations in contaminant concentrations and suspended sediment concentration (SSC) within runoff events across a typical hydrograph for each location and to document short-term and long-term trends in stormwater contaminant concentrations associated with the mitigation features. The monitoring strategy described below is developed to achieve these goals. After 2 yr of implementation of this plan, data will be reviewed and recommendations will be made regarding the suite and/or approach to sampling. **Gaging** Each of the monitoring locations listed in Table 1 will be monitored continuously for stage. Each location will have a rating curve established and reviewed annually or after large channel-changing floods to enable conversion of stage to discharge.

Monitoring Stormwater Runoff (continued)	**Sampling** Stormwater-runoff sampling at each of the monitoring locations, except E050, E060, and E110, will be triggered by flows of approximately 10 cfs. Samples at E050, E060, and E110 will be triggered by 5-cfs flows to ensure sampling at flows that may extend to the Rio Grande. Samples will be collected using automated stormwater samplers that contain a carousel of 24 1-L bottles. The collection approach will utilize collection of "grab" samples that will consist of composites of several bottles collected within a 15-min time interval to satisfy NMED Surface Water Bureau requirements for comparison of water samples with water-quality standards. The exception will be the last of the four composite samples, which is intended to represent the relatively steady long-duration recessional portion of a typical hydrograph that is characterized by rapid rising limb, rapid initial recessional limb, and long recessional tail. This final composite sample will represent a longer duration than 15 min to capture the concentration and mass flux associated with the late recessional portion of hydrographs. The sampling approach is described in Table 2. Because sediment concentrations within a flood generally follow the shape of the hydrograph, this approach optimizes representation of concentrations at each of four portions of the hydrograph and also enables the most reliable estimates of sediment and contaminant flux for an event and ultimately for a monitoring year. Sample suites vary according to monitoring groups and are based on key indicator contaminants for a given portion of the watershed. Table 1 shows the monitoring groups and the analyte suite for each. SSC analysis is common to all groups. Analysis of SSC will be used to determine correlations to contaminant concentrations and estimates of total mass flux for suspended sediment. All events exceeding 5 cfs at E050, E060, and E110 will be analyzed for the suite described in Table 1. For the other two monitoring groups, the first four events of each stormwater runoff year (beginning on June 1) will be analyzed for the suite described in Table 1. Subsequent events will be monitored only for SSC, unless the event is larger than events already sampled in the stormwater runoff year. In that case, samples will be submitted for contaminant analysis. The list of contaminants for each monitoring group is prioritized to guide which analyses will be conducted if the collected water volume for a sample composite is insufficient to fulfill the suite. The priority is consistent with the order of the constituents listed in Table 1. The analytical method, detection limit, and minimal detectable activity (for radionuclides) and sample-volume requirements are described in Table 3.
Reporting	The repeat cross-section, channel thalweg, and general area surveys will be conducted in late fall to early spring, as described above. The survey data, plotted cross-section and channel thalweg profiles, and discussion will be provided in an annual report on May 30 of each year. An initial report documenting baseline geomorphic conditions will be submitted to NMED on May 30, 2010. Analytical data for each water year (October through September) will be reported annually on February 28. The report will include discharge data from each gage, analytical results, and discussion. The timing of report delivery will allow combining analytical data from off-site laboratories with finalized discharge data from the gage stations, the latter of which has a typical 3-mo data processing time (e.g., December 31 for discharge data obtained in the third quarter of the calendar year). The objective of both reports is to review the data in the context of each of the mitigation measures implemented under the work plans as described in the Introduction and Objective section. The data will be reviewed to evaluate overall watershed performance and to watch for impacts to ongoing activities within the watershed. Additionally, evaluations of geomorphic change will include considerations of the need for adaptive management of any of the mitigative structures or activities implemented in the watershed.

REFERENCES

The following list includes all documents cited in this plan. Parenthetical information following each reference provides the author(s), publication date, and ER ID number. This information is also included in text citations. ER ID numbers are assigned by the Environmental Programs Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the 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), 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)

NMED (New Mexico Environment Department), February 20, 2009. "Approval with Modifications, Supplemental Interim Measure Work Plan (SIWP) to Mitigate Contaminated Sediment Transport in Los Alamos and Pueblo Canyons," New Mexico Environment Department letter to D. Gregory (DOE-LASO) and D. McInroy (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2009, 105014)

NMED (New Mexico Environment Department), May 5, 2009. "Approval of Exten[s]ion Request for Submittal of the Los Alamos and Pueblo Canyons Sediment Transport Monitoring Plan," New Mexico Environment Department letter to D. Gregory (DOE-LASO) and M. Graham (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2009, 106081)

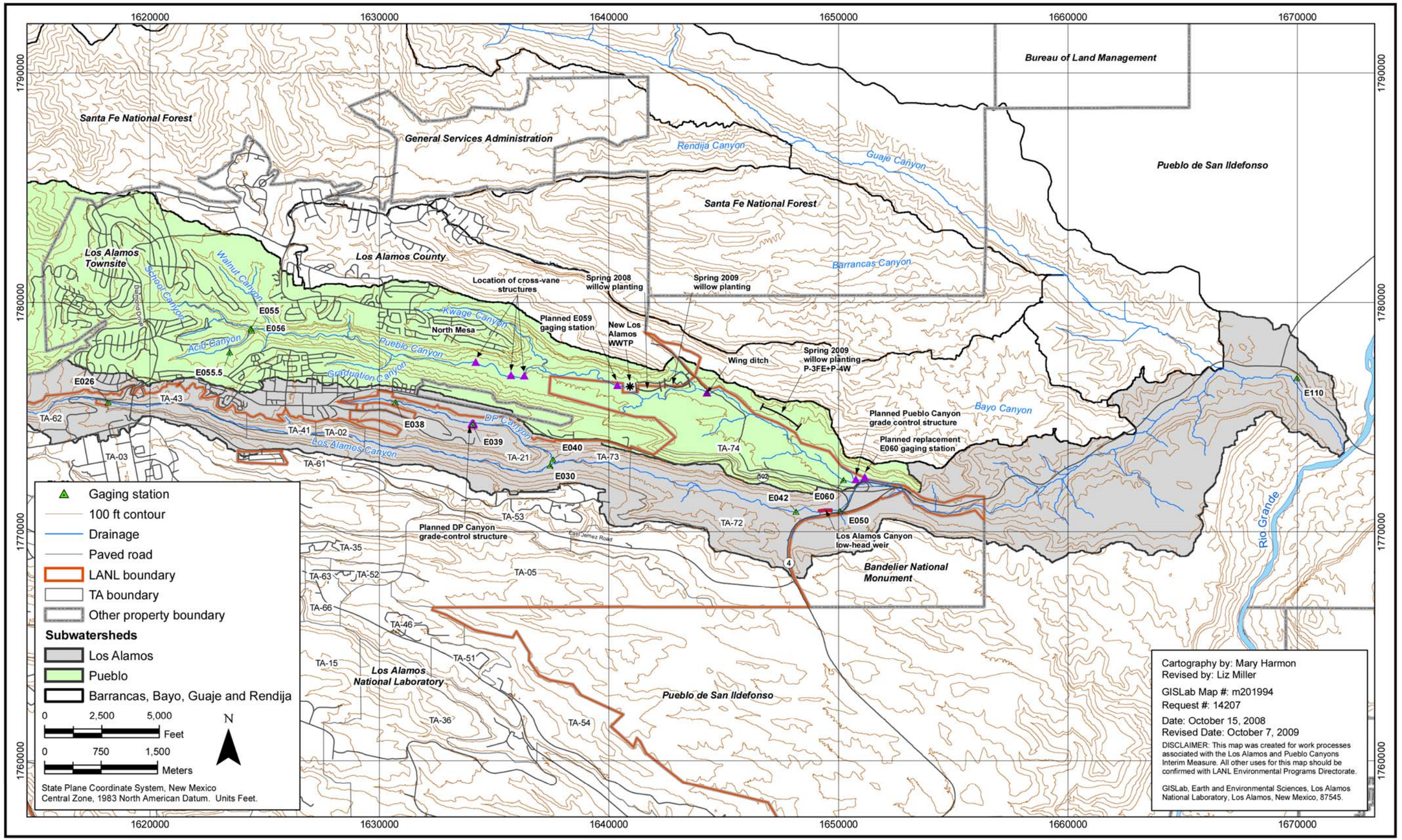
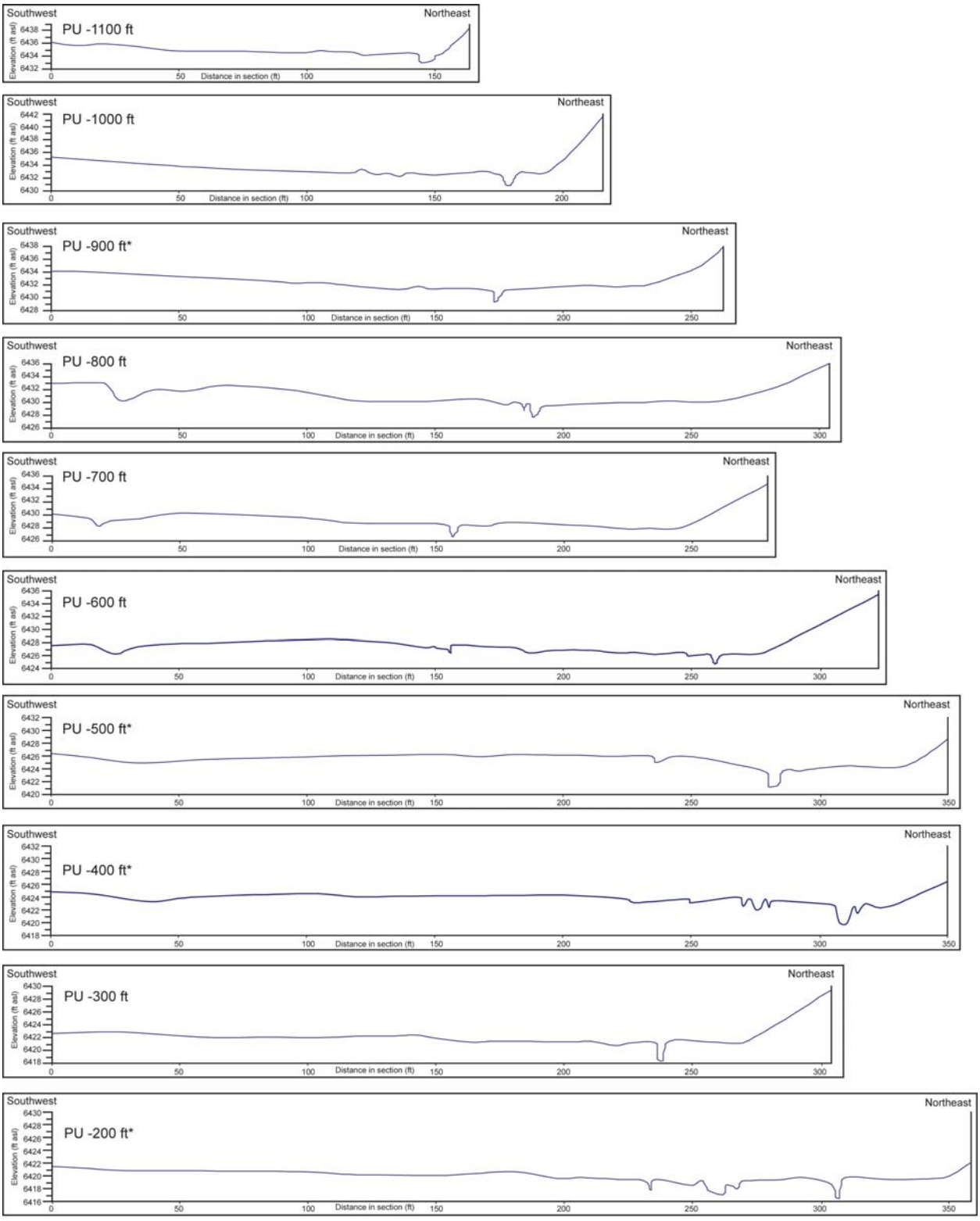


Figure 1 **Los Alamos and Pueblo Canyon watershed showing monitoring locations and stormwater mitigation features**

Figure 2 **Orthophotograph of a portion of Pueblo Canyon showing surveyed cross-section locations around reach P-4W**



*Truncated on northeast end, northeast of contact with Puye Formation.

Figure 3 Topographic survey profiles conducted in September 2009 in an area in Pueblo Canyon around reach P-4W

Table 1
Sample Locations and Analyte Suite

Monitoring Group	Locations	Analytical Suite[a, b]
Los Alamos Canyon	E038, E039, E040, E026, E030, E042	PCBs, gamma spec, iso pu, Sr-90, dioxin/furans, SSC
Pueblo Canyon	E055.5, E055, E056, E059	PCBs, iso pu, SSC
Lower Watershed	E050, E060, E110	PCBs, gamma spec, iso pu, Sr-90, dioxin/furans, target analyte list metals, gross alpha, iso u, Am-241 (alpha spec), SSC

[a] Suite listed in order of priority to guide analysis of limited water volume within a composite sample. SSC is independent of prioritization because it is derived from separate sample bottles.

[b] Radionuclides will be analyzed in filtered and nonfiltered samples for E050, E060, and E110.

Table 2
Sampling Design

Sample	Number of Subsamples (Bottles) Comprising Grab Sample for Contaminant Analysis	Subsample Spacing (min)	Pause Duration after Prior Sample (min)	Total Duration Represented by Sample (min)[a]	Bottles Used for Contaminant Analysis[b]	Bottles Used for SSC Analysis[c]
1	3	3	na[d]	15	1,3,5	2,4
2	3	3	5	15	6,8,10	7,9
3	3	3	15	14	11,13,15	12,14
4	5	12	60	84	16,18,20,22,24	17,19,21,23

[a] Total duration monitored by sampling approach = 208 min (~3.5 hr).

[b] Samples will be analyzed according to prioritization shown in Table 1 if insufficient volume is collected for each group-suite analysis.

[c] Excess beyond 500 mL will be used for contaminant analysis.

[d] na = not available.

Table 3
Analytical Requirements

Analyte	Method	Detection Limit	Monitoring Group Suites		
			Los Alamos	Pueblo	Lower Watershed
PCBs	SW-846:8082	1 µg/L	√	√	√
Gamma spec	EPA:901.1	0.5 pCi/L (Cs-137)	√	—*	√
Iso plutonium	HASL-300	0.5 pCi/L	√	√	√
Strontium-90	EPA:905.0	0.5 pCi/L	√	—	√
Dioxins/furans	SW-846:8290	1.0 pCi/L	√	—	√
Target analyte list metals	SW-846:6010B/6020/7470A	variable	—	—	√
Gross alpha	EPA:900	3 pCi/L	—	—	√
Iso uranium	HASL-300	0.5 pCi/L	—	—	√
Americium-241	HASL-300	0.5 pCi/L	—	—	√
Suspended solids	EPA:160.2	10 mg/L	√	√	√

*— = Not analyzed.