Response to the Notice of Disapproval for Stormwater Performance Monitoring in the Los Alamos/Pueblo Watershed During 2010, Los Alamos National Laboratory, EPA ID No. NM0890010515, HWB-LANL-11-012, Dated May 12, 2011

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 notice of disapproval. Los Alamos National Laboratory's (LANL's or the Laboratory's) responses follow each NMED comment. This response contains data on radioactive materials, including source, special nuclear, and byproduct material. 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 policy.

GENERAL COMMENTS

NMED Comment

1. *The Permittees did not collect samples during the majority of storm events which met the criteria for required sampling, specifically, ten cubic feet per second (cfs) flow rate at most gage stations and five cfs flow rate at gages E050.1, E060.1, and E109.9. The results presented in the Report indicate that the Permittees sampled 32 of the 88 required stormwater events, resulting in an overall sampling efficiency of 36%. While several of the missed samples were attributed to sampler malfunction, the overwhelming majority of missed events were the direct result of not retrieving previously collected samples in a timely fashion. Sampling stations were left unchecked for over a week, sometimes over two weeks, after storm events passed through the area. Missed samples attributed to sampler malfunction could have also been avoided had the samplers been checked in a more timely manner. The table below shows the results of this lack of attention to the samplers.*

Sampling Point	Sampling Efficiency	Max Sampled Flow Compared to Max Flow Event	Notes
E038	25%	55%	Missed 4 highest flow sampling events
E039.1	33%	63%	Missed 2 highest flow sampling events
E040	40%	33%	Missed 2 highest flow sampling events
E026	na	na	No triggered events
E030	50%	33%	Missed highest flow sampling event
E042.1	50%	100%	Captured highest flow event
E050.1	0%	na	Missed all triggered events
E109.9	75%	100%	Captured highest flow event
E055.5	57%	61%	Missed highest flow sampling event
E056	23%	93%	Missed highest flow sampling event
E055	50%	80%	Missed highest flow sampling event
E059	25%	54%	Missed highest flow sampling event
E060.1	100%	100%	Only one triggered event

NMED's January 11, 2010 Approval with Modifications Comment #5 states, "The sampling equipment must be maintained in good working order so that all significant storm events at each location can be sampled at each monitoring location where there is sufficient flow to trigger the samplers." The Permittees did not did not follow this directive. Include a section in the Report entitled "Deviations from Work Plan" and provide explanations for the missed sampling events at each sampling station.

LANL Response

1. The report has been revised by including a new section entitled "Deviations from Work Plan" (section 2.5). This section describes all deviations from the approved work plan and the basis for these deviations.

NMED Comment

2. *The Permittees did not analyze the collected samples for all constituents in the analytical suites outlined in Table 2.3-1 of the Report. No explanation was provided for why certain analyses were omitted. Section 2.3 of the Report states, "[a]nalyses were conducted from stormwater collected at gage locations as shown in Table 2.3-1. In cases where insufficient water was collected to perform all planned analyses, analyses were prioritized in the order presented in this table." This prioritization was not followed. For example, the sample collected from E040 on August 15, 2010 was analyzed for the last four analytes on the list and was not analyzed for the six preceding analytes. Section 2.2 of the Report states, "[t]he sampler at E040 collected stormwater on August 15 and samples were retrieved during the following inspection on August 23. As a result, the E040 sampler was full and did not collect during discharge of 263 cfs on August 16." This statement indicates that there was a sufficient amount of water collected to conduct all required analyses for this stormwater event.*

In addition, in Table 2.3-1, "suspended sediment" (SSC) is listed as both the highest and lowest priority analysis in the analytical suites for both Upper Los Alamos Canyon and Upper Pueblo Canyon monitoring groups. According to the Permittees' October 2009 Monitoring Plan for Los Alamos and Pueblo Canyons Sediment Transport Mitigation Project (Work Plan), suspended sediment should be the lowest priority for both monitoring groups.

There is confusion regarding gross beta analysis because gross beta is not listed in Table 2.3-3 for analyses requested. Gross beta is listed in Tables 2.3-5 and 2.3-6 with regards to sampling sequences. However, no gross beta results are provided in Table 4.0-2.

The table below shows the analytes that were neglected in the analyses of the stormwater samples based on Table 2.3-3 of the Report.

Sampling Point	Date of Sample	Analyses Not Performed
E038	6/24/2010	Gross Alpha
E040	8/15/2010	PCBs, Gamma Spectroscopy, Isotopic Plutonium, Isotopic Uranium, Strontium 90, Dioxins and Furans
	8/23/2010	Gamma Spectroscopy, Isotopic Plutonium, Isotopic Uranium, Strontium 90, Dioxins and Furans, TAL Metals, Hardness
E042.1	7/22/2010	Gross Beta
	7/31/2010	Gross Alpha, Gross Beta

Sampling Point	Date of Sample	Analyses Not Performed
	8/5/2010	Gross Beta
	8/15/2010	TAL Metals, Hardness, Gross Apha, Gross Beta
	8/16/2010	Gross Alpha, Gross Beta
E109.9	8/15/2010	Gross Beta
	8/23/2010	PCBs, Dioxins and Furans, Gross Beta
	9/22/2010	Gross Alpha, Gross Beta
E059	8/5/2010	TAL Metals, Hardness, Gross Apha, Gross Beta
E060.1	8/16/2010	Gross Alpha, Gross Beta

Include a section in the revised Report entitled "Deviations from Work Plan" and provide explanations for the analyses that were not performed in accordance with the Work Plan.

LANL Response

2. The report has been revised by including a new section entitled "Deviations from Work Plan" (section 2.5). This section describes all deviations from the approved work plan and the basis for these deviations. Subsection 2.5.3 specifically addresses deviations from proposed analytical suites.

NMED Comment

3. *The Permittees did not follow the sampling protocol outlined in the Work Plan. The Work Plan states that, "[s]amples will be collected using automated stormwater samplers that contain a carousel of 24 1-L bottles." This protocol was changed with no notification provided to, or approval received from, NMED. Table 2 of the Work Plan provided a sampling approach that was apparently abandoned, and no explanation was provided for the deviation in the Report. Samples were to be composited from multiple sample bottles collected over a much longer duration than that which actually occurred.*

The Work Plan also stated, "[s]ubsequent events will be monitored only for SSC, unless the event is larger than events already sampled in the stormwater runoff year." This protocol was not followed. For example, the Report states, "The samples at E038 collected on August 9, September 8, and September 22 were discarded because four samples had been collected during prior storm events and discharges of 63, 47, and 86 cfs, respectively, were less than the discharge of 112 cfs collected on July 22. These samples were not submitted for suspended sediment analyses." No explanation was provided in the Report for these deviations from the Work Plan.

In a section in the revised Report entitled "Deviations from Work Plan", provide explanations for not following the approved Work Plan. Also, modify future work so that events are collected at near equal intervals throughout the range of peak discharge events, from a minimum flow near the 5 or 10 cfs activation discharge rate to the maximum flows. This issue also will be addressed in NMED's comments on the annual update to the Monitoring Plan for Los Alamos and Pueblo Canyons Sediment Transport Mitigation Project (Monitoring Plan).

LANL Response

3. The report has been revised by including a new section entitled “Deviations from Work Plan” (section 2.5). This section describes all deviations from the approved work plan, including deviations from sampling protocol, and the basis for these deviations. Revisions to the sampling protocol have been incorporated into the NMED-approved sediment monitoring plan for 2011 (LANL 2011, 201578; NMED 2011, 203705).

NMED Comment

4. *The primary monitoring objective in assessing the effectiveness of the Los Alamos Watershed mitigations in reducing contaminated sediment transport was not met. In order to demonstrate effectiveness, the report should be able to demonstrate reductions in responses to watershed mitigations, in:*

1. *flow rates*
2. *sediment yield, and*
3. *contaminant yield*

These reductions must be demonstrated temporally and spatially. Temporal relationships must be described and developed from historical flow data, changes between events, and changes during events. Spatial relationships must be described and developed from data from each station, including the relevance those relationships have to the reaches between the stations.

The discussion of flow data must include changes in peak flows and in total discharge. The data should be presented in context with precipitation, stream transmission, and provenance. For example, demonstrate any correlations between:

1. *flow reduction (peak flow and volume or total discharge) in relation to precipitation intensity, volume, and provenance;*
2. *transmission gains or losses per mile (e.g., cfs/mile), between stations, and in relation to changes through time (between events and relative to preceding years);*
3. *storm paths and origin of flow;*
4. *peak flow and volume or total discharge at each monitoring location.*

Sediment and contaminant volume evaluations also must be provided. This includes concentration measurements and inventory transport estimate comparisons between monitoring stations and at individual stations over time.

Define the relationship between flow measurements at all new critical flume stations and the stations that were replaced (e.g., E110 vs E109.9). If data does not exist for 2010 (old stations were not maintained), include this evaluation in 2011 Monitoring Plan and continue to assess the accumulated data until a relationship can be established.

Although some relational evaluations were presented between sediment, contaminant concentrations, and flow in this report, the conclusions are based on limited data sets and comparisons between populations that are not appropriate. For example, although it is important to demonstrate and

conclude that a relationship between data does not exist across the watershed during 2010, a more important conclusion may be that there are differences between reaches and that those differences can be defined (e.g., different source terms). For example, the source terms located in upper Los Alamos, upper Pueblo, or Guaje Canyons provide a fraction of the plutonium concentrations found in Lower Pueblo Canyon or Lower Los Alamos Canyon.

The Permittees presented a conclusion which stated that the correlations were poor at individual stations. However, the sedigraph demonstrations, provided for events in which multiple samples were collected, indicate good correlations. It is unclear whether the samples collected during the rising leg of the hydrograph, where SSC and contaminant measurements are highly variable, were included in the comparisons that led to the presented conclusion. Regardless, insufficient information was provided to support the conclusion. Reevaluate this conclusion after eliminating from the comparison those samples collected prior to the first peak of the hydrograph.

NMED concurs with the Permittees' conclusion that the data collected during 2010 did not result in a comprehensive data set from which complete assessments might be made regarding LANL mitigation efforts. However, historical flow data is available from which comparisons must be made and assessments presented. The data should become more useful as the data populations increase.

Ultimately, data that indicate that the availability of sediment and contaminants are decreasing in relation to flow will demonstrate the positive effects of mitigations in the watershed. While the flood frequencies and intensities have been decreasing since the Cerro Grande fire and are expected to continue to diminish, the assessments should develop a metric that is capable of demonstrating that sediment and contaminant concentrations (or transport rates) are decreasing relative to similar discharge.

LANL Response

4. Comment noted. Issues related to evaluation and presentation of data and associated conclusions have been addressed in the responses to specific comments.

NMED Comment

5. *Provide an Appendix which defines all acronyms, abbreviations and data qualifiers used in the Report.*

LANL Response

5. Appendix C has been added to the revised report and defines acronyms, abbreviations, and data qualifiers.

NMED Comment

6. *There are two files on the data disk provided (AppendixB LAP Stormwater.xls and AppendixE_LAP_Buckman.xls) that do not have times associated with sample results. These files also have data with an apostrophe preceding results that are not useable in this format. Replace the data disk with properly formatted data.*

LANL Response

6. The two files on the data disk have been revised and are attached to the revised report to include the sample collection time. The apostrophe preceding results has been removed. Results are sorted by collection date/time, station number, Resource Conservation and Recovery Act facility investigation (RFI) class, analyte, and field preparation.

NMED Comment

7. *Provide the data obtained from sampling the retention basins and below the wetland at the base of the SWMU 01-001(f) drainage on the data disk in the file entitled AppendixB LAP Stormwater.xls.*

LANL Response

7. The file Appendix B LAP Stormwater.xls has been revised to include results obtained from sampling the retention basins and wetland below the Solid Waste Management Unit 01-001(f) drainage. This revised file is included with Appendix B of the revised report.

NMED Comment

8. *Provide a table of dioxin/furan TEQs for each location and the times that dioxin/furan measurements were obtained.*

LANL Response

8. New section 4.5 was added to discuss dioxin and furan results. Tables 4.5-1 and 4.5-2 were added to present toxicity equivalence factors and toxic equivalents for each location where samples were analyzed for dioxins and furans, including sample times.

SPECIFIC COMMENTS

NMED Comment

9. Executive Summary, page v, second paragraph

Permittees' Statement: "In addition, three grab samples were collected at the outlets of two constructed retention basins and wetlands below the SWMU 01-001(f) drainage on July 26."

NMED Comment: Grab samples at SWMU 01-001(f) were collected from residual flows on the day after three consecutive days of precipitation and do not represent the majority of flow conditions through the retention basins.

LANL Response

9. The text has been revised to indicate the collected samples represent residual, low-flow conditions prevalent during the long duration between storms.

NMED Comment

10. Executive Summary, page v, third paragraph

Permittees' Statement: "Throughout the LA/P Watershed, frequency of discharge and suspended sediment concentrations are positively correlated with the impermeable area draining to each gage, indicating that the larger the impermeable area, the more frequently it flows and the greater the sediment yield."

NMED Comment: Correlations of sediment yield /impermeable area must be presented for each gage station in the revised Report.

LANL Response

10. Correlations between suspended sediment concentration (SSC) statistics and drainage area (including impermeable and permeable area) are presented in section 3.1 for each gage station. Correlations between sediment yield (for each storm event, thus temporal, or several numbers per gage station) and impermeable area (one number per gage station) cannot be computed; thus, SSC statistics for each gage station were used.

NMED Comment

11. Executive Summary, page v, third paragraph

Permittees' Statement: "Because of extremely localized precipitation, travel times and peak discharge increases/decreases vary substantially, and there is little to no relationship between peak discharge magnitudes, travel times between stations, or peak discharge increases/decreases."

NMED Comment: This statement is the only evaluation of flood provenance provided. Expand on provenance evaluations, especially in relation to storm pathways, flood origin, and contaminant source term in the revised Report.

LANL Response

11. A discussion of peak discharge travel times, peak discharge, and transmission gains/losses is provided in section 3.2 and Tables 3.2-1 through 3.2-6. Appendix A portrays the relationships between precipitation, discharge, and sediment concentrations.

NMED Comment

12. Executive Summary, page v, third paragraph

Permittees' Statement: "Downstream the large decreases far outweigh the increases until the final stretch of the watershed, gage stations E060.1 to E109.9, where peak discharge increases in three of four events (100% average increase), most likely as a result of runoff from Guaje Canyon."

NMED Comment: This statement must be quantified. LANL must propose to repair, maintain, and monitor the gage at E090 Guaje Canyon in the updated Monitoring Plan. In addition, the Guaje Canyon confluence is downstream from E060.1; therefore, the increase in flow would not be attributable to flows from Guaje Canyon.

LANL Response

12. Statements relating to Guaje Canyon have been removed from the executive summary and are addressed in section 3.2. The Laboratory repairs, maintains, and monitors the E099 Guaje Canyon gage, as discussed in the Monitoring Plan for 2011 (LANL 2011, 201578). The Guaje Canyon confluence is indeed downstream from E060.1; thus it is unclear how increase in flow would not be attributable to flows from Guaje.

NMED Comment

13. Executive Summary, page vi, first paragraph

Permittees' Statement: "Overall, the Pueblo Canyon mitigations, DP Canyon mitigations, and LA Canyon low-head weir reduced peak discharges, thus reducing the erosive force of the stream."

NMED Comment: This statement is not proven. Frequency and intensity of storm flows have diminished since the Cerro Grande fire and reductions are identified between gages, but they may represent transmission loss from conditions other than mitigations. Comparisons must be made to reductions in flows at sequential gages from previous years flow measurement data.

LANL Response

13. The statement concerning the effectiveness of the sediment mitigations has been revised to be less definite. While historical data would be useful in evaluating the effectiveness of the mitigations, historical data suitable for comparison with the 2010 data set are limited. Gages E039.1 (downstream of DP Canyon mitigations), E059 (upstream of Pueblo Canyon mitigations), E060.1 (downstream of Pueblo Canyon mitigations), E042.1 (upstream of LA weir), and E050.1 (downstream of LA weir) were all new in 2010. These new gages have more reliable rating curves than the previous gages in these canyons. Comparing E060.1 data with E060 data, E042.1 data with E042 data, and E050.1 data with E050 data is beyond the scope of this report, which is to provide monitoring results for 2010.

NMED Comment

14. Executive Summary, page vi, second paragraph

Permittees' Statement: "Overall, suspended sediment concentrations were reduced by the DP Canyon and Pueblo Canyon mitigations."

NMED Comment: This statement is not proven. The reduced SSC values may be relative to reduced flows not relevant to mitigations, as stated in Comment 13 above, comparisons must be made to historic flow and SSC data. Develop a metric that measures diminishing SSC relative to flows.

Also, a linear relationship is presented for sediment yield and runoff volume. Demonstrate whether there is or is not any correlation between run-off volume and peak flow.

LANL Response

14. The statement concerning the effectiveness of the sediment mitigations has been revised to be less definite. Concerning use of pre-2010 data from these canyons, see response to Specific Comment 13.

NMED Comment

15. Executive Summary, page vi, third paragraph

NMED Comment: As discussed in Comments 21 and 51, the SWMU 01-001(f) samples collected for PCB analysis were collected the day after a series of consecutive storm events and provide a misleading representation of flow conditions. Modify the paragraph to acknowledge this condition.

LANL Response

15. The text has been revised to indicate the collected samples represent residual, low-flow conditions prevalent during the long duration between storms.

NMED Comment

16. Executive Summary, page vi, fourth paragraph

Permittees' Statement: "Some positive effects of the mitigations, including reductions of peak discharge, sediment deposition, and contaminant transport, were observed during this monitoring year and will be reevaluated during sampling that will occur during 2011."

NMED Comment: These effects were not evaluated in relation to flows and transport characteristics preceding implementation and therefore cannot be attributed to the sediment migration controls installed in 2010.. Revise the paragraph accordingly or remove the paragraph.

LANL Response

16. The statement concerning the effectiveness of the sediment mitigations has been revised to be less definite. Concerning use of pre-2010 data from these canyons, see response to Specific Comment 13.

NMED Comment

17. Section 2.0, Flow, Precipitation, and Sampling in the LA/P Watershed, pages 2-3

NMED Comment: Report and discuss the periods of time that recordings were not made. Discuss whether potential flows had occurred and were not recorded.

LANL Response

17. The text in section 2.0 of the report has been revised to identify all instances when flow measurements were not made at each gage and to discuss whether as a consequence discharges were potentially not recorded.

NMED Comment

18. Section 2.0, Flow, Precipitation, and Sampling in the LA/P Watershed, page 3

Permittees' Statement: "The use of the extended rain gage network allows the stormwater projects to optimize field team response to only those areas where precipitation likely resulted in runoff or exceeded a preestablished [sic] trigger amount that allows for more accurate association of rainfall to discharge at a gage."

NMED Comment: This statement is misleading. Based on an overall sampling efficiency of 36%, it is apparent that either the network was not effective in identifying storm events for optimizing field team responses or the field teams did not respond when necessary. The lack of information regarding flood provenance indicates that the network was also not effective in providing adequate information for evaluation of flood provenance. Remove or revise the statement in the revised Report.

LANL Response

18. The overall sampling efficiency was not affected by the rain gage network. The report has been revised to remove the field team optimization statement and to address reasons for deviating from the proposed sampling plan (see response to General Comment 1). The statement referenced in NMED's comment was deleted from the text.

NMED Comment

19. Section 2.0, Flow, Precipitation, and Sampling in the LA/P Watershed, page 3

Permittees' Statement: "Sampling is conducted using ISCO 3700 portable automated samplers. At E042.1, E050.1, E059, E060.1, and E109.9 two ISCO samplers are installed."

NMED Comment: The Report does not specify where the sampling port is fastened to channel bottom. If fastened near the bottom of the channel, the samples may contain an inordinate and unrepresentative amount of coarse grained sediments. The ports should be uniformly oriented relative to the channel bottom at each station. Provide a description of the sampling port orientation.

LANL Response

19. The text in section 2.0 has been revised to provide additional details concerning the configuration of the sample intake lines. A new table, Table 2.0-1, has been provided that summarizes the sampler trip levels and the sampler intake levels at each gage.

NMED Comment

20. Section 2.0, Flow, Precipitation, and Sampling in the LA/P Watershed, page 3

Permittees' Statement: "During the 2010 sampling season, activated gages and sampling equipment at E042.1, E050.1, E060.1, and E109.9 were inspected at least weekly. Gaging and sampling equipment at the other LA/P Watershed gages were inspected at least biweekly."

NMED Comment: The second statement above is not accurate. Stations E055 and E056 were not inspected between some date prior to August 15 and September 1, 2010, a time span of almost three weeks. In addition to the weekly and biweekly inspections, field personnel must inspect samplers in response to precipitation in order to fulfill the requirements of the Work Plan. Identify which Sutron data loggers are connected by telemetry to a base station and whether the data loggers identify when samples have been collected. Field personnel must respond as soon as practicable to events that initiate sample collection at all sampling locations. Revise the Report to remove inaccurate assertions and revise operating procedures to enable the timely response to storm events and sample collection.

LANL Response

20. The text in section 2.0 has been revised to refer to the frequency of requests for field personnel to inspect gages and sampling equipment. Procedures for responding to storm events and sample collection were revised in the 2011 monitoring plan (LANL 2011, 201578).

NMED Comment

21. Section 2.1, Sampling at the Retention Basins in the Former LA-SMA-2 Drainage, page 4

Permittees' Statement: "Three grab samples were collected at the outlets of two constructed basins and wetlands below the SWMU 01-001(f) drainage on July 26. The basins were filled during precipitation on July 22, and remained full during subsequent smaller rains on July 23, 24, and 25. Discharge measurements were not collected from these constructed features."

NMED Comment: The samples were collected July 26th, the day after the preceding rainfall events had filled the impoundments. The samples likely reflect residual, low-flow conditions rather than prevalent storm conditions or flow conditions between impoundments. Contaminant transport estimates to the canyon and transport reduction between impoundments could be misleading based on these data. Revise the statement accordingly.

LANL Response

21. The text in section 2.1 has been revised to indicate the collected samples represent residual, low-flow conditions prevalent during the long duration between storms.

NMED Comment

22. Section 2.3, Samples Collected in the LA/P Watershed, page 6

Permittees' Statement: "The full list of samples collected at each gage station, sample IDs assigned, and analyses requested are given in Table 2.3-3."

NMED Comment: No sample IDs are provided in Table 2.3-3. Revise the table to include the assigned sample IDs.

LANL Response

22. Table 2.3-3 has been revised to include sample identification (ID) numbers for each sample collected.

NMED Comment

23. Section 2.3, Samples Collected in the LA/P Watershed, page 7

NMED Comment: The first and last bottles (or bottle 9 or 10 as listed in Table 2.3-4) collected from the 12 bottle sets prescribed for the upper stations are reserved for SSC, according to Table 2.3-4. Bottle fill times of one minute increments are presented in Table 2.3-4, as well as text stating that sample collection is completed within 12 minutes. The text also indicates the samples are collected sequentially without delay. ISCO specifications indicate that the sample rate can be up to 3.5 L per minute. It is unclear whether the times associated with the SSC samples are predetermined by the table, (at ten and 18 or 19 minutes after initiation), or based on Sutron data recorders and/or ISCO

recordings. The SSC collection times could be as little as three minutes apart if the sample bottles were filled without interruption. The figures in Appendix A appear to reflect longer sample intervals and are misleading. These samples must be collected over longer time intervals, in accordance with the protocol presented in the NMED approved Work Plan. Resolve these discrepancies and provide an explanation as to why the protocol in the Work Plan was not followed.

LANL Response

23. The time required to fill bottles in the field will depend on the distance from the sampler to the collection point. The times presented in Tables 2.3-4 through 2.3-6 represent the idealized sample timing, whereas the times in Appendix A are actual times based on field conditions. The text in section 2.3 has been revised to clarify sample timing. New section 2.5, Deviations from the Approved Work Plan, addresses the concern that sample bottles must be filled over a longer time interval at upper watershed gages.

NMED Comment

24. Section 3.1, Drainage Areas and Impermeable Surfaces, page 9

Permittees' Statement: "The gage at E109.9 measures discharge from a drainage area encompassing 15,800 acres, but E055.5 drains 52.7 acres."

NMED Comment: The actual drainage area, for E109.9, is unclear. While the text states that it is 15,800 acres, Figure 2.0-1 indicates 25,802.77 acres. Resolve this discrepancy. Also, provide drainage acreages for Pueblo Canyon, Los Alamos Canyon above the Los Alamos – Pueblo Canyons confluence, Los Alamos Canyon below that confluence, and Guaje Canyon (contribution at station E090).

LANL Response

24. New Table 3.1-1 presents the drainage area above each gage and the corresponding percentage of impermeable surface area. The text in section 3.1 has been revised for consistency with this table.

NMED Comment

25. Section 3.1, Drainage Areas and Impermeable Surfaces, page 9

NMED Comment: It is unclear whether the correlations of SSC are relative to specific drainage areas between sequential gages or to cumulative drainage areas above each gaging station. If the correlations are to specific areas between sequential gages, provide a discussion as to how the statistics would change if correlations were made to cumulative drainage areas.

For Figures 3.1-1 and 3.1-2, include associated tables with values to aid in comparing differences between the stations and historical data.

LANL Response

25. The correlations between SSC and cumulative drainage area are even higher than the correlations between SSC and specific drainage area. Therefore, the text in section 3.1, Figure 3.1-2, and former Table 3.1-1 (now Table 3.1-2) have been revised to include the cumulative drainage area relationship rather than the specific drainage area relationship.

The data associated with Figure 3.1-1 are presented in Table 4.3-1. The data associated with Figure 3.1-2 are presented in a new Table 3.1-1 (see response to Specific Comment 24).

NMED Comment

26. Section 3.2, Water and Sediment Transmission, page 9

NMED Comment: Include a discussion of flood durations, total discharges, and the differences between adjacent stations to aid in identifying transmission gains or losses and changes in watershed due to mitigation measures. Provide tables with these values. Also, provide a discussion of flood provenance and relationships between precipitation, peak discharge, total discharge, and reductions that could identify changes in watershed conditions.

LANL Response

26. A discussion of peak discharge travel times, peak discharge, and transmission gains/losses is provided by subwatershed in section 3.2 and Tables 3.2-1 through 3.2-6. Appendix A summarizes the relationships between precipitation, discharge, and sediment concentrations.

NMED Comment

27. Section 3.2, Water and Sediment Transmission, page 10

Permittees' Statement: "In the upper watershed (E055.5 to E056 and E055 to E059) of Acid and Pueblo canyons, there are as many large increases in peak discharge as there are large decreases, signifying that the location of the precipitation has a considerable impact on the flow in the headwaters, as one might expect."

NMED Comment: This statement appears to be contradicted in Table 3.2-5, which identifies 17 increases and 7 decreases from E055.5 to E056. Revise the Report to clarify this contradiction or qualify the reference to "large increases."

LANL Response

27. The text in section 3.2 has been revised so that it is consistent with Table 3.2-5.

NMED Comment

28. Section 3.2, Water and Sediment Transmission, page 10

Permittees' Statement: "In this stretch, peak discharge increases in three of four events (100% average increase), most likely due to the contribution of runoff from Guaje Canyon (a non-Laboratory subwatershed of E109.9 that is currently not monitored). Also note that between E055, E056, and E059 to E060.1, which have flow paths that traverse the Pueblo Canyon Watershed mitigations, the peak discharge decreases for 34 of 35 events (E055 to E060.1, 69% increase), the only increase occurring during the very large August 16 storm when the grade-control structure failed."

NMED Comment: The assumption that the three discharge increases from E060.1 to E109.1 originated from Guaje Canyon is speculative. The Guaje Canyon E090 gage station must be monitored for flow in order to substantiate this assumption. The last sentence regarding flow paths

traversing mitigations must be corrected from 34 of 35 decreases to 32 of 33, and the purpose of the statement must be provided. These events occurred over 23 individual days, and the cross-vane structure mitigations were eliminated in middle Pueblo Canyon during the August 16th flood. Therefore, the purpose of the statement is unclear. Clarify whether the purpose of the statement is related to the effectiveness of mitigations or to discharge variability in relation to localized precipitation.

LANL Response

28. The text in section 3.2 has been revised to include discussion of Guaje Canyon, E050.1, and hillside watersheds as possible contributors to the flow at E109.9. Graphs of stage height at E099 have been added to Appendix A to show the increase in stage during these events.

    The purpose of the statement in the last sentence is to illustrate that the channel section from E055/E056 to E060.1 (before E059 was operational) and E059 to E060.1 (after E059 was operational) typically experiences transmission losses, not gains. The fact that this section traverses the Pueblo Canyon Watershed mitigations is pertinent because they were constructed to reduce the erosive power of the stream. Thus one could conclude that the mitigations are performing well. The fact that the cross-vane structures failed on August 16th is important (particularly because this was the only increase in peak discharge in this channel section); however, the wing-ditch, willow plantings, wetlands and large grade-control structure were still operational and undamaged for the most part after this storm event. The number of peak discharge decreases (34 of 35 events) is correct.

NMED Comment

29. Section 3.2, Water and Sediment Transmission, page 10, third paragraph

NMED Comment: The statements concerning the effectiveness of the sediment migration mitigations lack sufficient supporting data. Larger numbers of discharge decreases occurred in preceding years. For example, in 2005, peak flows decreased in 29 of 30 events, as for most years. Data was not recorded in 2006 and increases were noted in 2004.

LANL Response

29. Statements throughout the report concerning the effectiveness of the sediment mitigations have been revised to be less definite. Concerning use of pre-2010 data from these canyons, see response to Specific Comment 13.

NMED Comment

30. Section 3.2, Water and Sediment Transmission, page 10

Permittees' Statement: "In the final stretch of the Los Alamos Canyon Watershed E050.1 to E109.9, the peak discharge increases for two storm events (59% average increase, most likely from Guaje Canyon), and decreases for two storm events (84% average decrease, assumed to be infiltration)."

NMED Comment: As mentioned above, attribution of increases measured at E109.1 to flow from Guaje Canyon is speculative unless actually measured. Modify this statement to acknowledge this uncertainty.

LANL Response

30. The text in section 3.2 has been revised by deleting statement that Guaje Canyon was the most likely source of the increase. The text has also been revised to reference an increase in stage height in Guaje Canyon when peak discharge increases were observed from E050.1 to E109.9.

NMED Comment

31. Section 3.2, Water and Sediment Transmission, page 10

Permittees' Statement: "Table 3.2-7 shows the linear correlations between the discharge and suspended sediment for these stations and storm events for different time lags (suspended sediment lagging behind discharge)."

NMED Comment: Expand the discussion of the time lag correlations of SSC and discharge. The relationships may be useful but the concept, as well as the data and information used to develop the correlations, are unclear.

LANL Response

31. The text in section 3.2 has been revised to better describe the time lag correlations of SSC and discharge. Table 3.2-7 has been revised to present correlations for time lags from 0 min to 30 min.

NMED Comment

32. Section 3.2, Water and Sediment Transmission, page 11, first paragraph

NMED Comment: It is unclear whether an evaluation of discharge and suspended sediment was completed for the August 23rd storm event at monitoring station E109.9, and whether those values were used in the volume /yield correlation demonstrated in Figure 3.2-4. The August 23rd event was identified as a sampled event in Table 2.1-1. State whether the August 23rd event was included in the correlation.

Clarify whether the August 15th or August 16th storm event was sampled and evaluated at E109.9. Tables 2.2-1 and 3.2-1, and Figure 3.2-3 identify a 439 cfs event sampled on August 15th as evaluated. Tables 3.2-7 and 3.2-8 identify an event on August 16th as the event evaluated. In Table 3.2-1, the peak flow at E109.9 was listed as 95 cfs. In Table 2.2-1, the peak flow is listed as 243 cfs. Resolve these discrepancies. Also, correct these errors if they propagate through other tables and evaluations.

LANL Response

32. As described in section 2.2, flow measurement devices at gage E109.9 were damaged on August 16 and were still inoperative on August 23. However, sample collection devices were still operational, and the August 23rd storm event was sampled (sediment yield could be calculated), but no discharge was measured (runoff volume could not be calculated). Therefore, runoff volume was not included in the correlation computations.

    Tables 2.2-1 and 3.2-1 through 3.2-4 were corrected for errors and discrepancies (see response to Specific Comment 54). Tables 3.2-7 and 3.2-8 have been revised to indicate the reported data for E109.9 are for August 15 rather than August 16.

NMED Comment

33. Section 3.2, Water and Sediment Transmission, page 11, first paragraph

NMED Comment: Re-evaluate how well the suspended sediment concentrations and instantaneous discharge are correlated after the flood bore (the peak of the hydrograph) passes. Presumably the antecedent sediment load is flushed and the sediment availability is more uniform and representative of the storm water sediment load.

At station 109.9, it appears that a large amount of sediment was available during the first part of the August 15th event and during the September 22nd event (similar 20,000 mg/l SSC per 20 to 40 cfs discharge values). Figure 3.2-4 indicates that the September event does not fit the sediment yield runoff volume relationship established by the other floods. Discuss potential conditions that might create this situation. Also, provide the statistical significance evaluation for these correlations.

LANL Response

33. The text in section 3.2 and Table 3.2-7 have been revised to better describe the time lag correlations of SSC and discharge.

    There were typographic errors in Figure 3.2-4 and Tables 3.2-7 and 3.2-8, which have been corrected to indicate that the August 15th event (not the August 16th or September 22nd event) at E109.9 may not fit the relationship established by the other storm events (indicated in the figure caption). The large SSC values in the beginning of the August 15th event at E109.9 are discussed in section 3.2. Statistical correlations were not computed between the runoff volume and sediment yield because there are only seven (with the E109.9 August 15th event) or six (without this event) data points, which are not enough to create statistically significant relationship but possibly show the development of one.

NMED Comment

34. Section 3.2, Water and Sediment Transmission, page 11

NMED Comment: Equations 3.2-1 and 3.2-2 must include conversion factors to compensate for the five minute recordings.

LANL Response

34. The equations presented in section 3.2 have been revised to include conversion factors.

NMED Comment

35. Section 3.2, Water and Sediment Transmission, page 11

Permittees' Statement: "The precipitation shown is associated with the precipitation-station-based Thiessen polygons that overlay the watershed area, thus are theoretically contributing to the discharge measured at the station."

NMED Comment: The Thiessen polygons are associated with an extended rain gauge system that ends near the LANL facility boundary and does not bound or reflect conditions over the entire Los Alamos watershed. Provide a more complete explanation of how this program is used. In

addition, present correlations between precipitation intensity and discharge volume and also peak flow and flood volume.

LANL Response

35. The text in section 3.2 has been revised to clarify the Thiessen polygon creation. Relationships between precipitation intensity and discharge volume, as well as peak flow and flood volume, are presented in Appendix A.

36. Section 3.3, Impact and Efficiency of Watershed Mitigations, DP Canyon during 2010, page 12, first paragraph

Permittees' Statement: "Sampling conducted in DP Canyon on July 9 and July 30 was performed above (E038) and below (E039.1) the watershed mitigations. Analyses performed from samples collected during these storms allow direct evaluation of the DP Canyon Watershed mitigations."

NMED Comment: Sampling was also conducted at E038 and E039.1 on July 22nd. Include these evaluations in relation to the July 9th and 30th assessments.

The times between collection of samples in most of these events are less than five minutes and most likely are inconsequential for flow correlations. The relative percent differences appear to be much less than those presented. While SSC has been demonstrated to have decreased, the decrease is likely related to decreasing flow rates (peak discharge RPD decreased 82% on July 9th (52% at the time of SSC sampling), and SSC variations on July 30th were related to discharge rate changes of less than 15%).

LANL Response

36. Suspended sediment samples were not collected on July 22 at both E038 and E039.1. As noted in section 4.1 and table note "e" in Table 2.2-1, the sample from E039.1 was actually collected on July 21 (see also response to Specific Comment 42). Because the samples from these two stations were collected on different days and were not associated with the same storm event, the results cannot be correlated.

    On July 9, samples for SSC analysis were collected at 20:55 and 21:05 at E038 and 21:40 and 21:49 at E039.1. As shown in Figure 3.3-2, these sample times are on similar descending limbs on the hydrograph. These samples show decreases in SSCs of 46% relative percent difference (RPD) in the leading two samples and 40% RPD in the trailing two samples. On July 30, samples for SSC analysis were collected at 22:20 and 22:31 at E038 and 22:49 and 23:04 at E039.1. As shown in Figure 3.3-2, both sample times for E038 are on the descending limb, but the first sample time for E039.1 is on the rising limb, and the second sample time is on the descending limb. The increase in SSCs in the leading two samples of 29% RPD is attributable to elevated SSCs carried in the leading edge of the storm flow. Even though discharge at E039.1 was greater than at E038 when the trailing samples were collected on July 30, decreases of 16% RPD were observed in SSCs in the trailing two samples.

NMED Comment

37. Section 3.3, Impact and Efficiency of Watershed Mitigations, DP Canyon during 2010, page 12, second paragraph

Permittees' Statement: "Decreasing stormwater 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 inorganic and organic chemicals and radionuclides entrained in the water column travel. Increasing infiltration reduces peak storm discharge (see Figure 3.3-2), but also decreases the total volume of stormwater volume passing the gage station. A reduction in runoff volume and suspended sediment concentrations was observed related to watershed mitigations between E038 and E039.1 on July 9 and July 30. On July 9, total runoff volume was reduced from 1.1 acre feet at E038 to 0.3 acre feet at E039.1. Not counting runoff unique to the E039.1 drainage area, 0.8 acre feet of stormwater was absorbed between the two gage stations. On July 30, total runoff volume was reduced from 3.2 acre feet at E038 to 2.4 acre feet at E039.1. Again, not counting runoff unique to the E039.1 drainage area, 0.8 acre feet infiltrated between the two gage stations."

NMED Comment: There is no Figure 3.3-2 included in the Report. Include the figure in the revised Report.

On July 30th the total run-off was reduced from 2.7 to 2.3 acre feet, a difference of 0.4 acre feet, not 0.8 acre feet as reported. The difference may be water retained above the grade control structure (Los Alamos Canyon Low-Head Weir) from the previous 3 events. The impoundment capacity of the weir may be 0.8 acre feet (approximately 35,000 cubic feet) as reported from the July 9th event. Infiltration cannot be guaranteed if storm events occur in quick succession and the capacity of the impoundment is filled. Infiltration rates between stations (transmission loss or gains measured in flow differences per unit distance) may be useful to assess changes throughout the watershed. Revise the Report to discuss these issues.

LANL Response

37. The report has been revised to include new Figure 3.3-1.

    The text in section 3.3 and Table 3.2-6 have been revised to correct the volumes of stormwater and infiltration associated with the July 30 storm event.

NMED Comment

38. Section 3.3, Impact and Efficiency of Watershed Mitigations, DP Canyon during 2010, page 12, third paragraph

Permittees' Statement: "Figure 3-3.1 displays box and whisker plots for E038 and E039.1 for both suspended sediment concentrations and peak discharge. These plots show that the DP Canyon Watershed mitigations are reducing the suspended sediment concentrations and peak discharge (i.e., erosive force), thus are performing well."

NMED Comment: The plots in Figure 3.3-1 demonstrate potentially strong correlations between discharge and SSC. The performance conclusions are not supported because data from previous years was not provided. Comparisons to flows and measurements from previous years monitoring are required, as well as identifying whether SSC is reduced relative to similar flow conditions. Revise the Report accordingly.

LANL Response

38. The plots in Figure 3.3-2 (former Figure 3.3-1) do show potentially strong correlations between discharge and SSC; however, the number of data points are too small to perform statistically significant correlation analyses. In DP Canyon, there are only four storm events, or eight SSC samples each for gages E038 and E039.1. For Pueblo Canyon, there are only four storm events, or eight SSC samples each for gages E059 and E060.1. Thus, text in section 3.3 has been revised to indicate that the mitigations may be reducing SSCs and peak discharge. Concerning use of pre-2010 data from these canyons, see response to Specific Comment 13.

NMED Comment

39. Section 3.3, Impact and Efficiency of Watershed Mitigations, Los Alamos Canyon during 2010, page 12

Permittees' Statement: "No sampling was performed in Los Alamos Canyon above (E059) and below (E060.1) the watershed mitigations for the same storm. Therefore, overall statistics for 2010 must be used to assess performance. Figure 3.3-1 displays box and whisker plots for E059 and E060.1 for both suspended sediment concentrations and peak discharge. As can be seen in these plots, the Los Alamos Canyon Watershed mitigations are reducing the suspended sediment concentrations and peak discharge (i.e., erosive force), thus are performing well."

NMED Comment: Reference to Los Alamos Canyon in this section should be changed to Pueblo Canyon. As in the previous comment, discharge and SSC whisker plots presented in Figure 3.3-1 demonstrate potentially strong correlations between discharge and SSC. The performance conclusions are not supported with previous data. Comparisons to flows and measurements from previous years monitoring are required as well as identifying whether SSC is reduced relative to similar flow conditions. Revise the Report accordingly.

LANL Response

39. The plots in Figure 3.3-2 (former Figure 3.3-1) do show potentially strong correlations between discharge and SSC; however, the number of data points are too small to perform statistically significant correlation analyses. See response to Specific Comment 38. Concerning use of pre-2010 data from these canyons, see response to Specific Comment 13.

    The text in section 3.3 and Figure 3.3-2 have been revised to refer to Pueblo Canyon Watershed mitigations rather than Los Alamos Canyon mitigations.

NMED Comment

40. Section 4.0, Analytical Results, page 12

Permittees' Statement: "For this report, monitoring results are compared with water quality standards for the purpose of narrowing the list of specific constituents for conceptual model discussions in this report and to provide a basis for potential future revisions to the analytical suites."

NMED Comment: No discussion of water quality criteria comparisons is provided in the report. Provide a discussion of these comparisons.

LANL Response

40. Table 4.0-1 presents the New Mexico Water Quality Control Commission standards that were used as numeric values for comparison with monitoring results. Table 4.0-2 presents the comparison of detected analytical results with these comparison values.

NMED Comment

41. Section 4.1, Data Exceptions, page 13

Permittees' Statement: "Suspended sediment concentrations measured from stormwater samples collected at E042.1 on August 16 are not representative of field conditions. During this particular event, the maximum discharge corresponds to the smallest sediment concentrations, and sediment concentrations fluctuate in ways unlike those observed in samples collected from other sampling events. The suspended sediment associated with the samples collected at E042.1 on August 16 cannot be used for evaluation of watershed mitigation performance."

NMED Comment: In Figure 3.2-3, page 37, for the August 16th storm event recorded at E042.1, the maximum discharge is near 100 cfs and the maximum SSC near 6,500 mg/L. Except for the following two samples, flow and SSC decrease proportionately to the end of the hydrograph and appear to be representative of field conditions. Revise the Report accordingly.

LANL Response

41. The text in section 4.1 has been revised to indicate that most of the data from the August 16 event at E042.1 are representative and can be used to evaluate performance. Figure 3.2-3 has been revised to include additional data for this event. Table 3.2-8 has been revised to include calculated sediment yield and runoff volume for this event. Appendix A has been revised to include a new figure for E042.1 on August 16.

NMED Comment

42. Section 4.1, Data Exceptions, page 13

Permittees' Statement: "Sampling at E039.1 occurred on July 21. However, no discharge and no precipitation were recorded to occur during the day of sample collection. Water collected is of unknown origin. There is no hydrograph associated with samples collected at E039.1 on July 21. Analytical results are not representative of stormwater, thus cannot be used for evaluation of watershed mitigation performance."

NMED Comment: Discuss the possibility that the flow meters and Sutron data recorders malfunctioned or otherwise attempt to account for the discrepancy. Describe the actions taken to address these kinds of problems when they arise.

LANL Response

42. The source of the discrepancy could not be indentified after reviewing all possible sources, including the possibility of nonstorm water discharges, including spills and potable water releases. The text in section 4.1 has been revised to indicate that the source of the discrepancy could not be identified.

NMED Comment

43. Section 4.1, Data Exceptions, page 13

Permittees' Statement: "Sampling at E109.9 occurred on August 23 at a time when stage-height measurements from the encoder were invalid because of silting and the damaged bubbler from the August 16 storm. As a result, peak discharge was estimated from the high water mark left by the storm. There is not a usable hydrograph associated with this storm."

NMED Comment: A delay of seven days to inspect and effect repairs on damaged stormwater gages, particularly at a critical location such as E109.9, located just above the confluence with the Rio Grande and community water supplies, is unacceptable. Propose an inspection and maintenance schedule for the monitoring stations to correct this problem.

LANL Response

43. The inspection and maintenance frequency has been increased for 2011 over the frequency for 2010. The text in section 4.1 has been revised to describe the new frequency.

NMED Comment

44. Section 4.2, Filtered and Unfiltered Results, page 14, second paragraph

NMED Comment: On Table 4.2-1, six values demonstrated larger contaminant concentrations in the filtered samples relative to the unfiltered samples collected on August 15th without reference to the station. Normally, the unfiltered value is larger because it includes the contaminant component in suspended solids as well as those in solution. Provide an explanation as to why these discrepancies occurred and qualify the data, if determined to be invalid.

LANL Response

44. The results referred to in the comment were actually for unfiltered samples. The text in sections 4.1 and 4.2 has been revised to explain this discrepancy.

NMED Comment

45. Section 4.3, Sediment Transport, page 14

Permittees' Statement: "Suspended sediment was measured up to 22 times at E042.1, E050.1, E059, and E060.1 during the first 290 minutes of each storm."

NMED Comment: No samples were collected at E050.1. Remove the reference to E050.1 from the statement.

LANL Response

45. The text in section 4.3 has been revised to remove the reference to E050.1.

NMED Comment

46. Section 4.3, Sediment Transport, page 14

Permittees' Statement: "Using this equation, concentrations of suspended sediment and instantaneous discharge are calculated for each sample collected. The calculated suspended sediment concentrations are presented in Table 4.3-1."

NMED Comment: Provide a revised Table 4.3-1 that includes the calculated instantaneous discharge associated with each calculated suspended sediment concentration.

LANL Response

46. Table 4.3-1 has been revised to include instantaneous discharges.

NMED Comment

47. Section 4.4, Relationships between Discharge, Suspended Sediment, and Contaminant Concentrations, page 15, second paragraph

Permittees' Statement: "Across the watershed, instantaneous discharge is poorly correlated to suspended sediment concentrations. Instead, instantaneous sediment transport is more accurately related to the particle sizes of sediment being transported in the water column; transport velocity of suspended load as affected by stream grade, channel obstructions, and other factors; settling velocity of particles; and channel bed sheer stress due to grain resistance as impacted by recent soil disturbances, wetland condition, channel erosion and channel composition among other factors (Scott 2006, 111789). These conditions can vary between gages in the same channel and between storms at the same gage."

NMED Comment: Scott (Scott 2006, 111789) concluded his literature review with a general guidance for sediment transport formula use. One of those functions may provide a better predictor and must be considered. Discharge poorly correlated to suspended sediment concentrations across the watershed is not unexpected. Evaluations of data relationships at individual monitoring stations may provide the information concerning changing conditions between stations necessary to define the effectiveness of LANL mitigations in the Los Alamos watershed. Provide evaluations of data relationships at individual stations in the revised Report.

LANL Response

47. The purpose of this report is to relay the results of stormwater monitoring efforts performed in the Los Alamos/Pueblo Watershed during 2010. Including empirical models beyond basic statistics, such as correlations and regressions, is beyond the scope of this report. Additional data evaluations at individual stations were not performed.

NMED Comment

48. Section 4.4, Relationships between Discharge, Suspended Sediment, and Contaminant Concentrations, page 15

Permittees' Statement: "Sixteen frequently detected inorganic chemicals and radionuclides were selected to show the relationship between instantaneous discharge and corresponding analyte

concentration (Figure 4.4-3). These 16 chemicals and radionuclides were evaluated to show the relationship between suspended sediment concentrations and corresponding analyte concentration (Figure 4.4-4). All correlations between instantaneous discharge and analyte concentrations are negative. The correlations between suspended sediment concentrations and unfiltered detected results are considerably stronger. Results obtained from E109.9 on August 15 and September 22 can be identified as outliers but are retained in both sets of figures for comparison."

NMED Comment: Figure 4.4-3 demonstrates conditions similar to the correlations between discharge and SSC and the same comments from Comment 47 above apply.

In reference to Figure 4.4-4, analyte concentration correlations to SSC would be expected to be strong if the analyte is uniformly available, such as uranium-238. Analyte correlations that demonstrate poor correlations indicate highly variable source terms. Based on data sets with strong correlations, individual measured samples much different from predicted values indicate variability that should be investigated. For example, measurements at station E109.9 collected September 22nd might suggest that an inordinate, or unlikely, amount of sediment was entrained in the sample. Evaluate and discuss these conditions.

LANL Response

48. See response to Specific Comment 47.

    Section 4.4 has been revised to discuss the results from E109.9 for August 15 and September 22.

NMED Comment

49. Section 4.4, Relationships between Discharge, Suspended Sediment, and Contaminant Concentrations, page 15, fifth paragraph

Permittees' Statement: "In contrast, plutonium-239/240 and total PCBs across the LA/P Watershed are not linearly correlated to suspended sediment concentrations as shown in Figure 4.4-5. The lack of correlation results from a spatial distribution of this radionuclide and class of organic chemicals across the LA/P Watershed."

NMED Comment: NMED agrees that the lack of correlation results from the spatial distribution of plutonium. Discuss the spatial distribution of source terms for contaminants in stormwater identified for plutonium and PCBs.

LANL Response

49. Section 4.4 has been revised to indicate that the spatial distribution of plutonium and polychlorinated biphenyls (PCBs) indicates multiple sources and to identify potential sources of these contaminants.

NMED Comment

50. Section 4.4, Relationships between Discharge, Suspended Sediment, and Contaminant Concentrations, page 15, sixth paragraph

Permittees' Statement: "However, even at a single gaging station, the relationships between plutonium-239/240 and total PCBs to suspended sediment concentrations are not consistent. The relationships of these constituents measured at E042.1 during storm events sampled this year are

shown in Figure 4.4-6. At this single station, equations describing the relationship between suspended sediment and plutonium-239/240 or total PCBs have very poor correlation. This lack of a single equation indicates that plutonium-239/240 and total PCBs are not homogeneously distributed through sediments reaching E042.1 during storm events. Because of the paucity of samples collected, correlations cannot be determined for plutonium-239/240 and total PCBs in Pueblo Canyon this year."

NMED Comment: An evaluation of events at E042.1 indicates that concentrations of plutonium and PCBs are variable. Further investigation suggests that individual events have stronger correlations. Continued monitoring is necessary to demonstrate contaminants are attenuating.

LANL Response

50. The text in section 4.4 has been revised to clarify that additional monitoring is necessary to demonstrate attenuation of plutonium-239/240 and total PCBs.

NMED Comment

51. Section 4.4, Relationships between Discharge, suspended Sediment, and Contaminant Concentrations, page 15

Permittees' Statement: "Because suspended sediment concentrations vary widely, it is useful to normalize inorganic chemical and radionuclide concentrations to sediment concentrations in which a correlation exists between suspended sediment and an analyte across the LA/P Watershed. After normalization, inorganic chemicals are converted to milligrams per kilogram units of measure and can be compared with canyon sediment background values (LANL 1998, 059730). Table 4.4-1 presents the results of this normalization and comparison of inorganic chemicals from aluminum through iron, Table 4.4-2 presents normalized results for lead through zinc. Table 4.4-3 presents normalized results for radionuclides."

NMED Comment: Normalization of soluble contaminants to SSC may significantly bias results. Discuss the normalized data in comparison to the differences between filtered and unfiltered data presented in Table 4.2-1 and other references and identify potential bias that could affect the results.

Also, provide the proper units associated with each normalized value in Tables 4.4-1, 4.4-2, 4.4-3 (i.e. pCi/g, mg/kg,). Provide an additional table which displays normalized results for total PCBs in pg/g.

LANL Response

51. Tables 4.4-1, 4.4-2, and 4.4-3 contain the appropriate result units in the notes at the end of the tables.

New Table 4.4-4 has been added to present normalized PCB results.

The text in section 4.4 has been revised to indicate that normalization can be misleading for analytes having no preferential attachment to sediment and to identify specific analytes least affected by filtration and, therefore, most biased by normalization.

NMED Comment

52. Section 4.4, Relationships between Discharge, Suspended Sediment, and Contaminant Concentrations, page 16, first paragraph

Permittees' Statement: "Analytical results for samples collected at the retention basins and wetland below the SWMU 01-001(f) drainage are presented in Table 4.4-4. Total PCBs collected at the terminus of the wetland are almost 30 times less concentrated than total PCBs collected in the upper retention basin. Suspended sediment is reduced two times in the same samples. Lead is reduced almost five times. Interestingly, total and isotopic uranium show concentration increases as water passes through the retention basins to the wetland."

NMED Comment: Describe the flow and other conditions these samples are meant to represent. From previous descriptions, these samples were collected from outflow of water standing in impoundments for many days. Also state that along with total and isotopic uranium, the hardness, gross alpha and beta values increased.

LANL Response

52. The text in section 4.4 has been revised to indicate that analytical results for samples collected at the retention basins and wetland below represent residual, low-flow conditions prevalent during the long duration between storms. The text has also been revised to note increases in concentrations of total and isotopic uranium, hardness, and gross-alpha and-gross beta radioactivity.

NMED Comment

53. Table 2.3-3, Summary of Samples Collected and Analyses Requested

NMED Comment: Table 2.3-3 lists a sample from E042.1 collected on July 23, 2010. There was no stormwater event at any gage on that date according to Table 2.2-1 of the Report. Section 2.2 of the Report states, "[t]he sampler at E042.1 collected stormwater on July 22 and samples were retrieved during the following inspection on July 27. As a result, the E042.1 sampler was full and did not collect during discharge of 11 cfs on July 25." This statement confirms that there was no sample collected on July 23rd. Revise the table accordingly.

LANL Response

53. Stormwater sampling at E042.1 was initiated on July 22 at 21:26 and concluded on July 23 at 02:26. Table 2.3-3 lists this correctly. Maximum discharge was recorded correctly in Table 2.2-1 as occurring on July 22. To present this information more clearly, Table 2.3-3 has been revised to include all sample collection times and sample IDs, and the text in section 2.2 has been revised as follows:

    E042.1: Samples were collected from five storm events at E042.1 during the year. The sampler at E042.1 initiated stormwater collection on July 22, and samples were retrieved during the following inspection on July 27.

NMED Comment

54. Tables 3.2-1 through 3.2-6, Travel Time of Flood Bore…, pages 60-68

NMED Comment: Multiple errors regarding the evaluations of storm discharges are recorded in Tables 3.2-1 through 3.2-4. For example, in Table 3.2-1, on August 15th between stations E056 and E059, the peak discharge increased from 24 to 38 cfs, not from 28 to 34 cfs, as indicated. These errors also affect the summary Tables 3.2-5 and 3.2-6. Revise the tables to provide accurate data.

LANL Response

54. Tables 3.2-1 through 3.2-4 have been corrected, and the text in section 3.2 and Tables 3.2-5 and 3.2-6 have been revised for consistency with the corrected tables.

    Please note also that the peak discharges in Tables 3.2-1 through 3.2-4 are conceptually different than those in Table 2.2-1 because of temporal resolution; that is, Table 2.2-1 shows daily peak discharges (midnight to midnight) and Tables 3.2-1 through 3.2-4 show peak discharges for a particular storm event.

NMED Comment

55. Table 4.0-1, NM Aquatic Acute…Screening Levels, page 70

NMED Comment: Table 4.0-1 indicates that a hardness of 100 was used to determine the New Mexico acute aquatic life criteria for comparison purposes. The geometric mean of all 33 hardness values presented in this report is 33 mg/L as dissolved CaCO3. This is very similar to the hardness value of 30 used in the NPDES Individual Stormwater Permit. Therefore, the hardness of 30 must be used for comparison purposes as outlined in this section of the Report. Revise Table 4.0-1 by replacing the NM Aquatic Acute 2010 (hardness 100 mg/L) criteria with values based on 30 mg/L hardness levels and revise Table 4.0-2 accordingly.

LANL Response

55. The acute aquatic life screening levels for aluminum, cadmium, chromium(III), copper, lead, manganese, nickel, silver, and zinc presented in Table 4.0-1 have been revised based on a hardness of 30 mg/L. The screening results presented in Table 4.0-2 have been revised based on these screening levels.

REFERENCES

LANL (Los Alamos National Laboratory), March 2011. "2011 Monitoring Plan for Los Alamos and Pueblo Canyons Sediment Transport Mitigation Project," Los Alamos National Laboratory document LA-UR-11-0943, Los Alamos, New Mexico. (LANL 2011, 201578)

NMED (New Mexico Environment Department), June 3, 2011. "Approval with Modifications, 2011 Monitoring Plan for Los Alamos and Pueblo Canyons Sediment Transport Mitigation Project," New Mexico Environment Department letter to G.J. Rael (DOE-LASO) and M.J. Graham (LANL) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2011, 203705)