ERID-239222

LA-UR-13-21839
March 2013
EP2013-0056

Results of 2012 Sediment Monitoring in the Pajarito Canyon Watershed



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.

EP2013-0056

Results of 2012 Sediment Monitoring in the Pajarito Canyon Watershed

March 2013

Responsible project manager:

Printed Name	Signature	Title	Organization	Date
Steve Veenis	Steve Veenis	Project Manager	Environmental Programs	3-26-13

Responsible LANS representative:

Printed Name	Signature	Title	Organization	Date
Jeff Mousseau	Daniel R Cox for JM	Associate Director	Environmental Programs	3/27/13

Responsible DOE representative:

Printed Name	Signature	Title	Organization	Date
Peter Maggiore	Cheryl J Rodriguez for	Assistant Manager	DOE-LASO	3/28/2013

CONTENTS

1.0 INTRODUCTION 1

2.0 SAMPLES COLLECTED AND ANALYSES PERFORMED 1

3.0 RESULTS 2

3.1 Radionuclides 2
3.2 Inorganic Chemicals 3
3.3 PCBs 4
3.4 Dioxins and Furans 4
3.5 Explosive Compounds 5

4.0 SUMMARY 5

5.0 RECOMMENDATIONS 6

6.0 REFERENCES AND MAP DATA SOURCES 6

6.1 References 6
6.1 Map Data Sources 8

Figures

Figure 1.0-1 Photographs of ash-rich sediment in reach PA-3E along Pajarito Road east of TA-18: (a) Sediment deposited by August 3, 2011 flood, (b) Same area photographed in February 2012 11

Figure 2.0-1 Sediment sampling locations in the Pajarito Canyon watershed in 2012 and 2011 12

Figure 2.0-2 2012 and 2011 baseline sediment sampling locations downstream from the Las Conchas burn area 13

Figure 3.1-1 Concentrations of americium-241, plutonium-238, and plutonium-239/240 in the MDA G-7 drainage, 2002 to 2012 14

Figure 3.2-1 Silver concentration in 2012, 2011, and Pajarito Canyon Investigation Report, Rev. 1 sediment samples 15

Figure 3.2-2 Temporal variations in the average concentrations of cadmium and copper in fine facies sediment in reach PA-2W 16

Figure 3.3-1 Total detected PCB concentration in 2012 and 2011 sediment samples plotted versus distance from the Rio Grande; Frijoles Canyon and Guaje Canyon samples arbitrarily plotted at 16–17 km 17

Figure 3.3-2 Total PCB concentration in 2012, 2011 Pajarito Canyon Investigation Report, Rev. 1 sediment samples 18

Figure 3.4-1 Total detected dioxin concentration plotted versus distance from the Rio Grande: (a) 2012 and 2011 sediment samples from Pajarito Canyon watershed and baseline areas with Frijoles Canyon and Guaje Canyon samples arbitrarily plotted at 16–17 km, and (b) 2012, 2011 and pre-2011 sediment samples from Pajarito Canyon watershed 19

Figure 3.4-2 Total detected furan concentration plotted versus distance from the Rio Grande: (a) 2012 and 2011 sediment samples from Pajarito Canyon watershed and baseline areas with Frijoles Canyon and Guaje Canyon samples arbitrarily plotted at 16–17 km and (b) 2012, 2011 and pre-2011 sediment samples from Pajarito Canyon watershed 20

Figure 3.4-3 TCDD equivalent concentrations in 2012 compared to 2011 and the Investigation Report. The dashed line is the post-Cerro Grande fire concentration for comparison (Kraig et al. 2002, 85536) 21

Tables

Table 2.0-1 Summary of Sediment Samples Collected and Analyses Requested in 2012 from the Pajarito Canyon Watershed 23

Table 2.0-2 Summary of Sediment Samples Collected and Analyses Requested in 2012 from Baseline Areas Outside the Pajarito Canyon Watershed 24

Table 3.0-1 Inorganic Chemicals above BVs in 2012 Pajarito Canyon Watershed Sediment Samples 25

Table 3.0-2 Organic Chemicals Detected in 2012 Pajarito Canyon Watershed Sediment Samples 26

Table 3.0-3 Radionuclides Detected above BVs in 2012 Pajarito Canyon Watershed Sediment Samples 34

Table 3.1-1 Summary of Radionuclide COPCs in 2012 Sediment Samples from the Pajarito Canyon Watershed 34

Table 3.2-1 Summary of Inorganic COPCs in 2012 Sediment Samples from the Pajarito Canyon Watershed 35

Table 3.4-1 Mammalian Toxic Equivalency Factors 36

Table 3.4-2 Mammalian TECs 36

Attachments

Attachment 1 Analytical Data from 2012 Sediment Samples from the Pajarito Canyon Watershed (on CD included with this document)

Attachment 2 Analytical Data from 2012 Sediment Samples from Baseline Areas Outside the Pajarito Canyon Watershed (on CD included with this document)

Attachment 3 Particle-Size Data from 2012 Sediment Samples from the Pajarito Canyon Watershed (on CD included with this document)

1.0 INTRODUCTION

This report presents analytical data obtained from sediment samples collected in the Pajarito Canyon watershed in 2012. These samples are collected to satisfy a requirement implicit in the New Mexico Environment Department's (NMED's) approval for the Pajarito Canyon Investigation Report, Revision 1 (NMED 2009, 107367). The approval of the Pajarito Canyon investigation report accepted Los Alamos National Laboratory's (LANL or the Laboratory) response (LANL 2009, 106939) to NMED's notice of disapproval (NOD) (NMED 2008, 103803). The Laboratory's response to the NOD and the revised investigation report recommended continued monitoring of sediments to evaluate the potential for erosion and downcanyon transport of contaminants. These same samples are also collected as part of the Laboratory's Environmental Surveillance Program. Sampling followed the September 2009 sampling and analysis plan (SAP) (LANL 2009, 107340). NMED issued an approval with modifications for the SAP (NMED 2009, 108123) that included the requirement to provide the results of annual sampling in a report to NMED by March 31 of each calendar year beginning in 2010. This report satisfies that requirement for sampling conducted in 2012. 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.

In June and July 2011, the Las Conchas fire burned most of the Pajarito Canyon watershed west of NM 501. A total of 9.3 km^2 was within the burn perimeter, which comprises 28% of the total watershed area. Of the area within the burn perimeter, 44% (4.1 km^2) was classified as high- or moderate-severity burn and the remainder as low-severity burn or unburned. Most of this area had been burned previously in the May 2000 Cerro Grande fire (BAER 2000, 072659). The Cerro Grande fire involved a larger part of the watershed (20.5 km^2 within the burn perimeter), including large areas east of NM 501, and a larger area of the watershed was classified as high- and moderate-severity burn (5.9 km^2). The first large flood after the Las Conchas fire occurred on August 3, 2011, and extended into the Pajarito Canyon wetlands below Technical Area 18 (TA-18), leaving ash-rich sediment deposits ("muck") (Figure 1.0-1). A larger flood occurred on August 21–22, 2011 (LANL 2011, 206488) and extended past NM 4 and White Rock into White Rock Canyon. The 2011 sampling effort was expanded relative to the 2010 sampling program to characterize post–Las Conchas deposits on floodplains throughout Pajarito Canyon. Floods that occurred during the 2012 monsoon season were smaller than in 2011. The only flow recorded at stream gaging station E250 [Pajarito at State Route (SR) 4] was on July 12, 2012, when peak flow was 1.2 cubic feet per second (cfs). This flow is much less than the maximum discharge of 95 cfs recorded during the 2011 water year. The 2012 floods extended into the Pajarito Canyon wetlands below TA-18, leaving a second Las Conchas muck layer on top of the 2011 deposits (Figure 1.0-1). The planned sampling of fine-grained post-Las Conchas deposits was expanded in 2012 to include additional samples collected in reaches where flood plain deposition had occurred.

2.0 SAMPLES COLLECTED AND ANALYSES PERFORMED

Sample collection targeted specific reaches identified in the Pajarito Canyon SAP (LANL 2009, 107340), with an emphasis on 2012 post-monsoon sediment deposits. Stream gage data and field reconnaissance are reviewed to identify specific sampling locations. Pajarito and Twomile Canyons both experienced floods in 2012 during the second monsoon season following the Las Conchas fire. A total of 11 samples were collected from 4 reaches. As part of the post-Las Conchas fire sampling, an additional 7 fine-grained baseline samples were collected from Los Alamos and Water Canyons and Cañon de Valle upstream of solid waste management units (SWMUs) and areas of concern (AOCs), and data from these samples are included in this report as a point of reference. The Water Canyon and Cañon de Valle baseline samples

were collected upstream of NM 501, and the Los Alamos Canyon samples were collected upstream of the Los Alamos County Ice Rink. In addition to the analytical suites specified in the SAP (LANL 2009, 107340), as modified by NMED (2009, 108123), polychlorinated biphenyls (PCBs) in the fire-affected samples were analyzed using U.S. Environmental Protection Agency (EPA) Method 1668A for PCB congeners instead of EPA Method 8082 for Aroclors to provide more detailed characterization of the nature of PCBs transported in post-fire floods.

Of the seven planned active channel samples in the Pajarito Canyon watershed, one was collected in 2012. The active channel sample was from MDA G-7, one of the drainages below Material Disposal Area (MDA) G at TA-54. Active channel samples were not collected from the remaining MDA drainages because the thickness of new sediment was not sufficient for sampling. Samples were not collected from the Pajarito Canyon active channel because of the minimal flow in PA-4E and the absence of flow in lower Pajarito Canyon in 2012. Figure 2.0-1 shows the 2011 and 2012 sampling locations in the Pajarito Canyon watershed, and Figure 2.0-2 shows the 2011 and 2012 baseline sampling locations downstream from the Las Conchas burn area. Table 2.0-1 presents requested analytical suites for each sample collected from the Pajarito Canyon watershed in 2012, and Table 2.0-2 presents requested analytical suites for the 2012 baseline samples outside the Pajarito watershed.

Two changes from the SAP are that tritium analyses and semivolatile organic compound (SVOC) analyses were not obtained from the sediment samples collected in the Pajarito Canyon watershed in 2012. This modification follows a decision in 2010 to remove tritium from the analytical suite for Environmental Surveillance Program sediment samples because it is present as a component of water, is not adsorbing onto sediment particles, and is included in the analytical suite for water samples, where appropriate (LANL 2010, 109107). In addition, tritium concentrations in sediment samples (a function of moisture content) are orders of magnitude below human health screening levels and do not pose a potential risk in sediment. SVOCs were also not analyzed in 2012 but will be included in the 2013 surveillance sampling event.

3.0 RESULTS

Analytical results for the 2012 sediment samples from the Pajarito Canyon watershed are included as Attachment 1 (on CD), and analytical results for the additional baseline samples outside the watershed are included as Attachment 2 (on CD). Attachment 3 (on CD) presents particle-size data from sediment samples collected from the Pajarito Canyon watershed in 2012. Tables 3.0-1, 3.0-2, and 3.0-3 present sampling results above the sediment background values (BVs) for inorganic chemicals, detected results for organic chemicals, and results above the sediment BVs for radionuclides, respectively, within the Pajarito Canyon watershed, which are identified as chemicals of potential concern (COPCs) (LANL 1998, 059730). As requested in Modification 1 of NMED's approval with modification (LANL 2012, 213570; NMED 2012, 520815), relevant historical data are also presented to evaluate temporal trends.

3.1 Radionuclides

Three radionuclides (americium-241, plutonium-238, and plutonium-239/240) were detected above sediment BVs in the samples collected in the Pajarito Canyon watershed in 2012 (Table 2.0-1), as presented in Tables 3.0-3 and 3.1-1. Table 3.1-1 also summarizes maximum detected results from baseline samples collected previously downstream from the Cerro Grande burn area, and from Cerro Grande ash samples (LANL 2004, 087390). All these radionuclides were also detected above BVs in ash and baseline samples collected after the Cerro Grande fire, and all were detected above BVs in the 2011 baseline samples (LANL 2012, 213570).

Radionuclide data for americium-241, plutonium-238, and plutonium-239/240 in the MDA G-7 drainage are shown in Figure 3.1-1 and in Table 3.0-3. Concentrations are consistent with previous data from that drainage and remain low relative to results obtained in the early 2000s. These concentrations are also very similar to post-fire baseline sediment samples and Cerro Grande ash (Table 3.1-1).

None of the 2012 samples from the main Pajarito and Twomile Canyon drainages had plutonium-238 concentrations exceeding the sediment BV of 0.006 pCi/g (Tables 3.0-3 and 3.1-1). The only radionuclide detected in concentrations above the sediment BV in the main Pajarito and Twomile Canyon drainages in 2012 was plutonium-239/240 (Table 3.0-3). Two samples each from TW-4E and PA-3E exceeded the plutonium-239/240 sediment BV of 0.068 pCi/g, with a maximum of 0.107 pCi/g detected from reachTW-4E (Tables 3.0-3 and 3.1-1). This value is substantially lower than the maximum plutonium-239/240 concentration of 0.343 pCi/g detected in post–Cerro Grande baseline samples (Table 3.1-1). The lower concentration of radionuclides in the 2012 samples is consistent with results of previous sediment investigations that indicated the dominant source for these radionuclides in the main Pajarito and Twomile Canyon drainages is ash from the Las Conchas and Cerro Grande burn areas (LANL 2009, 106939).

3.2 Inorganic Chemicals

Thirteen inorganic chemicals were detected above sediment BVs in at least 1 sample collected in the Pajarito Canyon watershed in 2012 (Table 2.0-1), and 1 inorganic chemical (antimony) had only nondetected results above BV, as summarized in Tables 3.0-1 and 3.2-1. In the MDA G drainage samples, only zinc and silver had detected results above their BVs (Table 3.0-1). Zinc concentrations were above background in both MDA G drainage samples, and silver was above background only at the MDA G-6 retention pond location (Table 3.0-1). Only 1 of the 14 inorganic COPCs in the watershed, silver, had higher results in the 2012 samples than in the 2011 samples. None of the 2012 inorganic COPCs had values that exceeded the maximum values detected in previous sediment samples from the watershed (LANL 2009, 106939; LANL 2012, 213570).

Two 2012 muck samples from reach PA-3E contained the maximum concentrations in the Pajarito Canyon watershed for 9 of the 14 inorganic COPCs indicating Las Conchas ash is probably a major source of these COPCs. All 14 COPCs had higher detected concentrations in Cerro Grande ash than was sampled in 2012 (Table 3.2-1; LANL 2004, 087390). However, the PA-3E muck samples also include COPCs likely derived from Laboratory sites, indicating that post–Las Conchas flooding has remobilized some contaminants previously deposited within the watershed. For example, silver is above the BV of 1 mg/kg in both of the PA-3E samples (3.77 mg/kg and 6.86 mg/kg) as well as the 3 samples collected from PA-2W (9.1 mg/kg, 10.0 mg/kg, and 12.1 mg/kg) and is also higher than concentrations measured in Cerro Grande ash (Tables 3.0-1 and 3.2-1). The elevated silver concentration in these reaches is consistent with known releases of silver from TA-08 and TA-09 (LANL 2009, 106939). Before the 2011 investigation, silver had not been identified as a COPC in PA-3E, indicating post–Las Conchas floods may be responsible for transporting silver into PA-3E. These resultant silver concentrations are, however, well within the concentration distribution documented in the Pajarito Investigation Report, Revision 1 (Figure 3.2-1) (LANL 2009, 106939).

Two inorganic chemicals identified as having a source at Laboratory sites in the Pajarito Canyon watershed above Twomile Canyon and detected above BVs in the 2012 samples are cadmium and copper (Table 3.0-1). Figure 3.2-2 shows temporal variations in average concentrations of these metals in sediment samples from reach PA-2W, updated from a previous report (LANL 2009, 106939, Figure 7.1-18) with data from the 2011 and 2012 samples. Cadmium concentrations show no apparent trend over time, whereas copper concentrations were highest soon after the Cerro Grande fire and have

decreased since. Both copper and cadmium were also above BVs in Cerro Grande ash, and the sources for these metals in the 2011 and 2012 samples probably include a combination of Las Conchas ash and Laboratory sources as well as naturally occurring metals in soils.

3.3 PCBs

In the Pajarito Canyon watershed, PCBs were analyzed by the congener method in the 9 fine-grained sediment samples collected downstream from the Las Conchas burn area in 2012 and in the 2 MDA-G samples, 1 collected from the MDA G-7 drainage and 1 from the MDA G-6 retention pond (Table 2.0-2). PCB congeners were detected in all 11 samples, and total detected PCBs ranged from 0.00033 mg/kg in reach PA-2W, above the FRS, to 0.0146 mg/kg in reach TW-4E, also above the FRS (Table 3.0-2). In the 3 baseline samples collected from LA-0 (Table 2.0-2) that were also measured by the congener method, total detected PCBs ranged from 0.00011 mg/kg to 0.00095 mg/kg (Table 3.0-2). Longitudinal variations in total PCB concentration in the 2011 and 2012 samples are presented in Figure 3.3-1, showing elevated concentrations in TW-4E and decreasing concentrations downstream to reach PA-4, above NM 4. Previous sediment investigations indicated PCBs in Twomile Canyon have a primary source at TA-03 (LANL 2009, 106939). PCB concentrations in all reaches sampled in both 2011 and 2012 (PA-3E, PA-2W, TW-4E, and LA-0; Figure 3.3-1) showed a decreasing trend, possibly from the lower ash content in 2012 samples relative to the 2011 samples. The 2011 and 2012 PCB concentrations are at the very low end of the concentration distribution documented in the Pajarito Canyon Investigation Report, Revision 1 (LANL 2009, 106939) (Figure 3.3-2).

3.4 Dioxins and Furans

Dioxins were detected in all samples collected in 2012 from the Pajarito Canyon watershed (Table 3.0-2). Furans were also detected in all of these samples (Table 3.0-2). Dioxin and furan results are reported as both individual congeners and as totals for different homologs, and in this section the total detected results for individual homologs and total detected dioxins and furans based on the sum of these homologs were used to evaluate sources and spatial variations. As with PCB congeners, dioxin and furan congener homologs are distinguished by the number of chlorine atoms on the dioxin or furan ring structures. In the samples discussed in this report, dioxins and furans both have five reported homologs ranging from tetrachlorodibenzodioxin (tetraCDD, with four chlorine atoms) to octachlorodibenzodioxin (octaCDD, with eight chlorine atoms) and from tetrachlorodibenzofuran (tetraCDF) to octachlorodibenzofuran (octaCDF).

Samples collected in the Pajarito Canyon watershed in 2012 below the Las Conchas burn area and downstream from SWMUs and AOCs have a maximum total dioxin concentration of 2.5×10^{-4} mg/kg from one of the samples collected from PA-3E (Table 3.0-3). This concentration is essentially the same as the maximum 2011 total dioxin concentration of 2.6×10^{-4} mg/kg from reach TW-4E (LANL 2012, 213570). In the 2011 baseline samples, total detected dioxins have a maximum concentration of 6.9×10^{-5} mg/kg from reach TW-1W (LANL 2012, 213570). All 2011 and 2012 sample areas downgradient of SWMUs and AOCs, except PA-4, have higher detected concentrations of total dioxins than in the baseline samples, as shown in Figure 3.4-1a, indicating potential contributions from Laboratory sources. Figure 3.4-1b compares concentrations of dioxins in the 2011 and 2012 samples from the Pajarito Canyon watershed with previous data from this watershed (LANL 2009, 106939; LANL 2011, 201574; LANL 2011, 207316), indicating that maximum concentrations in the 2011 and 2012 samples in each sampling area are lower or are within the range of those previously measured. Figure 3.4-1b also shows that pre-2011 samples from the baseline reach TW-1W, in Twomile Canyon above NM 501, had higher total dioxin concentrations than measured in the 2011 baseline samples, up to 1.3×10^{-4} mg/kg, indicating a larger range for total dioxins in areas not affected by Laboratory activities.

Total detected furans in the samples collected in the Pajarito Canyon watershed in 2012 downstream from SWMUs and AOCs have a maximum concentration of 4.2×10^{-5} mg/kg from reach PA-3E (Table 3.0-2). This concentration is less than the maximum 2011 total furan concentration of 8.5×10^{-5} mg/kg from reach TW-4E (LANL 2012, 213570). In the 2011 baseline samples, total detected dioxins furans have a maximum of 1.1×10^{-5} mg/kg from reach TW-1W (LANL 2012, 213570). As with dioxins, all 2011 and 2012 sampling areas downgradient of SWMUs and AOCs, except PA-4, have higher detected total concentrations of furans concentrations than in the baseline samples, as shown in Figure 3.4-2a, indicating potential contributions from Laboratory sources. Figure 3.4-2b compares concentrations of total detected furans in the 2011 and 2012 samples from the Pajarito Canyon watershed with previous data from this watershed (LANL 2009, 106939; LANL 2011, 201574; LANL 2011, 207316), indicating that maximum concentrations in the 2011 and 2012 samples in most sample areas are lower than previously measured. The exception is TW-4E, where the maximum total detected furan result in 2011 was slightly higher than the previous maximum. Figure 3.4-2b shows that the range of furan results from the baseline reach TW-1W, in Twomile Canyon above NM 501, in pre-2011 samples was similar to that measured in 2011.

For the two MDA samples that do not contain ash, the maximum total furan concentration detected in 2012 samples is 2.7×10^{-4} mg/kg, from the coarse-grained sample from the small drainage below MDA G-7 (Table 3.0-2). Maximum total furan concentration detected in 2012 samples is 4.0×10^{-5} mg/kg, also from the coarse-grained sample from the small drainage below MDA G-7 (Table 3.0-2). These are slightly higher than concentrations detected in 2011 samples (1.3×10^{-4} mg/kg and 1.7×10^{-5} mg/kg, respectively) from MDA G-7 (LANL 2012, 213570).

The mammalian tetrachlorodibenzodioxin (2,3,7,8-) (2,3,7,8-TCDD-) or toxic equivalent concentration (TEC) data from samples collected in Pajarito Canyon and the main tributaries were calculated using the toxic equivalency factors (TEFs) referenced in “The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds” (Van den Berg et al. 2006, 106990). The mammalian TEFs are presented in Table 3.4-1 and the resulting TECs are presented in Table 3.4-2. The TECs measured in the 2012 samples are basically not different from the 2011 levels and not substantially different from the TEC calculated in the Pajarito Canyon Investigation Report, Revision 1 (LANL 2009, 106939) (Figure 3.4-3). The Pajarito watershed TEC levels are less than the maximum value reported in post–Cerro Grande fire sediment samples (Kraig et al. 2002, 085536).

3.5 Explosive Compounds

Analytical results for explosive compounds were obtained from the 9 fine-grained sediment samples collected in the Pajarito Canyon watershed in 2012 downstream from the Las Conchas burn area (Table 2.0-1). Analytical results for explosive compounds were also obtained from four additional fine-grained sediment samples from baseline areas in Cañon de Valle and Water Canyon above NM 501 (Table 2.0-2). No explosive compounds were detected in these samples (Table 3.0-2, Attachment 1, and Attachment 2).

4.0 SUMMARY

Analytical results from sediment samples collected in the Pajarito Canyon watershed and in baseline areas downstream from the Las Conchas burn area in 2012, combined with results from previous sediment investigations, indicate concentrations of most COPCs released from Laboratory sites decrease downstream from the sources and also decrease over time. This finding is consistent with the conceptual model presented in a previous investigation (LANL 2009, 106939). Dissipation of flood energy and deposition of entrained sediment in the wetland areas between TA-18 and NM 4 contributed greatly to

reducing the downstream transport of contaminants derived from SWMUs or AOCs farther west in the watershed. These data also indicate many COPCs detected in the 2012 sediment samples have a primary source in the Las Conchas burn area and are associated with the transport of ash. This interpretation is consistent with results of previous investigations conducted after the Cerro Grande fire. One exception to this trend is silver, which had not been identified as a COPC in PA-3E before 2011 sampling and was also detected above sediment BVs in 2012, indicating post–Las Conchas floods likely transported some silver contamination downcanyon from source areas.

5.0 RECOMMENDATIONS

Based on evaluation of the sediment data discussed in the previous sections and the observation of continued low concentrations in flood deposits in Pajarito Canyon, separate reporting of Pajarito Canyon sediment monitoring results no longer appears to be warranted. Instead, the Laboratory proposes that the annual sediment sampling conducted in Pajarito Canyon under the Compliance Order on Consent be conducted and reported as part of the Laboratory's environmental surveillance activities. The sampling approach used for the Laboratory's annual environmental report (ER) is the same as is implemented for the Pajarito Canyon sampling and this approach is being used across all watersheds that flood annually. Section 6.0 of the Laboratory's 2011 ER (LANL 2012, 228615) provides an example of the reporting methodology for sediment monitoring that will be used for the foreseeable future.

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. This information is also included in text citations. ER IDs 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.

BAER (Burned Area Emergency Rehabilitation), June 9, 2000. "Cerro Grande Fire, Burned Area Emergency Rehabilitation (BAER) Plan: Interagency Burned Area Emergency Rehabilitation Team," Los Alamos, New Mexico. (BAER 2000, 072659)

Kraig, D.H., R. Ryti, D. Katzman, T. Buhl, B. Gallaher, and P. Fresquez, March 2002. "Radiological and Nonradiological Effects After the Cerro Grande Fire," Los Alamos National Laboratory report LA-13914, Los Alamos, New Mexico. (Kraig et al. 2002, 085536)

LANL (Los Alamos National Laboratory), September 22, 1998. "Inorganic and Radionuclide Background Data for Soils, Canyon Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 059730)

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), August 2009. "Pajarito Canyon Investigation Report, Revision 1," Los Alamos National Laboratory document LA-UR-09-4670, Los Alamos, New Mexico. (LANL 2009, 106939)

LANL (Los Alamos National Laboratory), September 2009. "Sampling and Analysis Plan for Sediment Monitoring in the Pajarito Canyon Watershed," Los Alamos National Laboratory document LA-UR-09-5858, Los Alamos, New Mexico. (LANL 2009, 107340)

LANL (Los Alamos National Laboratory), December 2009. "Radionuclide Screening Action Levels (SALs) from RESRAD, Version 6.5," Los Alamos National Laboratory document LA-UR-09-8111, Los Alamos, New Mexico. (LANL 2009, 107655)

LANL (Los Alamos National Laboratory), February 2010. "Technical Approach for Calculating Recreational Soil Screening Levels for Chemicals, Revision 1," Los Alamos National Laboratory document LA-UR-09-07510, Los Alamos, New Mexico. (LANL 2010, 108613)

LANL (Los Alamos National Laboratory), March 2010. "Los Alamos National Laboratory Environmental Surveillance Program Sampling and Analysis Plan for Sediment, 2010," Los Alamos National Laboratory document LA-UR-10-1748, Los Alamos, New Mexico. (LANL 2010, 109107)

LANL (Los Alamos National Laboratory), March 2011. "Results of 2010 Sediment Monitoring in the Pajarito Canyon Watershed," Los Alamos National Laboratory document LA-UR-11-0942, Los Alamos, New Mexico. (LANL 2011, 201574)

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), September 2011. "Los Alamos National Laboratory Environmental Report 2010," Los Alamos National Laboratory report LA-14445-ENV, Los Alamos, New Mexico. (LANL 2011, 207316)

LANL (Los Alamos National Laboratory), March 2012. "Results of 2011 Sediment Monitoring in the Pajarito Canyon Watershed," Los Alamos National Laboratory document LA-UR-12-1133, Los Alamos, New Mexico. (LANL 2012, 213570)

LANL (Los Alamos National Laboratory), September 2012. "Los Alamos National Laboratory Environmental Report 2011," Los Alamos National Laboratory report LA-14461-ENV, Los Alamos, New Mexico. (LANL 2012, 228615)

LANL (Los Alamos National Laboratory), October 2012. "Technical Approach for Calculating Recreational Soil Screening Levels for Chemicals, Revision 3," Los Alamos National Laboratory document LA-UR-12-25447, Los Alamos, New Mexico. (LANL 2012, 228733)

NMED (New Mexico Environment Department), November 21, 2008. "Notice of Disapproval, Pajarito Canyon Investigation Report," 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 2008, 103803)

NMED (New Mexico Environment Department), November 3, 2009. "Notice of Approval, Pajarito Canyon Investigation Report, Revision 1," 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, 107367)

NMED (New Mexico Environment Department), November 13, 2009. "Notice of Approval with Modifications; Sampling and Analysis Plan for Sediment Monitoring in the Pajarito Canyon Watershed," 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, 108123)

NMED (New Mexico Environment Department), December 2009. "Technical Background Document for Development of Soil Screening Levels, Revision 5.0," with revised Table A-1, New Mexico Environment Department, Hazardous Waste Bureau and Ground Water Quality Bureau Voluntary Remediation Program, Santa Fe, New Mexico. (NMED 2009, 108070)

NMED (New Mexico Environment Department), June 29, 2012. "Approval with Modifications, Results of 2011 Sediment Monitoring in the Pajarito Canyon Watershed," New Mexico Environment Department letter to P. Maggiore (DOE-LASO) and M.J. Graham (LANL) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2012, 520815)

Van den Berg, M., L. Birnbaum, M. Denison, M. De Vito, W. Farland, M. Feeley, H. Fiedler, H. Hakansson, A. Hanberg, L. Haws, M. Rose, S. Safe, D. Schrenk, C. Tohyama, A. Tritscher, J. Tuomisto, M. Tysklind, N. Walker, and R.E. Peterson, 2006. "The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds," *Toxicological Sciences,* Vol. 93, No. 2, pp. 223–241. (Van den Berg et al. 2006, 106990)

6.1 Map Data Sources

2000 LIDAR Hypsography; Los Alamos National Laboratory, Earth and Environmental Sciences GISLab; 1:1,200; Draft.

Boundary, LANL; Los Alamos National Laboratory, SSMO Site Planning and Project Initiation Group; Unknown; December 2, 2008.

Boundary, Technical Area; Los Alamos National Laboratory, SSMO Site Planning and Project Initiation Group; Unknown; August 16, 2010.

Dirt Roads; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating, and Mapping Section; Unknown; August 17, 2011.

Drainage; Los Alamos National Laboratory, Environment and Remediation Support Services; Unknown; May 15, 2006.

Land Ownership; Los Alamos National Laboratory, SSMO Site Planning and Project Initiation Group; Unknown; December 2, 2008.

Location IDs; Los Alamos National Laboratory, Waste and Environmental Services Division; 1:2,500; March 8, 2012.

Perimeter of the Las Conchas fire burn area; Los Alamos National Laboratory, Earth and Environmental Sciences GISLab; Unknown; July 19, 2011.

Primary Roads; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating, and Mapping Section; Unknown; August 17, 2011.

Security Fence; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating, and Mapping Section; Unknown; August 17, 2011.

Structures; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating, and Mapping Section; Unknown; August 17, 2011.

Watersheds; Los Alamos National Laboratory, Environment and Remediation Support Services; 1:2,500; October 27, 2006.

a



b



Figure 1.0-1 **Photographs of ash-rich sediment in reach PA-3E along Pajarito Road east of TA-18: (a) Sediment deposited by August 3, 2011 flood, (b) Same area photographed in February 2012. Summer 2012 monsoon floods deposited an additional 4 to 8 cm of sediment over the 2011 deposits at the 2012 sampling locations.**

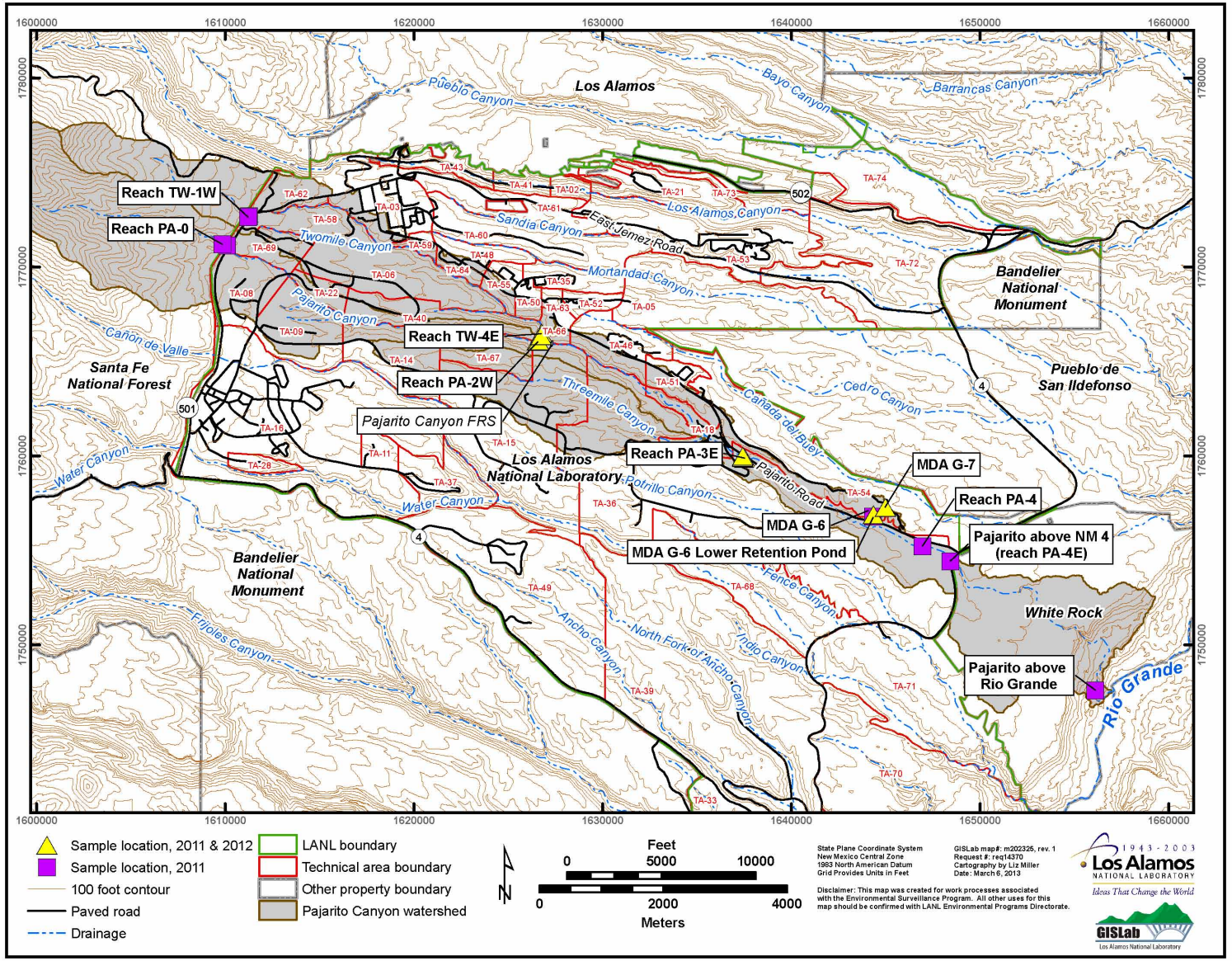


Figure 2.0-1 Sediment sampling locations in the Pajarito Canyon watershed in 2012 and 2011

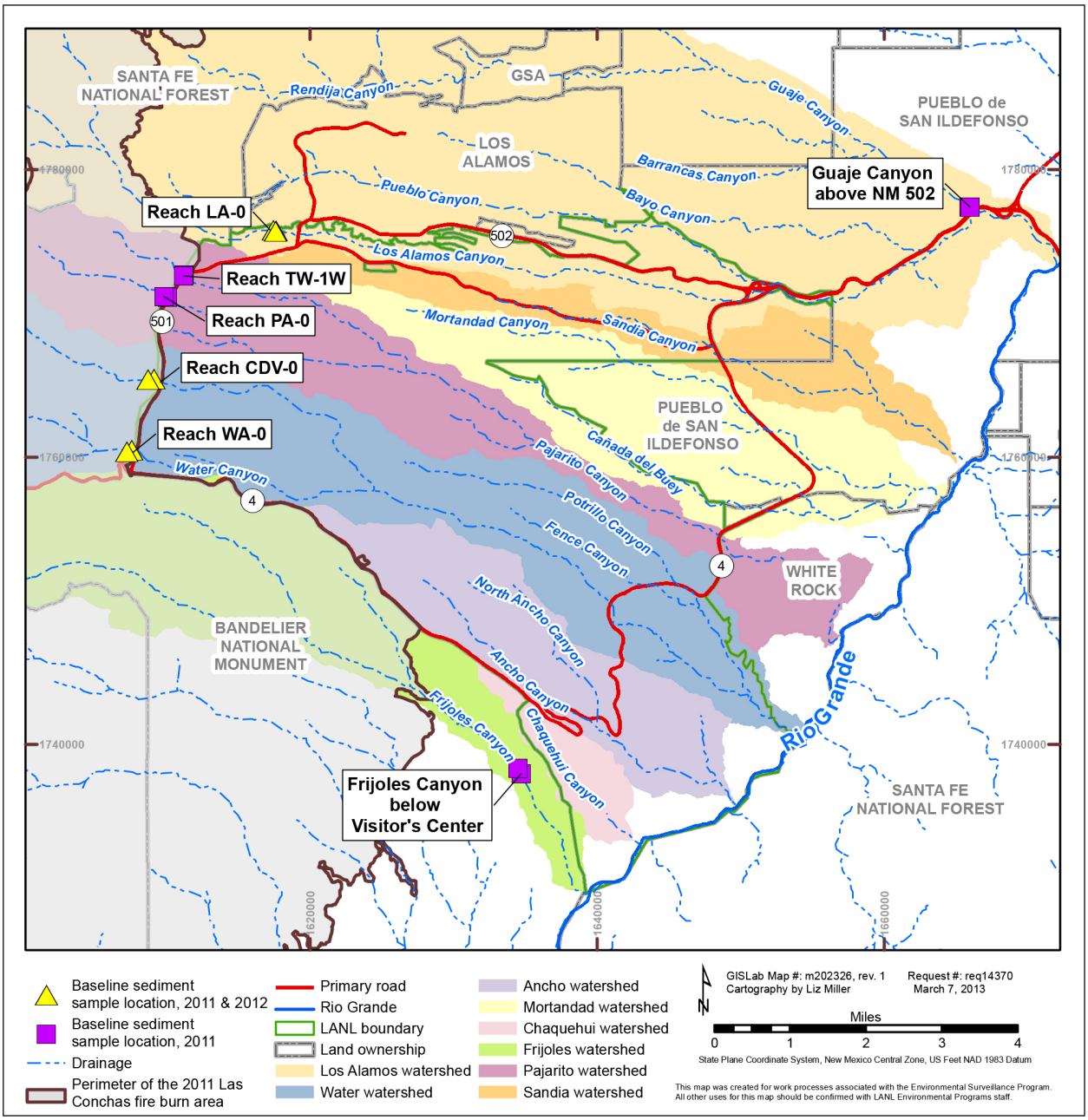
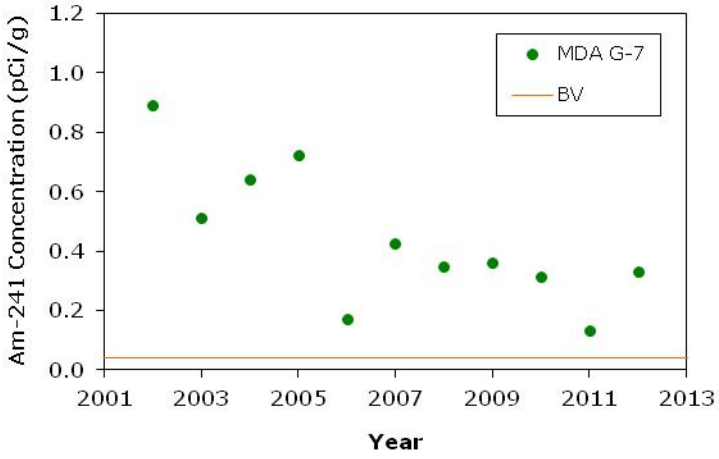
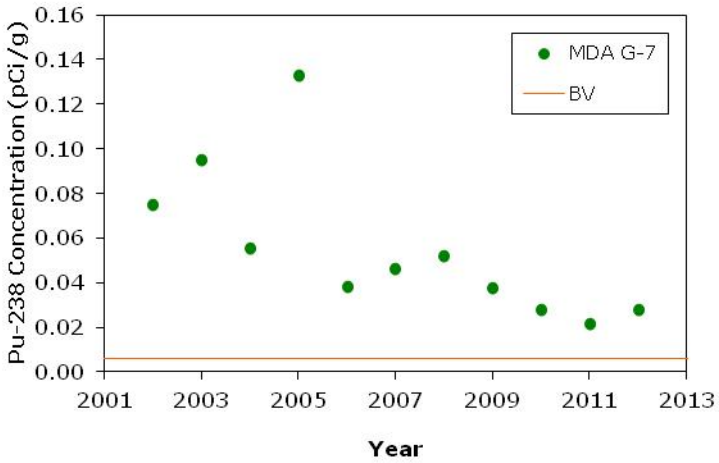


Figure 2.0-2 **2012 and 2011 baseline sediment sampling locations downstream from the Las Conchas burn area**





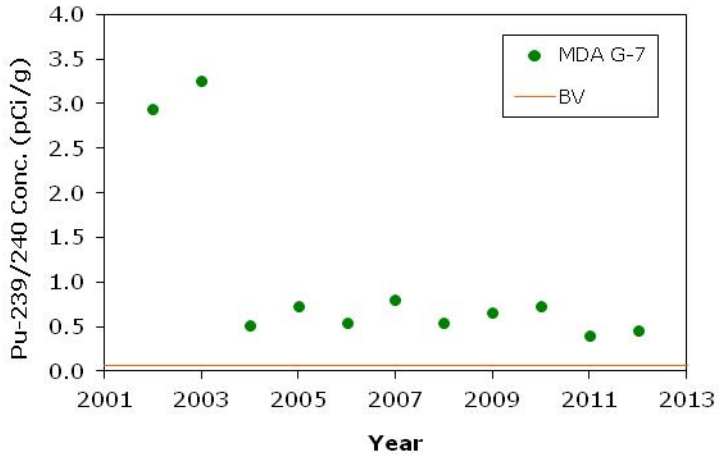


Figure 3.1-1 Concentrations of americium-241, plutonium-238, and plutonium-239/240 in the MDA G-7 drainage, 2002 to 2012

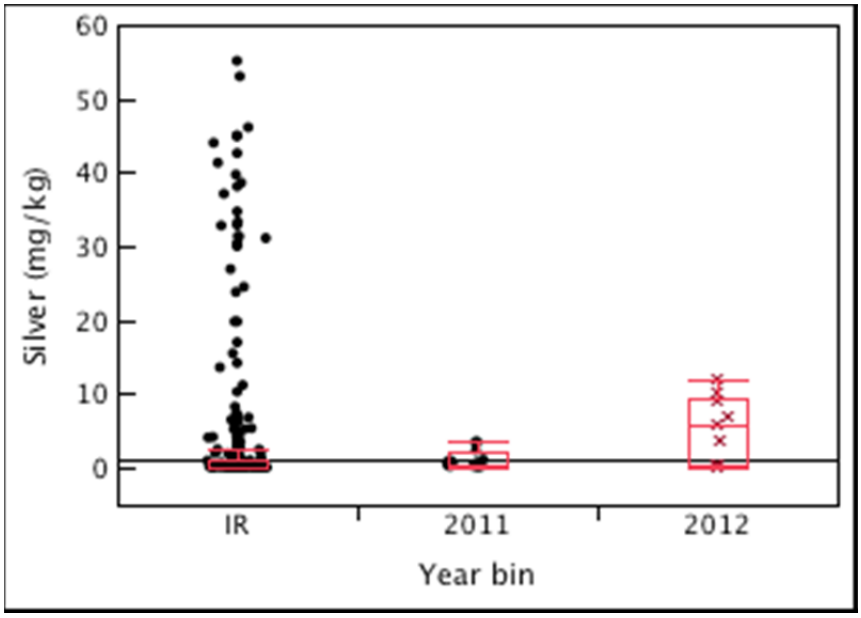


Figure 3.2-1 Silver concentration in 2012, 2011, and Pajarito Canyon Investigation Report, Rev. 1 sediment samples

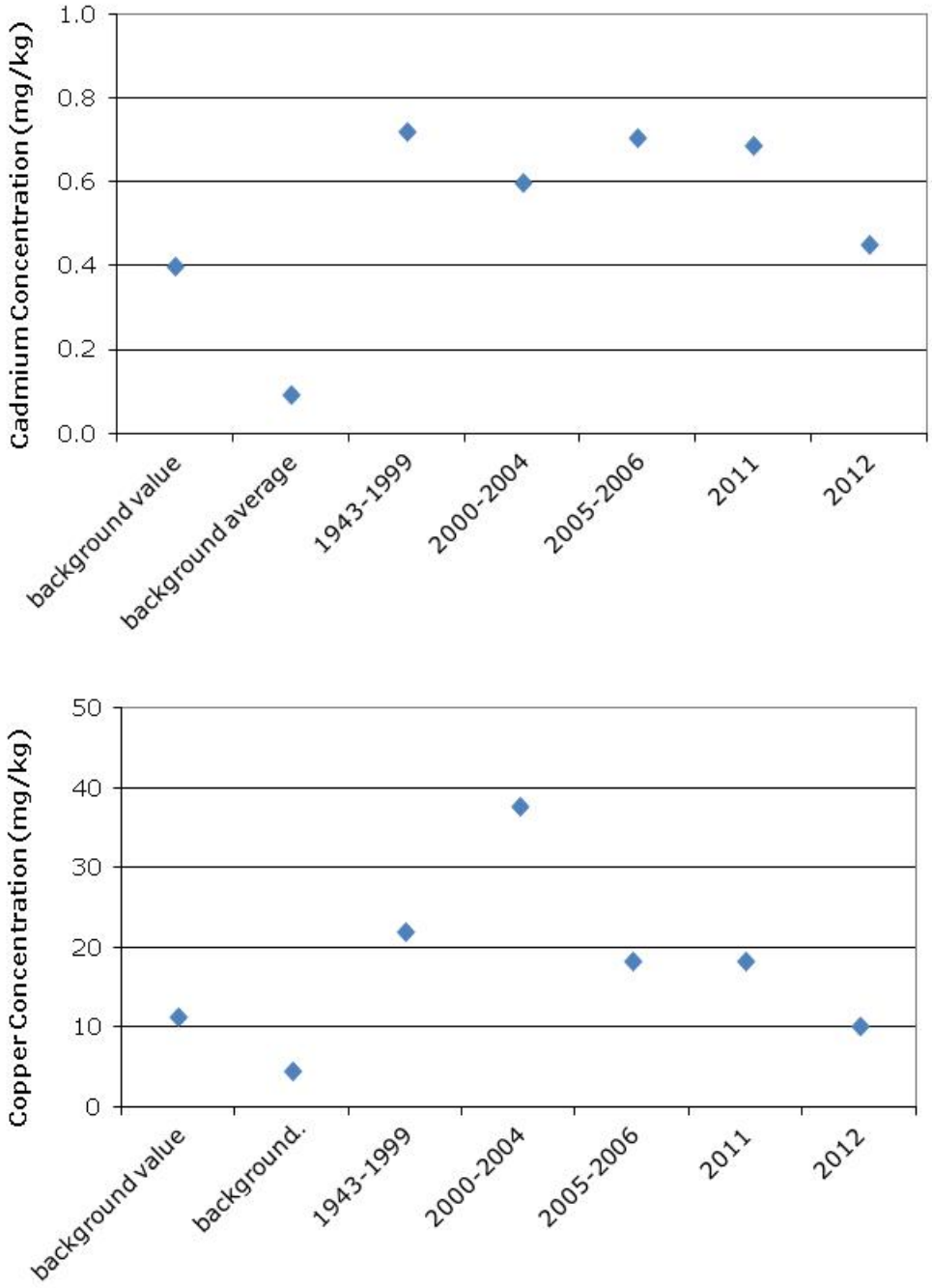


Figure 3.2-2 Temporal variations in the average concentrations of cadmium and copper in fine facies sediment in reach PA-2W

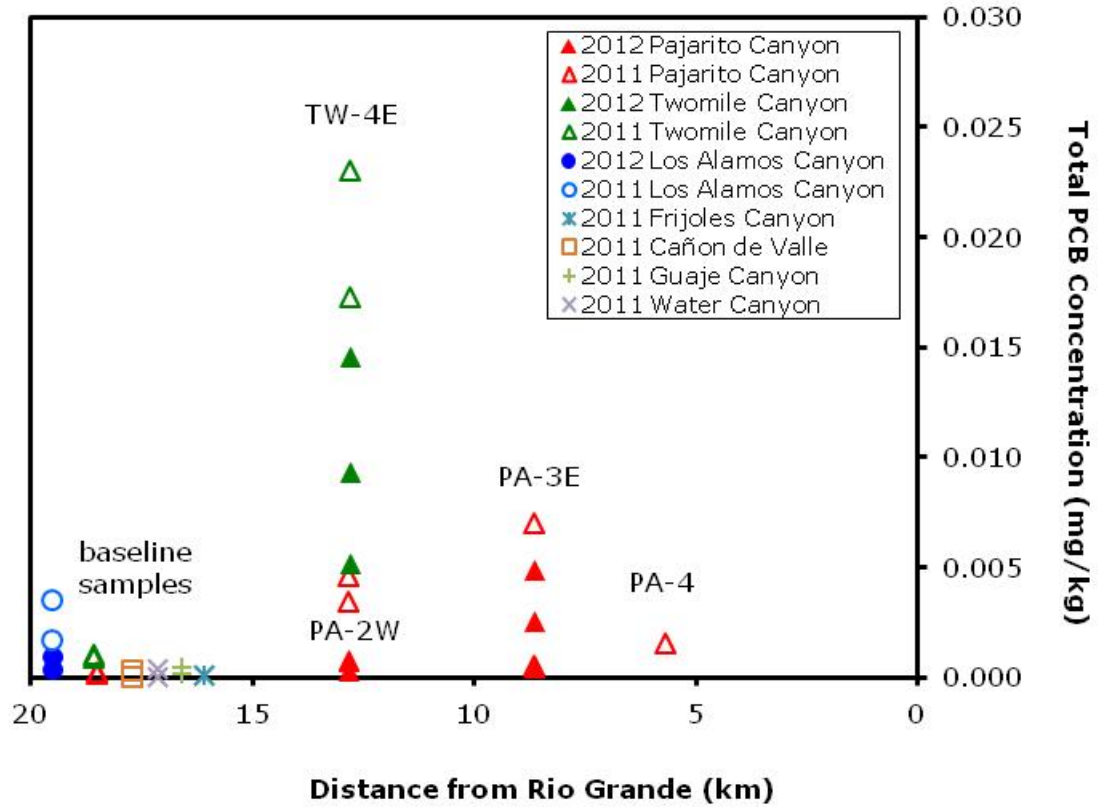


Figure 3.3-1 **Total detected PCB concentration in 2012 and 2011 sediment samples plotted versus distance from the Rio Grande; Frijoles Canyon and Guaje Canyon samples arbitrarily plotted at 16–17 km**

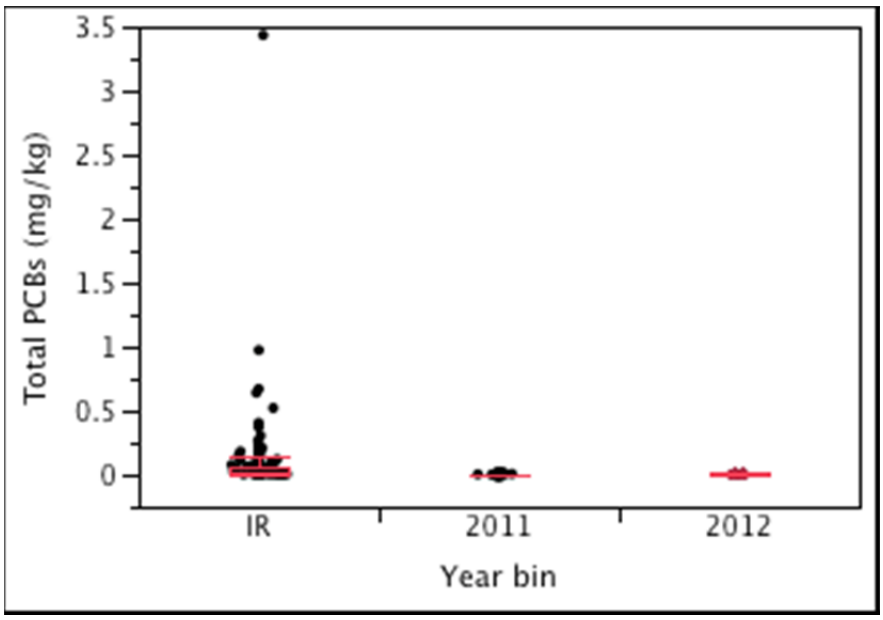


Figure 3.3-2 Total PCB concentration in 2012, 2011 Pajarito Canyon Investigation Report, Rev. 1 sediment samples

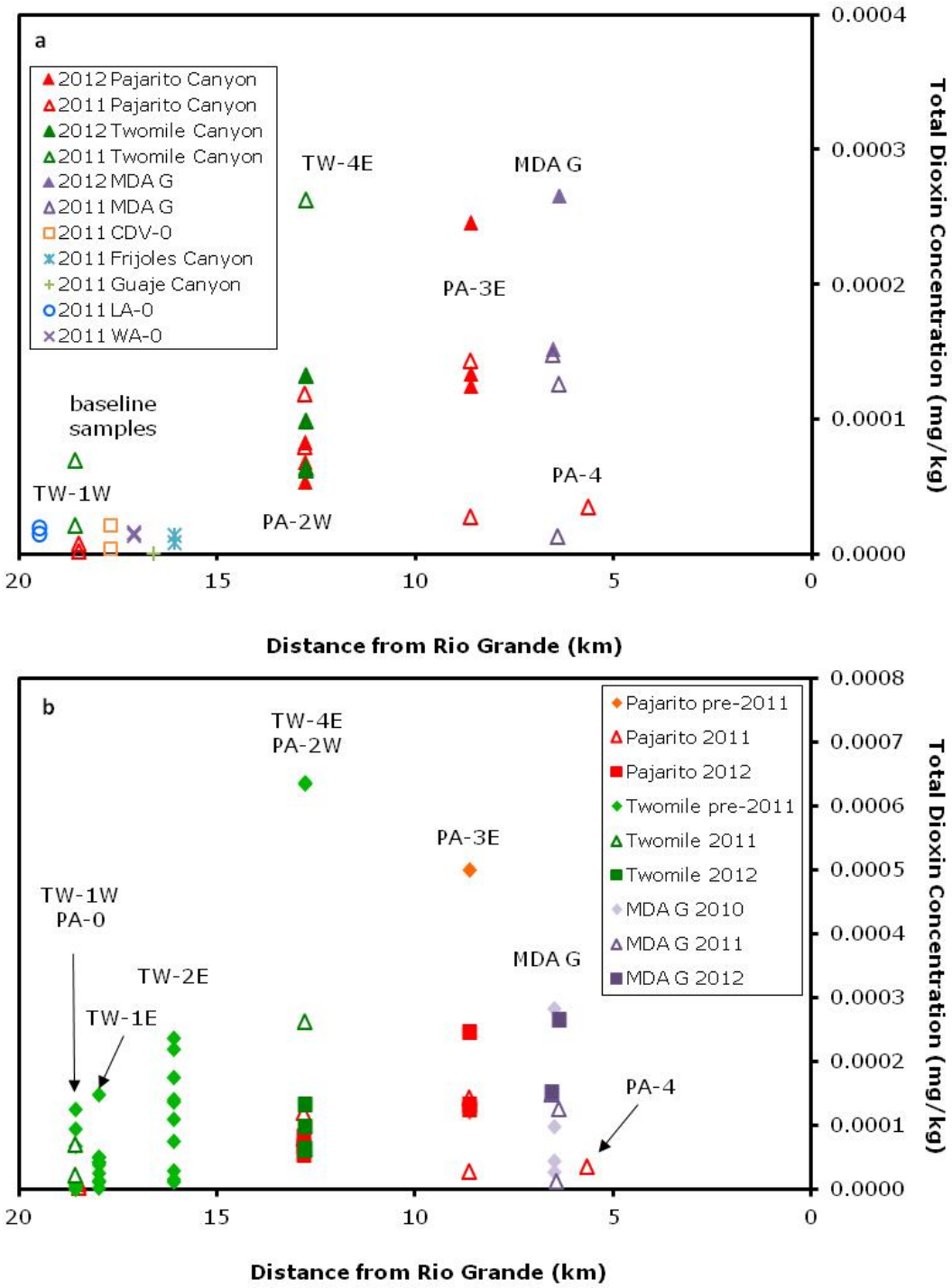


Figure 3.4-1 **Total detected dioxin concentration plotted versus distance from the Rio Grande: (a) 2012 and 2011 sediment samples from Pajarito Canyon watershed and baseline areas with Frijoles Canyon and Guaje Canyon samples arbitrarily plotted at 16–17 km, and (b) 2012, 2011 and pre-2011 sediment samples from Pajarito Canyon watershed**

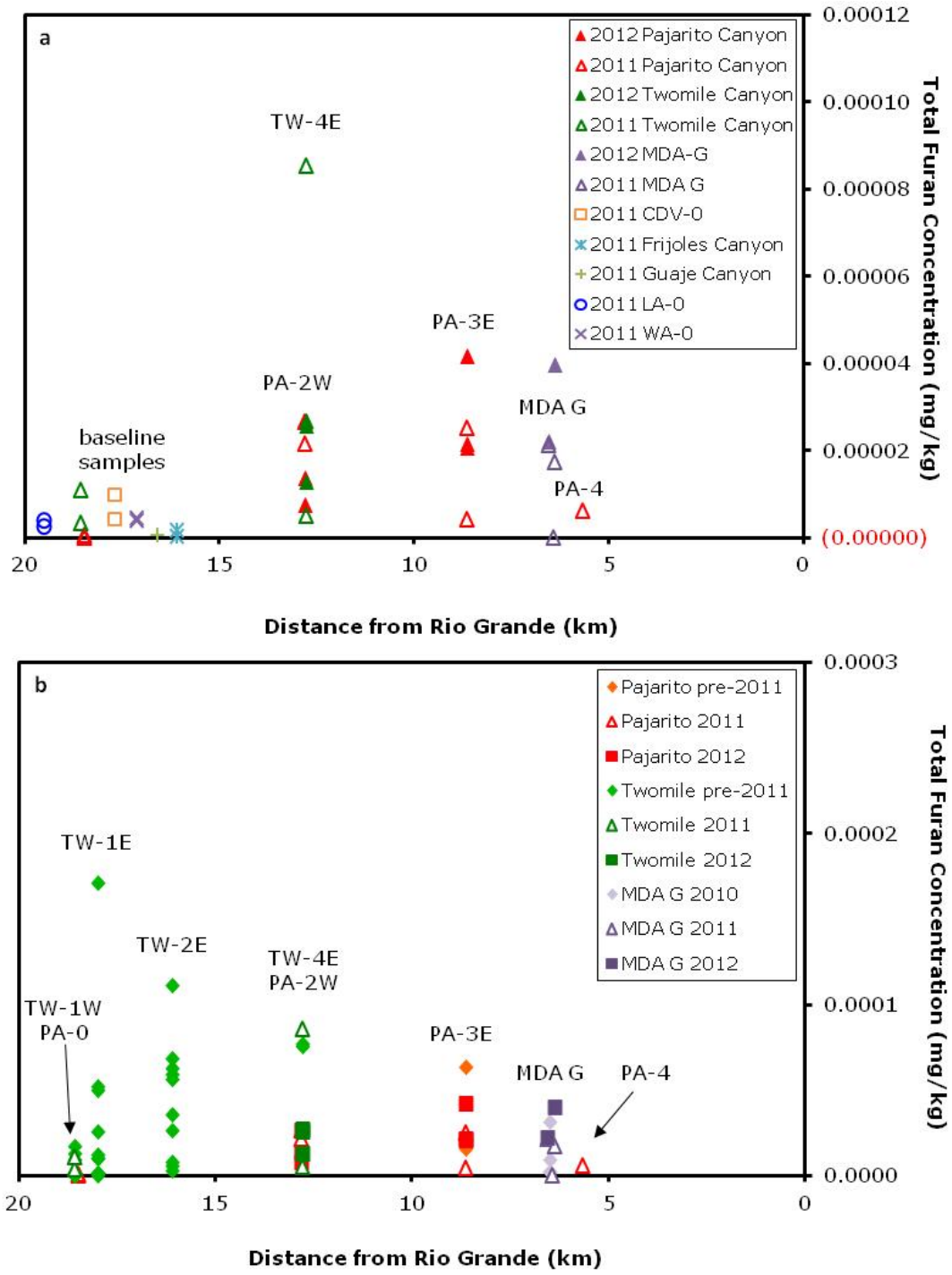


Figure 3.4-2 **Total detected furan concentration plotted versus distance from the Rio Grande: (a) 2012 and 2011 sediment samples from Pajarito Canyon watershed and baseline areas with Frijoles Canyon and Guaje Canyon samples arbitrarily plotted at 16–17 km and (b) 2012, 2011 and pre-2011 sediment samples from Pajarito Canyon watershed**

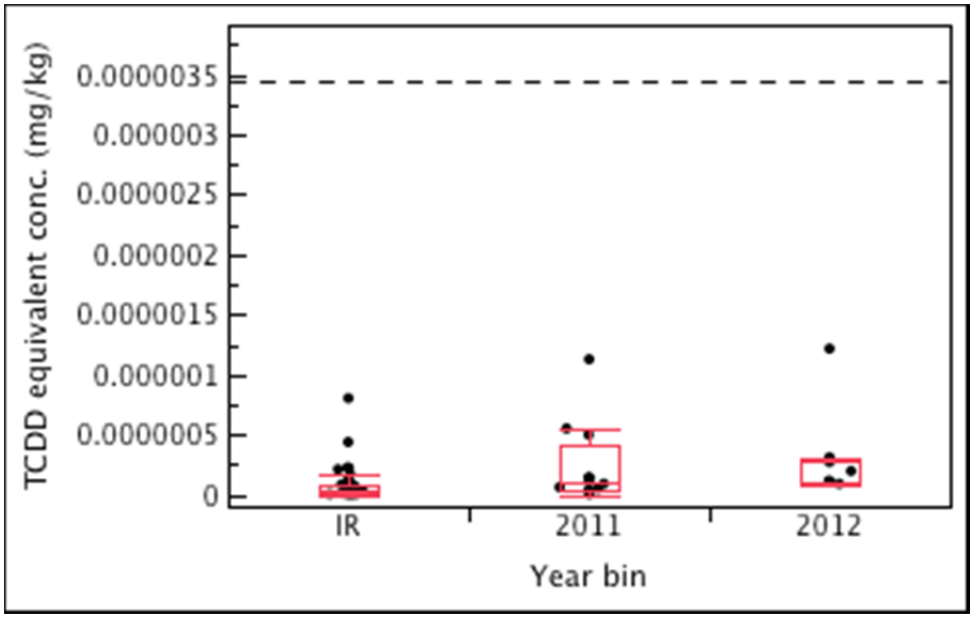


Figure 3.4-3 TCDD equivalent concentrations in 2012 compared to 2011 and the Investigation Report. The dashed line is the post-Cerro Grande fire concentration for comparison (Kraig et al. 2002, 85536)

Table 2.0-1
Summary of Sediment Samples Collected and Analyses Requested in 2012 from the Pajarito Canyon Watershed

Sample ID	Reach or Area	Location ID or Location Name	Depth (cm)	Sediment Facies	Americium-241	Dioxin and Furans	Explosive Compounds	Isotopic Plutonium	Isotopic Uranium	Target Analyte List Metals	PCB Congeners (EPA Method 1668A)	Particle Size
CAPA-13-24756	PA-2W	PA-1	0–5	Fine	X[a]	X	X	X	X	X	X	X
CAPA-13-24757	PA-2W	PA-2	0–6	Fine	X	X	X	X	X	X	X	X
CAPA-13-24758	PA-2W	PA-3	0–6	Fine	X	X	X	X	X	X	X	X
CAPA-13-24784	PA-3E	PA-7	0–6	Fine	X	X	X	X	X	X	X	X
CAPA-13-24785	PA-3E	PA-8	0–4	Fine	X	X	X	X	X	X	X	X
CAPA-13-24786	PA-3E	PA-9	0–8	Fine	X	X	X	X	X	X	X	X
CAPA-13-24787	MDA G-6 Retention Pond Lower	MDA-G Retention Pond Lower	0–1	Fine	X	X	—[b]	X	X	X	X	X
CAPA-13-24788	MDA G-7	MDA G-7	0–2	Coarse	X	X	—	X	X	X	X	X
CATW-13-24759	TW-4E	TW-1	0–5	Fine	X	X	X	X	X	X	X	X
CATW-13-24760	TW-4E	TW-2	0–6	Fine	X	X	X	X	X	X	X	X
CATW-13-24761	TW-4E	TW-3	0–4	Fine	X	X	X	X	X	X	X	X

[a] X = Analysis was performed.

[b] — = Analysis was not performed.

Table 2.0-2
Summary of Sediment Samples Collected and Analyses Requested in 2012 from Baseline Areas Outside the Pajarito Canyon Watershed

Sample ID	Reach or Area	Location ID	Depth (cm)	Sediment Facies	Americium-241	Gamma Spectroscopy Radionuclides	Explosive Compounds	Isotopic Plutonium	Target Analyte List Metals	PCB Congeners (EPA Method 1668A)	Particle Size
CACV-13-24689	CDV-0	CV-21	0-6	Fine	—[a]	—	X[b]	—	X	—	X
CACV-13-24690	CDV-0	CV-22	0-3	Fine	—	—	X	—	X	—	X
CALA-13-24718	LA-0	LA-1004	0-9	Fine	X	X	—	X	X	X	X
CALA-13-24719	LA-0	LA-1005	0-6	Fine	X	X	—	X	X	X	X
CALA-13-24720	LA-0	LA-1006	0-5	Fine	X	X	—	X	X	X	X
CAWA-13-24699	WA-0	WA-11	0-1	Fine	—	—	X	—	X	—	X
CAWA-13-24700	WA-0	WA-12	0-6	Fine	—	—	X	—	X	—	X

[a] — = Analysis not requested.

[b] X = Analysis requested.

Table 3.0-1
Inorganic Chemicals above BVs in 2012 Pajarito Canyon Watershed Sediment Samples

Sample ID	Reach or Area	Location ID or Location Name	Depth (cm)	Media	Antimony	Barium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Selenium	Silver	Vanadium	Zinc
Sediment BV[a]					**0.83**	**127**	**0.4**	**4420**	**10.5**	**4.73**	**11.2**	**13800**	**19.7**	**543**	**0.3**	**1**	**19.7**	**60.2**
Recreational Soil Screening Levels[b]					**248**	**124000**	**465**	**na**[c]	**927000**[d]	**186**	**24800**	**433000**	**1350**	**14800**	**3100**	**3100**	**3100**	**186000**
CAPA-13-24756	PA-2W	PA-1	0–5	Sediment	1.3 (U)	192	0.454 (J)	5560 (J-)	10.9	4.86	11.4	—[e]	—	771 (J-)	1.31 (U)	9.1	—	—
CAPA-13-24757	PA-2W	PA-2	0–6	Sediment	1.06 (U)	139	0.434 (J)	—	—	—	—	—	—	579	1.04 (U)	10	—	—
CAPA-13-24758	PA-2W	PA-3	0–6	Sediment	1.54 (U)	180	0.45 (J)	5520	—	—	—	—	—	730	1.45 (U)	12.1	—	—
CAPA-13-24784	PA-3E	PA-7	0–6	Sediment	1.51 (U)	241	0.503 (J)	6530	—	5.46	13.7	—	21.4	960	1.37 (U)	5.72	—	—
CAPA-13-24785	PA-3E	PA-8	0–4	Sediment	1.35 (U)	284	0.604 (J)	7670	—	6.45	16.5	14100	27.3	1110	1.34 (U)	3.77	22.6	72.8
CAPA-13-24786	PA-3E	PA-9	0–8	Sediment	1.52 (U)	298	0.737 (J)	9130	—	6.46	18	—	25.9	1200	1.47 (U)	6.86	20.9	68.5
CAPA-13-24787	MDA G-6 Retention Pond Lower	MDA G-6 Retention Pond Lower	0–1	Sediment	0.928 (U)	—	—	—	—	—	—	—	—	—	0.967 (U)	1.26	—	111
CAPA-13-24788	MDA G-7	MDA G-7	0–2	Sediment	—	—	—	—	—	—	—	—	—	—	0.868 (U)	—	—	71.1
CATW-13-24759	TW-4E	TW-1	0–5	Sediment	1.27 (U)	239	0.441 (J)	8780	—	—	12.3	—	22.5	1100	0.407 (J)	—	—	60.6
CATW-13-24760	TW-4E	TW-2	0–6	Sediment	1.56 (U)	281	0.528 (J)	10600	—	5.04	14.6	—	26.2	1440	1.46 (U)	—	—	67.4
CATW-13-24761	TW-4E	TW-3	0–4	Sediment	1.44 (U)	273	0.478 (J)	7870	—	5.7	13.3	—	21.7	1090	1.46 (U)	—	20.3	62

Notes: Units are mg/kg. U = The analyte was analyzed for but not detected. J = The analyte was positively identified, and the associated numerical value is estimated to be more uncertain than would normally be expected for that analysis. J- = The analyte was positively identified, and the result is likely to be biased low.

[a] BVs are from LANL (1998, 059730).

[b] Soil screening levels are from LANL (2012, 228733).

[c] na = Not available.

[d] BVs for chromium(III) are from LANL (2012, 228733).

[e] — = Not detected or not detected above BV.

Table 3.0-2
Organic Chemicals Detected in 2012 Pajarito Canyon Watershed Sediment Samples

Sample ID	Reach or Area	Location ID or Location Name	Depth (cm)	Media	Heptachlorodibenzodioxin [1,2,3,4,6,7,8-]	Heptachlorodibenzodioxins(Total)	Heptachlorodibenzofuran [1,2,3,4,6,7,8-]	Heptachlorodibenzofuran [1,2,3,4,7,8,9-]	Heptachlorodibenzofurans (Total)	Hexachlorodibenzodioxin [1,2,3,4,7,8-]	Hexachlorodibenzodioxin [1,2,3,6,7,8-]	Hexachlorodibenzodioxins (Total)	Hexachlorodibenzofuran [1,2,3,4,7,8-]	Hexachlorodibenzofuran [1,2,3,6,7,8-]	Hexachlorodibenzofuran [2,3,4,6,7,8-]
Recreational Soil Screening Levels[a]					**na[b]**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
CAPA-13-24756	PA-2W	PA-1	0–5	Sediment	8.53E-06	1.87E-05	2.7E-006 (J)	1.17E-006 (J)	6.68E-006 (J)	1.41E-006 (J)	1.64E-006 (J)	4.58E-006 (J)	1.37E-006 (J)	1.02E-006 (J)	1.07E-006 (J)
CAPA-13-24757	PA-2W	PA-2	0–6	Sediment	5.8E-06	1.33E-05	1.66E-006 (J)	—[c]	2.35E-006 (J)	—	—	1.33E-006 (J)	—	—	—
CAPA-13-24758	PA-2W	PA-3	0–6	Sediment	7.32E-06	1.71E-05	1.69E-006 (J)	—	4.39E-006 (J)	—	—	8.85E-007 (J)	—	—	—
CAPA-13-24784	PA-3E	PA-7	0–6	Sediment	1.87E-05	4.58E-05	3.82E-006 (J)	—	1.37E-05	—	—	1.09E-006 (J)	—	—	—
CAPA-13-24785	PA-3E	PA-8	0–4	Sediment	1.31E-05	2.73E-05	2.66E-006 (J)	—	6.45E-006 (J)	—	7.9E-007 (J)	3.02E-006 (J)	—	—	—
CAPA-13-24786	PA-3E	PA-9	0–8	Sediment	0.000013	2.98E-05	3.39E-006 (J)	—	7.93E-006 (J)	—	—	—	—	—	—
CAPA-13-24787	MDA G-6 Retention Pond Lower	MDA G-6 Retention Pond Lower	0–1	Sediment	1.54E-05	3.61E-05	4.32E-006 (J)	—	0.000007	—	8.02E-007 (J)	4.29E-006 (J)	—	—	—
CAPA-13-24788	MDA G-7	MDA G-7	0–2	Sediment	2.82E-05	5.33E-05	7.66E-06	—	1.37E-05	1.1e-006 (J)	1.81E-006 (J)	8.81E-06	5.24E-007 (J)	5.47E-007 (J)	7.13E-007 (J)
CATW-13-24759	TW-4E	TW-1	0–5	Sediment	1.52E-05	2.73E-05	2.96E-006 (J)	—	6.45E-06	—	7.2E-007 (J)	7.2E-007 (J)	—	—	—
CATW-13-24760	TW-4E	TW-2	0–6	Sediment	1.18E-05	2.21E-05	2.56E-006 (J)	—	5.87E-006 (J)	—	—	1.16E-006 (J)	—	—	—
CATW-13-24761	TW-4E	TW-3	0–4	Sediment	8.06E-06	1.46E-05	1.61E-006 (J)	—	3.6E-006 (J)	—	—	—	—	—	—

Table 3.0-2 (continued)

Sample ID	Reach or Area	Location ID or Location Name	Depth (cm)	Media	Hexachlorodibenzofurans (Total)	Octachlorodibenzodioxin [1,2,3,4,6,7,8,9-]	Octachlorodibenzofuran [1,2,3,4,6,7,8,9-]	PCB-1	PCB-105	PCB-107	PCB-108/PCB-124	PCB-11	PCB-110/PCB-115	PCB-114	PCB-118
Recreational Soil Screening Levels[a]					**na**	**na**	**na**	**na**	**4.88**	**na**	**na**	**na**	**na**	**4.88**	**4.88**
CAPA-13-24756	PA-2W	PA-1	0–5	Sediment	7.19E-006 (J)	5.75E-05	4.55E-006 (J)	—	2.91E-006 (J)	—	—	2.01E-005 (J)	1.86E-05	—	9.62E-06
CAPA-13-24757	PA-2W	PA-2	0–6	Sediment	9.29E-007 (J)	0.0000383	2.72E-006 (J)	—	7.57E-06	—	—	—	3.64E-05	—	2.03E-05
CAPA-13-24758	PA-2W	PA-3	0–6	Sediment	2.14E-006 (J)	4.74E-05	4.15E-006 (J)	—	8.88E-06	—	—	1.69E-005 (J)	4.06E-05	—	2.25E-05
CAPA-13-24784	PA-3E	PA-7	0–6	Sediment	3.23E-006 (J)	0.000196	2.04E-05	—	3.27E-05	2.76E-006 (J)	1.62E-006 (J)	2.27E-005 (J)	0.000126	—	6.95E-05
CAPA-13-24785	PA-3E	PA-8	0–4	Sediment	3.12E-006 (J)	0.0001	5.54E-006 (J)	—	7.11E-05	8.54E-06	6.07E-06	—	0.000258	—	0.000148
CAPA-13-24786	PA-3E	PA-9	0–8	Sediment	3.52E-006 (J)	9.11E-05	6.54E-006 (J)	—	6.32E-06	—	—	—	0.000032	—	1.62E-05
CAPA-13-24787	MDA G-6 Retention Pond Lower	MDA G-6 Retention Pond Lower	0–1	Sediment	4.67E-006 (J)	0.00011	4.39E-006 (J)	—	0.000298	—	—	—	—	—	0.000611
CAPA-13-24788	MDA G-7	MDA G-7	0–2	Sediment	1.11E-05	0.000203	1.19E-05	—	2.29E-006 (J)	—	—	—	1.06E-05	—	7.86E-06
CATW-13-24759	TW-4E	TW-1	0–5	Sediment	1.13E-006 (J)	9.82E-05	6.47E-006 (J)	—	0.000149	2.07E-005 (J)	1.61E-005 (J)	—	0.000609	—	0.000323
CATW-13-24760	TW-4E	TW-2	0–6	Sediment	2.67E-006 (J)	7.04E-05	5.11E-006 (J)	1.02E-006 (J)	0.000116	1.56E-05	1.07E-05	2.72E-005 (J)	—	2.52E-006 (J)	0.000237
CATW-13-24761	TW-4E	TW-3	0–4	Sediment	1.42E-006 (J)	4.68E-05	3.72E-006 (J)	—	6.82E-05	8.26E-06	5.74E-06	2.08E-005 (J)	—	—	0.000145

Table 3.0-2 (continued)

Sample ID	Reach or Area	Location ID or Location Name	Depth (cm)	Media	PCB-12/PCB-13	PCB-122	PCB-123	PCB-126	PCB-128/PCB-166	PCB-129/PCB-138/PCB-163	PCB-130	PCB-131	PCB-132	PCB-133
Recreational Soil Screening Levels[a]					**na**	**na**	**4.88**	**0.00146**	**na**	**na**	**na**	**na**	**na**	**na**
CAPA-13-24756	PA-2W	PA-1	0–5	Sediment	—	—	—	—	2.34E-006 (J)	2.96E-05	—	—	4.75E-06	—
CAPA-13-24757	PA-2W	PA-2	0–6	Sediment	—	—	—	—	7.22E-06	7.03E-05	8.41E-007 (J)	—	1.34E-05	—
CAPA-13-24758	PA-2W	PA-3	0–6	Sediment	7.3E-006 (J)	—	—	—	8.14E-06	7.44E-05	1.07E-006 (J)	—	1.47E-05	—
CAPA-13-24784	PA-3E	PA-7	0–6	Sediment	1.12E-05	—	—	—	2.55E-05	0.000172	6.98E-06	—	3.93E-05	—
CAPA-13-24785	PA-3E	PA-8	0–4	Sediment	2.42E-05	—	2.22E-006 (J)	6.75E-007 (J)	6.14E-05	0.000395	2.06E-05	—	9.94E-05	1.12E-006 (J)
CAPA-13-24786	PA-3E	PA-9	0–8	Sediment	—	—	—	—	5.42E-06	4.99E-05	—	—	1.05E-05	—
CAPA-13-24787	MDA G-6 Retention Pond Lower	MDA G-6 Retention Pond Lower	0–1	Sediment	—	—	—	—	0.00023 (J)	0.00161	0.0001 (J)	—	0.0004	—
CAPA-13-24788	MDA G-7	MDA G-7	0–2	Sediment	—	—	—	—	—	2.15E-05	—	—	2.02E-006 (J)	—
CATW-13-24759	TW-4E	TW-1	0–5	Sediment	5.54E-005 (J)	—	7.79E-006 (J)	—	0.000122	0.000862	—	—	0.00024	—
CATW-13-24760	TW-4E	TW-2	0–6	Sediment	4.86E-05	2.04E-006 (J)	3.55E-06	—	9.26E-05	0.000569	3.32E-05	2.87E-006 (J)	0.000172	3.26E-006 (J)
CATW-13-24761	TW-4E	TW-3	0–4	Sediment	1.91E-05	—	2.21E-006 (J)	—	6.36E-05	0.000408	2.09E-05	—	0.000117	1.32E-006 (J)

Table 3.0-2 (continued)

Sample ID	Reach or Area	Location ID or Location Name	Depth (cm)	Media	PCB-134	PCB-135/PCB-151	PCB-136	PCB-137	PCB-139/PCB-140	PCB-141	PCB-144	PCB-146	PCB-147/PCB-149	PCB-15	PCB-153/PCB-168
Recreational Soil Screening Levels[a]					**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
CAPA-13-24756	PA-2W	PA-1	0–5	Sediment	—	4.76E-06	—	—	—	—	—	9.14E-007 (J)	1.62E-05	—	2.26E-05
CAPA-13-24757	PA-2W	PA-2	0–6	Sediment	—	1.36E-05	2.43E-06	—	—	7.13E-06	—	5.92E-06	4.02E-05	—	5.34E-05
CAPA-13-24758	PA-2W	PA-3	0–6	Sediment	—	1.42E-05	2.72E-06	—	—	7.57E-06	—	6.73E-06	4.39E-05	—	5.69E-05
CAPA-13-24784	PA-3E	PA-7	0–6	Sediment	2.32E-006 (J)	3.72E-05	1.08E-05	4.43E-06	—	2.21E-05	1.31E-006 (J)	1.68E-05	0.000101	1.42E-005 (J)	0.000119
CAPA-13-24785	PA-3E	PA-8	0–4	Sediment	1.04E-05	8.83E-05	2.64E-05	0.000014	2.25E-006 (J)	5.78E-05	6.43E-006 (J)	4.32E-05	0.000228	2.57E-05	0.000274
CAPA-13-24786	PA-3E	PA-9	0–8	Sediment	—	9.39E-06	1.96E-006 (J)	—	—	4.23E-06	—	3.01E-006 (J)	2.93E-05	—	3.54E-05
CAPA-13-24787	MDA G-6 Retention Pond Lower	MDA G-6 Retention Pond Lower	0–1	Sediment	—	0.000357	0.00013 (J)	—	—	0.000235 (J)	—	0.000196 (J)	0.000898	—	0.00117
CAPA-13-24788	MDA G-7	MDA G-7	0–2	Sediment	—	—	—	—	—	—	—	—	8.4E-06	—	1.41E-05
CATW-13-24759	TW-4E	TW-1	0–5	Sediment	3.32E-005 (J)	0.000224	7.67E-05	3.08E-005 (J)	—	0.000152	2.9E-005 (J)	9.88E-05	0.000547	0.0001 (J)	0.000641
CATW-13-24760	TW-4E	TW-2	0–6	Sediment	1.98E-05	0.000142	5.08E-05	2.49E-05	5.12E-06	9.14E-05	1.11E-005 (J)	0.000066	0.000359	8.86E-05	0.000407
CATW-13-24761	TW-4E	TW-3	0–4	Sediment	1.17E-05	0.000113	3.73E-05	1.52E-05	2.52E-006 (J)	6.46E-05	9.09E-006 (J)	4.59E-05	0.000256	2.64E-05	0.000296

Table 3.0-2 (continued)

Sample ID	Reach or Area	Location ID or Location Name	Depth (cm)	Media	PCB-155	PCB-156/PCB-157	PCB-158	PCB-16	PCB-162	PCB-164	PCB-167	PCB-17	PCB-170	PCB-171/PCB-173
Recreational Soil Screening Levels[a]					**na**	**na**	**na**	**na**	**na**	**na**	**4.88**	**na**	**1.46**	**na**
CAPA-13-24756	PA-2W	PA-1	0–5	Sediment	8.62E-05	—	—	—	—	2.05E-006 (J)	—	—	4.65E-06	—
CAPA-13-24757	PA-2W	PA-2	0–6	Sediment	0.000172	3.15E-006 (J)	3.32E-06	—	—	2.15E-006 (J)	—	—	1.34E-05	—
CAPA-13-24758	PA-2W	PA-3	0–6	Sediment	0.000179	3.5E-006 (J)	3.71E-06	—	—	8.68E-06	—	—	1.45E-05	1.69E-006 (J)
CAPA-13-24784	PA-3E	PA-7	0–6	Sediment	7.99E-05	1.14E-05	1.16E-05	6.63E-06	—	2.43E-05	4.02E-06	1.12E-05	3.38E-05	7.36E-06
CAPA-13-24785	PA-3E	PA-8	0–4	Sediment	8.64E-05	3.09E-05	3.04E-05	1.09E-05	—	9.83E-007 (J)	1.36E-05	1.81E-05	8.06E-05	0.00002
CAPA-13-24786	PA-3E	PA-9	0–8	Sediment	3.43E-05	—	1.86e-006 (J)	—	—	5.74E-05	—	—	8.19E-06	—
CAPA-13-24787	MDA G-6 Retention Pond Lower	MDA G-6 Retention Pond Lower	0–1	Sediment	—	0.000196 (J)	0.000135 (J)	—	—	—	7.15E-005 (J)	—	0.000359	—
CAPA-13-24788	MDA G-7	MDA G-7	0–2	Sediment	—	—	—	—	—	2.05E-006 (J)	—	—	2.83E-006 (J)	—
CATW-13-24759	TW-4E	TW-1	0–5	Sediment	—	0.000064	6.98E-05	0.000066	—	3.69E-05	3.01E-005 (J)	9.41E-05	0.000171	5.18E-05
CATW-13-24760	TW-4E	TW-2	0–6	Sediment	—	4.71E-05	4.95E-05	5.68E-05	1.46E-006 (J)	2.59E-05	2.28E-05	7.59E-05	0.000116	3.07E-05
CATW-13-24761	TW-4E	TW-3	0–4	Sediment	—	3.03E-05	3.25E-05	0.000014	—	0.0001 (J)	1.46E-05	2.17E-05	8.95E-05	2.25E-05

Table 3.0-2 (continued)

Sample ID	Reach or Area	Location ID or Location Name	Depth (cm)	Media	PCB-172	PCB-174	PCB-175	PCB-176	PCB-177	PCB-178	PCB-179	PCB-18/PCB-30	PCB-180/PCB-193	PCB-183/PCB-185
Recreational Soil Screening Levels[a]					**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
CAPA-13-24756	PA-2W	PA-1	0–5	Sediment	—	5.74E-06	—	—	2.13E-006 (J)	—	1.17E-006 (J)	—	—	2.02E-006 (J)
CAPA-13-24757	PA-2W	PA-2	0–6	Sediment	—	0.000015	—	—	7.65E-06	9.85E-007 (J)	4.97E-06	—	3.45E-05	7.75E-06
CAPA-13-24758	PA-2W	PA-3	0–6	Sediment	—	1.66E-05	—	—	8.35E-06	1.4E-006 (J)	5.48E-06	—	3.73E-05	—
CAPA-13-24784	PA-3E	PA-7	0–6	Sediment	3.69E-06	0.000035	—	1.49E-006 (J)	1.93E-05	4.47E-06	0.000012	0.000025	7.33E-05	—
CAPA-13-24785	PA-3E	PA-8	0–4	Sediment	1.15E-05	8.12E-05	—	6.17E-06	4.56E-05	1.38E-05	0.000029	4.14E-05	—	4.55E-05
CAPA-13-24786	PA-3E	PA-9	0–8	Sediment	—	8.4E-06	—	—	3.95E-06	—	2.23E-06	2.65e-006 (J)	—	3.74E-006 (J)
CAPA-13-24787	MDA G-6 Retention Pond Lower	MDA G-6 Retention Pond Lower	0–1	Sediment	6.56E-005 (J)	0.000357	—	—	0.000217 (J)	6.87e-005 (J)	0.000133 (J)	—	—	0.00021 (J)
CAPA-13-24788	MDA G-7	MDA G-7	0–2	Sediment	—	2.11E-006 (J)	—	—	—	—	—	—	8.78E-06	—
CATW-13-24759	TW-4E	TW-1	0–5	Sediment	2.96E-005 (J)	0.000187	—	1.98E-005 (J)	0.000109	3.37E-05	7.34E-05	0.000181	0.000369	0.000116
CATW-13-24760	TW-4E	TW-2	0–6	Sediment	1.77E-05	0.000114	1.13E-006 (J)	9.89E-06	6.51E-05	0.000019	4.16E-05	0.00014	0.000234	6.69E-05
CATW-13-24761	TW-4E	TW-3	0–4	Sediment	1.32E-05	9.27E-05	—	7.22E-06	5.23E-05	1.44E-05	3.44E-05	4.21E-05	0.000189	5.26E-05

Table 3.0-2 (continued)

Sample ID	Reach or Area	Location ID or Location Name	Depth (cm)	Media	PCB-184	PCB-187	PCB-189	PCB-19	PCB-190	PCB-191	PCB-194	PCB-195	PCB-196	PCB-197/PCB-200	PCB-198/PCB-199
Recreational Soil Screening Levels[a]					**na**	**na**	**4.88**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
CAPA-13-24756	PA-2W	PA-1	0–5	Sediment	1.28E-006 (J)	7.94E-06	—	—	—	—	1.77E-006 (J)	—	—	—	3.17E-006 (J)
CAPA-13-24757	PA-2W	PA-2	0–6	Sediment	6.69E-06	2.08E-05	—	—	1.32E-006 (J)	—	6.82E-06	9.5E-007 (J)	1.94E-006 (J)	—	1.02E-05
CAPA-13-24758	PA-2W	PA-3	0–6	Sediment	5.57E-06	2.26E-05	—	—	1.45E-006 (J)	—	8.1E-06	1.22E-006 (J)	2.35E-06	—	1.15E-05
CAPA-13-24784	PA-3E	PA-7	0–6	Sediment	1.85E-006 (J)	4.02E-05	—	—	4.89E-06	—	1.32E-05	3.51E-06	4.77E-06	—	1.62E-05
CAPA-13-24785	PA-3E	PA-8	0–4	Sediment	2.2E-06	9.66E-05	—	—	1.48E-05	—	3.36E-05	1.19E-05	1.49E-05	—	3.93E-05
CAPA-13-24786	PA-3E	PA-9	0–8	Sediment	—	1.04E-05	—	—	—	—	2.28E-006 (J)	—	—	—	3.29E-006 (J)
CAPA-13-24787	MDA G-6 Retention Pond Lower	MDA G-6 Retention Pond Lower	0–1	Sediment	—	0.000413	—	—	6.71E-005 (J)	—	0.000153 (J)	6.24E-005 (J)	7.8E-005 (J)	—	0.000173 (J)
CAPA-13-24788	MDA G-7	MDA G-7	0–2	Sediment	—	2.99E-06	—	—	—	—	—	—	—	—	—
CATW-13-24759	TW-4E	TW-1	0–5	Sediment	—	0.00021	—	1.39E-005 (J)	3.13E-05	—	6.96E-05	2.77E-005 (J)	3.51E-05	—	8.13E-05
CATW-13-24760	TW-4E	TW-2	0–6	Sediment	—	0.000127	9.3E-007 (J)	9.74E-06	0.000022	1.86E-006 (J)	4.76E-05	0.000018	2.13E-05	5.36E-06	5.29E-05
CATW-13-24761	TW-4E	TW-3	0–4	Sediment	—	0.000103	—	9.61E-007 (J)	1.68E-05	1.11e-006 (J)	3.95E-05	1.43E-05	1.65E-05	3.91E-06	4.02E-05

Table 3.0-2 (continued)

Sample ID	Reach or Area	Location ID or Location Name	Depth (cm)	Media	PCB-2	PCB-20/PCB-28	PCB-201	PCB-202	PCB-203	PCB-206	PCB-208	PCB-209	PCB-21/PCB-33	PCB-22
Recreational Soil Screening Levels[a]					**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
CAPA-13-24756	PA-2W	PA-1	0–5	Sediment	—	7.17E-006 (J)	—	—	8.92E-007 (J)	—	—	—	2.82E-006 (J)	—
CAPA-13-24757	PA-2W	PA-2	0–6	Sediment	—	—	—	9.78E-007 (J)	4.92E-06	3.99E-06	—	2.39E-06	—	—
CAPA-13-24758	PA-2W	PA-3	0–6	Sediment	—	6.94E-006 (J)	—	1.06E-006 (J)	5.41E-06	5.9E-06	1.07E-006 (J)	8.21E-06	2.69E-006 (J)	1.36E-006 (J)
CAPA-13-24784	PA-3E	PA-7	0–6	Sediment	—	7.53E-05	—	1.87E-006 (J)	8.03E-06	4.35E-06	—	—	3.22E-05	2.93E-05
CAPA-13-24785	PA-3E	PA-8	0–4	Sediment	—	0.00012	2.37E-06	5.6E-06	2.08E-05	1.03E-05	1.62E-006 (J)	2.02E-006 (J)	4.58E-05	0.000043
CAPA-13-24786	PA-3E	PA-9	0–8	Sediment	—	1.41E-005 (J)	—	—	9.95E-007 (J)	—	—	—	5.32E-006 (J)	4.29E-06
CAPA-13-24787	MDA G-6 Retention Pond Lower	MDA G-6 Retention Pond Lower	0–1	Sediment	—	—	—	—	9.37E-005 (J)	—	—	—	—	—
CAPA-13-24788	MDA G-7	MDA G-7	0–2	Sediment	—	—	—	—	—	—	—	—	—	—
CATW-13-24759	TW-4E	TW-1	0–5	Sediment	—	0.000422	7.99E-006 (J)	1.46E-005 (J)	4.45E-05	2.1E-005 (J)	—	—	0.000171	0.000166
CATW-13-24760	TW-4E	TW-2	0–6	Sediment	3.71E-006 (J)	0.000321	3.7E-06	8.3E-06	2.81E-05	1.37E-05	2.29E-06	1.4E-006 (J)	0.000143	0.000142
CATW-13-24761	TW-4E	TW-3	0–4	Sediment	—	0.00011	2.34E-06	5.74E-06	2.14E-05	9.15E-06	7.25E-007 (J)	—	0.00004	4.47E-05

Table 3.0-2 (continued)

Sample ID	Reach or Area	Location ID or Location Name	Depth (cm)	Media	PCB-25	PCB-26/PCB-29	PCB-27	PCB-3	PCB-31	PCB-32	PCB-35	PCB-37	PCB-38	PCB-40/PCB-71	PCB-41	PCB-42
Recreational Soil Screening Levels[a]					**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
CAPA-13-24756	PA-2W	PA-1	0–5	Sediment	—	—	—	—	4.15E-006 (J)	—	—	—	2.44E-05	—	—	—
CAPA-13-24757	PA-2W	PA-2	0–6	Sediment	—	—	—	2.5E-006 (J)	—	—	—	—	5.49E-05	—	—	—
CAPA-13-24758	PA-2W	PA-3	0–6	Sediment	—	—	—	1.76E-006 (J)	4.15E-006 (J)	—	—	—	8.78E-05	—	—	—
CAPA-13-24784	PA-3E	PA-7	0–6	Sediment	4.85E-06	1.65E-05	1.08E-006 (J)	2.94E-006 (J)	9.04E-05	7.65E-06	2.45E-006 (J)	4.79E-05	6.58E-05	2.47E-05	5.53E-06	1.63E-05
CAPA-13-24785	PA-3E	PA-8	0–4	Sediment	9.1E-06	2.68E-05	2.6E-06	5.67E-06	0.000139	1.24E-05	5.15E-06	7.02E-05	0.000105	3.68E-05	8.72E-06	2.66E-05
CAPA-13-24786	PA-3E	PA-9	0–8	Sediment	—	—	—	—	1.51E-05	—	—	7.38e-006 (J)	1.32E-05	1.91e-006 (J)	—	7.7E-007 (J)
CAPA-13-24787	MDA G-6 Retention Pond Lower	MDA G-6 Retention Pond Lower	0–1	Sediment	—	—	—	—	—	—	—	—	—	—	—	—
CAPA-13-24788	MDA G-7	MDA G-7	0–2	Sediment	—	—	—	—	—	—	—	—	—	—	—	—
CATW-13-24759	TW-4E	TW-1	0–5	Sediment	3.65E-05	0.00011	2.04E-005 (J)	1.38E-005 (J)	0.000536	0.000065	2.78E-005 (J)	0.000272	8.38E-05	0.000175	5.91E-05	0.000125
CATW-13-24760	TW-4E	TW-2	0–6	Sediment	2.94E-05	8.66E-05	1.56E-05	1.18E-05	0.000431	0.000051	0.000023	0.000208	7.84E-05	0.000109	3.79E-05	8.97E-05
CATW-13-24761	TW-4E	TW-3	0–4	Sediment	7.43E-06	2.45E-05	3.31E-06	4.7E-06	0.000131	1.41E-05	5.2E-06	7.69E-05	6.44E-05	4.85E-05	0.000011	3.67E-05

Table 3.0-2 (continued)

Sample ID	Reach or Area	Location ID or Location Name	Depth (cm)	Media	PCB-43	PCB-44/PCB-47/PCB-65	PCB-45/PCB-51	PCB-46	PCB-48	PCB-49/PCB-69	PCB-50/PCB-53	PCB-52	PCB-55	PCB-56	PCB-59/PCB-62/PCB-75	PCB-6
Recreational Soil Screening Levels[a]					**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
CAPA-13-24756	PA-2W	PA-1	0–5	Sediment	—	—	—	—	—	—	—	2.11E-006 (J)	—	—	—	—
CAPA-13-24757	PA-2W	PA-2	0–6	Sediment	—	—	—	—	—	—	—	2.25E-006 (J)	—	—	—	—
CAPA-13-24758	PA-2W	PA-3	0–6	Sediment	—	—	—	—	—	—	—	2.97E-06	—	—	—	—
CAPA-13-24784	PA-3E	PA-7	0–6	Sediment	—	—	8.92E-06	9.6E-007 (J)	1.16E-05	5.48E-05	5.35E-06	8.59E-05	1.39E-006 (J)	4.84E-05	5.83E-06	—
CAPA-13-24785	PA-3E	PA-8	0–4	Sediment	1.65E-006 (J)	—	1.29E-05	2.21e-006 (J)	1.83E-05	8.91E-05	9.03E-06	0.000141	2.64E-06	7.66E-05	9.59E-06	—
CAPA-13-24786	PA-3E	PA-9	0–8	Sediment	—	1.07E-05	—	—	—	7.85E-06	—	0.000014	—	5.9E-06	—	—
CAPA-13-24787	MDA G-6 Retention Pond Lower	MDA G-6 Retention Pond Lower	0–1	Sediment	—	—	—	—	—	—	—	9.25E-005 (J)	—	—	—	—
CAPA-13-24788	MDA G-7	MDA G-7	0–2	Sediment	—	—	—	—	—	—	—	—	—	—	—	—
CATW-13-24759	TW-4E	TW-1	0–5	Sediment	1.62E-005 (J)	0.000459	7.28E-05	2.13E-005 (J)	9.51E-05	0.000363	5.17E-05	0.000543	1.38E-005 (J)	0.00029	4.86E-005 (J)	—
CATW-13-24760	TW-4E	TW-2	0–6	Sediment	7.81E-06	—	—	0.000011	5.93E-05	0.000237	3.15E-05	0.00037	1.12E-05	0.000194	3.08E-05	2.14E-006 (J)
CATW-13-24761	TW-4E	TW-3	0–4	Sediment	—	—	—	3.16E-06	2.16E-05	0.000101	1.03E-05	0.000161	1.92e-006 (J)	8.85E-05	1.09E-05	—

Table 3.0-2 (continued)

Sample ID	Reach or Area	Location ID or Location Name	Depth (cm)	Media	PCB-60	PCB-61/PCB-70/PCB-74/ PCB-76	PCB-63	PCB-64	PCB-66	PCB-67	PCB-77	PCB-8	PCB-82	PCB-83	PCB-84
Recreational Soil Screening Levels[a]					**na**	**na**	**na**	**na**	**na**	**na**	**1.46**	**na**	**na**	**na**	**na**
CAPA-13-24756	PA-2W	PA-1	0–5	Sediment	—	5.37E-006 (J)	—	—	2E-006 (J)	—	—	—	—	—	—
CAPA-13-24757	PA-2W	PA-2	0–6	Sediment	—	5.26E-006 (J)	—	—	—	—	—	—	—	—	7.83E-007 (J)
CAPA-13-24758	PA-2W	PA-3	0–6	Sediment	—	7.14E-006 (J)	—	—	2.43E-006 (J)	—	—	—	—	—	1.06E-006 (J)
CAPA-13-24784	PA-3E	PA-7	0–6	Sediment	2.35E-05	0.000147	1.1E-006 (J)	3.27E-05	9.61E-05	8.69E-007 (J)	1.22E-05	—	9.53E-06	2.83E-006 (J)	1.57E-05
CAPA-13-24785	PA-3E	PA-8	0–4	Sediment	3.47E-05	0.00023	2.49E-006 (J)	5.27E-05	0.000153	1.92E-006 (J)	0.000022	—	0.00002	5.86E-06	0.000031
CAPA-13-24786	PA-3E	PA-9	0–8	Sediment	1.9E-006 (J)	0.000024	—	4.34E-06	1.43E-05	—	—	—	—	—	1.61E-006 (J)
CAPA-13-24787	MDA G-6 Retention Pond Lower	MDA G-6 Retention Pond Lower	0–1	Sediment	—	—	—	—	—	—	—	—	6.07E-005 (J)	—	9.86E-005 (J)
CAPA-13-24788	MDA G-7	MDA G-7	0–2	Sediment	—	—	—	—	—	—	—	—	—	—	—
CATW-13-24759	TW-4E	TW-1	0–5	Sediment	0.000144	0.000875	1.77E-005 (J)	0.000212	0.000572	1.75E-005 (J)	7.44E-05	—	6.14E-05	1.78E-005 (J)	0.000103
CATW-13-24760	TW-4E	TW-2	0–6	Sediment	9.62E-05	0.000535	1.17E-05	0.000143	0.000376	—	4.82E-05	3.42E-05	3.85E-05	1.52E-05	7.21E-05
CATW-13-24761	TW-4E	TW-3	0–4	Sediment	4.13E-05	0.000247	3.01E-006 (J)	6.16E-05	0.000179	2.45E-06	2.78E-05	6.79e-006 (J)	2.38E-05	9.24E-06	4.32E-05

Table 3.0-2 (continued)

Sample ID	Reach or Area	Location ID or Location Name	Depth (cm)	Media	PCB-85/PCB-116/PCB-117	PCB-86/87/97/109/119/125	PCB-88/PCB-91	PCB-89	PCB-90/PCB-101/PCB-113	PCB-92	PCB-95	PCB-98/PCB-102	PCB-99	Pentachlorodibenzodioxins (Total)
Recreational Soil Screening Levels[a]					**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
CAPA-13-24756	PA-2W	PA-1	0–5	Sediment	—	7.78E-006 (J)	—	—	1.23E-05	—	5.52E-006 (J)	—	3.85E-06	1.39E-006 (J)
CAPA-13-24757	PA-2W	PA-2	0–6	Sediment	2.2E-006 (J)	1.36E-05	—	—	2.15E-05	2.07E-006 (J)	0.000011	—	8.99E-06	—
CAPA-13-24758	PA-2W	PA-3	0–6	Sediment	2.95E-006 (J)	1.52E-05	—	—	2.44E-05	2.45E-006 (J)	1.08E-05	—	1.06E-05	—
CAPA-13-24784	PA-3E	PA-7	0–6	Sediment	2.17E-05	6.04E-05	1.19E-05	—	8.46E-05	1.46E-05	5.69E-05	—	4.34E-05	—
CAPA-13-24785	PA-3E	PA-8	0–4	Sediment	4.38E-05	0.000118	2.54E-05	—	0.000174	3.32E-05	0.000107	1.68E-006 (J)	9.07E-05	—
CAPA-13-24786	PA-3E	PA-9	0–8	Sediment	3.28E-006 (J)	0.000014	—	—	2.05E-05	2.07E-006 (J)	1.34E-05	—	9.58E-06	—
CAPA-13-24787	MDA G-6 Retention Pond Lower	MDA G-6 Retention Pond Lower	0–1	Sediment	—	0.000398 (J)	—	—	0.000556	0.000109 (J)	0.000336 (J)	—	0.000195 (J)	1.9E-006 (J)
CAPA-13-24788	MDA G-7	MDA G-7	0–2	Sediment	—	5.04E-006 (J)	—	—	4.66E-006 (J)	—	—	—	8.9E-007 (J)	1.17E-006 (J)
CATW-13-24759	TW-4E	TW-1	0–5	Sediment	0.00011	0.000308	7.41E-05	—	0.000451	8.97E-05	0.000317	—	0.000218	7.67E-007 (J)
CATW-13-24760	TW-4E	TW-2	0–6	Sediment	7.06E-05	0.00022	4.76E-05	1.07E-006 (J)	0.00031	6.08E-05	0.000225	6.51E-06	0.000156	7.83E-007 (J)
CATW-13-24761	TW-4E	TW-3	0–4	Sediment	5.12E-05	0.000146	3.22E-05	-	0.00021	4.05E-05	0.000147	3.21E-006 (J)	0.000109	—

Table 3.0-2 (continued)

Sample ID	Reach or Area	Location ID or Location Name	Depth (cm)	Media	Pentachlorodibenzofuran [1,2,3,7,8-]	Pentachlorodibenzofuran [2,3,4,7,8-]	Pentachlorodibenzofurans (Totals)	Tetrachlorodibenzodioxins (Total)	Tetrachlorodibenzofuran[2,3,7,8-]	Tetrachlorodibenzofurans (Totals)	Total PCB	Total decaCB	Total diCB	Total heptaCB
Recreational Soil Screening Levels[a]					**na**	**na**	**na**	**na**	**0.00274**	**na**	**na**	**na**	**na**	**na**
CAPA-13-24756	PA-2W	PA-1	0–5	Sediment	1.12E-006 (J)	1.29E-006 (J)	4.54E-006 (J)	1.2E-006 (J)	—	3.66E-06	0.000327	—	2.01E-05	2.49E-05
CAPA-13-24757	PA-2W	PA-2	0–6	Sediment	—	—	8.96E-007 (J)	9.84E-007 (J)	—	6.72E-007 (J)	0.00073	2.39E-06	—	0.000113
CAPA-13-24758	PA-2W	PA-3	0–6	Sediment	—	—	8.6E-007 (J)	2.99E-06	—	2.26E-06	0.00086	8.21E-06	2.42E-05	0.000115
CAPA-13-24784	PA-3E	PA-7	0–6	Sediment	—	—	1.59E-006 (J)	3.02E-06	—	2.88E-06	0.00257	—	0.000048	0.000237
CAPA-13-24785	PA-3E	PA-8	0–4	Sediment	—	—	1.64E-006 (J)	3.45E-06	—	3.98E-06	0.00489	2.02E-06	4.98E-05	0.000447
CAPA-13-24786	PA-3E	PA-9	0–8	Sediment	—	—	1.43E-006 (J)	4.4E-06	—	2.29E-06	0.000496	—	—	3.69E-05
CAPA-13-24787	MDA G-6 Retention Pond Lower	MDA G-6 Retention Pond Lower	0–1	Sediment	—	—	3.62E-006 (J)	—	—	2.43E-006 (J)	0.011	—	—	0.00189
CAPA-13-24788	MDA G-7	MDA G-7	0–2	Sediment	—	—	2.37E-006 (J)	—	—	5.57E-007 (J)	9.41E-05	—	—	1.67E-05
CATW-13-24759	TW-4E	TW-1	0–5	Sediment	—	—	9.6E-007 (J)	5.18E-06	—	1.18E-05	0.0146	—	0.000156	0.0014
CATW-13-24760	TW-4E	TW-2	0–6	Sediment	—	—	1.77E-006 (J)	4.42E-06	1.42E-006 (J)	1.04E-05	0.00932	1.4E-06	0.000201	0.000868
CATW-13-24761	TW-4E	TW-3	0–4	Sediment	—	—	—	2.72E-06	—	4.21E-06	0.00519	—	7.32E-05	0.000689

Table 3.0-2 (continued)

Sample ID	Reach or Area	Location ID or Location Name	Depth (cm)	Media	Total hexaCB	Total monoCB	Total nonaCB	Total octaCB	Total pentaCB	Total tetraCB	Total triCB
Recreational Soil Screening Levels[a]					**na**	**na**	**na**	**na**	**na**	**na**	**na**
CAPA-13-24756	PA-2W	PA-1	0–5	Sediment	0.000167	—	—	5.82E-06	6.06E-05	9.48E-06	3.86E-05
CAPA-13-24757	PA-2W	PA-2	0–6	Sediment	0.000395	2.5E-06	3.99E-06	2.58E-05	0.000124	7.5E-06	5.49E-05
CAPA-13-24758	PA-2W	PA-3	0–6	Sediment	0.000419	1.76E-06	6.98E-06	2.97E-05	0.000139	1.25E-05	0.000103
CAPA-13-24784	PA-3E	PA-7	0–6	Sediment	0.000674	2.94E-06	4.35E-06	4.76E-05	0.000555	0.000583	0.000416
CAPA-13-24785	PA-3E	PA-8	0–4	Sediment	0.00151	5.67E-06	1.19E-05	0.000128	0.00115	0.000932	0.00065
CAPA-13-24786	PA-3E	PA-9	0–8	Sediment	0.000186	—	—	6.56E-06	0.000119	8.56E-05	6.21E-05
CATW-13-24759	TW-4E	TW-1	0–5	Sediment	0.00333	1.38E-05	0.000021	0.000281	0.00288	0.00425	0.00226
CATW-13-24760	TW-4E	TW-2	0–6	Sediment	0.00221	1.65E-05	0.000016	0.000185	0.00161	0.0024	0.00181
CATW-13-24761	TW-4E	TW-3	0–4	Sediment	0.00156	4.7E-06	9.87E-06	0.000144	0.00104	0.00106	0.0006
CAPA-13-24787	MDA G-6 Retention Pond Lower	MDA G-6 Retention Pond Lower	0–1	Sediment	0.00583	—	—	0.000561	0.00266	9.25E-05	—
CAPA-13-24788	MDA G-7	MDA G-7	0–2	Sediment	4.61E-05	—	—	—	3.13E-05	—	—

Notes: Units are mg/kg. J = The analyte was positively identified, and the associated numerical value is estimated to be more uncertain than would normally be expected for that analysis.

[a] Soil screening levels are from NMED (2009, 108070) unless otherwise noted.

[b] na = Not available.

[c] — = Not detected or not analyzed.

Table 3.0-3
Radionuclides Detected above BVs in 2012 Pajarito Canyon Watershed Sediment Samples

Sample ID	Reach or Area	Location ID or Location Name	Depth (ft)	Media	Americium-241	Plutonium-238	Plutonium-239/240
Soil BV[a]					**0.04**	**0.006**	**0.068**
Recreational Screening Action Level[b]					**280**	**330**	**300**
CAPA-13-24785	PA-3A	PA-8	0–4	Sediment	—[c]	—	0.0756
CAPA-13-24786	PA-3A	PA-9	0–8	Sediment	—	—	0.0681
CAPA-13-24787	MDA G-6 Retention Pond Lower	MDA G-6 Retention Pond Lower	0–1	Sediment	0.102	—	0.209
CAPA-13-24788	MDA G-7	MDA G-7	0–2	Sediment	0.331	0.028	0.46
CATW-13-24759	TW-4E	TW-1	0–5	Sediment	—	—	0.107
CATW-13-24760	TW-4E	TW-2	0–6	Sediment	—	—	0.0855

Note: All activities are in pCi/g.

[a] BVs are from LANL (1998, 059730).

[b] SALs from LANL (2009, 107655).

[c] — = Not detected or not analyzed.

Table 3.1-1
Summary of Radionuclide COPCs in 2012 Sediment Samples from the Pajarito Canyon Watershed

Analyte	Sediment BV (pCi/g)	Maximum Detected Concentration in Pajarito Canyon Watershed (pCi/g)	Location of Maximum Detected Concentration in Pajarito Canyon Watershed	Maximum Concentration in Baseline Samples (pCi/g)[a]	Location of Maximum Detected Concentration in Baseline Samples[a]	Maximum Detected Concentration in Post-Cerro Grande Baseline Samples (pCi/g)[b]	Maximum Detected Concentration in Cerro Grande Ash (pCi/g)
Americium-241	0.04	0.331	MDA G-7	<0.407	LA-0	0.13	0.305
Plutonium-238	0.006	0.028	MDA G-7	<0.0134	LA-0	0.0486	0.117
Plutonium-239/240	0.068	0.46	MDA G-7	<0.0223	LA-0	0.343	0.7

[a] Baseline samples were collected in reach LA-0, downstream from Las Conchas burn area, upstream of SWMUs and AOCs. All 2012 baseline samples were non-detect.

[b] All maximum concentrations in post–Cerro Grande baseline samples were from Pueblo Canyon above Diamond Drive.

Table 3.2-1
Summary of Inorganic COPCs in 2012 Sediment Samples from the Pajarito Canyon Watershed

Analyte	Sediment BV (mg/kg)	Maximum Detected Concentration in Pajarito Canyon Watershed, 2012 (mg/kg)	Location of Maximum Detected Concentration in Pajarito Canyon Watershed, 2012	Maximum Detected Concentration in 2012 Baseline Samples (mg/kg)	Location of Maximum Detected Concentration in 2012 Baseline Samples	Maximum Detected Concentration in Post-Cerro Grande, Pre-Las Conchas Baseline Samples (mg/kg)	Location of Maximum Detected Concentration in Post-Cerro Grande, Pre-Las Conchas Baseline Samples	Maximum Detected Concentration in Cerro Grande Ash (mg/kg)
Antimony	0.83	ND[a]	n/a[b]	ND	n/a	0.92[c]	Guaje Canyon	1
Barium	127	298	PA-3E	194	WA-0	550	South fork of Pajarito Canyon	1300
Cadmium	0.4	0.737 J	PA-3E	0.236	WA-0	0.705	Los Alamos Reservoir	1.2
Calcium	4420	9130	PA-3E	4830 J-	CDV-0	25000	South fork of Pajarito Canyon	90000
Chromium	10.5	10.9	PA-2W	8.77	WA-0	18.9	Los Alamos Reservoir	11
Cobalt	4.73	6.46	PA-3E	5.71	WA-0	8.2	Garcia Canyon	8.9
Copper	11.2	18	PA-3E	9.99	WA-0	24.6	Los Alamos Reservoir	45
Iron	13800	14100	PA-3E	11600	WA-0	15640	Los Alamos Reservoir	15000
Lead	19.7	27.3	PA-3E	13.8	WA-0	48[c]	Pueblo Canyon	84
Manganese	543	1200	PA-3E	650	WA-0	2200	South fork of Pajarito Canyon	8200
Selenium	0.3	0.407 J	TW-1	ND	n/a	1.6	Guaje Canyon	4.7
Silver	1	12.1	PA-2W	0.15 J	CDV-0	1.5	Garcia Canyon	0.64
Vanadium	19.7	22.6	PA-3E	19.6	WA-0	32.2	Los Alamos Reservoir	25
Zinc	60.2	111	MDA G-6 Retention Pond Lower	41.7	CDV-0	104	Los Alamos Reservoir	180

[a] ND = Nondetect.
[b] n/a = Not applicable.
[c] Excludes higher silver results of 1.12 mg/kg and 1.31 mg/kg from Frijoles Canyon that may represent contamination.

Table 3.4-1
Mammalian Toxic Equivalency Factors

PCB Congener	Mammal TEF*
Tetrachlorodibenzodioxin[2,3,7,8-]	1
Pentachlorodibenzodioxin[1,2,3,7,8-]	1
Hexachlorodibenzodioxin[1,2,3,4,7,8-]	0.1
Hexachlorodibenzodioxin[1,2,3,6,7,8-]	0.1
Hexachlorodibenzodioxin[1,2,3,7,8,9-]	0.1
Heptachlorodibenzodioxin[1,2,3,4,6,7,8-]	0.01
Octachlorodibenzodioxin[1,2,3,4,6,7,8,9-]	0.0003
Tetrachlorodibenzofuran[2,3,7,8-]	0.1
Pentachlorodibenzofuran[1,2,3,7,8-]	0.03
Pentachlorodibenzofuran[2,3,4,7,8-]	0.3
Hexachlorodibenzofuran[1,2,3,4,7,8-]	0.1
Hexachlorodibenzofuran[1,2,3,6,7,8-]	0.1

* TEF values are from Van den Berg et al. (2006, 106990).

Table 3.4-2
Mammalian TECs

Sample ID	Reach	Location ID	TEC (mg/kg)
CAPA-13-24756	PA-2W	PA-1	1.21E-06
CAPA-13-24757	PA-2W	PA-2	8.69E-08
CAPA-13-24758	PA-2W	PA-3	1.06E-07
CAPA-13-24784	PA-3E	PA-7	2.90E-07
CAPA-13-24785	PA-3E	PA-8	2.68E-07
CAPA-13-24786	PA-3E	PA-9	1.93E-07
CATW-13-24759	TW-4E	TW-1	2.85E-07
CATW-13-24760	TW-4E	TW-2	3.08E-07
CATW-13-24761	TW-4E	TW-3	1.12E-07

Attachment 1

Analytical Data from 2012 Sediment Samples
from the Pajarito Canyon Watershed
(on CD included with this document)

Attachment 2

Analytical Data from 2012 Sediment Samples
from Baseline Areas Outside the Pajarito Canyon Watershed
(on CD included with this document)

Attachment 3

Particle Size Data from 2012 Sediment Samples
from the Pajarito Canyon Watershed
(on CD included with this document)