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Date: April 12, 2000
Refer to: E/ER:00-079

2000
RECEIVED

Mr. John Kieling
NMED-HRMB
P.O. Box 26110
Santa Fe, NM 87502

HSWA LANL #/1071/0

SUBJECT: SUBMITTAL OF RESPONSE TO REQUEST FOR SUPPLEMENTAL INFORMATION FOR THE RCRA FACILITY INVESTIGATION REPORT FOR POTENTIAL RELEASE SITE 0-017

Dear Mr. Kieling:

Enclosed are three copies of the Los Alamos National Laboratory Environmental Restoration (ER) Project's response to your Request for Supplemental Information (RSI) on the RCRA Facility Investigation (RFI) Report for Potential Release Site (PRS) 0-017. The RSI was received at the ER Project Office on March 15, 2000.

If you have any questions or concerns please feel free to call Dave McInroy at (505) 667-0819 or Joe Mose at (505) 667-5808.

Sincerely,

Julie A. Canepa, Program Manager
Los Alamos National Laboratory
Environmental Restoration

Sincerely,

Theodore J. Taylor, Program Manager
Department of Energy
Los Alamos Area Office

JC/TT/NR/jml

Enclosure: Response to RSI

7488

Cy (w/enc.):
M. Buksa, E/ET, MS M992
J. Mose, LAAO, MS A316
D. Neleigh, US EPA (2 copies with disks)
N. Riebe, E/ET, MS M992 (1 disk)
T. Rust, E/ET, MS M992
T. Taylor, LAAO, MS A316
J. Davis, NMED-SWQB
J. Parker, NMED-DOE OB
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E/ER File, MS M992
E/ER (CT# C791), MS M992
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Response to
Request for Supplemental Information (RSI),
RFI Report PRS 0-017

INTRODUCTION

This document responds to a letter regarding "Request for Supplemental Information, RFI Report PRS 0-017, LANL NM0890010515, HRMB-LANL-99-003" dated March 3, 2000, from the New Mexico Environment Department (NMED) Hazardous and Radioactive Materials Bureau (HRMB) to the Los Alamos National Laboratory (LANL) Environmental Restoration (ER) Project. To facilitate review of this response, NMED's comments are included verbatim below. The comments are divided into general and specific categories as presented in the letter. LANL's responses follow each NMED comment. For clarification, the July 1999 RCRA facility investigation (RFI) report for PRS 0-017, which is the subject of this RSI, is referred to in this document as "the RFI report."

GENERAL COMMENTS

NMED Comment

1. *According to the SWMU report, PRS 0-017 is 39,000 feet of underground acid/industrial waste line and associated sumps and pumps that were used for transport of radiological and chemical waste to various treatment facilities. The RFI report addresses only a portion of the SWMU (former Line 167, Line 170 and Line 171). Is LANL proposing to NFA the entire SWMU or only the portions addressed in this report? If LANL is proposing to NFA the entire SWMU, then LANL should provide the information needed to make NFA determination for the entire SWMU. Human health and ecological risk assessment should have been performed for the entire SWMU. If LANL is proposing to NFA only the portions addressed in this report, review of this report could not result in NFA because HRMB will not grant NFA for a portion of a SWMU.*

LANL Response

1. LANL agrees that the solid waste management unit (SWMU) report's description of PRS 0-017 can be interpreted to include the entire underground acid/industrial waste line system. Because the RFI report addresses only a portion (Lines 167, 170, 171, and Manhole ULR-33) of the system, LANL is withdrawing the "no further action" (NFA) proposal for PRS 0-017 until the specific location(s) and components of PRS 0-017 are identified and documented as part of a joint LANL/NMED drainline consolidation effort to be undertaken in the near future.

NMED Comment

2. *Area of concern (AOC) is defined as "An area at LANL known or suspected to be contaminated with radionuclides, but not contaminated by hazardous chemicals (or hazardous waste)" in Appendix A of the RFI Report. Based on this definition[,] lead contamination of the soil in the Los Alamos Canyon, Omega Bridge area would not be an AOC, but a SWMU. The areas of lead contamination should either be addressed as part of this investigation or be assigned a new SWMU number and added to the HSWA module.*

LANL Response

2. LANL identified the lead contamination that was discovered during the RFI as an AOC because the area does not meet the definition of a SWMU, as *SWMU* is defined in Module VIII of LANL's Hazardous Waste Facility Permit. Specifically, LANL has determined that the lead contamination associated with the paint chips was not the result of routine or systematic releases. Rather, it was the result of infrequent, as needed, additional maintenance, which involved sandblasting or scraping of old paint prior to repainting. In addition, the ER Project glossary, which is included as Appendix A to RFI reports, was revised shortly after submission of this RFI report to correct the definition of *AOC* and to correct other erroneous definitions. The revised definition AOC now reads: "Areas at the laboratory that might warrant further investigation for *releases* based on past facility waste-management activities."

NMED Comment

3. *As it currently exists, comments on the ecological screening evaluation described in the document can be given in generalities because no details have been presented in the document which can be reviewed to verify risk calculations. The document references a methodology outlined in Kelly et al., 1998. However, that document does not supply adequate information such as biotransfer factors and toxicity reference values to evaluate how hazard quotients were calculated in this document. Please present all relevant information necessary to calculate hazard quotients and hazard indices, including biotransfer factors and toxicity reference values.*

LANL Response

3. The document titled, "Screening Level Ecological Risk Assessment Approach for the Environmental Restoration Project at Los Alamos National Laboratory" (Kelly et al.1998, 57916), which presents the methodology used for the ecological screening assessment conducted at PRS 0-017, does contain the concentration and dose equations used to calculate the ecological screening levels (ESLs) used in the screening process. These equations are presented in Section 4.2.3, ESL Calculations for Nonradiological Constituents, pp. 29–34; and in Section 4.2.4, ESL Calculations for Radiological Constituents, pp. 35–44. The general equations are also provided in the ECORISK Database. The bioconcentration factors, biotransfer factors, toxicity reference values, and other parameters used to calculate the ESLs are provided in an Excel file on the disk that accompanies this RSI response.

   The purpose of the ECORISK Database is to document the ESLs used by risk assessors in LANL's ER Project for conducting ecological risk screening. An ESL is that concentration of a chemical constituent in an environmental medium which is not expected to cause harm to a given ecological receptor. The appropriate ESL is compared to a site-specific medium concentration of a chemical constituent.

   The version of the ECORISK Database in use at the time of this report was a beta version and was supplied to NMED for its review and use. The information and ESLs presented in that version were subject to change and have undergone revision since the database was issued. Documentation of an ESL includes the ESL value; ESL equations; and the toxicity, bioaccumulation, and screening-receptor-specific and chemical-specific information used to derive each ESL, and references.

   Toxicity information includes toxicity reference values (TRVs), the highest dosage for a chemical constituent that is not expected to confer harm on a given ecological receptor. A TRV is preferentially derived from experimental data and should be based on studies of a species taxonomically similar to

the given screening receptor. The TRVs for nonradiological constituents are based upon investigation of primary literature (referred to as *primary toxicity studies* in this database) for primary toxicity values (PTVs). Nonradionuclide TRVs are dose rates (mg chemical/kg body weight/day) for birds and mammals. They are media concentrations (mg chemical/kg medium) for all other receptors. TRVs for radiological constituents are equivalent to 0.1 rad per day for all terrestrial and aquatic receptors. The uncertainty associated with the derivation of each TRV (e.g., any uncertainty factor applied to a PTV to derive an acceptable TRV) is documented in the database.

Bioaccumulation information includes soil-to-plant, soil-to-invertebrate, food-to-muscle, and food-to-blood transfer factors which are used to model each screening receptor's exposure to the surrounding environmental media.

Screening-receptor-specific information includes parameters such as body weight and food/water consumption rates which are used to model each screening receptor's exposure to the surrounding environmental media.

Chemical-specific information includes factors such as the log K_{ow} (octanol to water partition coefficient) used to model the behavior of organic chemicals. These values and other supporting information are provided in the beta version of the ECORISK Database.

When this site is resubmitted for NFA, all appropriate references will be provided.

NMED Comment

4. *The risk assessment shows that several chemicals of potential concern fail the ecological screening assessment based on the toxicity values used. This should bring the ecological screening assessment to the site-specific risk assessment stage. Then, uncertainties should be looked at more closely to see if: 1) site-specific adjustments can be made to the concentration or dose equation inputs; 2) additional site characterization data will change contaminant concentrations (especially those constituents with high detection limits) elected to represent exposure concentrations to ecological receptors, or 3) site-specific transfer factors and/or toxicity reference values can be substituted for the screening values utilized in calculating the hazard quotient. Eliminating the site without presenting <u>and</u> documenting how assumptions have been altered should not be used to recommend no further actions (NFA) decisions. Please propose and document any changes made to the screening assumptions to show that NFA is a viable option.*

LANL Response

4. Although moot due to the NFA request withdrawal (see comment response 1), the uncertainty analysis for the ecological screening assessment of PRS 0-017 was presented in the RFI report section that discusses the uncertainty surrounding the COPECs. This section does discuss and document the assumption regarding home range of the receptors. The assumption used in the ESL calculation is that the receptor spends 100% of its time in the contaminated area rather than the fraction of time normally encountered. The home ranges of the shrew and mouse, as well as the robin, were presented according to established references. For the shrew and mouse, the reference used was Burt and Grossenheider, *Field Guide to the Mammals of North America, North of Mexico,* 3rd ed., published by Houghton Mifflin Company (1976, 59097). (This reference is used by the Ecology Group (ESH-20) as a standard reference for mammals.) For the robin home range, the reference used was EPA's *Wildlife Exposure Factors Handbook,* a standard reference used in ecological risk assessments. No other assumptions or parameters were discussed or modified as part

of the uncertainty analysis. If appropriate, additional ecotoxicological and/or human health risk analyses will be performed upon completion of the investigation of all waste lines being consolidated with this PRS.

SPECIFIC COMMENTS

5. **2.1 Summary, page 4, paragraph 4:**

LANL Statement: "The canyon portion of the PRS was recommended for NFA based on Criterion 3; sampling results show no evidence that a release occurred."

HRMB Comment: *Section 5.5.2.1 of the RFI work plan for OU 1072 (May 1992) states that an area of contamination was found in the vicinity of Manhole ULR-33 in the Los Alamos Canyon. Americium-241 and Cesium-137 were identified and Plutonium-239 was thought to be present. Soil contamination was found under the cracked pipe that was removed from beneath the north end of Omega Bridge. The area was cleaned to equal to or less than 25 pCi/g. In addition, previous investigations were limited to radionuclides only. Inorganic and organic contamination was never investigated, though the waste lines carried both radiochemical and chemical waste. Furthermore, radionuclides (i.e. Pu-239) were consistently detected above fallout values in the canyon area during this investigation. Since a release has occurred at the site, NFA criterion 3 is not applicable for this portion of the PRS. Therefore, LANL should use an appropriate criterion for recommending NFA.*

LANL Response

Although moot due to the NFA request withdrawal (see comment response 1), despite the historic releases described in the RSI comment, the RFI sampling resulted in only approximately 0.1–0.2 pCi/g of plutonium-239 and 0.13–0.17 pCi/g of tritium. No metals were detected above background except for lead, which is related to maintenance of the Omega Bridge. These results were interpreted as not indicating a release, especially since the previous remediation was to 25 pCi/g or less, which indicates that much higher concentrations of radionuclides were released from the waste line. Therefore, the available data were interpreted as meeting NFA Criterion 3 for no release to the environment; however, Criterion 5 was also interpreted as applicable because the levels of COPCs detected at this location did not pose an unacceptable risk to human and ecological receptors. A change in the NFA recommendation, from Criterion 3 to Criterion 5, could be deemed appropriate. However, as stated in our response to General Comment 1, LANL is withdrawing its NFA proposal for PRS 0-017 until information supports an NFA proposal for the entire waste line system.

6. **2.2.1 Site Description, Figure 2.2-1, page 5:**

HRMB Comment: *Figure 2.2-1 does not represent the entire length of the waste line (i.e. 39,000 feet) described in the SWMU report. Please provide a detailed map of the entire waste line and associated structures that contributed to the waste line.*

LANL Response

As stated in our response to General Comment 1, the specific location(s) and components of PRS 0-017 will be identified and documented as part of a joint LANL/NMED drainline consolidation effort to be undertaken in the near future.

7. **2.2.1 Site Description, Land Use, page 7, paragraph 3:**

LANL Statement: "In the vicinity of Los Alamos Canyon, which is owned by the DOE, the current and anticipated future operation and land use of this PRS is recreational. The land adjacent to the southwest of the canyon, on the mesa top behind Fire Station No. 1, may be leased to the county of Los Alamos for a research business park in the future. No LANL decontamination and decommissioning (D&D) activities are currently proposed for these areas."

HRMB Comment: *Please clarify if this refers to areas (e.g. the land adjacent to the southwest of the canyon, on the mesa top behind Fire Station No. 1) where portions of waste line are or were located. Provide a map of the above referenced area and indicate the location of the fire station, PRSs, and former or current waste lines in the area.*

LANL Response

The figure in Attachment 1 illustrates the location of the Los Alamos Economic Development Corporation Research Park, relative to Fire Station No. 1, and the PRSs associated with the former waste lines in the area. No portion of the entire waste line system or associated PRSs are located within the proposed boundaries of the research park.

8. **2.2.1 Site Description, Environment, page 8, last paragraph:**

LANL Statement: "Small wetland areas are present on both sides of the Omega road, approximately one-quarter mile downstream from the PRS."

HRMB Comment: *LANL should investigate the small wetland area located downstream from the waste line. Over the years, contaminants released from the waste lines could have migrated and accumulated in the wetlands. This migration of contaminants could have occurred because waste lines on the sides of the canyon were at places buried at shallow depths.*

LANL Response

The need for investigation of the wetland areas downstream from the site of the former waste line will be assessed after careful review of the existing 0-017 data, the downstream Los Alamos Canyon reach data, and the sampling approach to be developed for the entire abandoned waste line system. The Canyons Focus Area's Sediment Investigation Team will develop, in consultation with the Townsites Team and the Drainline Aggregate Team, a sampling strategy and approach for the entire abandoned waste line.

9. **2.3.4.2 Field Investigation, (e) Surface and Subsurface Sampling (Line 167), page 24, paragraph 6:**

LANL Statement: "Initially, a total of 19 soil samples were collected for radiological screening only on the north side of the canyon at various locations along the trend of Line 167."

HRMB Comment: *Provide a map showing location of samples collected for radiological screening. Provide a table summarizing the results of radiological screening for both the north and south slopes of the canyon.*

LANL Response

A two-page map of radiological screening locations on the north side and the south side is provided as Attachment 2 to this response. A summarizing table is provided as Attachment 3.

10. **2.3.4.3 Data Review, (a) Radionuclide Comparison with Background/Fallout Radionuclide Concentrations, page 42, paragraph 4:**

LANL Statement: "The soil values were used for the backfill material on the mesa top as well as the soil in the canyon based on current protocol adopted by the ER Project."

HRMB Comment: *Clarify the discrepancy between this statement and the 'footnote d' of Table 2.3-8 that states that the Qbt 2,3,4 value was used as the BV for fill samples. In addition, the background/fallout values were not used consistently, i.e. Qbt 2,3,4 BV/fallout values were used for Am-241, Cs-137, Pu-238, and tritium and soil BV/fallout values were used for Pu-239, U-234, U-235, and U-238 fill samples. Please use media BV/fallout values consistently.*

LANL Response

The text quoted as part of the RSI comment is correct. The background values/fallout values used in Table 2.3-8 should reflect the use of soil values for the soil, fill, and weathered tuff and the use of Qbt 2,3,4 values for the unweathered tuff. Unfortunately, several of the background values/fallout values provided in the table were incorrect. The appropriate values have been inserted in revised Table 2.3-8. Footnote d should be used to describe only the plutonium-239 fallout value for unweathered Qbt 2,3,4. Because of changes in the background values/fallout values from Qbt to soil, cesium-137 has two fewer detects above the BV, which results in modifications to Table 2.3-8 and Table 2.3-9. Revised Table 2.3-8 and revised Table 2.3-9 are provided in Attachments 4 and 5, respectively. Several other minor errors were found in reviewing Table 2.3-8 and have also been corrected.

11. **2.3.5.1 Nature and Extent of Contamination, Mesa Top, page 56, paragraph 1:**

LANL Statement: "In the case of mercury, the six detects above the BV were all from locations along Line 171 and all occurred in shallow (fill) samples. In the deep sample at each of these locations, mercury was reported as not detected with a reporting limit less than the mercury concentration in the shallow sample. The detection of chromium and cyanide above their BVs also occurred in shallow fill samples, while in the deeper sample at each location, chromium and cyanide were not detected."

HRMB Comment: *The backfill material at the mesa top is contaminated at least with aluminum, barium, cyanide, chromium, magnesium, mercury, radionuclides, and PCBs. This could pose a future risk if the contaminated fill is exposed at the surface. Therefore, LANL should demonstrate that applicable institutional controls are in place to prevent exposure from future excavations.*

LANL Response

The property owner has constructed a two-story medical office building on the site above Line [segment] 171. Mr. Don Kindler, Project Supervisor for Cooper Medical, who built the addition, advised LANL that excavation conducted for that project only went 6-feet deep. Therefore, the actual excavation that occurred at the site after the RFI report was completed (which would qualify as the first "future excavation") did not extend to the depth of the pipes and did not, in actual practice, result in contamination being brought to the surface. This construction experience confirms that chemicals detected at a depth of 20 ft (the depth of the remaining lines) would not be brought to the surface and would therefore have no exposure path to surface receptors. During the construction of this building, all points of access to the line segment were covered by the structure, ensuring that any subsurface contamination associated with Line [segment] 171 will not be exposed at the surface in the foreseeable future.

12. **2.3.5.1 Nature and Extent of Contamination, Los Alamos Canyon (Line 167 and ULR 33), page 56, paragraph 1:**

LANL Statement: "The lead distribution, combined with other evidence provided in this report (Section 2.3.4.2), conclusively shows that the lead contamination is not the result of a release from Line 167. The apparent source of the lead contamination is the periodic maintenance of Omega Bridge; i.e., lead based paint removal prior to repainting."

HRMB Comment: *Lead was found at concentrations of 450 and 270 mg/kg at location 00-10144 (Samples RE00-98-0101 and RE00-98-102) at the depth of 1-2 ft. Explain how lead found at this depth could be attributed to the Omega Bridge maintenance. Explain why samples at greater depths were not taken at this location to define the vertical extent of contamination.*

LANL Response

Samples RE00-98-0101 and RE00-98-0102 (duplicate of RE00-98-0101) were collected at location 00-10144. These samples consisted of sand and gravel collected immediately above the tuff contact. Given the coarse, granular nature of this material, fine particles of leaded paint, lead-contaminated soil, or lead-contaminated blasting sand could easily migrate to the depth sampled. It is also possible that the interval sampled was at, or near, the surface when past bridge sandblasting was performed and that it was subsequently covered with 1 ft of additional sand and gravel as a result of depositional processes on the side of the canyon. At the time of investigation, a deeper sample of tuff could not be collected. The sampler was limited to the use of lightweight sampling equipment (stainless steel trowels, plastic scoops, and geology hammers) because of the steep slope and the restrictive nature of the fall-protection equipment required. This area has been identified as an area of concern (C-00-044) and as such will receive further attention during the investigation of that PRS.

13. **2.4.1 Summary, page 57:**

LANL Statement: "Human health and ecological screening assessments were not conducted on the mesa top portion of PRS 0-017 because the depth at which lines were buried precluded a viable pathway for exposure to occur and no receptors were present. The distribution and low concentrations of radionuclides detected in canyon samples indicated that a release from Line 167 did not occur."

HRMB Comment: *LANL should have evaluated both current and future risk for the mesa top. Excavation of the site in the future could result in contamination being brought to the surface and could pose risk to human health and the environment. Moreover, the fill at the surface was never investigated though the fill samples taken at depth were found to be contaminated with inorganic chemicals, radionuclides and PCBs. Please see Comment 5 regarding a release from Line 167 and Comment 11 regarding institutional controls.*

LANL Response

The explanation is in the text on page 58, following the summary:

> LAMC is constructing a wing of the hospital above the area where Line 171 is located. Line 170 is beneath an adjacent parking lot. There are no pathways (inhalation, ingestion, or dermal contact) of COPCs beneath 12 ft of earth (the typical depth of excavation for a basement) to reach the potential receptors above ground.

Los Alamos Medical Center has finished constructing the two-story medical office wing on the site identified as Line [segment] 171 of PRS 0-017. Mr. Don Kindler, Project Supervisor for Cooper Medical, who built the addition, advised LANL that excavation conducted for that project only went 6-feet deep. Therefore, the actual excavation that occurred at the site after the RFI report was completed (which would qualify as the first "future excavation") did not extend to the depth of the pipes and did not, in actual practice, result in contamination being brought to the surface. This construction experience confirms that chemicals detected at a depth of 20 ft (the depth of the remaining lines) would not be brought to the surface and would therefore have no exposure path to surface receptors. There are no receptors present at the 20-ft depth. Where there are no complete pathways and no receptors present, a screening assessment cannot be performed because there is no exposure.

Figure 2.3-3, captioned "Cross-section view of typical borehole along waste Lines 170 and 171," on p. 22, depicts the fill in relation to the waste lines. The fill samples collected at, and below, the waste lines were germane to the PRS because any liquid from leaks from this nonpressurized line would have migrated down due to gravity. Fill material above the line would not be affected by leaks from this nonpressurized line because liquid does not migrate up when not under pressure.

MISCELLANEOUS COMMENTS

14. **1.0 Introduction, page 1, paragraph 1:**

LANL Statement: "The Laboratory site covers 43 square miles of Pajarito Plateau, which consists of a series of fingerlike mesas separated by deep canyons containing ephemeral and intermittent streams that run from west to east."

HRMB Comment: *The above statement suggests that there are no perennial streams at LANL. However, Section 2.1, Site Description, identifies a perennial stream at the bottom of Los Alamos Canyon.*

LANL Response

It was incorrect to identify the stream in the bottom of Los Alamos Canyon as a perennial stream. Even though water releases from the Los Alamos Reservoir can create lengthy periods of continuous flow, the stream quickly dries up when releases from the reservoir are stopped. This stream flows only in response to stormwater events and releases from the reservoir, indicating that it is truly ephemeral in nature.

15. **2.3.4.2 Field Investigation, (d) Canyon Subsurface Borehole Sampling (Manhole ULR-33), page 24, paragraph 4:**

LANL Statement: "There were no deviations from these plans."

HRMB Comment: *There was a deviation from the RFI Work Plan (LANL 1992, 07667.1) as modified by the SAP for SWMU 0-017 (LANL 1998, 62737.30). A composite sample (RE 00-98-0097) was taken that represented three different locations at different depth intervals (7.5-9 ft interval at the original borehole, the 6.5-7 ft interval in the south offset borehole, and the 7.5-9 ft interval in the north offset borehole). Composite samples were not proposed in the SAP. LANL did not obtain HRMB's approval for the deviation prior to implementation.*

LANL Response

LANL's ER Project inadvertently omitted documentation of this SAP deviation in the RFI report. LANL recognizes that discrete sample collection methods are the appropriate collection methods for purposes of site characterization and there was no intent to collect a composite sample prior to implementing the SAP. However, because of poor sample recovery during the drilling of borehole B-16 and its offsets, which was caused by the dacite cobbles and boulders, it was necessary to composite the recovered sand and gravel to obtain sufficient volume for filling the required sample containers. In addition, LANL recognizes that it did not request prior approval from NMED HRMB to use this compositing collection method, as required, and apologizes for the oversight.

16. **2.3.4.3 Data Review, (a) Inorganic Chemical Comparison with Background, Table 2.3-7, page 41:**

LANL Statement: [Footnote] "d. This sample was analyzed for lead only."

HRMB Comment: *Samples RE00-98-0101, RE0098-0102, RE00-98-0103, RE00-98-0099, and RE00-98-0105 were analyzed for full suite of analyses not just lead.*

LANL Response

Footnote d to Table 2.3-7 refers to samples RE00-99-0001, -0002, -0004, -0005, -0006, -0007, -0008, and -0020 and should be combined with footnote e as one description. A revised Table 2.3-7 is provided as Attachment 6.

17. **2.3.4.3 Data Review, (a) Radionuclide Comparison with Background/Fallout Radionuclide Concentrations, Table 2.3-8, page 43:**

HRMB Comment: *The text on page 42, paragraph 5, states that Pu-238 was detected in the fill and tuff on the mesa top, however, the table does not report detected values for the tuff.*

The third column (Number of Analysis) states that 18 samples were analyzed for Uranium-235, when in fact, only 9 samples were analyzed for Qbt 2,3,4. Column four (Number of Detects) for Uranium-235 is also incorrect.

Since isotopic uranium was analyzed by alpha and gamma spectroscopy, the results of both analyses should have been provided. It is not clear if the data presented for isotopic uranium in Table 2.3-8 is same as the data provided in Appendix D. It is also not clear which analyses produced the data. The 'footnote g' refers to U-235 only. It is not clear if it applies to U-234 and U-238 also.

LANL should have used alpha spectroscopy for Am-241 analysis because BV/Fallout values used for comparison were obtained via alpha spectroscopy (footnote c).

The value for % soil moisture used in calculations to convert pCi/ml to pCi/g for tritium (footnote f) should have been provided.

LANL Response

A review of the data from the Facility for Information, Management, Analysis and Display (FIMAD) for this PRS indicates that the RFI report text, as quoted in the RSI comment, is incorrect. There

were no detects of plutonium-238 in the tuff. The text on page 42, paragraph 5, third sentence, should read: "Americium-241, cesium-137, and plutonium-238 were detected only in the fill on the mesa top."

Table 2.3-8 has been revised so that the number of analyses, detects, and frequencies of detects agree. This revised table is provided as Attachment 4.

Footnote g should be deleted. The data presented in the table, as well as in Appendix D, are the analytical results from the alpha spectroscopy analyses performed on the RFI samples. This analytical method is more reliable than gamma spectroscopy when analyzing for uranium-235 and is preferred when data from both methods are available. The footnote applied only to uranium-235 because gamma spectroscopy analysis does not detect both uranium-234 and uranium-238.

LANL agrees that alpha spectroscopy should have been used for americium-241 analysis. This is because the BV/fallout values were obtained by this method and because this method is more reliable at concentrations less than 1 pCi/g. However, gamma spectroscopy produces sampling results that are biased high and are therefore an overestimation of the amount of americium-241 in soil; fill; and Qbt 2,3,4. As a result, the data are usable for the purposes of the RFI.

The tritium concentrations were converted from pCi/ml to pCi/g based on the percent moisture measured by the off-site analytical laboratories for each sample collected. The percent moisture ranged from 13% to 18% for soil, from 8% to 23% for fill, and from 14% to 27% for Qbt 2,3,4, based on values from FIMAD. The data for percent moisture were also included in the electronic version of the RFI data that accompanied the RFI report submitted to NMED. This information has been incorporated into footnote f to the revised Table 2.3-8, which is provided as Attachment 4 to this response.

18. **2.3.4.3 Data Review, (a) Radionuclide Comparison with Background/Fallout Radionuclide Concentrations, Table 2.3-10, page 48:**

HRMB Comment: *It is not clear, if the two different background values (Column 5, tritium BV/fallout values 0.066 and 0.053) reported for tritium in soil are due to different moisture content of the soil since soil moisture content values were not provided. Sample RE00-98-0097 should have been identified as a composite sample in the footnotes.*

LANL Response

Yes, the fallout values presented in Table 2.3-9 (Attachment 5 to this response) and Table 2.3-10 (Attachment 7 to this response) were based on sample-specific moisture content measured by the off-site analytical laboratories and reported in FIMAD. The percent moisture was 15% for the sample of fill material reported in Table 2.3-9 (RE00-98-0089), and 15% and 18% for the soil samples in Table 2.3-10 (RE00-99-0099 and RE00-99-0103, respectively). These values have been included as footnote c to each of the revised tables.

Footnote b has been included in revised Table 2.3-10 (Attachment 7). It describes the composite sample (RE00-99-0097). This sample represents a composite because sufficient material for a sample could not be collected from one borehole due to coarse sand and gravel. This composite sample represented the 7.5- to 9-ft interval in the original borehole, the 6.5- to7-ft interval in the south offset borehole, and the 7.5- to 9-ft interval in the north offset borehole.

19. **2.4.2.2 Ecological, (a) Scoping, page 61, paragraph 5:**

LANL Statement: "The analytical data for antimony, cadmium, selenium, silver, and thallium produced by ICPES had detection limits greater than the background data, which were analyzed by inductively coupled plasma mass spectroscopy (ICPMS)."

HRMB Comment: *Not all chemicals cited above were analyzed by ICPMS. According to the background document (Ryti et. al. September, 1998) antimony and thallium were analyzed by ICPMS, and selenium by GFAA. To make appropriate comparisons, LANL should in the future use the same analytical methods for site samples as were used for background samples.*

LANL Response

The sentence should be revised to read, "The analytical data for antimony, cadmium, selenium, silver, and thallium produced by ICPES had detection limits greater than the background data, which were analyzed by ICPMS (antimony, cadmium, and silver) or by graphite furnace atomic absorption spectrometry (selenium and thallium)."

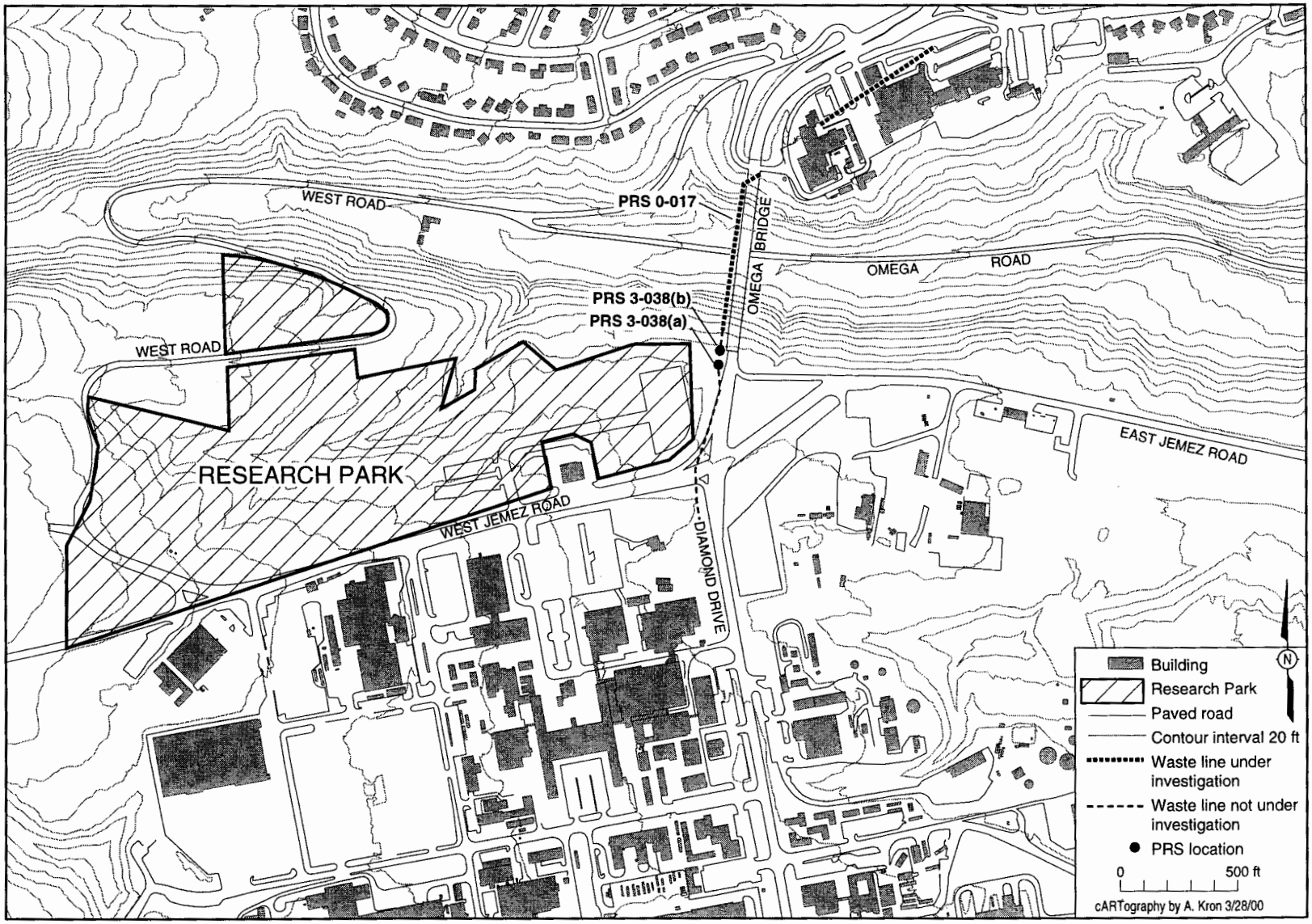
The ER Project has corrected this problem and now uses analytical laboratories that have methods comparable to the graphite furnace method (trace ICPES or ICPMS) when requesting metals analysis for samples.

20. **2.4.4.2 Other Applicable Assessments, Groundwater, page 68:**

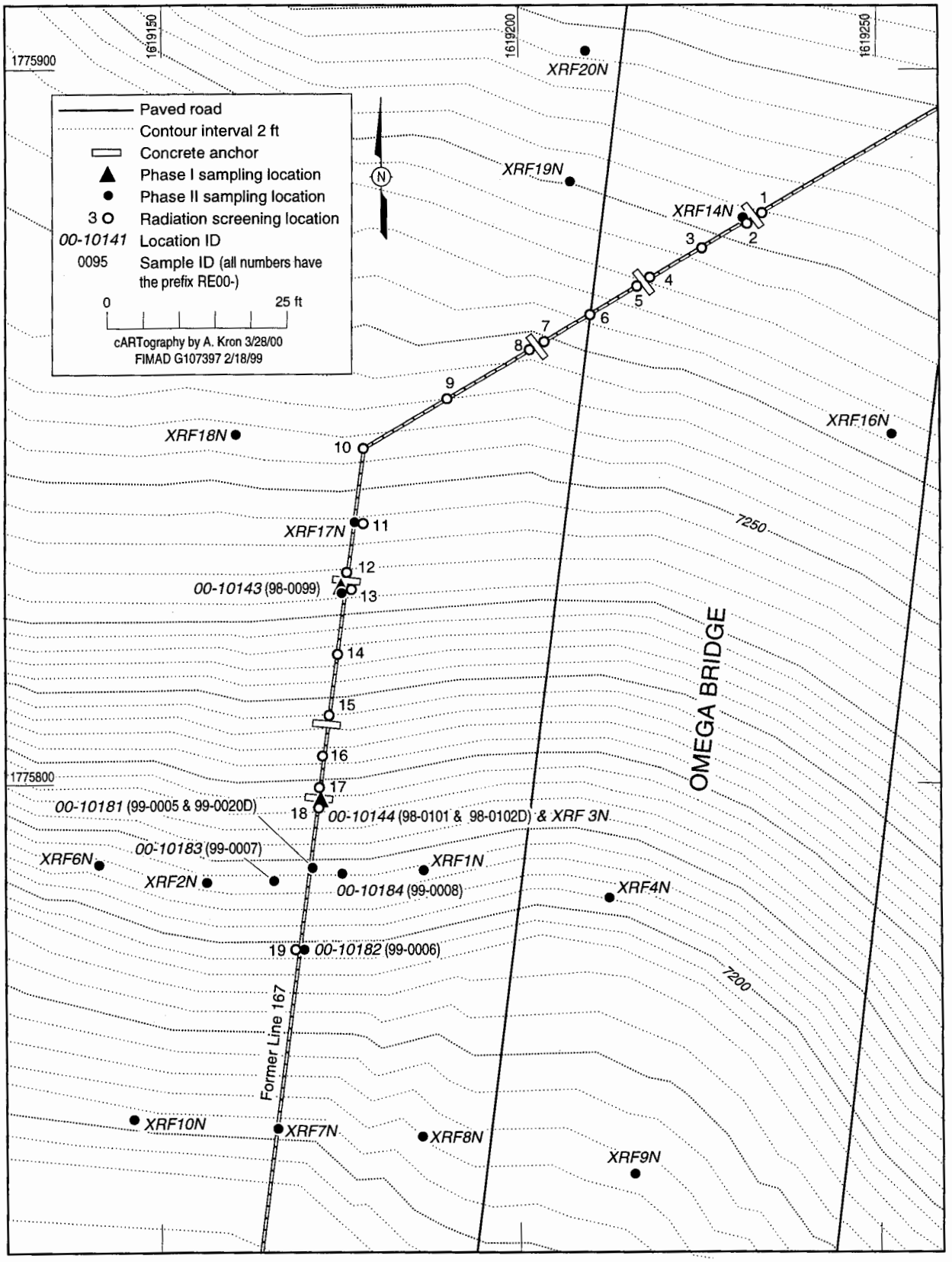
HRMB Comment: *The alluvial groundwater is within several feet of the surface in the canyon area. Since there was a release of contaminants in the past (see Comment 5) and radionuclides were detected in canyon area during this investigation, an assessment of alluvial groundwater should have been performed.*

LANL Response

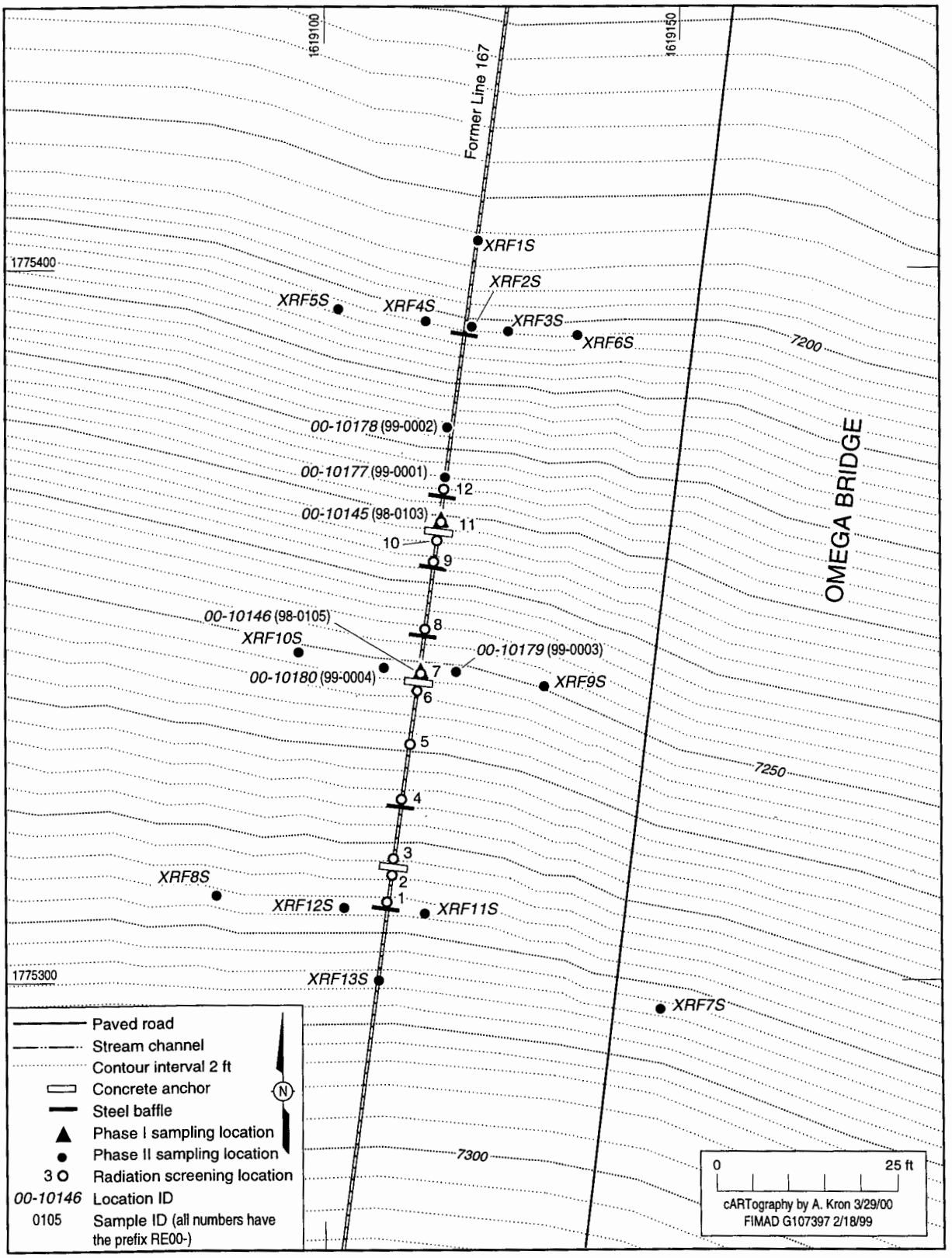
The approved RFI work plan for PRS 0-017 had no provisions for a groundwater investigation if saturated conditions were encountered. This comment will be forwarded to the ER Project's Groundwater Investigation Team for consideration during the development of the intermediate alluvial groundwater monitoring program.



Attachment 1. Location of research park in relation to PRSs 0-017, 3-038(a), and 3-038(b)



Attachment 2. Radiological screening locations at PRS 0-017 (under the north side of the bridge)



Attachment 2 (continued). Radiological screening locations at PRS 0-017 (under the south side of the bridge)

Radiological Screening Results[a]

Radiological Screening Location Number	Beta/ Gamma[b]	Alpha	Corresponding Sample Number	FIMAD Location ID
North Slope Locations				
1	220	NDA[d]	—	—
2	173	NDA	—	—
3	236	NDA	—	—
4	285	NDA	—	—
5	220	NDA	—	—
6	231	NDA	—	—
7	195	NDA	—	—
8	222	NDA	—	—
9	245	NDA	—	—
10	225	NDA	—	—
11	220	NDA	—	—
12	213	NDA	—	—
13	279	NDA	RE00-98-0099	00-10143
14	204	NDA	—	—
15	229	NDA	—	—
16	198	NDA	—	—
17	146	NDA	—	—
18	276	NDA	RE00-98-0101[c]	00-10144
19	240	NDA	RE00-99-0006	00-10182
South Slope Locations				
1	220	NDA	—	—
2	190	NDA	—	—
3	250	NDA	—	—
4	250	NDA	—	—
5	260	NDA	—	—
6	230	NDA	—	—
7	240	NDA	RE00-98-0105	00-10146
8	270	NA[e]	—	—
9	250	NA	—	—
10	270	NA	—	—
11	220	NA	RE00-98-0103	00-10145
12	230	NA	—	—

[a] Ave. Bkgd. = 206 counts per minutes (cpm); contamination criteria = 290 cpm.

[b] Beta/Gamma values in cpm.

[c] Also collected duplicate sample RE00-98-0102.

[d] NDA = No detectable activity.

[e] NA = Not analyzed.

Attachment 3. Table of radiological screening results for both slope locations

Table 2.3-8
PRS 0-017
Frequency of Detected Radionuclides

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (pCi/g)[a]	BV/Fallout Value (pCi/g)	Frequency of Detects Above BV/Fallout Value[b]
Americium-241[c]	Fill	15	3	[-0.25]–3.6	0.013	3/15
Cesium-137[c]	Soil	5	3	[0]–0.54	1.65[d]	0/5
	Fill	15	3	[-0.044]–3.3	1.65	3/15
Plutonium-238	Fill	15	4	[-0.0117]–0.21	0.023	4/15
Plutonium-239	Soil	5	4	[0.0037]–0.21	0.054[d]	4/5
	Fill	15	8	[-0.0072]–14.7	0.054	8/15
	Qbt 2,3,4	9	1	[-0.0044]–1.02	0.05[e]	1/9
	Sediment	3	2	[0]–0.073	0.068	1/3
Tritium	Soil	5	2	[0.04]–0.17	0.11–0.17[d,f]	2/5
	Fill	15	1	[-0.02-0.26]–0.22	0.066–0.23[f]	1/15
	Qbt 2,3,4	9	1	[-0.02-0.22]–0.07	0.05–0.11[f]	0/9
	Sediment	3	3	0.08–0.13	0.093	1/3
Uranium-234	Soil	5	5	0.68–0.84	2.59[d]	0/5
	Fill	15	15	0.55–2.02	2.59	0/15
	Weathered Qbt 2,3,4	9	9	0.48–1.53	2.59	0/9
	Qbt 2,3,4	9	9	0.401–0.79	1.98	0/9
	Sediment	3	3	0.433–1.032	2.59	0/3
Uranium-235	Soil	5	0	[0.04–0.064]	0.2[d]	0/5
	Fill	15	4	[0.018–0.089]	0.2	0/15
	Weathered Qbt 2,3,4	9	0	[0.025–0.1]	0.2	0/9
	Qbt 2,3,4	9	2	[0.0065–0.072]	0.09	0/9
	Sediment	3	0	[0.032–0.064]	0.2	0/3
Uranium-238	Soil	5	5	0.647–0.855	2.29[d]	0/5
	Fill	15	15	0.431–1.78	2.29	0/15
	Weathered Qbt 2,3,4	9	9	0.452–1.61	2.29	0/9
	Qbt 4	9	9	0.37–0.846	1.93	0/9
	Sediment	3	3	0.41–1.05	2.29	0/3

[a] Values in square brackets indicate nondetected results.
[b] Value is ratio of the number of detected values exceeding the BV to the number of analyses.
[c] Results obtained via gamma spectroscopy.
[d] The BV for soil was used for samples collected from disturbed material on the hill slope. Samples were taken from depths of 0.1 to 2.0 ft. The samples were considered representative of surficial soils normally restricted to depths of 0 to 6 in.
[e] Value is the nominal minimum detectable activity for Unit Qbt 2,3,4. This value was used as the BV for Qbt 4 and fill samples.
[f] Units are in pCi/mL of soil moisture. This value was converted to pCi/g for the background comparison using the following equation: fallout value (pCi/g) = 0.76 or 0.3 pCi/mL × % soil moisture in sample/(100 – % soil moisture in sample). Soil moisture content for the samples ranged from 13% to 18% for soil, 8% to 23% for fill, and 14% to 27% for Qbt 2,3,4, based on values in FIMAD. The sample-specific fallout values are included for each sample result that exceeded the fallout values in Table 2.3-9 and Table 2.3-10.

Attachment 4. Revised Table 2.3-8

Table 2.3-9
PRS 0-017 Mesa Top
Radionuclides with Concentrations at or Exceeding BV/Fallout Value Concentrations[a]

Analyte	Location ID	Sample ID	Sample Concentration (pCi/g)	BV/Fallout Value (pCi/g)	Media	Depth (ft)
Americium-241	00-10125	RE00-98-0051	3.6	0.013	Fill	18.5 - 19
	00-10125	RE00-98-0050	3.5	0.013	Fill	18.5 - 19
	00-10131	RE00-98-0068	1.33	0.013	Fill	20.5 - 23
Cesium-137	00-10125	RE00-98-0050	3.27	1.65	Fill	18.5 – 19
	00-10125	RE00-98-0051	3.01	1.65	Fill	18.5 - 19
Plutonium-238	00-10125	RE00-98-0051	0.206	0.023	Fill	18.5 - 19
	00-10125	RE00-98-0050	0.165	0.023	Fill	18.5 - 19
	00-10131	RE00-98-0068	0.066	0.023	Fill	20.5 - 23
	00-10130	RE00-98-0065	0.062	0.023	Fill	19.5 – 22
Plutonium-239	00-10125	RE00-98-0051	14.68	0.054	Fill	18.5 – 19
	00-10125	RE00-98-0050	12.85	0.054	Fill	18.5 – 19
	00-10130	RE00-98-0065	3.25	0.054	Fill	19.5 – 22
	00-10131	RE00-98-0068	2.82	0.054	Fill	20.5 – 23
	00-10133	RE00-98-0074	1.267	0.054	Fill	15 - 17.5
	00-10125	RE00-98-0052	1.015	0.05[b]	Qbt 2,3,4	19 - 19.5
	00-10126	RE00-98-0053	0.791	0.054	Fill	20 - 20.6
	00-10132	RE00-98-0072	0.176	0.054	Fill	16 - 18.5
	00-10128	RE00-98-0059	0.068	0.054	Fill	19 - 21.5
Tritium	00-10138	RE00-98-0089	0.22	0.13[c]	Fill	12.5 - 15

[a] Descriptions of the analytical methods used for this PRS can be found in Appendix C-1, Table C-1.0-1. Detection limits can be found in Appendix D-1, Table D-1.0-1.

[b] This value is the nominal minimum detectable activity for Unit Qbt 2,3,4.

[c] The fallout value of 0.76 pCi/mL is converted to pCi/g for the background comparison using the following equation: fallout value (pCi/g) = 0.76 pCi/mL × 15% soil moisture in sample/(100 – 15% soil moisture in sample).

Attachment 5. Revised Table 2.3-9

Table 2.3-7
PRS 0-017 – Canyon/Hillslope
Inorganic Chemicals with Concentrations at or Exceeding Background Values[a]

Analyte	Location ID	Sample ID	Sample Concentration (mg/kg)[b]	BV (mg/kg)	Media	Depth (ft)
Antimony	See Table D-2	See Table D-2	[11–14]	0.83	Soil	All samples[c]
	See Table D-2	See Table D-2	[11]	0.83	Sediment	All samples[c]
Cadmium	See Table D-2	See Table D-2	[0.57–0.61]	0.4	Soil	All samples[c]
	See Table D-2	See Table D-2	[0.54–0.57]	0.4	Sediment	All samples[c]
Cyanide	See Table D-2	See Table D-2	[0.57–0.61]	0.5	Soil	All samples[c]
Lead	00-10144	RE00-98-0101	450	22.3	Soil	1–2
	00-10144	RE00-98-0102	270	22.3	Soil	1–2
	00-10145	RE00-98-0103	93	22.3	Soil	0.3–1
	00-10143	RE00-98-0099	74	22.3	Soil	0.1–0.7
	00-10146	RE00-98-0105	53	22.3	Soil	0.2–1
	00-10177	RE00-99-0001[d]	76	22.3	Soil	0.1–0.5
	00-10178	RE00-99-0002[d]	240	22.3	Soil	0.1–0.5
	00-10180	RE00-99-0004[d]	53	22.3	Soil	0.1–0.4
	00-10181	RE00-99-0005[d]	390	22.3	Soil	0.1–0.8
	00-10182	RE00-99-0006[d]	100	22.3	Soil	0.2–0.8
	00-10183	RE00-99-0007[d]	31	22.3	Soil	0.1–0.3
	00-10184	RE00-99-0008[d]	28	22.3	Soil	0.1–0.6
	00-10181	RE00-99-0020[d]	220	22.3	Soil	0.1–0.8
Mercury	See Table D-2	See Table D-2	[0.11–0.12]	0.1	Soil	All samples[c]
	See Table D-2	See Table D-2	[0.11]	0.1	Sediment	All samples[c]
Selenium	See Table D-2	See Table D-2	[1.1]	0.3	Sediment	All samples[c]
Silver	See Table D-2	See Table D-2	[2.3–2.4]	1	Soil	All samples[c]
	See Table D-2	See Table D-2	[2.2–2.3]	1	Sediment	All samples[c]
Thallium	See Table D-2	See Table D-2	[2.3–2.4]	0.73	Soil	All samples[c]
	See Table D-2	See Table D-2	[2.2–2.3]	0.73	Sediment	All samples[c]

Soil = all horizons

a Descriptions of the analytical methods used for this PRS can be found in Appendix C-1, Table C-1.0-1. Detection limits are found in Appendix D-1, Table D-1.0-1.

b Values in square brackets indicate nondetected results.

c See Table D-2 for the depths of each sample. Multiple samples had detection limits above the BV. No detects were reported above background. See Table D-2 for the complete data set.

d These samples were analyzed only for lead. Included for completeness of the data set, lead contamination has been determined to be the result of facility maintenance (chipping and painting the bridge) and not the result of a release from PRS 0-017.

Attachment 6. Revised Table 2.3-7

Table 2.3-10
PRS 0-017 Canyon/Hillslope
Radionuclides with Concentrations at or Exceeding BV/Fallout Value Concentrations[a]

Analyte	Location ID	Sample ID	Sample Concentration (pCi/g)	BV/Fallout Value (pCi/g)	Media	Depth (ft)
Plutonium-239	00-10146	RE00-98-0105	0.212	0.054	Soil	0.2 - 1
	00-10144	RE00-98-0102	0.163	0.054	Soil	1 – 2
	00-10144	RE00-98-0101	0.147	0.054	Soil	1 – 2
	00-10145	RE00-98-0103	0.107	0.054	Soil	0.3 - 1
	00-10142	RE00-98-0097[b]	0.073	0.068	Sediment	5 – 9
Tritium	00-10145	RE00-98-0103	0.13	0.13	Soil	0.3 - 1
	00-10143	RE00-98-0099	0.17	0.17[c]	Soil	0.1 - 0.7
	00-10142	RE00-98-0097[b]	0.13	0.093	Sediment	5 – 9

[a] Descriptions of the analytical methods used for this PRS can be found in Appendix C-1, Table C-1.0-1. Detection limits can be found in Appendix D-1, Table D-1.0-1.

[b] This sample represents a composite because sufficient material for a sample could not be collected from one borehole due to the coarse sand and gravel. This composite sample represented the 7.5- to 9-ft interval in the original borehole; the 6.5- to 7-ft interval in the south offset borehole; and the 7.5- to 9-ft interval in the north offset borehole.

[c] The fallout value of 0.76 pCi/mL is converted to pCi/g for the background comparison using the following equation: fallout value (pCi/g) = 0.76 pCi/mL × 15% or 18% (respectively) soil moisture in sample/(100 – 15% or 18% soil moisture in sample).

Attachment 7. Revised Table 2.3-10