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CERTIFIED MAIL
RETURN RECEIPT REQUESTED

May 31, 2005

David Gregory, Federal Project Director
Los Alamos Site Office
Department of Energy
528 35th Street, Mail Stop A316
Los Alamos, NM 87544

G. Pete Nanos, Director
Los Alamos National Laboratory
P.O. Box 1663, Mail Stop A100
Los Alamos, NM 87545

**RE: NOTICE OF DISAPPROVAL
PAJARITO CANYON WORK PLAN
LOS ALAMOS NATIONAL LABORATORY, NM0890010515
HWB-LANL-99-026**

Dear Messrs. Gregory and Nanos:

The New Mexico Environment Department (NMED) is in receipt of the *Pajarito Canyon Work Plan* dated September, 1998 and referenced by LA-UR-98-2550. NMED has reviewed this document and is issuing a notice of disapproval. The Department of Energy and the University of California (collectively, the "Permittees") must respond to the comments as outlined below within sixty (60) days of receipt of this letter. The Permittees must provide responses to the comments and/or provide replacement pages to the Work Plan.

General Comments:

1. The Permittees must provide all available data that have been collected from Pajarito Canyon in summary tables, including any data collected following the Cerro Grande Fire, to augment its investigation report. The Permittees must provide separate tables for each medium (soil, sediment, surface water, storm water, springs, alluvial groundwater,



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perched intermediate-depth groundwater, and regional groundwater). If the data have already been provided in the requested format, the Permittees must indicate a reference for the document including the pertinent page numbers. The requested data must be submitted in the following format:

- a. A map with all past sampling locations for each medium clearly identified for each SWMU/AOC.
 - b. Tables in an electronic format (MS Excel or MS Access) containing the following: sampling location, sampling date, medium, analytical method, fraction (total or dissolved, if applicable), sample depth (if applicable), suspended sediment concentration (if applicable), constituent, analytical result, units, qualifier as assigned by the analytical laboratory, detection limit or MDA/MDC (for radionuclides), practical quantitation limit or TPU (for radionuclides), background value, and applicable screening criteria/standard.
2. The Permittees repeatedly uses the word "significant" throughout the document to qualify existing contaminant levels or to explain how future data will be evaluated. The meaning of the word in this context, however, is vague. The Permittees must describe contaminant levels in terms of their relationship to background levels, cleanup standards, cleanup levels, or any other applicable standard/level available for comparison to the corresponding constituent.
 3. The Permittees must provide boring logs and monitoring well construction diagrams for all wells installed in the Pajarito Canyon watershed.
 4. The Permittees must provide all relevant aerial photographs of Pajarito Canyon watershed. The Permittees' *Core Document for Canyons Investigation* (section 2.3.5.2) states that aerial photographs are an integral part of the historical evaluation of movement and deposition of sediments over time in the canyons. The following paragraph was taken from the Permittees' *Core Document for Canyons Investigation*:

A geomorphic study completed in 1991 (Graf 1994, 55536) provides a historic perspective for evaluating the contributions of plutonium from Los Alamos Canyon to the Rio Grande. The study used historic aerial photography and hydrologic data to evaluate the movement and deposition of sediment over time. Several conclusions were made regarding the regional balance of deposited plutonium in the sediment from 1948 to 1985, accounting for both worldwide fallout and the Laboratory contribution

from Los Alamos Canyon to the northern Rio Grande.”
(page 2-25)

5. The Executive Summary (pg. ES-1) states clearly that this work plan is prepared as a “Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) work plan”. However, later in this section and in Section 7.1.1 the Permittees state that “[t]he purposes of the investigation are to evaluate the present-day human health and ecological risks from Laboratory-derived contaminants within the canyon system...”

The EPA guidance “RCRA Corrective Action Plan” OSWER Directive 9902.3-2A, May 1994, pg. 17, specifies that “[t]he purpose of the RCRA Facility Investigation (RFI) is to determine the nature and extent of releases of hazardous waste or constituents from regulated units, solid waste management units, and other source areas at a facility...”

The Permittees are reminded that human health or ecological risk evaluations (or assessments) shall not be included as part of the investigation report. The Permittees must follow the format for Investigation Reports outlined in Section XI.C of the Consent Order. Following approval of the report, the Respondents may submit a risk assessment report to NMED.

Specific Comments:

1. Section 1.4.1.1 Surface Sediment Investigations, pg. 1-7, paragraph 2, and throughout the Work Plan:

Permittees Statement: “Sediment sampling is largely restricted to post-1942 canyon deposits...”

NMED Comment: LANL shall investigate all sediment (pre- or post-1942) because the mobility of contaminants cannot be disregarded regardless of sediment age.

2. Section 1.4.2.3 Pajarito Canyon Decision Rules, pg. 1-9, paragraph 3:

Permittees Statement: “To establish COPCs, analytical results from each reach in Pajarito Canyon will be compared against comparable background values and other relevant standards... A weight-of-evidence approach will be used to determine COPCs.”

NMED Comment: Initially, COPCs should be determined based on a comparison to background levels or to detection/quantitation limits. In these cases where background levels are not available, the Permittees must retain all detected constituents as COPCs.

A similar approach is described in the RCRA regulations for groundwater (40 CFR 264.95-100) and the EPA guidance “Statistical Methods For Evaluating The Attainment of Cleanup

Standards”, Volume III, December 1992 for soil. The purpose of any investigation shall be to determine “whether the site measurements are sufficiently larger to be considered significantly (statistically) different from the reference-area measurements” (Section 2.2 of the quoted guidance), where “the reference area contains no contamination from the cleanup unit being evaluated” (Section 2.4 of the quoted guidance).

3. Section 1.4.2.3 Pajarito Canyon Decision Rules, pg. 1-9, paragraph 7:

Permittees Statement: “If the uncertainty in estimated risk values is likely to influence the decision based on the risk assessment...”

NMED Comment: The Permittees are reminded that NMED’s (and EPA’s) criterion for determining a possible release from a site (SWMU or AOC) is the exceedance of background levels (or detection limits), not “estimated risk values” or “screening levels for human and ecological risk.”

4. Section 2.3 Sources of Potential Contaminants within Pajarito Canyon, pg. 2-7, last paragraph:

Permittees Statement: “The information compiled in this section is based on available reports and data as of circa February 1998. Additional and updated information about the status of PRSs can be obtained from the Laboratory’s ER Project office and/or the Community Reading Room in Los Alamos, New Mexico, as described in Section 7.1.2.3 of the *Installation Work Plan for Environmental Restoration Program* (LANL 1996, 55574, p. 7-2).”

NMED Comment: The Permittees must provide an update of SWMU/AOC status and any additional information used in making conclusions and recommendations for the Pajarito Canyon watershed. This information may be provided in the investigation report.

5. Section 3.4.2 Historic Channel Changes, pg. 3-19, paragraph 3:

Permittees Statement: “Areas of the Laboratory that have been impacted by post-1942 aggradation and degradation in the Pajarito Canyon system have not yet been defined.”

NMED Comment: The Permittees must examine relevant aerial photographs and documentation in order to define the approximate locations where construction and excavation within the Pajarito Canyon watershed have contributed to the alteration of the natural topography of the canyon. Such an evaluation may lead to eliminating the surface investigations of certain areas of the canyon floor and, instead, investigating to a greater extent the impacted groundwater (alluvial and intermediate). The Permittees must focus their resources on investigations that would gain the maximum useful information based on current canyon conditions.

6. Section 3.7.2 Alluvial Groundwater, pg. 3-71, paragraph 4:

Permittees Statement: "The shallow alluvial groundwater body in Pajarito Canyon extends from approximately 1 mi (1.6 km) west of TA-18 to the eastern Laboratory boundary at the state road NM4."

NMED Comment: The Permittees shall describe the boreholes/wells that support this statement. The Permittees shall also explain whether the entire length of the canyon has been investigated to determine the extent of the alluvial groundwater body in this canyon.

7. Section 3.7.4, pg. 3-102, Bullet 1 (from top of page):

Permittees Statement: "Water could migrate through fractures or faults as saturated flow."

NMED Comment: As part of their hydrogeologic characterization efforts for Pajarito Canyon and in accordance with Section IX.B.2.b.i of the Consent Order, the Permittees must record all conditions that are encountered or observations made of cuttings or core samples in each boring. This must include the presence and characteristics (orientation, density, width, etc.) of fractures.

8. Section 4.2.1.2 Deep Groundwater, pg. 4-8:

NMED Comment: In Section 4.2.1.1 the Permittees state that the precipitation in the Los Alamos area contained 50 to 450 pCi/L tritium for the last decade. In this section, the Permittees conclude that based on the low tritium concentration in the deep groundwater from the Pajarito Mesa supply wells (PM-1 to PM-5), this deep groundwater has been isolated from the atmosphere for at least 100 years, and therefore, recent recharge to these wells has not occurred. The Permittees make similar conclusions in the rest of the section based on other isotope concentrations (or ratio).

Groundwater supply wells have screened intervals of more than 1000 feet across the regional aquifer. Most of the groundwater in the aquifer is expected to be of "old" age and thus to have low concentration of tritium and other characteristics of "old" groundwater. Considering the amount of recharge that may be reaching the deep aquifer and the volume of this aquifer, it is expected that dilution of any contaminant, isotopes or other compound concentrations infiltrating from the surface would occur. Therefore, groundwater age determination based on concentration of tritium or other isotopes from production wells is not reliable. Furthermore, tritium and technetium have been detected in regional aquifer monitoring wells in the Pajarito Canyon watershed, suggesting recent recharge may have occurred. If the Permittees intend to conduct studies for determining the groundwater recharge paths, then the Permittees may propose such studies using reliable methods (tracer test or others) in this work plan.

9. Section 4.2.2.1 Surface Runoff and/or Erosion from PRSs, pg. 4-10, paragraph 2:

Permittees Statement: “The HE were not detected in the baseline wetland surface water samples in Threemile Canyon but were detected in the baseline wells in Pajarito Canyon. The concentrations of HE were higher in the wetlands surface water, which suggests that the source of these compounds could be TA-18 or the nearby former firing site...”

NMED Comment: The Permittees must identify the locations of the baseline wetland surface water samples. Although NMED agrees that TA-18 and the former firing sites could be sources of HE contamination, NMED recommends that comparison of similar types of water are performed (e.g., downgradient and upgradient surface water, and downgradient and upgradient alluvial groundwater).

10. Section 4.2.2.4 Subsurface Release of Liquid or Vapor, pg. 4-11, last paragraph:

Permittees Statement: “The concentrations of HE were higher in the wetlands surface water compared with the baseline alluvial groundwater wells, which suggests that the source of these compounds could be TA-18 or the nearby former firing site.”

NMED Comment: See Specific Comment #9.

11. Section 4.2.4.1 Pajarito Canyon Reaches, pg. 4-16:

NMED Comment: The Permittees shall add an alluvial reach between Reach PA-3 East and PA-4 because the source and fate of the alluvial groundwater and the detected HE compounds are unknown between PCO-2 and PCO-3 of Pajarito Canyon (see Section 3.7.2.5.2).

12. Section 7.1, Table 7.1-2 Initial Estimates of Sample Collection and Analysis, pg. 7-3
Footnotes h and i:

Permittees Statement: “The number of groundwater samples reflects the total number of filtered and unfiltered samples to be collected after well completion and semiannually for two years. If surface water is present, samples will be collected semiannually during low flow and high flow.”

NMED Comment: The Permittees must follow the approved sampling schedule submitted as part of the Interim Facility-wide Groundwater Monitoring Plan.

13. Section 7.2.3 Sampling and Analysis Plan for Sediment Investigation, pg. 7-9, paragraph 2:

Permittees Statement: “Field surveys and mapping, as well as sampling and analysis tasks, will initially concentrate on 14 reaches, which may be expanded to include up to 29 additional canyon reaches for a maximum of 43 reaches that may be investigated.”

NMED Comment: The Permittees must explain the criteria for the addition and elimination of reaches, and the number of samples that will be collected from additional (or expanded) reaches. The Permittees must not eliminate reaches (and therefore eliminate parts of the canyon) from further investigation until the report from the initial investigation has been reviewed by NMED for concurrence.

14. Section 7.2.4 Canyon Reaches Planned for Investigation, pg. 7-12:

Permittees Statement: "In addition, some subreaches intended to evaluate dilution of contaminants from upstream PRSs may not be sampled if significant levels of contaminants are not found upstream close to PRSs. The boundaries shown in Figure A-1 indicate the general areas that will be investigated; more precise definitions of the investigation boundaries will be based on the significant geomorphic units found within each reach."

NMED Comment: The "contingency" reaches that are located downstream of PRSs and downstream from subreaches that do not show contamination may have levels of contaminants that are indicative of contaminant migration, possibly beyond the Facility boundary. The Permittees are required to determine if contaminants have migrated beyond the Facility boundary and the extent of this contamination. Given the history of liquid discharges, surface/storm water runoff, dispersion from firing sites dating back to the beginning of operations at the Facility, and post-Cerro Grande floods, the Permittees shall investigate the subreaches beyond the Facility boundary as part of this investigation and shall not consider the sampling of these subreaches as contingent on what is detected upstream.

15. Section 7.2.5.1 Sampling Design, pg. 7-22, paragraph 3:

Permittees Statement: "Because of the scarcity of information available on contaminants in the Pajarito Canyon system, the initial round of sampling and analysis will be full-suite analyses from a series of subreaches throughout the watershed."

NMED Comment: The Permittees must list the subreaches that will be sampled within each reach for the initial round of full-suite analyses.

Considering the large area of the Pajarito Canyon watershed and the "scarcity of information available on contaminants", the Permittees must revise its sampling design, where applicable, to include field screening as outlined in Section IX.B.2.d of the Consent Order. The Permittees must use the screening results to guide in the selection of samples for laboratory analysis. NMED also understands that the Permittees will use radiologic screening methods and requests that the methods and procedures be submitted for review.

16. Section 7.2.5.3 Analytical Methods, pg. 7-23, paragraph 1:

Permittees Statement: “To meet the objectives for representativeness and comparability, the sediment samples will be homogenized in the field using a stainless steel bowl and spoon before being placed in a container. All samples will be sieved, in either the field or the laboratory, to remove stones and organic matter greater than 2 mm (0.08 in.) in diameter.”

NMED Comment: Homogenization of discrete samples collected for analyses other than VOCs and SVOCs shall be performed by the analytical laboratory and not in the field, if necessary. Any samples collected for analyses of VOCs and SVOCs shall not be homogenized.

The Permittees state in their *Core Document for Canyon Investigations (Core Document)* that heavy metals and radionuclides discharged from the Laboratory in liquid effluent preferentially adsorb to finer-grained sediment particles.” In those cases where liquid effluents are the only source of contamination, sieving of samples may be appropriate. The Permittees must ensure that samples collected for volatile compounds analysis or wet samples are not sieved because chemical and physical losses may occur. The analytical laboratory may sieve the soil samples only if it has a standard operating procedure on the subject. The Permittees shall not sieve samples in the field. The Core Document goes on to state that “[in] some cases, however, such as locations where fragments of shrapnel or depleted uranium are (or have been) dispersed from firing sites, higher concentrations of contaminants as larger, heavy particles may be present in active channel deposits.” In these cases, sieving of samples is not appropriate because the large fractions may contain the bulk of the contaminant concentrations. The Permittees previous claim that “any biasing imparted by sieving would be on the high side and result in a conservative estimation of potential risk” is not always accurate. The Permittees must not sieve at any sampling location downgradient or immediately upgradient of any firing sites within the Pajarito Canyon watershed.

17. Table 7.2.5-4 Analyte List, Minimum Detectable Activities, and Analytical Methods for Radionuclides in Sediment Samples, pg. 7-26:

NMED Comment: This table lists the minimum detectable activity (MDA) for Americium-241 and Plutonium-238 to be 0.05 pCi/g, when the background levels are 0.04 pCi/g and 0.006 pCi/g, respectively. The Permittees must revise their MDA values to ensure that they are below the background levels.

18. Section 7.3.1 Objective, pg. 7-29, third bullet:

NMED Comment: The Permittees must describe where the discrete flow measurements will be taken and the frequency of the measurements. The Permittees must clarify whether a subset or all of the existing streamflow gaging stations will be sampled.

19. Table 7.3.3-1 Planned Surface Water Gaging Stations and ET Stations, pg. 7-36:

NMED Comment: The Permittees must use the water data collected under the Federal Facility Compliance Agreement entered into on February 3, 2005 between the EPA and DOE as part of the decision-making for corrective action activities in Pajarito Canyon.

20. Section 7.3.4.1 Surface Water Sampling, pg. 7-40, paragraph 3:

Permittees Statement: “Additionally, all identified springs will be sampled (if flowing) semiannually, once during low flow conditions and once during high flow conditions each year for a period of two years.”

NMED Comment: The Permittees must follow the approved sampling schedule submitted as part of the Interim Facility-wide Groundwater Monitoring Plan.

21. Table 7.3.4-3 Estimated Detection Limits and Analytical Methods for Inorganic Chemicals in Surface Water Samples, pg. 7-43:

NMED Comment: The Permittees list the detection limits for beryllium to be 5 µg/L and for thallium to be 2 µg/L. The detection limits for any constituent shall not be equal to or higher than the corresponding EPA MCL, EPA health advisory, NMWQCC standard, or any other standard or screening level. The Permittees shall revise the table to show lower detection limits and require the analytical laboratories to achieve appropriate detection limits.

The estimated detection limits (EDL) for antimony, cadmium, cobalt, silver, selenium, and thallium are greater than the corresponding background values. Such detection limits would make it impossible to determine if a release occurred based on background levels. The Permittees shall revise their EDLs to ensure that they are below the relevant background values.

22. Section 7.4.3 Sampling and Analysis Plan for Groundwater Investigation, pg. 7-51, bullet 3:

Permittees Statement: “Based on information from boreholes SHB-4 and PM-2, possible saturation may be present in the Cerro Toledo interval and/or the Otowi Member; however, no saturated zones have been documented in any unit beneath the alluvium until the depth of the regional aquifer.”

NMED Comment: Saturated conditions may have been present during the drilling of R-23 in addition to SHB-4 and PM-2. A saturated perched zone has been identified in Section E.3 of the reference Purtymun 1995 (45344). In order to fully investigate these saturated zones and to test their hypothesis regarding recharge of the intermediate zones from the alluvium, the Permittees shall install the following:

- One intermediate depth replacement well near SHB-4. SHB-4 must be plugged and abandoned.
- One intermediate depth well between the flood retention structure and proposed PCAO-6.
- One intermediate-depth well east of R-23.
- One intermediate depth well between R-23 and R-32.

23. Table 7.4.3-1 Description of Planned Alluvial Groundwater Monitoring Wells, pg. 7-55:

NMED Comment: The Permittees shall install the following alluvial wells:

- One alluvial monitoring well in Twomile Canyon upgradient from its confluence with Pajarito Canyon to determine any impact of the flood retention structure on the movement of water and possible contaminants in the alluvial system originating from that canyon.
- Two sets of nested alluvial system piezometers in Pajarito Canyon downstream from the drainages associated with TA-54, in order to test the conceptual flow paths (as depicted in Figure A-4) and the occurrence of saturated zones in the area.
- One alluvial monitoring well in the vicinity of PCTH-5.
- Move alluvial well 3MAO-2 into reach TH-1 East to monitor the impact of outfalls 04A-102 and 04A-103.
- Omit PCAO-1 because it is redundant with PCAO-B.
- Omit PCAO-6 because it is redundant with BG-1. If BG-1 is not useable, drill PCAO-6 east of the proposed location.
- Omit 3MAO-1 because it is redundant with BG-4. If BG-4 is not useable, drill 3MAO-1 east of the South Fork Threemile Canyon confluence to capture groundwater flow from both watersheds.

24. Table 7.4.3-2 Description of Planned Regional Aquifer Wells, pg. 7-55:

NMED Comment: The Permittees must install R-17 at the location determined by NMED and the Permittees on February 16, 2005.

25. Section 7.4.4.1 Alluvial, Perched Intermediate, and Regional Groundwater Investigations, pg. 7-59, bullet 6 (from top of page):

Permittees Statement: "Alluvial groundwater may be collected from selected existing wells in lower Pajarito Canyon and Threemile Canyon if appropriate samples can be obtained from the wells. Existing wells that may be sampled in Pajarito Canyon include 18-BG-1 (west of TA-18), 18-MW-4 (near Kiva 1), 18-MW-17, PCO-1, 18-MW-18, PCO-2, and PCO-3. Existing wells 18-BG-4 and 18-MW-8 may be sampled in Threemile Canyon."

NMED Comment: The Permittees must follow the approved sampling schedule submitted as

part of the Interim Facility-wide Groundwater Monitoring Plan.

26. Section 7.4.4.2.4 General Sampling Guidelines, pg. 7-87, paragraph 8:

Permittees Statement: "After the wells are completed, groundwater from two depths will be sampled and analyzed twice at approximately six-month intervals."

NMED Comment: The Permittees must follow the approved schedule submitted as part of the Interim Facility-wide Groundwater Monitoring Plan.

27. Tables 7.4.4-4 (pg. 7-68), 7.4.4-6 (pg. 7-80), and 7.4.4-7 (pg. 7-81):

NMED Comment: The Permittees must add perchlorate to these tables. The Permittees must add this contaminant to the COPCs for sediment, borehole (soil) and any other investigations planned for the canyon.

28. Section 7.4.4.3.1 Analysis of Groundwater Samples, pg.7-88, paragraph 1:

Permittees Statement: "The first sample collected from each alluvial and regional aquifer well location will undergo analysis for the full suite of organic and inorganic chemicals and radionuclides. If chemicals are identified as COPCs for a particular sampling location, all subsequent samples from that location will be analyzed for appropriate COPCs. Any analyte reported as not detected may be excluded from subsequent limited-suite analyses."

NMED Comment: The Permittees must monitor for the full suite of chemicals and radionuclides until NMED approves a limited-suite analysis.

29. Table 7.4.4-9 Estimated Detection Limits and Analytical Methods for Inorganic Chemicals in Groundwater Samples, pg. 7-89:

NMED Comment: See Specific Comment #21.

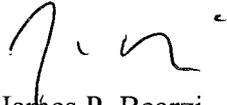
30. Section 7.6 Biological Sampling and Analysis Plan, pg. 7-95:

NMED Comment: The Permittees must submit a biological SAP as a part of their response to this NOD.

Messrs. Gregory and Nanos
Pajarito Canyon Work Plan NOD
May 31, 2005
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Should you have any questions regarding this letter, please feel free to contact Darlene Goering at (505) 428-2542.

Sincerely,



James P. Bearzi
Chief
Hazardous Waste Bureau

JPB:dxg

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