M E M O R A N D U M

TO: STU DINWIDDIE, RCRA PERMITTING PROGRAM

THROUGH: BARBARA HODITSCHECK, MANAGER, RCRA PERMITTING PROGRAM

THROUGH: STEVE ALEXANDER, MANAGER, RCRA TECHNICAL COMPLIANCE PROGRAM

FROM: LEE WINN, SUPERVISOR, RCRA TECHNICAL COMPLIANCE PROGRAM

DATE: MARCH 31, 1994

RE: REVIEW OF LOS ALAMOS NATIONAL LABORATORY AUGUST 30, 1993, CLOSURE AND POST-CLOSURE PLAN FOR MATERIAL DISPOSAL AREA P (MDA P).

The following comments in Attachment A are provided as a review of the technical adequacy of the Los Alamos National Laboratory **(LANL)** August 30, 1993 submittal of the "Closure and Post-Closure Plan for Material Disposal Area P **(MDA P)**." On March 15, 1994, the RCRA Technical Compliance Program **(RCRA TCP)** was requested to review the ground water/soil monitoring, sampling/analysis plan, and other items of concern which were highlighted in Volume I of the submittal as well as delineated in a list provided by Mr. Dinwiddie. The ground-water monitoring waiver was the main focus of the review. The RCRA TCP declined to review the cap design due to a lack of expertise. During the March 17, 1994 briefing between programs, it was decided that the list of technical concerns would be delivered by March 31, 1994.

At this time the RCRA TCP does not recommend approval of the Closure and Post-Closure Plan. It is understood that the RCRA Permitting Program will determine how these concerns will be addressed. Mr. Dinwiddie has requested that we have a staff meeting between the programs after the review is completed to decide the next action before the Notice of Deficiency **(NOD)** is issued.

cc: File:LANL Red Confidential 94
Steve Alexander
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ATTACHMENT A

The following comments are provided as a review of the technical completeness of the Los Alamos National Laboratory **(LANL)** August 30, 1993 Closure and Post-Closure Plan **(Plan)** for Material Disposal Area P **(MDA P)**. The first category below describes general comments which are significant items missing from the Plan. The second category below describes specific comments from the text of the proposal.

GENERAL COMMENTS:

The three most significant inadequacies of this Plan are:

1) NMED does not agree that LANL has demonstrated the ground water monitoring requirements are waived as per 40 CFR 264.90(b)(4). Therefore, the post-closure plan regulations as outlined in 40 CFR 264.118 are applicable in requiring compliance with Subpart F. Section 264.97 of Subpart F states that an owner or operator must comply with the requirements of Sections 264.91 through 264.100 in lieu of Section 264.101 (corrective action for solid waste management units) for purposes of detecting, characterizing and responding to releases to the uppermost aquifer; and

2) This Plan also lacks a complete sampling and analysis plan addressing ground water detection monitoring of the uppermost aquifer as per 40 CFR 264.98 regulations.

SPECIFIC COMMENTS:

The following are specific comments which need clarification before the Plan is technically complete. Reference to the Plan text are located by part, section, page, and paragraph, where applicable. The specific text is quoted and highlighted in bold. Following are the RCRA TCP comments.

ITEM	COMMENT
	Part 2.0 Background and History
1	Part 2, section 2.3, page 6, paragraph 1. **"While there are no records documenting the types, quantities, or locations of wastes placed in MDA P, some of the known wastes that have been disposed of include concrete rubble, structural steel, timbers, burning pad sand, burned equipment, and empty solvent cans."** Was there controlled access to this site from the time of its inception in 1950? Additionally, what are the assurances that significant quanities of free liquids and/or liquid hazardous constituents were **never** placed in this landfill?

2 Part 2.0, section, 2.4, page 7, paragraph 4. **"Available hydrologic data indicate that the major recharge area.... The water in the aquifer moves from its major recharge area toward the Rio Grande...."** What are the references for these statements? The quoted text provides very little hydrogeologic data/information documentation. How deep is the main aquifer under the landfill?

3 Part 2.0, section, 2.4, page 8, paragraph 2. **"To the north of the landfill, the ephemeral stream in Canon de Valle has cut steep canyon walls into the Bandelier Tuff and drains an area to the west."** The 40 CFR 264.97 regulations require that:

> The owner or operator must comply with the following requirements for any ground-water monitoring program developed to satisfy Section 264.98, Section 264.99, or Section 264.100:
>
> > (a) The ground-water monitoring system must consist of a sufficient number of wells, installed at appropriate locations and depths to yield ground-water samples from the uppermost aquifer that:
> >
> > > (3) Allow for the detection of contamination when hazardous waste or hazardous constituents have migrated from the waste management area to the uppermost aquifer.

Is the ephemeral stream a gaining or loosing stream? Is the ephemeral stream hydraulically connected to MDA P? Does LANL believe this is the uppermost aquifer?

4 Part 2.0, section 2.6, page 9, paragraph 2. **"Free-flowing groundwater was not encountered during drilling operations and was never detected in subsequent monitoring in any of the groundwater wells."** Is this monitoring well network meant to satisfy 40 CFR 264 Subpart F? If so, please explain how these wells satisfy the requirements of Subpart F of 40 CFR 264.

5 Part 2,0, section 2.6, page 12, paragraph 2. **"Stephens (1988) analyzed ten different P-16A core samples for saturated hydraulic conductivity, unsaturated hydraulic conductivity, moisture retention, initial moisture content, dry bulk density, and porosity."** According to Appendix B in volume 2 of this submittal the lithology these measurements were performed on was welded tuff.

The highest volumetric moisture content reported was greater than 35%. Moisture content may be important in determining transport in the vapor phase of constituents of concern. Use of saturated hydraulic conductivity values must be considered prudently as most saturated flow would occur in fractures. Has LANL identified the location of fractures beneath the landfill? Has LANL determined saturated hydraulic conductivities within the fractures beneath the landfill?

6 Part 2,0, section 2.6, page 12, paragraph 4. **"Barium was the only metal identified in the five core samples analyzed for RCRA metal concentrations (by EP toxicity method). Barium concentrations of 0.07 mg/L and 0.09 mg/L were slightly above the 0.05 mg/L detection level in three core samples; however, these concentrations are considerably below the regulatory threshold of 100 mg/L for EP toxicity."** It is unclear as why LANL is utilizing the EP toxicity method in characterizing this site. This method is used in determining if a solid waste is a hazardous waste. According to Figure 2-5, these barium samples were found at elevations between 50 and 60 feet. Because the EP Toxicity test utilizes the TCLP extraction method, there could be as much as 20 times more of the detected quantities at this depth. Therefore, the potential exist for this hazardous constituent to occur at depths greater than 60 feet.

7 Part 2,0, section 2.6, page 14, paragraph 2. **"Notably, the barium concentrations in the stream water were similar for samples upstream and downstream of the landfill, potentially indicating that MDA P is not contributing barium to the stream water."** This also indicates that there is no hydraulic connection between the stratigraphy beneath the landfill and the aquifer beneath the stream. The barium may have migrated to a depth of greater than 60 feet. The stream channel is approximately 100 feet below the top of the landfill and may not have been significantly impacted by this migration indicating that there is no hydraulic connection. Additionally, there is an obvious lack of fluid in the current "monitoring well" system suggesting no hydraulic connection. Finally, the potential for migration through the fracture system, which has not been mapped, suggests hydraulic connection to a deeper aquifer. However, the stream and alluvial aquifer system is one obvious route for surface runoff.

8 Part 2.0, section 2.6, page 14, paragraph 2. **"When soil samples were subjected to the EP toxicity test, ... The**

lead concentration in the extract from a sediment sample collected near the southern edge of the landfill was 0.13 mg/L.... No background samples were taken." The EP Toxicity test is used for hazardous waste determination. Alone, it is not adequate for contaminant characterization. LANL may choose to determine background values in soil for barium, lead, and all other contaminants of concern that may be naturally occurring background metals. This determination must be provided in a separate document for approval by NMED. Alternatively, LANL may choose to use the proposed 40 CFR 264 Subpart S action levels for soil.

9 Part 2.0, section 2.6, page 14, paragraph 3. **"In 1989 Nyhan (Nyhan 1989) examined the water balance relationships at MDA P...."** Water balance relationships do no account for the possibility of contaminant migration in the vapor phase.

10 Part 2.0, section 2.6, page 16, paragraph 2. **"The data show that the wells located adjacent to the landfill (P-13 and P-16A) exhibited elevated levels of volumetric water content relative to the levels at the background location (P-12A). Some of these moisture differences were attributed to the much lower saturated hydraulic conductivity in the underlying tuff than in the crushed tiff; indicating that the underlying tuff is acting as a barrier to vertical soil-water movement. The majority of the large volumetric moisture content differences were attributed to the unlined drainage channel located along the southern boarder of the landfill...."** What crushed tuff is being referred to? If this moisture content is represented as vapor phase moisture, the tuff may be a barrier. However, when considering saturated moisture content, fractures don't obey the Darcian model of saturated hydraulic flow. The tuff at this site may be more fractured than the typical Parajito Plateau tuff because of the proximity to the Parajito fault system. Therefore, since the inception of the landfill in 1950, if there has been a saturated component of flow (for example, 10 times more than the average) into the fractures, leachate may be migrating to the uppermost aquifer. Finally, the argument that the drainage channel is the source for the moisture content in the landfill appears to be refuted in paragraph three, page 22. Please explain this discrepancy.

Part 3.0 Closure Plan Rationale

11 Part 3.0, section 3.1.4, page 27, paragraph 1. **"Archival**

information about site operations indicates that the site waste materials are largely construction rubble and HE-decontaminated equipment, therefore, source term capable of creating migration of hazardous constituents in not anticipated." Please provide all archival information to support this statement. In a previous section of this document a reference was made to the lack of adequate information on the types, quantities, or locations of wastes in this landfill (see comment for item number 1 above). Please explain and clarify these statements.

12 Part 3.0, section 3.1.4, page 27, paragraph 1. **"Previous site studies (subsection 2.6) indicate that barium (the likely major RCRA contaminant in MDA P) is probably not migrating from the MDA P.... Therefore, poses no risk to groundwater which occurs at over 850 ft below MDA P."** Although barium may be the major constituent at the landfill, it is not know whether this or any other constituent has migrated to the uppermost aquifer because there are no monitoring wells in the uppermost aquifer. The depth to the uppermost aquifer at this site is unknown because there has not been an adequate site specific investigation to determine depth to the uppermost aquifer beneath this landfill. Furthermore, it is unknown whether there is a perched aquifer or main aquifer under this site due to the inadequate investigations conducted on-site.

13 Part 3.0, section 3.2, page 30, paragraph 5. **"The data collection is designed to test the assumption that the landfill presently does not contribute unacceptable levels of contaminants to the stream. ... while they support the assumption of no significant migration, are inconclusive because ...."** It is important to determine whether there is hydrologic connection to the stream.

14 Part 3.0, section 3.2, page 31, paragraph 3. **"At the conclusion of the Phase I investigation an addendum to this closure plan will .... Should the results of the field investigation confirm the probable condition that there is little or no potential for migration...."** As per 40 CFR 264.90(b)(4), the requirements for a waiver of ground-water monitoring which is based on no potential for migration have not been met. Therefore, until such time as "no potential" may be demonstration, the requirements of 40 CFR 264 Subpart F apply.

Part 4.0 Closure Procedures

15 Part 4.0, section 4.1.2.1, page 36, paragraph 3. **"An**

important premise of the Phase 1 investigation is that current and future risks to human health and the environment from migration of contaminants from MDA P will be determined by: evaluating current levels of contamination in the stream and by evaluating the impact of seeps and drainages on stream water quality." The requirements for corrective action under 40 CFR 264.100 require that the ground-water protection standards under 264.92 be met.

16 Part 4.0, section 4.1.2.2, page 36, paragraph 5. **"The primary objective of the Phase I data collection is to determine if there are COCs migrating from the landfill to the stream. Table 4-1 lists the potential contaminants of concern (PCOCs) and their screening action levels (SALs)."** The objective is incomplete. Releases from the unit are the overall concern.

17 Part 4.0, section 4.1.2.3, pages 38 and 39, heading: **Decisions, Identifying COCs, Determining If COCs are from MDA P; and Determining Transport of COCs to Stream.** See comments for item 16 above regarding contaminants of concern.

18 Part 4.0, section 4.1.2.6, page 40, heading: **Decision Rules.** These decisions may apply only if a single PCOC is found in the media of investigation. If multiple PCOCs are detected or identified as J-flag or TICs then all constituents identified are COCs.

19 Part 4.0, section 4.1.2.6, page 40. **"Some adjustments will be made to these decisions rules to account for PCOCs for which SALs are less than the Laboratory normal range of background in this area...."** In determining background, LANL must submit a plan for the determination of background levels for naturally occurring metals, to NMED for approval as a separate submittal. The resulting concentrations determined by this plan for background metals must be approved by the NMED. In a background investigation, cross sections must be provided to show that samples for background represent the same stratigraphic layer and soil type as the unit under investigation. It must be demonstrated that sample sites are not from areas of suspected sources of contamination.

20 Part 4.0, section 4.1.3.3, page 44. **"Quality control and quality assurance samples will be taken according to specifications in the SOPs..."** Reference should be made to the exact location of these SOPs in appendix G.

21 Part 4.0, section 4.1.5, page 45, **general comment.** A description of analytical laboratory quality control quality assurance procedures must be included.

Part 5.0 Post-Closure Care

22 Part 5.0, section 5.3, page 60, paragraph 1. **"The Laboratory has determined that the groundwater monitoring requirements under 40 CFR Part 264 Subpart F (NMHWMR-7, Part VI, Section 264 Subpart F) are waived for the site allowed under 40 CFR 264.90 (C)]NMHWMR-7, Part VI, Section 264.90 (c)]. This determination has been made based on the demonstrated absence of groundwater in sufficient quantities to sample in monitoring wells installed around MDA P."** NMED does not agree that LANL has demonstrated that the ground water monitoring requirements are waived. Therefore, until a ground-water monitoring waiver demonstration of no potential for migration is approved LANL must meet all requirements of 40 CFR 264.90(a)(2). For ground-water monitoring requirements to be waived a demonstrations must be made which addresses items a-i below. Additionally, there is no evidence that the alluvial aquifer is the uppermost aquifer in hydraulic connection beneath the landfill (see comments for items 2 through 10 above). Also, it is unclear as to how, 40 CFR 264.90 (c) refers to the ground water monitoring waiver demonstration.

As per Federal Register Vol. 47, No. 143, Monday, July 26, 1982, page 32293, "Owners or operators must base any predictions made to qualify for this exclusion [no potential for migration] on assumptions that tend to maximize the estimated rate of leached migration...." The following are a list of the types of assumptions which must be evaluated when making this demonstration.

a. The thickness or depth of soil [and strata] underlying the regulated unit must be determined.

b. The calculation of travel time must be based only on natural soil [and strata] properties, ignoring the effects of synthetic or recompacted natural soil liners placed beneath the waste.

c. The prediction must be based on the travel time of the most dense and/or least viscous fluid in the regulated unit (i.e., the fluid with the lowest kinematic viscosity).

d. Since the depth of liquids or leachate in a unit

can vary, the prediction should assume that the unit is full of liquids (i.e. the maximum possible hydraulic head).

e. The owner or operator should assume that the soil is saturated because fluids will pass through soils more quickly than in unsaturated soils.

f. The owner or operator should account for the effective porosity of the soil when making a prediction. Estimations of effective porosity are difficult to make. For this reason, EPA believes that 10 percent effective porosity, a low value, should be used to avoid the uncertainty involved in estimating effective porosity and to ensure relatively short travel time predictions for the soil beneath the regulated unit.

g. Soil attenuation mechanisms should be ignored in travel time predictions.

h. Since a regulated unit may have been in operation well before the prediction of travel time is made, an owner or operator should assume that migration of fluids through the soil began when the unit commenced operation.

i. As another measure to increase confidence in a prediction made to qualify for this exclusion, the owner or operator's demonstration must be certified by a qualified geologist or geotechnical engineer.