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NOTICE OF DEFICIENCY

June 17, 1994

Mr. Earl Bean
Los Alamos National Laboratories
DOE/LAAO
528 35th Street
Los Alamos, New Mexico 87545

RE: Closure Plan for TA 16 MDA Area P Landfill

Dear Mr. Bellows:

The Hazardous and Radioactive Materials Bureau (HRMB) of the New Mexico Environment Department (NMED) has conducted a technical and administrative review of the **TA 16 MDA Area P Landfill Closure Plan**. The review resulted in the issuance of this **Notice of Deficiency**. All deficiencies were determined by comparison of the **Closure Plan for TA 16 MDA P Landfill** submitted on **August 30, 1993** with the Closure Plan Checklist. The deficiencies to be addressed are found in the following attachments as indicated:

Attachment A Parts I and II: The deficiencies noted during technical review.

Attachment B: The deficiencies noted during administrative review.

The deficiencies noted in regard to the cover/cap design are found in 40 CFR § 264, and/or the EPA Guidance Document Evaluating Cover Systems for Solid and Hazardous Waste, SW 867.

Submittal of all information addressing these deficiencies is expected within thirty (30) days of the receipt of this notice of deficiency. If you fail to provide the information within thirty (30) days, you may receive a **Notice of Violation** and the facility may be subject to permit denial pursuant to **HWMR-7 Part V, 40 CFR § 264**. In cases where specific information cannot be provided within the thirty (30) day period, an extension to submit such information may be requested.



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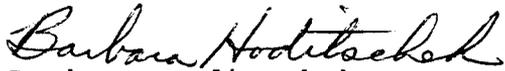
TA 16

TK

Mr. Earl Bean
LANL/TA-16 MDA-P Closure Plan NOD
June 16, 1994

If you have any questions concerning this Notice of Deficiency please contact Mr. Robert S. (Stu) Dinwiddie of my staff at 827-4308.

Sincerely,



Barbara Hoditschek
Program Manager
RCRA Permits
Hazardous and Radioactive Materials Bureau

Enclosure.

xc: Benito Garcia, Chief HRMB
Red File

**ATTACHMENT A, PART I
TECHNICAL DEFICIENCIES**

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 are specific comments from the text of the proposal.

GENERAL COMMENTS:

The two 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 HWMR-7, Part V, 40 CFR 264.90(b)(4). Therefore, the post-closure plan regulations as outlined in HWMR-7, Part V, 40 CFR 264.118 are applicable in requiring compliance with Subpart F. HWMR-7, Part V, Section 264.97 of Subpart F states that an owner or operator must comply with the requirements of HWMR-7, Part V, Sections 264.91 through 264.100 in lieu of HWMR-7, Part V, 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 HWMR-7, Part V, 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 Technical Compliance Program (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 quantities 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."** Is the ephemeral stream a gaining or losing stream? Is the ephemeral stream hydraulically connected to MDA P? Does LANL believe the alluvial aquifer is the uppermost aquifer underlying the regulated unit? These questions must be answered adequately before determination of an adequate groundwater monitoring system is made per the HWMR-7, Part V, 40 CFR 264.97 regulations. Some specific applicable regulations from HWMR-7, Part V, 40 CFR 264.97 are:

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.

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 HWMR-7, Part V, 40 CFR 264 Subpart F? If so, explain how these wells satisfy the requirements of Subpart F of HWMR-7, Part V, 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 to 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 exists 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. LANL must address these concerns adequately before determining where to locate an adequate ground water monitoring system.

- 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 HWMR-7, Part V, 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 not account for the possibility of contaminant migration in the vapor phase. LANL must address the possibility of vapor phase contaminant migration in the vadose zone beneath the landfill.
- 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 tuff; 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. LANL must 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, a source term capable of creating migration of hazardous constituents is 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 known 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. LANL must adequately address these data gaps before the above statement concerning risk and depth to groundwater can be made.
- 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 HWMR-7, Part V, 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 demonstrated, the requirements of HWMR-7, Part V, 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 I 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 HWMR-7, Part V, 40 CFR 264.100 require that the ground-water protection standards under HWMR-7, Part V, 40 CFR 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. LANL must address releases from the unit which 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.** LANL must change these decisions rules to reflect two approaches. One approach would apply only if a single PCOC is found in the media of investigation. Another approach would apply 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 must be made by LANL 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 HWMR-7, Part V, 40 CFR 264.90(a)(2). For ground-water monitoring requirements to be waived a demonstration 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 HWMR-7, Part V, 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 saturated soils more quickly than through 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.

ATTACHMENT A
PART II
Technical Deficiencies of the Cap Design

Final Cover Design requirements are found in HWMR-7, Part VI, 40 CFR § 265.310 unless otherwise noted:

1. CREAMS is a one-dimensional model which makes use of the concept of a water budget. Thus, CREAMS is similar to the Hydrologic Evaluation of Landfill Performance model (HELP Model). The most recent HELP Model is "much improved" in its applicability to landfills compared to the CREAMS Model. LANL needs to model the TA 16 MDA Area P Landfill with the HELP Model and use both current conditions and worst case scenario for the proposed cap. Should LANL insist on using the CREAMS Model LANL needs to provide the NMED with detailed documentation on the CREAMS Model and its underlying assumptions as applied to TA 16 MDA-P.
2. The cover on the face needs to be beyond the surface occupied by the waste.
3. NMED requires a detailed justification for why such a limited amount of actual field data are used to set up the CREAMS Model.
4. The CREAMS Model used does not reflect nor explain why the difference in S-Site and OHL-Site was not used.
5. No detailed calculations of erosion were provided as required.
6. NMED requires a detailed explanation of the exact layering model used by LANL for this application of CREAMS.
7. Additional site characterization is required to determine potential contaminate migration pathways (including a determination of the spacing and orientation of fractures in the tuff).
8. None of the years modeled by LANL in the CREAMS application could be considered a worst case scenario for precipitation (a 10-year, 100-year, or larger event) at LANL. This type of information needs to be provided.
9. The amount of total precipitation and snowfall at LANL, combined with cooler temperatures, is not trivial as implied by LANL.

10. The basic elements proposed by LANL seem to reflect a limited understanding of landfill cap design. The proposed landfill design will likely have the undesired effect of increasing infiltration into the underlying waste layer. The sand and gravel layers in the proposed design will not function as lateral drainage layers as claimed by LANL due to their expected increasing saturated hydraulic conductivities and decreasing field capacities (field capacity is the minimum volumetric moisture content required for gravity drainage to occur in unsaturated flow conditions. The field capacity of a gravel is typically less than that of clay). LANL is required to produce the plans for a cap that meets the requirements of the regulations.
11. Based on the information provided, the submitted closure plan for the subject hazardous waste landfill would not even meet the minimum closure requirements of the New Mexico Solid Waste Management Regulations for RCRA Subtitle D (nonhazardous) landfills.
12. Waste within the landfill needs to be better characterized. Potential presence of organics needs to be investigated.
13. The relatively high volumetric moisture contents in and below the landfill imply that significant infiltration has already occurred.

ATTACHMENT B
Administrative Deficiencies

The following deficiencies were noted during an administrative review of the closure plan. These deficiencies are required to be addressed in detail by 40 CFR § 265.310:

1. Duties of the inspectors is missing.
2. Qualifications of the inspectors is missing.
3. Synthetic liner is mentioned but design specifications are not given. The following information is required: strength, thickness, brand name, and manufacturer
4. Certification of certifying engineer is not addressed.
5. Engineering calculations demonstrating the permeability of the cap is equal to or less than the permeability of the bottom layer/liner.
6. Long term liquid movement with detailed engineering calculations.
7. Checklist to support number 6 and 7 above.
8. Overall final cover integrity is not sufficiently addressed.
9. Erosion of the cover face is not addressed.

10. Detailed descriptions or discussions are required for the following:
 - A. identification of the drainage layer and its composition.
 - B. final cover integrity.
 - C. thickness and permeability of the "low permeable" soil layer.
 - D. permeability of the two-foot-thick soil layer (closure plan does not address permeability in centimeters/second).
 - E. material specifications for all components of the cover.
 - F. Detailed description of the vegetative/cover crop which must include species and variety to determine local adaptability/indiginicity.
 - G. even though the horizontal surface is considered stable settlement is not discussed in enough detail.
 - H. detailed discussion of the potential for gas generation is missing.
 - I. frost heave or freeze thaw cycle effects are not discussed.
 - J. detailed specifications for cap placement are missing.
 - K. construction inspection and Quality Assurance/Quality Control is missing.
 - L. control of vegetation growth is not adequately addressed.
 - M. control of wild burrowing animals is not adequately addressed.
 - N. gas collection or control.

11. There are no detailed engineering drawing/calculations addressing: LANL must provide the following in detail.
 - A. erosion of cover and vertical faces.
 - B. free drainage of precipitation off of the cover.
 - C. free drainage of the drainage layer.
 - D. potential for clogging of B and C above.
12. "Finally, the plan must describe in detail how any leachate collection/detection system will be operated during the post closure period. Included must be:
 - A. frequency of inspection for leachate, including justification for the selected frequency;
 - B. method of leachate removal and transportation;
 - C. disposition of collected leachate;
 - D. any testing procedures used to test the leachate, including analytical methods and test parameters;
 - E. documentation procedures to document quality, quantity, and the dates leachate was observed and/or removed.

The following administrative deficiencies are required to be addressed in detail by the regulations where cited.

13. Post Closure Contact not identified. (Office code individual not necessary in this case) 40 CFR § 265.118(c)(3)
14. Maximum inventory of waste is not sufficiently identified. 40 CFR § 265.112(b)(3)
15. Addendums to the post closure plan are addressed but not amendments. 40 CFR § 265.118(d) and (g)
16. Addendums to the closure plan are addressed but not amendments. 40 CFR § 265.112(c)
17. Notification of partial closure (required for each cell) western cell is "closed" yet no record of partial closure can be located.

Attachment B
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18. Detailed description of the maintenance and replacement of benchmarks is missing. 40 CFR § 265.309
19. Inspection documentation procedures and records are not adequately addressed. 40 CFR §265.94
20. Maintenance and replacement of the Ground Water Monitoring System are not adequately addressed. 40 CFR § 265.93(e)