file LANL FY94

TA-16
MDA-P

Department of Energy
Field Office, Albuquerque
Los Alamos Area Office
Los Alamos, New Mexico 87544

JUL 21 1994

1994
RECEIVED
HAZARDOUS WASTE
PROGRAM

Ms. Barbara Hoditschek
Permit Program Manager
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
1190 St. Francis Drive
Santa Fe, New Mexico 87502

TA 16

Dear Ms. Hoditschek:

Enclosed is Response to the Notice of Deficiency (NOD) for the Closure and Post-Closure Plan for Technical Area 16, Material Disposal Area (MDA) P. The Response is referenced by item number, document section, page, and paragraph. Upon approval of all items, proposed amendments to the Closure Plan will be drafted which incorporate the deficiency resolutions.

A request for an extension to respond to certain NOD comments has been submitted to you under separate cover.

If you have questions, please call me at 665-5027 or ask your staff to call Bonnie Koch at 665-7202.

Sincerely,

T. J. Taylor

Theodore J. Taylor
Program Manager
Environmental Restoration Program

Enclosure

cc w/enclosure:
T. Taylor, LAAO
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LAAO ER Program Library
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TA-16

RESPONSES TO NOD FOR AREA P CLOSURE PLAN

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.

Response

A plan for monitoring of the vadose zone will be developed and submitted to NMED within a period of 120 days. This monitoring may involve some or all of the following: additional characterization of waste material, installation of angled boreholes beneath the landfill, associated characterization of hydrologic characteristics of the solid tuff and fractures, sampling for potential contaminants, and continued monitoring after completion of the boreholes. This plan will be designed to address the concerns regarding the potential for migration of liquids from the Area P landfill to the main aquifer underlying Area P. The potential vadose zone contamination investigation is intended to be a quicker alert to potential contaminant movement rather than the monitoring of groundwater for possible signs of a potential contaminant presence.

SPECIFIC COMMENTS

Comment No. 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?*

Response

Access to TA-16, within which Area P is located, was controlled for security and safety reasons beginning in 1944 and continuing to the present. There have always been two levels of control.

An outer security fence and an inner fence protecting the high explosives exclusion area. The Area P landfill has always been behind these two fences. It has always been the practice that virtually all material that went into the landfill was flash-burned before disposal. Exceptions to this rule-some "unburnable and uncontaminated" material-are outlined in a memo by Ballance dated 8/29/60. The possible presence of volatile and semi-volatile organic constituents will be investigated as part of the proposed monitoring. The proposed vadose zone monitoring will include additional characterization of waste materials.

Comment No. 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?*

Response

Available hydrologic data on the main aquifer is presented and discussed in Purtymun 1984, as referenced in the sentence prior to that cited in the comment. No deep wells have been drilled to the main aquifer at Area P. The elevation of the potentiometric surface in the main aquifer beneath Area P, based on contouring of data from both north and southeast of Area P, is estimated at approximately 6200 ft, or approximately 1200 ft below the surface.

Comment No. 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 out steep canyon walls into the Bandelier Tuff and drains an area to the west."*** *Is the ephemeral stream a gaining or loosing 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 ground water 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 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.*

Response

Flow in the stream in Valle Canyon immediately north of the Area P Landfill, as observed in April through June of 1994, is derived in part from springs located in the bottom of the canyon several hundred yards west of the landfill. Flow also rises directly within the stream channel within and upstream of this same interval for an equivalent distance. Along this length of the stream channel flow varies; first increasing, then decreasing in a downstream direction. Flow measurements made in April and June of 1994 at two locations - one measurement approximately 150 ft upstream of the western boundary of Area P and the other measurement approximately 100 ft downstream of the gully bordering the eastern edge of Area P (site S3 and S6 on attached map)- indicate no measurable change in flow over that interval. Downstream of Area P the stream eventually infiltrates the streambed, and flow would be expected only during periods of rapid snow-melt or heavy summer rains. Based on these limited observations, and the typical behavior of streams along the western portion of the Pajarito Plateau, the stream would be characterized as gaining above Area P, and losing below. These conditions can be expected to vary seasonally, but no systematic observations have been conducted. Recently installed stream gages (summer, 1994) will contribute data to better understand this issue.

Observations in the shallow monitoring wells located at the base of Area P in Valle Canyon have not detected saturated conditions in the alluvium. Although alluvial materials immediately underlying the stream channel may be saturated, these would not be appropriately categorized as an aquifer. In that there is apparently no aquifer in the alluvium in Valle Canyon near Area P, this could not be characterized as the upper-most aquifer beneath Area P.

During periods of heavy rainfall or very rapid snow melt some surface runoff from Area P could enter the stream channel at the base of the landfill. This possibility has been substantially mitigated by the installation of a surface drainage diversion channel south of Area P which diverts all potential surface water run-on away from the site. Surface runoff can presently be derived only from precipitation onto or snow-melt within Area P.

Comment No. 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.*

Response

Note: comments 4 through 10 address Section 2.6 Previous Site Studies. The information presented in that section provides information on the characteristics of Area P. Rather, information collected by the proposed (and any additional) monitoring will be used to support the proposed closure.

The monitoring network addressed by Comment No. 4 was not intended to satisfy HWMR-7 Part V, 40CFR264 Subpart F. Rather, the network was installed in 1987 in response to a Notice of Violation issued under regulations in 40CFR265 to determine if saturated conditions existed in the alluvium adjacent to Area P. If saturated conditions were detected it would have represented a potentially significant flow path for contaminant movement from the base of Area P. However, no saturated conditions have been detected.

Comment No. 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?*

Response

The proposed vadose zone monitoring plan will be designed to address among other items the location, extent, and hydrologic significance of fracturing beneath the landfill.

Comment No. 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.*

Response

Future sampling and analysis to determine concentrations of potential contaminants in undisturbed soil and tuff underlying or adjacent to the landfill will use SW846 methods, and will determine total concentrations rather than using the toxic characteristic leach procedure (TCLP). Concentrations of potential contaminants in material presumed to be waste may use TCLP to establish whether or not the material is classified as hazardous waste. A possible oversight in previous investigations resulted in the use of the EP toxicity method for analysis of undisturbed tuff underlying the waste.

Measured background concentrations of barium in soils at Los Alamos- as determined with SW846 methodology, vary from 24 to 730 ppm, with an average of 459. Multiplying the measured EP toxicity value by 20 (with units conversion) as suggested by the comment results in

a maximum concentration of 1.4 and 1.8 ppm for the two measurements referenced by the comment. These values are significantly below known total barium concentrations in the tuff at Los Alamos. Existing data are not sufficient to determine if the barium measured by the analyses referenced in the comment is derived from naturally occurring barium, or from Area P, or both.

Comment No. 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.*

Response

We agree that the stream channel is a possible route for surface runoff (see response to Comment No. 3.) The sampling/monitoring program proposed in the Area P Closure Plan and now being implemented is designed to address surface runoff. Please note response to NMED General Comment on Page 1.

Comment No. 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 in background metals. This determination must be provided in a separate document for approval by NMED. Alternatively, LANL may choose to sue the proposed HWMR-7, Part V, 40 CFR 264 Subpart S action levels for soil.*

Response

Future sampling, as will be proposed as a part of the vadose zone monitoring and waste characterization program, will not use the TCLP methodology for analysis of undisturbed soil and tuff. The ER Project's plan for evaluating background concentrations of potential contaminants in soil and tuff will be submitted to NMED for their review. The Laboratory may, as suggested by the comment, choose to use the proposed HWMR-7, Part V, 40 CFR264 Subpart

S action levels as decision criteria to determine if contaminants at a level of concern have migrated from the waste into undisturbed soil or tuff.

Comment 9.

Part 2.0, section 2.6, page 14, paragraph 3. ***"In 1989 Nyhan (Nyhan 1989) examined the water balance relationship 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.*

Response

The proposed vadose zone monitoring plan will be designed to allow for investigating the possible presence of vapor phase contaminants beneath the Area P landfill.

Comment 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 border 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 Pajarito Plateau tuff because of the proximity to the Pajarito 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*

Response

The "crushed tuff" referred to in the cited sentence is the backfill and topsoil illustrated in Figure 2-7. As indicated in Nyhan 1989, page 14 , crushed tuff backfill was placed over the surface of the waste when use of the landfill was discontinued(See Appendix C of Closure Plan). This crushed tuff is up to 7 ft thick in the moisture monitoring holes penetrating the landfill. Some of this crushed tuff is present in the area along the southern boundary of Area P where wells P-13 and P-16A are located. The sentence would have been more clear if written "Some of these moisture differences were attributed to the much lower saturated hydraulic conductivity in tuff as compared with that of the overlying backfill and topsoil at locations P-13 and P-16A."

The cited statement does not say that the unlined drainage ditch is responsible for elevated moisture levels in the landfill, but rather that it is responsible for elevated moisture levels in wells P-13 and P-16A which are near the drainage ditch but outside the southern boundary of the landfill. The cited statement was taken from Nyhan 1989, page 16. Moisture monitoring holes P-18 and P-19 were installed after Nyhan's investigation, and the data from these wells were not available to him. Data for these latter wells is reported by McLin 1989 (See Appendix D of

Closure Plan). McLin specifically cites Nyhan's conclusion regarding infiltration though the unlined ditch and appears to disagree with Nyhan's conclusion. (McLin 1989, page 17). It should be noted too that the data reported by McLin for hole P16-A (shown in Figure 2-11 of the closure plan) indicate significantly lower moisture contents at all depths than those reported by Nyhan (as shown in Figure 2-7 of the closure plan). No ready explanation for these differences can be provided.

The apparent discrepancy is best explained by the fact that McLin was comparing moisture contents in the landfill with those outside the landfill at Moisture Hole P-16A, while Nyhan was comparing moisture contents at Holes P-13 and P-16 outside the landfill with a background hole at a significant distance from the landfill. A conclusion fitting all the observations is that while the unlined ditch was responsible for increased infiltration adjacent to the landfill, the highly permeable cover material resulted in even greater increases in water content in underlying material. Fracture densities and orientations will be determined during the drilling, which is part of the vadose zone monitoring.

Comment No. 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-contaminated equipment, therefore, a source term capable of crating 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.*

Response

We have included a package of 16 documents that discuss waste disposal operations at the Burning Ground at the Area P landfill. This material is summarized in the cover memo accompanying the package. In reconciling the lack of knowledge regarding the characteristics of waste in the landfill we should emphasize that we know in a general sense what went into the landfill, but with a few exceptions, we don't how much waste was placed in the landfill. The cited statement is based on the existing, incomplete data. Estimates of total waste volume in the landfill range from 13,000 to 16,000 cubic yards. The document by Courtwright (9/69) and personal discussions with Courtwright suggest that 1325 truckloads of non-combustible material were disposed of at Area P during clean-up activities in the 1960's. Assuming a minimum of 7 cubic yards per truck, at least 9275 cubic yards of construction debris was placed in the landfill. In addition, the Panowski and Salgado memo (6/28/71) provides a detailed inventory of material burned at the burning ground in a six-month period in the early 1970's. They state that 3000 lbs. of barium nitrate and 7,500 lbs of "trash" were burned at the site and based on known operating procedures, were subsequently placed in Area P. These documents suggest that a large portion of the material in the landfill is non-hazardous waste. The proposed monitoring will include additional characterization of the waste materials.

Comment No. 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.

Response

The proposed vadose zone monitoring plan will be designed to address these data gaps. Please note the response to NMED General Comment on Page 1.

Comment No. 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.*

Response

The proposed vadose zone monitoring plan will be designed to address potential moisture flow from Area P to the adjacent stream. However, data collected during the spring of 1994 indicate no significant increase in stream flow from upstream to downstream of Area P (See Response to Comment No. 3).

Comment No. 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.*

Response

The proposed vadose zone monitoring plan will be designed to address the potential for migration of liquids to the uppermost aquifer. Please note the response to NMED General Comment on Page 1.

Comment No. 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 be 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.*

Response

LANL does not disagree with the comment. The proposed vadose zone monitoring plan together with the proposed modified design of the landfill cover is intended to demonstrate that the requirement to meet these standards can be waived. See Nov. 1992 EPA RCRA Ground-Water Monitoring: Draft Technical Guidance, EPA/530-R-93-001.

Comment No. 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 release from the unit which are the overall concern.*

Response

The proposed vadose zone monitoring plan, along with the ongoing surface water and sediment sampling as presently proposed in the Closure Plan will address releases from Area P. However, it is also LANL's intent to apply Subpart S Action levels as criteria to determine whether any documented releases from the site are of concern (see response to Comment No. 8).

Comment No. 17

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

Response

See response to Comment No. 16

Comment No. 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.*

Response

The text cited in the comment indicates that " Some adjustment will be made to these decision rules ...if several PCOCs exhibit concentrations that are close to SALs without actually exceeding them." Reference is made to the Los Alamos IWP (LANL 1993a) for details of those adjustments. The cited statement should have indicated that this approach is used if two or more

(rather than "several") PCOCs exhibit concentrations close to SALs without exceeding them. A copy of Appendix J of the IWP, which describes these adjustments, is attached to these responses.

Comment No. 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 statigraphic 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.*

Response

The plan for determining background concentrations is under development and will be provided to the NMED within 120 days with information under the request for extension.

Comment No. 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.*

Response

LANL-ER-SOP-01.05 Rev 0, Field Quality Control Samples, identifies the types and frequency of field quality control samples that will be collected. The cited sentence also references the ER Quality Program Plan and the Quality Assurance Project Plan. The latter document contains specifications for the type and frequency of both field and laboratory quality assurance/quality control samples. Copies of these documents will be provided with the proposed plan for vadose zone monitoring.

Comment No. 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.

Response

Quality control for all proposed sampling and analysis will be consistent with the Environmental Restoration Project Generic Quality Assurance Project Plan (QAPjP) which is currently being revised.

Comment No. 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.*

Response

The proposed vadose zone monitoring plan will be designed to demonstrate that a waiver to the groundwater monitoring requirements can be granted.

Comments presented in Attachment A, Part II, Technical Deficiencies of the Cap Design and comments presented in Attachment B, Administrative Deficiencies (as appended below)

The cap design presented in the Closure Plan was intended to be conceptual, with a detailed design to be submitted at a later date (as illustrated in Figure 4-7 of the Closure Plan). LANL proposes that the analytical data from the proposed vadose zone monitoring plan be evaluated prior to proceeding with an engineered technical cap design.

ATTACHMENT A

PART II

Technical Deficiencies of the Cap Design

Final Cove 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 tthat significant infiltration has already occurred.*

Response

Responses to these comments will be provided to the NMED after the scheduled meeting between the NMED and LANL on July 25, 1994.

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 specification 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 ate 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 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.*

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)*

Response

Responses to these comments will be provided to the NMED after the scheduled meeting between the NMED and LANL on July 25, 1994.

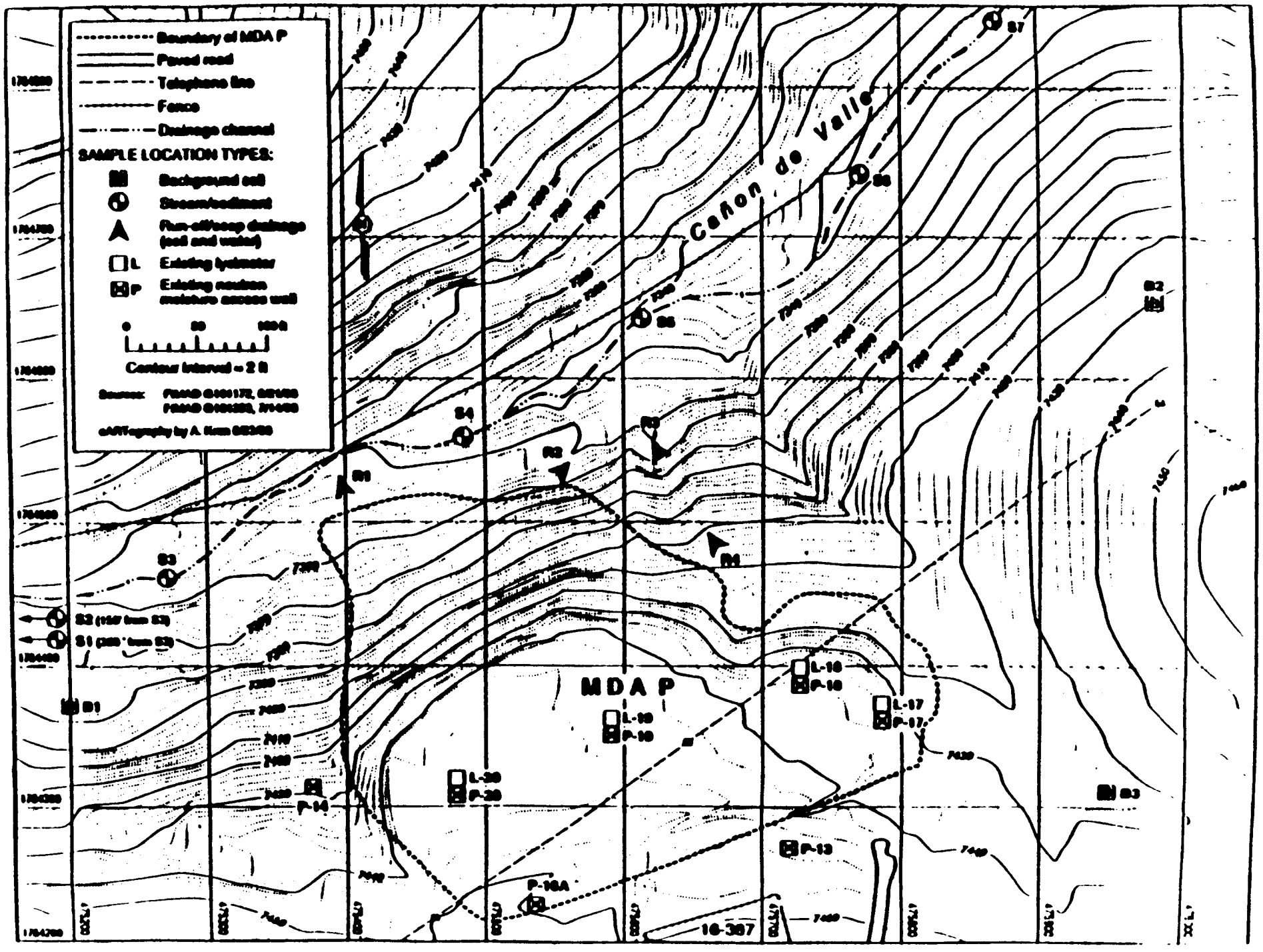

Figure 4-2. Phase 1 closure field design data collection sampling locations.

Archival Material Concerning Area P Landfill and the Burning Ground

The following material in our reference collection concern operations at the TA-16 Burning Ground and the Area P landfill. These are provided roughly in chronological order:

Date	Author	Subject/Relevance to Area P
11/18/53	Wilder	Discusses HE waste burning operations at Burning Ground.
4/18/54	Burch	Shows that materials other than HE were disposed at Burning Ground
9/16/56(?)	GMX Division	Describes SOP for HE burning at TA-16. Shows that residues are dumped at Area P.
12/23/59	Ballance	Shows that large items (i.e trucks involved in Burning Ground accident) were deposited in Area P.
8/29/60	Ballance	Shows that filter baskets were flashed and disposed of in Area P. Also shows that some "unburnable and uncontaminated" material were deposited, unflashed in Area P.
9/1/65	Eng-3	Shows that detonators were burned at Area P and that metallic material found at old S-site was disposed of in Area P.
9/30/65	Williams	See 9/1/65 entry.
4/13/66	Courtright	Shows that non-combustibles from old buildings were disposed of in Area P. HE contaminated material went to Mesita del Buey (TA-54).
5/2/66	Work order	See 4/13/66

9/69	Courtright	"Slide 20" states that 1325 truck loads of noncombustible material from the demolished buildings went to the 'regular controlled disposal area' (Area P). Attached photo (LASL 665553) shows material being dumped into Area P landfill.
8/19/70	MacDougall.	Estimates HE burned at 1900 lbs/week.
6/1/71	Salgado	Estimates 49,400 lbs HE and 3,284 gallons of solvents were disposed of at TA-16 during 6 month period
6/28/71	Panowski and Salgado	Confirms (roughly) waste volumes in 6/1/71 memo. Further describes Burning Ground wastes as containing 49,500 lbs HE, 3000 lbs barium nitrate, 3000 lbs HE contaminated solvents, 54 lbs depleted uranium, and 165 lbs kerosene over 6 months. Memo notes that uranium burns are monitored and the residues go to Mesita del Buey (TA-54). Memo notes that 143,000 lbs of normal trash and 7,500 lbs of contaminated trash were burned during this period.
1970's	no author	Viewgraph shows that 100,600 lbs of HE and 29,600 lbs of contaminated material were burned at LASL in 1975(??).
4/25/83	Warren	Further information on HE and HE-contaminated material burning at S-Site.
8/13/92	Barr	A site-worker provides a perspective on the history of the burning ground.