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RETURN RECEIPT REQUESTED

September 30, 1993

Mr. Joseph C. Vozella
Acting Chief
Environment, Safety, and Health Branch
DOE/LAAO
528 35th Street
Los Alamos, New Mexico 87544

SUBJECT: Mixed waste surface impoundments TA-53-166 NE and TA-53-166 NW: Clean closure plan review

Dear Mr. Vozella:

The New Mexico Environment Department has completed its review of the Closure Plan for Surface Impoundments TA-53-166 NE and TA-53-166 NW, Technical Area 53, submitted by Los Alamos National Laboratory (LANL) on February 12, 1993.

TA-53-166 NE and TA-53-166 NW are mixed waste storage units with liquid storage capacities of approximately 1,600,000 gallons each. Between construction in 1969 and February 2, 1993, they have at various times received industrial, radioactive, and sanitary wastewaters. The sludge deposited at the bottom of the impoundments (3"-18" thick) has never been removed. The mixed waste in the sludge includes metals, organic compounds, and low-level radionuclides. Primarily retention lagoons, the system operated in batch mode, with discharge to Los Alamos Canyon under an NPDES permit two to three times a year. However, unpermitted discharges due to overflowing were fairly frequent until 1985, when a third impoundment, TA-53 South, was constructed. Sanitary wastewater discharge was continuous between January 1992 and January 31, 1993. Ta-53 S, now a total retention storage impoundment for radioactive liquid waste, is not included in this closure plan.

Clean closure in place is proposed for the two northern lagoons under the plan application. If this is not feasible, LANL proposes clean closure by removal. Under either of these scenarios, a post-closure permit is not required. If, however,

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it is determined during closure activities that all mixed waste residues cannot practically be removed due to the nature and extent of contamination, the impoundments will be closed as landfills and an amended closure/post-closure plan will be prepared.

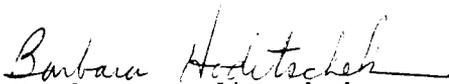
The closure plan includes a request for a time extension from the 180 days allowed under the regulations for completion of all final closure activities. LANL believes from 16.5 to 20.5 months from the date of closure plan approval is necessary, primarily to remove the water from the impoundments by evaporation. The Department will make determination on the length of the closure plan time extension at the time of closure plan approval.

In its review, the Department has noted several deficiencies in the closure plan application which must be addressed before it can be approved. These deficiencies are identified in the enclosed comments.

Please respond, within 30 days of receipt of this letter, to these comments with complete information to fully support this proposal for clean closure; these comments should be incorporated into a revised closure plan which will meet the requirements for clean closure as identified in the State's closure regulations.

Please call Stephanie Kruse of my staff at 827-4308 if you have any questions.

Sincerely,



Barbara Hoditschek
Program Manager
Permits Section
Hazardous and Radioactive Materials Bureau

Enclosure

xc: Marc Sides, NMED
Ron Kern, NMED
Dave Neleigh, EPA

September 1993

**Comments: Interim Status Closure Plan
Los Alamos National Laboratory
Technical Area 53
Surface Impoundments TA-53-166 NE and TA-53-166 NW**

General comments are presented below, followed by specific comments. These comments focus primarily, although not entirely, on regulatory deficiencies. The specific comments follow the order of the submittal. Sentences in bold type are direct quotes from the submittal. Comments follow the quotes.

A section of technical comments (Attachment I) completes the review.

GENERAL COMMENTS

1. Surface impoundments TA-53-166 NE and TA-53-166 NW are not included in the Los Alamos National Laboratory (LANL) RCRA permit; instead, LANL has chosen to proceed directly to closure under interim status for these units. Therefore, certain information which would normally be included in a permit should be provided in this proposed closure plan. This information is addressed in Comments Nos. 2 and 7 below and in the Specific Comments.
2. Insofar as possible, waste stream sources, the location of sources, and waste stream composition should be identified so that a list of probable hazardous constituents can be drawn up. In order to do this, the other technical areas which trucked sanitary sewage to these lagoons should be identified. Interior connections to the sanitary sewage outfalls at TA-53 should be identified and traced back to sources. Project work at these sources should be ascertained, and potential waste streams by constituent and constituent amount developed from knowledge of process or documentation.
3. The lack of documentation regarding waste stream origin and constituents is a recurring theme in this plan. Documentation regarding this information should be available from Johnson Controls, Inc./Pan Am, which were responsible for management of these lagoons. Also, the draft TA-53 waste stream characterization report, prepared by Santa Fe Engineering under contract to LANL's Water Quality and Toxics Section, should be used.

4. If it is not possible to identify potential hazardous wastes adequately, sampling should include all hazardous constituents listed in 40 CFR 261, Appendix VIII, which can reasonably be expected to be in or derived from waste contained in the surface impoundments.
5. In general, the sampling and analysis plan should be written so as to be third-party executable. Sampling, testing, quality assurance/quality control, and reporting should be done in accordance with the US Environmental Protection Agency (EPA) document **SW-846, Test methods for evaluating solid wastes: Physical/chemical methods**. The sampling and analysis protocols should be identified and discussed. If equivalent methods are used, this equivalency should be documented and justified in the Closure Plan Application.

The chemical constituents, methods of analysis, practical quantitation limits (PQLs), and method detection limits (MDLs) should be shown on the data reporting sheets.

6. Under 40 CFR 261.24, **Toxicity characteristic**, toxicity should be determined by the toxicity characteristic leaching procedure (TCLP). Equivalent methods should be approved by the Secretary of this Department under the procedures set forth in HWMR-7, Part 2, which incorporates 40 CFR 260.20 and 260.21.
7. The Health and Safety Plan should be included in the Closure Plan Application.
8. For hazardous constituents without proposed Subpart S action levels, a risk assessment is usually performed to determine health-based limits. Protocols for performing these risk assessments are contained in **Risk assessment guidance for Superfund, Volume I, Human health evaluation manual, Part A** (EPA/540/1-89/002, December 1989).
9. Because no regulatory controls follow a closure by removal or by equivalency demonstration, EPA has adopted an environmentally conservative approach (see the preamble to the interim status regulations for closing hazardous waste surface impoundments, **Federal Register**, March 19, 1987, p. 8704 ff.) for this form of closure. The demonstration should focus on waste contaminant levels and characteristics, consider all potential exposure pathways, and assume no attenuation. Therefore, arguments relying on fate and transport calculations are not acceptable.

SPECIFIC COMMENTS

Section 1. Introduction.

p. 1-1, ¶1. The closure plan is submitted...to meet the requirements of the New Mexico Hazardous Waste Regulations-6 (HWMR-6)....

The applicable regulations are the New Mexico Hazardous Waste Management Regulations-7 (HWMR-7).

Section 2. Facility Description.

p. 2-4, ¶2. The surface impoundment dikes were constructed of...welded tuff bedrock (Bandelier Tuff).

Could this compacted tuff, through hydration, lose its ability to retain water movement? The RCRA Part B application, **Surface Impoundments, Technical Area 53** (June 1992), p. 4-2, mentions a planned stability analysis of the dikes, including geotechnical testing of the soils, foundation materials, and fill materials used to construct the impoundment dikes and bentonite clay liners. Have these analyses been carried out? If so, what were the results of these tests?

p. 2-5, ¶2. The [two impoundment] system was operated in a batch mode, with discharges occurring two or three times a year to Los Alamos Canyon through a...NPDES...outfall, NPDES Serial No. 09S. (Historical information indicates that before the south impoundment was constructed [1985], discharges from the north impoundment due to overflowing occurred on a fairly frequent basis.)

What is a "fairly frequent basis"?

Also see comments to p. 2-10, ¶3.

p. 2-7, ¶2. The...NE and NW impoundments received sanitary waste and small amounts of industrial wastes...they also received radioactive waste...Administrative controls have been implemented at TA-53 to prevent mixed waste from entering the influent to these impoundments.

When were these administrative controls implemented?

p. 2-7, ¶¶3-4. The TA-53 surface impoundments served all

buildings at TA-53....

Historically, sanitary sewage from other technical areas was trucked to TA-53 and disposed of in the NE and NW impoundments.

Were all industrial and radioactive wastes from TA-53? Or were these kinds of waste also trucked in from other TAs? Which ones? Could the sanitary waste from TA-53 and other TAs have contained hazardous constituents? See General Comments Nos. 2 and 3.

p. 2-9, carry-over ¶. Listed wastes can only be determined by knowing how the wastes were generated and knowing detailed information regarding the chemical composition of the material before it became a waste.

Nevertheless, it is highly likely that listed wastes have been placed in the lagoons. Can any of the industrial wastes be "listed" through knowledge of process? See General Comments Nos. 2 and 3.

p. 2-9, ¶2. ...These water supply wells are described in Section 2.1.3 of the Part B application for the impoundments (LANL, 1992a). The nearest [municipal] well is approximately one mile from the impoundments.

Section 2.1.3 refers to LANL's Environmental Surveillance document for analytical results of sampling;; this document presents data only on general water chemistry and heavy metals. For ease of review, pertinent data should be included or summarized in this plan.

Are any data available for the other parameters of concern?

p. 2-10, ¶3. The TA-53 surface impoundments are not within the 100-year floodplain boundary....

But the impoundments discharged to the floodplain of Los Alamos Canyon. "Infiltration of treated effluents and natural run-off from the stream channel maintains a shallow body of water in the alluvium of Los Alamos Canyon." (**Environmental Surveillance at Los Alamos during 1988**, LA-11628-ENV, p. 49.) What has been the impact of these discharges on the alluvium and alluvial ground water?

Section 3. Waste Characterization.

p. 3-1, ¶3. Three [sludge] samples...were collected from each impoundment....

Only three samples from ponds 210 feet on a side is inadequate horizontal characterization, not to mention that no vertical characterization was done. Also, it is not clear where and at what depth the three subsamples were obtained.

Analytical methods should be identified. This comment also applies to discussion of the 1991 and 1992 sampling events.

p. 3-6, Table 3-3, Metals Detected in Sludge Samples.

What does the "W" mean in the silver, barium, and beryllium columns?

p. 3-9, ¶2. The sludge and water...in the impoundments were sampled...in July 1991....

Same comments as for the 1989 sampling (p. 3-1, ¶3 above).

p. 3-10, ¶1. Detection limits to volatiles and semivolatile organics below detection are presented in Appendices C and D, respectively.

This sentence is unclear.

p. 3-15, ¶1. Water samples were also collected from one location in each impoundment.

One sample is not adequate to characterize 1.6 million gallons.

p. 3-15, ¶1. The total levels of PCB were above the proposed RCRA Subpart S action level on carcinogenicity, but were below the EPA soil cleanup level of 10 mg/kg for unrestricted access areas [40 CFR 761.125(c)(4)(v)].

The proposed Subpart S action levels apply.

p. 3-15, ¶1. ...All pesticides were present below proposed RCRA Subpart S action levels and TCLP screening levels.

Heptachlor epoxide and toxaphene may be above proposed Subpart S action levels (see p. 3-16, Table 3-6, Results of Pesticide and Herbicide Analysis of Sludge Samples).

p. 3-18, ¶2. Water and sludge samples were analyzed for total concentrations of the toxic constituents contained in HWMR-6, Section 261.24. To determine whether water or sludge exhibits the toxicity characteristic, results...were compared with the TCLP regulatory levels...Maximum concentrations in water were compared directly with the regulatory levels. Maximum

concentrations in sludge were compared with 20 times the regulatory level....

See General Comment No. 6.

p. 3-18, ¶3. It is not certain whether the impoundments have ever received discharges of waters listed under HWMR-6, Section 261.31, Hazardous wastes from non-specific sources. The possibility...exists because facilities that generate such wastes have or had discharge drains to the impoundments. Past analysis of the water and sludge has detected chemicals that are constituents of listed waste streams. These chemicals include...acetone (F003), 2-butanone (F005), carbon disulfide (F005), and toluene (F005). There are, however, no documented discharges of listed wastes to the impoundments.

Nevertheless, it seems safe to assume that, if these wastes are present, they are from LANL facilities.

The Webster's Seventh Collegiate Dictionary states that "include" suggests the containment of something as a constituent, component, or subordinate part of a larger whole. Is this a complete list of detected constituents of listed hazardous waste?

p. 3-20, ¶1. The definition of F003 and F005 spent solvent waste requires that the solvent contain, before use, at least 10% of one or more of the listed solvents. Without knowledge of the source of the constituents identified above, it is impossible to determine whether this condition was met.

As a counter to this, the question can be asked: Why wouldn't the solvent contain, before use, at least 10% or more of a listed solvent? An effort to determine the sources of the wastes in the impoundment should be made; if this is not possible, discuss why not. See General Comments Nos. 2-4.

p. 3-21, ¶2. It is not known whether the impoundments have received discharges of any wastes that are defined as listed wastes under HWMR-6, Section 261.33. Chemical products listed under HWMR-6, Section 261.33 are used at Ta-53, including in facilities that discharge to the impoundments. There is, however, no documentation of discharges of chemical products, off-specification species, container residues, or spill residues to the impoundments.

But it is hard to imagine that there are not these kinds of wastes in the impoundments. See General Comments Nos. 2-4.

p. 3-22, Table 3-8, Listed Waste Constituents Detected in Sludge and Water.

This table presents "maximum concentrations", and not "constituents detected above detection limits". Maximum concentrations shown in Table 3-8 do not always agree with those shown in Appendix I.

p. 3-23, ¶1. These activities will include sampling the water and sludge in the impoundments, the bentonite liner material, the soil/tuff beneath the impoundment liners, and any wastes generated as part of closure.

The gunite liners on the sidewalls should also be sampled.

p. 3-23, ¶3. The results of radiological characterization of the sludge will be used to support decisions under the Environmental Restoration Program for final disposition of the impoundments after RCRA closure is complete.

This statement assumes clean closure.

p. 3-23, ¶5. Sludge and water samples will be collected after the closure plan has been approved and sufficient water has evaporated from the impoundments to facilitate sampling...For example, sludge characterization data are needed before a decision can be made as to whether the sludge must be maintained wet or can be allowed to dry.

See Comment to p. 5-18, ¶1.

p. 3-24, ¶3. Sludge samples will be collected within each of the selected blocks...Sludge samples will be analyzed for metals, volatile and semivolatile organics, PCBs and organochlorine pesticides, chlorinated herbicides, reactive sulfide, gross alpha and beta radioactivity, tritium, and gamma-emitting radionuclides.

Methods of analysis should be identified. Sludge samples should be analyzed for appropriate Appendix VIII constituents. Selection of Appendix VIII constituents should be justified. See General Comments Nos. 4-6.

pp.3-25-3-26, Tables 3-3 and 3-4, Locations of Sludge, Liner, and Soil/Tuff Samples....

These diagrams should be extended to show locations of the soil samples to be collected from beneath the gunite liners on the sidewalls.

p. 3-27, ¶2. Samples will be located where there is any visual evidence of leakage, such as cracking. If there is no evidence of leakage, the samples will be collected at the corners of the impoundment and the middle of the sidewalls.

Samples at leakage points should be taken in addition to the eight samples at corners and midpoints.

p. 3-28, ¶3. The waters of the surface impoundments are exclusion zones, and protective clothing must be worn if contact with surface impoundment waters or sludges is possible. Protective clothing requirements will be determined by the health and safety officer assigned to the project and will be described in a Health and Safety Plan (HSP) to be prepared before sampling. Exclusion zones and access, staging, and decontamination areas will be designated near each surface impoundment.

See General Comment No. 7.

Exclusion zones, etc., should be identified on a map of the impoundments.

p. 3-49, §3.4.1, Analytical Methods.

See General Comments No. 5-6.

p. 3-58, carry-over ¶. Alternatively, ICP emission spectroscopy...and other furnace AA methods...may be used as long as the detection limits are at or below all action levels except the carcinogenic SALs for arsenic and beryllium in water and the proposed Subpart S action level for beryllium in water. These action levels are below the PQLs of current analytical methods.

See General Comment No. 5.

p. 3-59, ¶4. The analytical laboratory shall be required to submit summary reports of analytical results to the OUPL [Operable Unit Project Leader]. At a minimum, the data reports shall contain the information shown in the Data Format Checklist....

Copies of these data reports should also be included in the Certification of Closure Report.

p. 3-64, ¶5, p. 3-65, ¶¶1-2. Variances are deviations from approved work plans or procedures. Variance requests for field sampling and analysis procedures will be submitted to the project manager...Telephoned or verbal approval from the project manager is sufficient to proceed with the variance...

Nonconformances are uncontrolled deviations from approved procedures of project requirements.

Corrective actions for field procedures will be implemented as described on the nonconformance report.

A discussion of variances, nonconformances, and corrective actions should be included in the Certification of Closure Report.

Section 4.0. Groundwater and Vadose Zone Monitoring Program.

p. 4-1, ¶2. Los Alamos National Laboratory (Laboratory) has determined that the groundwater monitoring requirements under HWMR-6, Subpart F are waived for this site, as allowed under HWMR-6, Section 265.90(c). The Laboratory implemented a program to demonstrate that there is a low potential for migration of mixed wastes or hazardous constituents from the impoundments. This program was designed to meet the requirements for a waiver under HWMR-6, Section 265.90(c).

Ground water monitoring requirements for clean closure under interim status are set forth in 40 CFR 270.1(c)(5). In essence, this section requires that, in order to avoid post-closure requirements, surface impoundments closing under the Section 265 regulations must demonstrate equivalency with the Section 264 regulations. While the ground water monitoring waiver under Section 265.90(c) requires demonstration of a "low potential for migration", the waiver under Section 264.90(a)(4) requires "no potential for migration".

If LANL believes that its program fulfills the "no potential" requirement, this demonstration should be included in the Closure Plan Application. Otherwise, the ground water monitoring requirements for closure under Section 264 apply.

All hazardous constituents listed in 40 CFR 264, Appendix IX, **Ground-water Monitoring List**, which can reasonably be expected to have been contained in the discharges into the lagoons should be sampled, analyzed, and reported according to the suggested methods listed in Appendix IX. Alternatively, soil sampling can in some cases be used as a proxy for ground water sampling data. Such a proposal should be thoroughly justified in terms of soils, geology, and hydrology of the site.

p. 4-4, ¶3. It is noted that low boiling point compounds that chromatographically elute before or coelute with the carbon disulfide used to extract the sample tubes (e.g., vinyl chloride

or chloromethane) would not be observed by the analytical procedure.

See General Comment No. 5.

Section 5.0 Closure and Postclosure Requirements.

p. 5-2, ¶4. Under this approach, cleanup levels will only be identified for constituents for which there are established, defensible human toxicity data.

See the comment for p. 5-4, ¶2.

p. 5-2, ¶5. If all values are below the SAL, the closure performance standard will be met for that constituent. If values are above the SAL, three options exist...a site-specific risk assessment can be performed to determine a cleanup level.

In general, proposed Subpart S action levels should be used in order to meet RCRA regulatory requirements. However, LANL may use its Screening Action Levels as well as the proposed Subpart S action levels as long as the more stringent of the two is selected.

With regard to site-specific risk assessments, see General Comment No. 8.

p. 5-4, carry-over ¶. If levels are not greatly above the SALs, a risk assessment will probably be performed.

The health-based action limits already listed in proposed Subpart S should be used.

p. 5-4, ¶2. If a constituent does not have an SAL, the approach described above will be used with the proposed RCRA Subpart S action level. If a constituent does not have either an SAL or Subpart S action level, it will not be considered further unless levels indicate a characteristic mixed waste.

All such constituents must be addressed. Practical alternatives for the case where a constituent does not have a proposed Subpart S action level include: use of the Subpart S action level for a similar constituent, preparation of a risk assessment, or removal of the constituent to background level. See General Comments Nos. 8 and 9 regarding risk assessment development.

What happens if a constituent is a characteristic mixed waste?

p. 3-7, ¶¶3-4. An extension of these closure timeframes is requested....

This request is discussed in the cover letter for these comments.

p. 5-12, ¶2. If removal is necessary, confirmatory sampling will be performed to demonstrate that all contaminated materials above the cleanup levels or mixed-waste characteristic levels have been removed.

Confirmatory sampling should be discussed. Will it repeat, where necessary, the sampling patterns, soil depths, etc., of the closure sampling done to identify the extent of hazardous waste contamination?

p. 5-14, ¶4. Any expected removal can be performed with wheel- or track-mounted excavation equipment. All sludge removed from the impoundments will be packaged, labeled, and transported to TA-54....

What kind of containers will be used?

Barrels or other containers used for removal of contaminated sludge for removal to TA-54 should be placed on plastic-covered soil, to prevent possible contamination, or else this soil should be sampled once removal is complete.

p. 5-16, ¶1. Soils, tuff, and liner material that are determined to have mixed wastes will be taken to a storage facility at TA-54 that is operating under interim status...Any expected removal can be performed with wheel- or track-mounted equipment.

This storage facility needs to be identified. Will the contaminated material receive treatment at this facility? Is this permanent disposal? Is the facility permitted for storage and/or disposal of mixed waste? The amount of waste removed needs to be identified. Treating, storage, and permanent disposition of the waste need to be discussed.

The wheel- or track-mounted equipment will need to be either lined or decontaminated. Will the boat used for sampling be decontaminated?

p. 5-16, ¶2. Following completion of sampling activities, the site will be temporarily stabilized by covering the impoundments with a 10-mil polyethylene cover...This cover will be installed to:

- ...
- provide a temporary wastewater storage facility for use in conjunction with closure of the south impoundment.

What does this mean? What kind of wastewater? This statement assumes clean closure of the site. Nevertheless, following completion of sampling activities, the site will remain under RCRA authority unless and until this Department approves the closure certification that clean closure has been completed. What happens if it is decided that the sludge should be maintained wet?

p. 5-17, ¶2. The requirements for final stabilization of the impoundments following completion and certification of closure...will be determined through the Laboratory Environmental Restoration Program.

If closure as a landfill becomes necessary for these impoundments, final stabilization will be regulated under RCRA.

p. 5-18, ¶1. The results of the sludge sample analysis will be used to determine whether site-specific risk-based cleanup levels are needed. The results of the sludge analysis will also be used to evaluate the hazard associated with potential airborne releases. The evaluation will be used to determine whether the sludge can be allowed to dry completely or whether it must be maintained wet.

How will the sludge be dried? What is the time period allowed for this? Under what circumstances would it be advisable to maintain the sludge wet? Air emissions should be discussed.

p. 5-18, ¶2. The need for removal and confirmatory sampling will be evaluated after receipt and review of analytical data and development of risk-based levels, if necessary.

Amounts and concentrations of contaminated sludge and soil which will trigger removal and confirmatory sampling should be identified and included in the Closure Plan Application.

p. 5-23, carry-over ¶. If a change under interim status for TA-54 is required in order to store these wastes, a revised Part A permit application will be submitted to the NMED with a request for approval, if necessary. If any of these mixed wastes exceed land disposal restriction treatment standards, storage of these wastes will be addressed in the Federal Facility Compliance Agreement for the Laboratory.

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The area or facility in TA-54 which will be used to store the waste, and its permit status, should be identified and discussed in the closure plan application. Treatment proposed for the waste should be identified and discussed. Final disposal of the waste should be identified and discussed.

Section 6.0 Final Closure Report.

p. 6-1, ¶1. ...This report will...contain, at a minimum...

Copies of the laboratory data analysis sheets should be included in the report.

Appendices C-F.

The maximum detection limits should be explained. Why are they the same as the minimum detection limits?

Appendix I. Maximum Detected Concentrations and Detection Limits for Listed Waste Constituents.

Are these results from all sampling events? Detection limits are not included in this table. This table does not agree with Table 3.8.

ATTACHMENT 1

The following technical comments from the Hazardous and Radioactive Materials Bureau (HRMB) of the New Mexico Environment Department (NMED) relate to Sampling and Analysis concerns of the document "Interim Status Closure Plan, Surface Impoundments TA-53-166 NE and TA-53-166 NW, Technical Area 53", submitted on February 12, 1993 by Los Alamos National Laboratory (LANL).

Language in bold print enclosed in parentheses is quoted directly from the text. Following the quotes are comments from the Technical Compliance Program of HRMB.

ITEM

- 1 Page 3-18, Section 3.1.2.4: (**Maximum concentrations in sludge were compared with 20 times the regulatory level to account for the dilution that occurs during the TCLP extraction procedure.**). Please explain the validity of the "twenty times" approximation for samples, such as sludges, which are part solid and part liquid and which may have different preparation/analytical methods.
- 2 Page 3-24, Section 3.2, Paragraph 4: (**If the amount of sludge at a selected block is insufficient for the collection of an adequate sample volume, the absence of sufficient volume will be recorded in the field log book, and sampling will proceed to the next location.**). As recommended by NMED (March 19, 1992), if a sludge sample cannot be acquired from within a particular block, one of the immediately adjacent blocks should be sampled. If a sample cannot be obtained from one of the eight adjacent blocks, then the sample might be omitted for reason.
- 3 Page 3-24, Section 3.2, Paragraph 4: (**The bottom of the sludge profile will be sampled because it is expected to have the highest concentrations of potential contaminants of concern.**). These impoundments received sanitary, radioactive, and industrial wastewaters for twenty years (1969 - 1989) and sanitary wastewaters from 1989 to February 2, 1993. Considering that numerous contaminants of concerns (including volatile and semi-volatile organic compounds, metals, pesticides, herbicides, and radionuclides) may have been discharged to these surface impoundments during the majority of their service life, any or all contaminants may realistically be expected to occur throughout essentially the entire sludge profile. It is recommended that the entire sludge column be sampled at each sample location to ensure proper contaminant characterization of the sludge.
- 4 Page 3-27, Section 3.2, Paragraph 2: (**The bentonite impoundment liners and the soil or tuff beneath the liners will be collected at the same location as the sludge samples.**

Samples will be collected from the bentonite liner material and from the depth interval 0 to 6 in. below the liner.).

A) Although it has been stated previously (page 3-24) that these samples will be collected after water has been allowed to evaporate from impoundments, please clarify whether the sludge will be completely analyzed and characterized at each sample site prior to obtaining liner and soil/tuff samples. Specifically, if the sludge does contain hazardous waste(s), please explain how sludge material will be prevented from entering the liner penetration site and possibly seeping downward into the soil/tuff.

B) Because tritium has been detected previously in the subsurface, contamination from the surface impoundments may have already infiltrated the soil/tuff. HRMB recommends that an east-west shallow angle (sub-horizontal) borehole be drilled beneath the lateral extent of the surface impoundments. Soil/tuff samples should be collected at intervals of no greater than ten feet; additional samples should be collected at any fracture zone. Samples should be analyzed for the full suite of hazardous constituents proposed by LANL for the liner and soil/tuff.

- 5 Page 3-27, Section 3.2, Paragraph 3: (Soil samples will also be collected beneath the gunite liners.). See comments for Item 4.
- 6 Page 3-27, Section 3.2, Paragraph 4: (If it is determined that removal is necessary and TCLP regulatory levels could be exceeded, samples of the materials to be removed will be collected and analyzed using the TCLP procedure.). Please provide additional information as to the proposed locations and numbers of samples to be collected.
- 7 Page 3-30, Section 3.3.4: (Water Sampling Procedures). In addition to the stated procedures, samples for volatile organic compound (VOC) analysis should be collected first, and the sample bottles should be filled so that there is no headspace upon capping.
- 8 Page 3-31, Section 3.3.5, Paragraph 1: (Grab samples will be collected from the bottom of the sludge profile where the highest concentrations are expected.). See comment for Item 3.
- 9 Page 3-31, Section 3.3.5, Bullet 2: (Collect a grab sample of sludge...using the pole-mounted beaker and transfer the sludge from the beaker to a decontaminated steel bucket. Immediately collect the sample for volatiles organics analysis.). It is recommended that samples for VOC analysis be collected directly from the pole-mounted beaker to ensure minimal sample

disturbance and to minimize possible VOC loss. Depending upon the fluid content of the sludge, sample containers for VOC analysis should be filled to minimize headspace.

- 10 Page 3-31, Section 3.3.6: (Soil/Tuff Sampling Procedures). See comments for Item 4.
- 11 Page 3-38, Section 3.3.7, Bullet 6: (Carefully discharge the [liquid decontamination waste] sample into appropriate containers, beginning with the sample for volatiles analysis.). See comment for Item 7.
- 12 Page 3-44, Section 3.3.9.2: (For samples analyzed on site, preprinted sample labels containing only the sample numbers and initials of the sample collector may be used.). Please explain why this would be sufficient information to characterize the sample and its analytical requirements. Although samples are expected to be analyzed on site by the Laboratory Environmental Chemistry Group (EM-9), will the samples be labelled appropriately, particularly if EM-9 cannot perform the required analyses or if they have insufficient laboratory capacity at the time the analyses are required?
- 13 Page 3-51, Table 3-11: The screening action level (SAL), carcinogenic, listed for chloroform (27 ug/l) in water is greater than the practical quantitation limit (PQL). Is this the correct SAL?
- 14 Page 3-64, Section 3.5.2: (Laboratory QC). Complete details of the laboratory QA/QC specific to the Closure Plan for these surface impoundments should be appended to the Plan.