LANL TA-50

draft

April 3, 1997

Mat Johansen, POC
U.S. Department of Energy
Los Alamos Area Office
528 35th Street, MS A316
Los Alamos, NM 87544

RE: Review of Los Alamos National Laboratory's Ground Water Discharge Plan Application for the TA-50 Radioactive Liquid Waste Treatment Facility (August 16, 1996)

Dear Mr. Johansen:

The DOE Oversight Bureau (DOE OB) has reviewed several sections of the subject document. The following comments are provided for the purpose of communicating the results of the review. They are not provided or intended for the purpose of representing the regulatory position of the New Mexico Environment Department.

Executive Summary

Specific Comments:

1. Page 1, third paragraph, first sentence:

Nitrate (NO3-N) and fluoride (F) concentrations in Mortandad Canyon's alluvial ground water presently exceed WQCC ground water standards but current trends are downward.

LANL may want to re-evaluate its position concerning contaminant concentration trends in Mortandad Canyon alluvium ground water because of the following:

o It is the DOE OB's assumption or conclusion (based on field observations and data review) that variations in contaminant concentration in the shallow ground water

within Mortandad Canyon alluvium is primarily dependent on the concentration and volumes of contaminants released through outfall(s) (i.e., TA-50 treatment outfall) and the volume or amount of recharge derived from natural runoff such as snowmelt-runoff. For example, MCO- 4B, MCO-5 was sampled by the DOE OB during the spring and summer of 1996, and our results show that contaminant concentrations increased with respect to previous years (e.g., ^{90}Sr detected at 111 pCi/L at MCO-4B and NO2-NO3 as N at 66 mg/L at MCO-5). These high concentrations may be due to 1996 drought conditions which resulted in a lack of snow-melt runoff and infiltration as shown by the discharge data collected during 1995 and 1996 (Shaull et al., 1996a)(Shaull et al., 1996b): from May 10 through May 31, 1995 a total of 7.2 acre-feet was discharged at GS-08313200 versus 0.2 acre-feet discharged during the entire month of May, 1996. Hence, samples collected in 1996 probably contained a greater volume of effluent water versus natural runoff water, in addition to higher contaminant concentrations. Additionally, yearly sampling results may vary widely depending on the type (e.g., effluent water) and timing of recharge.

resulting in

- Large volumes of radioactive liquid waste effluent were routinely discharged into Ten Site Canyon from the TA-35 wastewater treatment plant from 1951 through 1963 (RFI Work Plan for OU 1129, May 1992). Prior to the installation of an ion-exchange column in June of 1955, these discharges contained up to 1000 times the drinking water tolerance level of radiostrontium (RFI Work Plan for OU 1129, May 1992). Ten Site Canyon continues to receive an unknown amount of runoff from precipitation and therefore may potentially be a source of underflow interconnected to ground water in Mortandad Canyon alluvium. Hence, due to our perception of Ten Site Canyon's contribution to the overall hydrology of Mortandad Canyon, one might expect to see variation in the water quality between MCO-6 and MCO-7.

- Mortandad Canyon sediments contain an inventory from 45 years of contaminated water and accidental spill discharges. If soluble, these contaminants may be re-mobilized and transported down canyon by underflow within the alluvium or down into underlying units by leakage from the alluvium.

Further characterization and monitoring data are needed in order to address contaminant trends.

2. Page 10, Section 7, Discharge Quality.

See Appendix D for the complete data record for 1994 for RLWTF operational monitoring of treated effluent.

LANL's NPDES Permit No. NM0028355 lists monthly monitoring requirements for Total Toxic Organics [as defined in 40 CFR 433.11 (e)] for outfall 051. It would be useful to illustrate these data in the discharge plan.

3. Page 10, Section 8. Location of Water Supply and Injection Wells.

Map 3.0 shows that no water supply wells or injection wells are located within 1 mile of the RLWTF discharge point (NPDES Outfall 051).

An important concern of the DOE OB is that contaminated ground water in Mortandad Canyon alluvium is located approximately 6200 ft from PM-3, 3800 ft fromPM-4, 1700 ft from PM-5 and 4000 ft from O-4. Flow direction of regional ground water near these wells has not been determined due to the lack of adequate water-level monitoring points, especially near production fields.

4. Page 10, Section 10. Location of Monitor Wells.

- It should be noted that the MCM series wells are unscreened moisture-access holes/tubes, and MCC-8.2 was abandoned in 1989. LANL may want to omit these from Map 4.0. In addition, LANL may want re-evaluate the existence of the noted wetlands (east of the sediment traps) which are illustrated on Map 4.0.

- We recommend that LANL show all screened wells which exist in Mortandad Canyon, define which wells are useful for water quality and/or hydrologic data, and show all available data associated with these wells (chemical, water-level, etc.).

- Well MCO-4 may not be useful because it is not capped and erosion has exposed a portion of the well casing.

- Upon reviewing many of the well records for Mortandad Canyon, it is apparent that some wells may not be constructed as prescribed by regulatory guidance. DOE OB suggests that LANL evaluate historical head changes within the shallow perched aquifer prior to drilling additional wells and determining screen lengths. That is, it may be appropriate to use screen lengths that are greater than the prescribed regulatory guidance due to extreme head variations.

- DOE OB does not recommend monitoring surface water at GS-1 as a substitute for MCO-3 because underflow above or to the west of GS-1 may be mixing with infiltrated surface-water at GS-1. We recommend replacing MCO-3.

5. Page 13 - 14, Section 11. Ground Water Conditions.

a) Depth to Ground Water at the Discharge Site; b) Flow Direction of Ground Water Below the Site; and c) Gradient of Ground Water Below the Site.

DOE OB recommends that LANL develop water-level maps which show the seasonal variations in head and flow direction. Adequate water-level maps may show gradient anomalies which may help define areas of faulting and recharge/discharge (e.g., zones of

preferential seepage to hydrologic units within the Bandelier Tuff). The sediment traps and artificial-channel dredging above the traps may influence the ground-water flow regime(s) near the Ten Site and Mortandad Canyon confluence; hence, seepage into the underlying tuff beneath the canyon alluvium may be greater than normal in this area.

6. Page 14, Quality of Mortandad Canyon Alluvial Ground Water

Downward contaminant trends in Mortandad Canyon ground water.

See Comment 1.

APPENDIX E

7. Page E-1, Hydrologic Setting of Mortandad Canyon, first paragraph.

The canyon contains a shallow body of ground water recharged by industrial effluent and runoff. The spatial extent of this saturation is within the Laboratory boundaries, extending from near the plant outfall on the west to near observation well MCO-8 (Figure 3.0). Transverse to the canyon axis, the saturation does not extend to the canyon walls.

DOE OB recommends that LANL show all water-level data and measurement dates for all wells, including assumed dry wells. These data will better define the extent of saturation through time.

8. Page E-1, Hydrologic Setting of Mortandad Canyon, second paragraph.

Due to the small drainage area and the large volume of unsaturated alluvium there has been no continuous surface runoff through the canyon extending off the Laboratory since hydrologic observations began in 1960. The largest runoff events have extended no further than a hundred or so meters past the sediment traps.

- Numerous spills of highly contaminated liquid wastes and sludge have been documented into Ten Site canyon from 1952 through 1956 (RFI Work Plan for OU 1129, May 1992).

- Large volumes of minimally treated, radioactive liquid waste effluent, were routinely discharged into Ten Site Canyon prior to 1960 (RFI Work Plan for OU 1129, May 1992).

- DOE OB storm water data, collected on August 29, 1995, show elevated levels of gross alpha (100 pCi/L +/- 7.7) and gross beta (87 pCi/L +/- 12) at State road 4, nearly 2 miles south of LANL property. Screening Levels for gross alpha and beta are 5 pCi/L and 50 pCi/L respectively. The Livestock Watering standard for gross alpha is 15 pCi/L.

The DOE OB is concerned that large storm events prior to 1960 may have transported contaminants via surface-water past the LANL boundary and may be responsible for the elevated levels of radioisotopes detected in storm water at State road 4.

9. Page E-1, Hydrologic Setting of Mortandad Canyon, third paragraph, fourth sentence.

The stream flow in this section is perennial from waste water and periodic releases of industrial effluents.

The DOE OB questions whether stream flow in upper Mortandad Canyon is actually perennial based on recent observations. Between October 1, 1995 and September 30, 1996, 156 days of no-flow conditions were recorded at Gaging Station #08313200 which is located approximately 500 ft east of the TA-50 outfall (Shaull et al., 1996b).

10. Page E-1, Hydrologic Setting of Mortandad Canyon, fourth paragraph.

To prevent the transport of contaminants by storm runoff out of the lower canyon, three sediment traps have been constructed between MC0 - 7 and MCO - 7.5.

The referenced sediment traps probably act as ground-water recharge points, and may effect ground-water quality. LANL may want to implement some type of in-situ remedial system/barrier at the bottom of the traps (e.g., absorption liner).

11. Page E-2, Extent of Saturation in Mortandad Canyon, first paragraph.

The saturated canyon alluvium is of limited extent as the recharge (effluents, waste water, and storm runoff) is sufficient only to maintain a saturated zone in the alluvium extending about 2.2 mi downstream from the outfall location (about the edge of the conceptual illustration in Figure 3.0, near observation hole MCO-8).

- DOE OB recommends that LANL show all water-level data and measurement dates for all penetrations, including dry penetrations, in Mortandad Canyon.

- The lateral extent of saturation may extend to at least MCO-13. On February 11, 1996, DOE OB, along with an LANL ESH-18 escort, detected water in MCO-13 at approximately 105' below land surface and collected two liters of sample (no purging was conducted due to the lack of time). Field specific conductance was measured at 716 uS/cm, which closely matches that of shallow perched ground water. The remaining sample was sent to DOE OB's contract laboratory for the analysis of tritium, NO2/NO3 as N and ^{90}Sr. Preliminary results for NO2/NO3 as N and ^{90}Sr are 19 mg/L and 3.8±2.3 pCi/L respectively. These data suggest that saturation seasonally extends farther to the east than previously thought.

12. Page E-2, Extent of Saturation in Mortandad Canyon, second paragraph.

Test holes drilled or cored through the alluvium indicate that the underlying tuff, weathered to silts and clays immediately below the alluvium, is not saturated. The saturated portion of the alluvium is perched on the weathered-unweathered tuff. Moisture content generally declines to less than 50 percent of saturation conditions both transverse to canyon axis and at depth. Test holes completed in the weathered tuff below the saturated alluvium will not yield free water.

Saturation approaching 90% was encountered at the Tsankawi pumice and Cerro Toledo interval contact during the drilling of MCM-5.9, and it appears that other penetrations (SHB-4 and corehole 35-2028) in the same area may have encountered saturation or near saturation within these units. The DOE OB recommends that LANL characterize and monitor ground water (if present) within the Tsankawi Pumice Bed, the Cerro Toledo interval and the Guaje Pumice Bed.

If there are any questions concerning the review of these sections, please contact me at 672-0448 or Michael Dale at 672-0449.

Sincerely,

Steve Yanicak, LANL POC
Department of Energy Oversight Bureau

SY:mrd

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