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July 25, 2005

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JUL 2005
Hazardous
Bureau

Mr. David Cobrain
State of New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303

RE: Work Assignment No. 06110.270.0003; State of New Mexico Environment Department, Santa Fe, New Mexico; Los Alamos National Laboratory (LANL) Groundwater Background Investigation Report, June 2005, Task 3 Deliverable

Dear Mr. Cobrain,

This deliverable is for the above referenced work assignment, and addresses the technical review of the Los Alamos National Laboratory (LANL) Groundwater Background Investigation Report (Report), dated June 2003.

The document review indicated minor technical concerns, regarding Sections 3.0, 4.0, and 5.0 of the report. There were also concerns regarding several of the Figures contained in the report.

The document is formatted in Word. This deliverable was emailed to you on July 25, 2005 at Dave.Cobrain@state.nm.us. A formalized hard (paper) copy of this deliverable will be sent via mail. If you have any questions, please feel free to contact me at (303) 763-7188, or Jim Ashworth at (770) 752-7585.

Sincerely,

June K Dreith

June K. Dreith
Program Manager

Enclosure

cc: Jim Ashworth, TechLaw
Denver Files

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TASK 3 DELIVERABLE

LOS ALAMOS NATIONAL LABORATORY (LANL) GROUNDWATER BACKGROUND INVESTIGATION REPORT (DATED JUNE 2003)

Submitted by:

TechLaw, Inc.
560 Golden Ridge Road, Suite 130
Golden, CO 80401

Submitted to:

Mr. David Cobrain
State of New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East
Building 1
Santa Fe, New Mexico 87505

In response to:

Work Assignment No. 06110.270.0003

July 2005

Los Alamos National Laboratory
Los Alamos, New Mexico

Technical Review of
Groundwater Background Investigation Report
June 2005

The following comments were generated from a technical review of the Los Alamos National Laboratory (LANL) *Groundwater Background Investigation Report* (Report), dated June 2005.

3.0 SCOPE OF ACTIVITIES AND METHODS
3.1.5 Decision Rules (pages 18 through 19)

1. The second step of data assessment includes determination of any outliers within a statistical population. An "outlier" datum point, however, is not necessarily invalid and may be a replicable value within the groundwater sample. An "outlier" may also be influenced by sampling and analytical techniques, as well as analytical methodology. Clarify the use of the term "outliers" and provide the definition used in the context of the data assessment to establish the parameter(s) for declaring a datum point as an outlier.

4.0 RESULTS
4.2.1.2.4 Evaluation of Analytes (pages 33 through 36)

2. Aluminum - The Report states that the volcanic rock aquifer appears to have locations with the highest and most variable aluminum concentrations. However, Figure C-4 and the aluminum mean concentrations reported in Tables 4.2-2e, 4.2-3e, and 4.2-4e indicate that the highest and most variable aluminum concentrations were detected in the alluvial aquifer, followed by the volcanic and regional aquifers. The Report text should be revised to clarify which aquifer had the highest aluminum concentrations.

3. Chromium - The Report states that little difference in chromium concentrations occur by aquifer type in the study area. Although not substantial, Report Tables 4.2-2e, 4.2-3e, and 4.2-4e indicate that the mean chromium concentration in the regional aquifer was greater than the mean concentrations in the alluvial and volcanic aquifers (by about four times). The Report text should be revised to clarify these variations.

4. Chromium and Nickel - The Report indicates that the filtered sample concentrations for chromium and nickel were actually higher than the non-filtered concentrations. It is not clear why this is the case - the Report only states that the filtered sample results are "anomalous." Revise the Report text to indicate whether it is believed that these anomalies are due to laboratory error, error introduced during the sample handling or filtering activities, or from other potential interferences.

5. Iron - The Report indicates that the iron sample results for most locations are variable. While this statement is true, there is also a progressive increase in the mean iron

concentrations from the regional aquifer to the volcanic and alluvial aquifers (refer to Report Tables 4.2-2e, 4.2-3e, and 4.2-4e). The Report text should be revised to discuss this trend.

6. Strontium - An inspection of Report Tables 4.2-2e, 4.2-3e, and 4.2-4e indicates that the mean strontium concentration in the regional aquifer is about two and one-half times greater than the mean concentrations in the alluvial and volcanic aquifers. The Report text should be revised to discuss these aquifer concentration variations.

7. Zinc - The Report states that zinc concentrations differ more by location than by aquifer type. While this may be true, there is also a noticeable trend with regard to aquifer types. Report Tables 4.2-2e, 4.2-3e, and 4.2-4e indicate that the mean zinc concentration in the regional aquifer is over twice as large as the mean concentrations in the alluvial and volcanic aquifers. Revise the Report text to clarify this issue.

8. Dissolved organic carbon - The Report states that DOC concentrations were greatest for the volcanic rock aquifer locations. However, Report Tables 4.2-2e, 4.2-3e, and 4.2-4e indicate that the mean DOC concentration was highest in the alluvial aquifer. Revise the text to correct this discrepancy.

9. Fluoride - The Report states that fluoride concentrations varied with aquifer type. Report Tables 4.2-2e, 4.2-3e, and 4.2-4e indicate that the mean concentration in the regional aquifer was about four times greater than the concentration in the alluvial and volcanic aquifers. Revise the text to reflect this trend.

10. Nitrate - The Report states that the concentrations of nitrate varied by location but did not vary significantly by aquifer type. However, Report Figure C-36 suggests that the alluvial aquifer concentrations were much lower than the concentrations in the volcanic and regional aquifers. Revise the text to clarify this discrepancy.

11. Isotopic uranium - An inspection of Report Figures C-48 and C-50 reveals that the concentrations of U-234 and U-238 were much higher at La Mesita Spring than at the other sample locations. Revise the Report text to discuss the reasons for the elevated U concentrations at the spring.

5.0 SUMMARY AND CONCLUSIONS

5.2 Geochemical Variations within Groundwater Types (page 45)

12. The third bullet on page 45 states "concentrations of calcium, *magnesium*, sodium, and *potassium* are the lowest within the alluvial groundwater and highest in the regional aquifer" (italics added). However, this statement contradicts the text in Section 4.2.1.2.4. The Report states on page 34 that "magnesium shows little variation by sample locations", and in the section on potassium on page 35 that "no notable differences occur between aquifer types." Given these statements, it is not clear how the Report concludes in Section 5.2 that these two constituents are highest in the regional aquifer. The Report should be revised to clarify these apparent discrepancies.

FIGURES

13. The narrative text for Figure 2.1-1 states, "Regional and tectonic setting of the Jemez Mountains, Valles Caldera, and Pajarito Plateau in relation to the Rio Grande Rift, Española Basin, Colorado Plateau, and the Sangre de Cristo Mountains, New Mexico." The figure, however, does not identify the location of the Rio Grande Rift and the Colorado Plateau. In addition, the volcanic rocks of the Jemez Mountains are mapped according to three general rock types, but they are not identified in the legend. A fourth lithology is illustrated for the Chino Mesa and La Mesita area, but it is not depicted in the legend for the figure. Revise Figure 2.1-1 to identify the locations of the Colorado Plateau and the Rio Grande Rift, as well as the four lithologies illustrated on the figure. It may also be appropriate to revise the text to state, "the Española Basin segment of the Rio Grande Rift."

14. A map illustrating the location of a cross-section is typically provided, either as an inset to a cross-section or as a separate figure. The cross-section in Figure 2.1-2, however, does not reference or include a map to clearly indicate its location. Provide a map that clearly presents the location of the cross-section in Figure 2.1-2.

15. Figure 2.1-3 presents a simplified regional map, which uses several acronyms (including CCFZ, EFZ, NFZ, PFZ, PPFZ, and VC) that are not explained on the figure or in the glossary for the report. Clarify the intended meanings of the acronyms in Figure 2.1-3.

16. Figure 2.1-6 illustrates a depression in the potentiometric surface at an elevation of 5700 feet. The depression is shown on the figure as located approximately two miles north-northwest of White Rock. Another 5700-foot elevation contour is shown down-gradient of the depression. There are no groundwater elevation data presented on the figure between the two contours at 5700 feet. As such, there is no reason to present two 5700-foot contours, and the potentiometric surface may be simplified by illustrating a 5700-foot elevation contour that parallels the 5750-foot elevation contour. Verify whether additional elevation data were used in developing the potentiometric surface map in the area of the depression and, if so, provide the elevation values on the figure. If no additional data were used, then consider whether the depression in the potentiometric surface is supported. Redraw the potentiometric surface elevation contour(s) in the area of the depression as appropriate.