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TECHLAW INC.

August 25, 2003

Mr. David Cobrain
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2905 Rodeo Park Drive East
Building One
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Reference: Work Assignment No. 06110.130.0001; State of New Mexico Environment Department, Santa Fe, New Mexico; Human Health and Ecological Risk Assessment Support; Review of the Human Health and Ecological Risk Assessment Screening Level Evaluation for Interim Action Completion Report for Solid Waste Management Unit 21-024(i) at Technical Area 21, Task 1 Deliverable.

Dear Mr. Cobrain:

Enclosed please find the deliverable for the above-referenced work assignment. The deliverable consists of risk assessment review comments on Los Alamos National Laboratory's (LANL) "Interim Action Completion Report for Solid Waste Management Unit [SWMU] 21-024(i) at Technical Area 21 [TA-21]" dated March 2003. The review also consisted of ensuring that the ecological risk assessment was conducted in accordance with the Record of Communication (ROC) dated August 19, 2002.

In general, the report was highly inadequate and lack sufficient detail to determine how both human health and ecological risks were derived and whether the estimated risks are acceptable. However, in accordance with the ROC, 95 % upper confidence limits (UCLs) were used in the risk assessment in determination of hazard quotients and hazard indices.

The background values for inorganics and radionuclides could not be cross-referenced, as the associated documents were not included for review as part of this task. For this review, it was assumed that the New Mexico Environment Department (NMED) has

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reviewed and accepted these background values. Therefore, while one comment requesting clarification of the background values was made, no comments were made concerning the actual background values applied in the identification of chemicals of potential concern (COPCs).

The screening action levels (SALs) applied for the human health risk assessments were derived outside of the report. The report did not provide any discussion as to how these values were determined, other than that they were developed in accordance with the Installation Work Plan (IWP) and NMED guidance. As the referenced documents were not included in the scope of work for this review, it was assumed that NMED has previously reviewed and accepted the SALs as derived in the referenced LANL documents.

The Executive Summary states that LANL would like to propose the site for No Further Action (NFA). However, this would apply to clean closure under a residential setting and would require that all potential (future) exposure pathways were evaluated in the risk assessment. As noted in the August 18, 2002 Environmental Restoration Project Communication Record, the current subsurface levels of tritium do not meet the residential scenario requirements, if it is assumed that a house with a basement is constructed on the site. As the site is intended to be restricted to industrial use, this would mean that deed restrictions or other institutional controls would be requied. It does not appear that LANL has met all the requirements for NFA. Under the current conditions, a restricted release (industrial closure) seems reasonable. As tritium decays (half-life of 12.3 years), the site could be re-investigated in the future and evaluated against all residential scenarios. A limited restricted release (dependent on the decay of tritium to acceptable levels) may also be a possibility.

The document is formatted in Word. The deliverable was emailed to you on August 25, 2003 at David_Cobrain@nmenv.state.nm.us. A formalized hard (paper) copy of this deliverable will be sent via mail. If you have any questions, please call me at (303) 763-7188 or Ms. Paige Walton at (801) 451-2978.

Sincerely,

June K. Dreith

June K. Dreith
Program Manager

Enclosure
cc: Mr. John Kieling, NMED
Ms. Vickie Maranville, NMED
Ms. Paige Walton, TechLaw

TASK 1 DELIVERABLE

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT REVIEW COMMENTS ON THE INTERIM ACTION COMPLETION REPORT FOR SOLID WASTE MANAGEMENT UNIT 21-024(I) AT TECHNICAL AREA 21, LOS ALAMOS NATIONAL LABORATORY MARCH 2003

Human Health and Ecological Risk Assessment Support

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Submitted to:

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In response to:

Work Assignment No. 06110.130

August 25, 2003

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT REVIEW COMMENTS ON THE INTERIM ACTION COMPLETION REPORT FOR SOLID WASTE MANAGEMENT UNIT 21-024(I) AT TECHNICAL AREA 21, LOS ALAMOS NATIONAL LABORATORY MARCH 2003

General Comments

1. For radiological soil samples, moisture data is required to convert analytical units of pico Curies per milliliter (pCi/mL) to pico Curies per gram (pCi/g). This conversion is necessary, as the screening action levels (SALs) are in units of pCi/g. However, moisture data was not collected during any of the sampling activities (1988 to 1992). As such, an estimated value of ten-percent moisture was used to convert from pCi/mL to pCi/g. Discuss the range of moisture levels for similar media (till, soil, and tuff) at Los Alamos National Laboratory (LANL) and what rationale was applied in deriving a value of ten-percent. Also, provide a sensitivity analysis of the possible range of percent moisture in the three different media (till, soil, and tuff) to site data and the SALs. Discuss the uncertainties associated with the use of a value of ten-percent moisture and the potential for over- or under-estimation of potential risks.

   In contradiction to the above, the report stated that sufficient information was not available to convert site tritium data to units of pCi/g for comparison to LANL background data. It is not clear why the assumption of 10-percent moisture was deemed adequate for comparing site data to the tritium SAL but not to background. Provide justification for this discrepancy.

2. Laboratory background values were used to identify inorganic and radiological constituents that may be present at elevated levels. Sampling results are provided for three media: till, soil, and tuff. However, it is not clear whether the background values are also representative of these three media. While it can be inferred from some of the tables that there is a unique background value for till, soil, and tuff, the report should provide a clear and concise discussion of the background data used and whether till-, soil- and tuff-specific background values were used.

3. For several constituents, site data indicated slightly elevated levels from background. Justification was typically provided indicating that the chemicals in soil (including till, soil, and/or tuff) could not be the result of leaks in the septic system, as the integrity of the system had not been compromised, but rather represent variation in background (radionuclides in particular). All constituents with maximum detections greater than background should be retained for additional analysis. It is suggested that a statistical comparison (e.g., using the Wilcoxon Rank Sum test) of the data distributions (background to site) be conducted to determine whether the actual site distributions of site data are significantly greater than background for these chemicals in question (e.g., chromium and nickel). Data distributions not significantly different from background could then be eliminated from additional consideration. Note that

this only applies to inorganics and radionuclides and with sufficient number of samples in both the site and background data sets.

4. For noncarcinogens, the exposure point concentrations (EPCs) were compared to the SAL and to one-tenth the SAL (0.1 SAL). It is not clear why a comparison to 0.1 SAL was conducted and what methodology or justification was applied. Overall noncarcinogenic risks are determined through an evaluation of hazard quotients and the hazard index or indices. Clarify the intent of the comparison of EPC to 0.1 SAL.

5. The ecological risk assessment provides only a limited amount of information. An ecological risk assessment should include a detailed discussion of the following:

   - Problem formulation and conceptual model;
   - Selection and definition of assessment endpoints;
   - Selection of receptor species;
   - Selection of measures of effects;
   - Exposure pathways;
   - Risk estimation and description; and
   - Uncertainties.

   The assessment as included in the report does not address the above criteria and should be revised to provide a detailed discussion of each of the above. For example, the report does not discuss how the receptors species were identified; nor does the report discuss the potential exposure pathways for each of the receptors. A discussion of the ecological screening levels (ESLs) and the derivation of them (other than a reference to ECORisk 1.5) should be included. In addition, it should be clear what methodology and assumptions were applied for the initial and final screening analyses. Revise the report accordingly.

6. The human health risk assessment calculations as provided in Appendix F are grossly inadequate. The report does not discuss the derivation of the SALs, including the exposure pathways used to develop the values, exposure parameters, and all assumptions. In addition, while a hazard quotient (HQ) is estimated, it is not known what assumptions were used in its derivation. Appendix F does not address whether the SAL is residential or industrial based. Revise the report to include a detailed discussion as to how the human health risk assessment was conducted. Also include details as to the derivation of the SALs. In addition, for the radiological risks, it is not apparent which pathways were included in the derivation of the SALs and whether to SALs account for someone building a house on the site. It is not clear that a dose assessment, using for example RESRAD or RESRAD-Build, is not necessary in addition to comparison to the SALs. At this time, the information provided in the report is so limited, that an assessment concerning risks as presented cannot be made at this time.

7. While no significant problems associated with the determination of exposure point concentrations (Appendix E) were noted, the document "Calculating Upper

Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites" (OSWER 9285.6-10, December 2002) should be consulted for future reports. No response to this comment is required.

Specific Comments

1. Section 2.2.2, Operational History, page 4. Part of the inlet was removed for construction of Building 21-209; however, only the section of line that was in the footprint of the building was removed. Discuss whether any soil samples from the removed inlet line pathway were collected to determine whether there had been any leaks in the piping. If samples were taken, discuss the analytical results and the potential for subsurface contamination beneath Building 21-209. Also, discuss whether the inlet line contained any visible debris/sludge and if so were any samples taken of this material. Also discuss whether the inlet line that was to remain in place was capped or left open.

2. Section 2.3.1.1, 1988 Reconnaissance Sampling, page 5. The text states that although several constituents exceeded their respective Laboratory (LANL) background levels, only arsenic was detected above its SAL. It should be noted that the comparison to SALs on an individual basis has little meaning, as this does not consider cumulative risks. The cumulative risks for all constituents assumed to be statistically above background levels must taken into consideration when determining whether a site meets the criterion for risk-based closure. Comparison to SALs on an individual basis is helpful for determining whether there are any hot spots and for deciding whether the full nature and extent of contamination has been adequately defined. Clarify the intent of the individual comparison of site levels to SALs.

3. Section 2.3.1.2, Phase I RFI [Resource Conservation and Recovery Act (RCRA) Facility Investigation], page 7. In 1993, a radiation survey was conducted in and around the drainage channel of Areas 2 and 3. The results of the survey indicated that elevated levels of alpha-emitting radionuclides were present in the drainage channel down gradient of the outfall. Discuss what criteria were used to determine whether the survey readings were elevated. Also provide a discussion of background measurements for each of the instruments used in this survey.

4. Table 2.3-1, Analytical Results of Detected Radionuclides above Background for Phase I RFI Samples from SWMU [solid waste management unit] 21-024(i), page 10. The table presents data that are above background levels. As noted in the footnote, a "-" indicates that results were below background. However, the table lists some results for Americium-241 (Am-241, 0.009 pCi/g), Plutonium-238 (Pu-238, 0.008 pCi/g), and Strontium-90 (Sr-90, 0.23 pCi/g), which are below background. Discuss the inclusion of these data.

5. Section 2.3.1.3, 1997 Phase II RFI, page 11. The text states that the septic tank contained potentially hazardous and toxic chemicals. While Appendix D does

contain the analytical results of the sampling event, the text should contain a discussion of what "potentially hazardous and toxic chemicals" were present in the tank. Revise the text to expand upon what constituents were present in the tank and provide a table (within this section of the report) listing all the constituents.

6. Section 2.3.1.3, 1997 Phase II RFI, page 11. Samples 21-05511 through 21-05514 were only analyzed for target analyte list (TAL) metals. Discuss why these samples were subject to only metals analyses.

7. Section 2.3.1.4, 1988 Interim Action, page 13. The text states that the septic tank contained hazardous chemicals. The text should contain a discussion of what "hazardous chemicals" were present in the tank. Revise the text to expand upon what constituents were present in the tank and provide a table (within this section of the report) listing each constituent.

8. Section 2.3.1.4, 1988 Interim Action, page 13. The text indicates that 20 to 30 feet of the inlet line was removed as part of the 1988 interim actions. Section 2.2.2 of the report states that a section of the inlet line was removed prior to construction of Building 21-209. Clarify whether the 20 to 30 feet of inlet line removed during 1988 was the remaining portion of the line or whether there is still a section(s) of the inlet line in the ground.

9. Section 2.3.1.4, 1988 Interim Action, page 13. The removal action in Area 2 included removing lifts of soil and then conducting a survey of the soil using a sodium iodide (NaI) 2-x2-inch detector. The background measurements used for comparison were 2650 to 3389 counts per minute (cpm). Clarify whether the background readings were taken using the same detector used for the site readings and whether these readings were taken on the same day as the other survey readings. In addition, as soil was removed, a survey was taken of the remaining lift. With each layer of soil removed, the geometry of the area changes. As a result, the NaI will pick up more scatter from the sides of the wall with increasing depth. This would result in higher instrument readings compared to similar readings taken from a flat surface. Discuss whether any adjustments to the readings were done to account for geometry. Note that not accounted for changes in geometry would be considered conservative.

10. Section 2.3.2.1, Subsurface Releases, page 15. While it agreed that migration of contaminants to the deep aquifer is unlikely, an assessment of maximum site concentrations to SALs for migration to groundwater based upon a dilution attenuation factor (DAF) of 20 should be conducted to confirm this assumption. Revise the report to include comparison to SALs based on a DAF of 20 in the risk assessment. A summary of the results should be included in this section of the report.

11. Section 2.3.2.2, Surface Releases, page 15. The first sentence lists the potential exposure pathways for humans. The second sentence lists additional exposure pathways for ecological receptors. It is not clear whether the exposure pathways listed for humans also apply to ecological receptors. The text should be revised to

clearly indicate all of the potential exposure pathways for both human and ecological receptors. For example, ecological exposure may occur through direct ingestion of soil, ingestion of other animals/invertebrates, ingestion of plants, and root uptake and leaf absorption by plants. Clarify the text.

12. 2.4.2, SWMU Data Review, page 25. The first sentence indicates that all samples not located within the excavated area were used to identify chemicals of potential concern (COPCs). It is assumed that the samples located in the excavated area refer to samples of soil that has been removed as part of remedial activities; however, it is not clear if this is a correct assumption. Clarify what is meant by "excavated area".

13. Section 2.4.2.1, Comparison of Inorganic Chemicals with Background Values, page 25. Inorganic COPCs were identified for fill, soil, and tuff. However, up until this point in the report, samples have only been discussed in relation to depth of sample and not in relation to the type of material. Provide the criteria used to identify fill, soil, and tuff, and specifically the difference between fill and soil.

14. Section 2.4.2.2, Comparison of Radionuclides with Background/Fallout Values, page 45. Table 2.4-1 presents the summary of samples included in the data review and screening assessments. However, Cesium-137 (Cs-137) is not listed in this table nor discussed in this section. Cs-137 is included as a radiological COPC in Appendix F (Table 2.0-3). Clarify why Cs-137 is not listed on Table 2.4-1.

15. Section 2.4.2.3, Evaluation of Organic Chemicals, page 51. Several organics were eliminated from further consideration based on infrequency of detections. The text also indicates that it does not appear that these constituents were associated with releases from the septic system. Clarify whether site history indicates the use of these constituents in any of the buildings that used the septic system. A comparison of the maximum detected concentration (from Table 2.4-6) to associated SALs indicated that all of the maximum concentrations were well below the SALs and would most likely not contribute significantly to overall risks. However, if site history indicates that these constituents were used, then it is plausible to assume that they may be present due to site activities and that sampling locations did not coincide with contamination and should be included in the risk assessment. Revise accordingly.

16. Section 2.4.3.1, Nature and Extent of Contamination, page 70. The first paragraph states that "several inorganic COPCs detected in Qbt3 samples from Area 2 exceeded Qbt3 BVs [background values] but were within range of background for soils." The comparison of tuff samples to background values for soil is inappropriate and not applicable. Any conclusions concerning COPCs in tuff (Qbt3) can only be drawn through comparison of the Qbt3 background values. Remove all comparisons of site data to inappropriate background data.

17. Section 2.4.3.1, Nature and Extent of Contamination, page 70. The fourth paragraph indicates that tritium and Cs-137 detected at depths of greater than 0.5 feet could be due to atmospheric fallout. This is extremely unlikely, especially given the arid

climate and lack of soil disturbance. In addition, the report bases many assumptions on the fact that due to climate and soil type, vertical migration of chemicals in soil is greatly retarded. Detections of non-naturally occurring radionuclides (NORM) at depths below surface (0.5 feet) should be considered present due to site activities. Revise the report accordingly. Data for the uranium isotopes should be compared to LANL background data.

18. Section 2.5.1.1, Human Health, page 74. Table 2.5-1 lists the comparison of noncarcinogenic COPCs to SALs while Table 2.5-2 lists the comparison of carcinogenic COPCs to SALs. Arochlor-1254 is listed in Table 2.5-2 as it is a carcinogen; however, Arochlor-1254 also has noncarcinogenic effects (refer to EPA Integrated Risk Information System (IRIS) database for current oral reference dose). As such, Arochlor-1254 should also be evaluated in Table 2.5-1. Revise Table 2.5-1 to include an evaluation of the noncarcinogenic effects of Arochlor-1254.

19. Section 2.5.1.1.b, Human Health– Screening Evaluation, page 74. The evaluation of carcinogenic COPCs (Table 2.5-2) does not address the metals toxicity due to radionuclides. While the radionuclides have associated doses associated with exposure, they are also heavy metals, which exhibit carcinogenic effects, especially thorium and uranium. As such, the toxicity from exposure to the radionuclides must be evaluated and included in the cumulative cancer risk. Revise Table 2.5-2 to address the toxicity to the radionuclides.

20. Section 2.5.1.1.b, Human Health – Screening Evaluation, page 76. The total estimated radiological dose is approximately 20 millirem per year (mrem/yr), which is greater that the allowable dose for free release (15 mrem/yr). The allowable dose of 15 mrem/yr is that allowed above the natural background dose (23 mrem/yr for LANL). The fact that the estimated dose of 20 mrem/yr is similar to the background dose is irrelevant. The Department of Energy (DOE) Order 5400.5 clearly states that the 15 mrem/yr is above background, not compared to background. Therefore, the dose from the site exceeds the DOE target dose limit requirement and does <u>not</u> meet the requirements for free release. Revise the report accordingly.

21. Section 2.5.1.1.c, Human Health – Data Evaluation and COPC Identification Process, page 76. The last two paragraphs (radionuclides and arsenic) of this subsection discuss the similarity between site concentrations and background. However, no discussion as to uncertainties (i.e., over- or under-estimation of overall risk) has been provided. These paragraphs are simply summaries and do not address uncertainties. Clarify the uncertainties associated with the EPCs for radionuclides and arsenic.

22. Section 2.5.1.1.c, Human Health – Exposure Pathway Assumptions, page 77. The text states that, "exposure pathways at this SWMU are likely incomplete unless the site is excavated." The text further indicates that the industrial land use for the site prevents this from occurring. Under both an industrial and residential scenario, exposure to surface soil is a complete exposure pathway. Exposure to subsurface soil through excavation or utility work is a plausible scenario for the industrial scenario.

The statement in the text infers that all exposure pathways are not plausible. This has not been adequately justified and should be removed from the uncertainty discussion.

23. Section 2.5.1.1.c, Human Health – Additive Approach, page 77. The paragraph indicates that there is a potential for occurrence of noncarcinogenic effects being overestimated for chemicals that act by different mechanisms and on different target organs that are addressed additively. This is true, however, this only represents the initial screening step for noncarcinogens. The first step in a risk assessment is to assume all noncarcinogenic HQs are additive. This is a conservative step, however, if the resulting hazard index (HI) is less than one, it can be safely assumed there are no unacceptable hazards. If the overall HI is greater than one, then only chemicals with like target organs and similar effects are grouped together to generate a target organ-specific HI. The text should be revised for completeness.

24. Section 2.5.1.1.d, Interpretation, page 78. The text indicates that the radiological dose above background is 3.4 mrem/yr. However, Section 2.5.1.1.b, Human Health – Screening Evaluation, page 76 states that the dose is 20 mrem/yr. Clarify the actual radiological dose due to site constituents. In addition, clarify whether this dose includes the dose associated with subsurface soil and tritium.

25. Section 2.5.1.2, Ecological, page 79. Discuss why Cs-137 was not included as a COPC for the ecological risk assessment.

26. Section 2.5.1.2.b, Ecological – Screening Evaluation, page 79. If a HQ was greater than 0.3 for a given chemical during the initial screen, that chemical was retained for additional analysis. However, the report does not discuss what the methodology(s) to be used for additional analyses. Revise the report to discuss the methodology that will be employed for conducting a Tier 2 analysis for chemicals with HQs exceeding 0.3. This should include a detailed discussion of the initial screening (summarized in Table 2.5-4 and the final screening summarized in Table 2.5-5), including how the criterion of 0.3 HQ was determined. Also include a discussion of the identification of receptors and receptor-specific data used in the Tier 2 assessment.

27. Section 2.5.1.2.b, Ecological – Screening Evaluation, page 80. Table 2.5-4, Final ESL Comparison, lists the final ESL that is to be used to estimate HQs. However, the report does not discuss how the final ESL was derived. For example, was the most conservative ESL for all receptors as listed in ECORisk used as the final ESL? Provide a discussion as to how the final ESL was derived.

28. Section 2.5.1.2.c, Ecological – Uncertainty Analysis, page 83. For chemicals with a HQ greater than 0.3, adjustments, using an area use factor (AUF), to the HQ is discussed. Typically the screening EPC for a given receptor species is estimated by the following: $EPC_{screening}$ = (EPC x ingestion rate x AUF)/body weight. Applying the AUF and not the ingestion rate or body weight is acceptable. However, the report should be revised to include a clear discussion of the methodology behind using the AUF, definition of an AUF, and specifically how the AUF is applied to the HQ.

Provide a table summarizing the AUF by receptor species. In addition, a table summarizing the HQs and final HIs adjusted using the AUF should be included in the report.

29. Section 2.5.1.2.c, Ecological – Uncertainty Analysis, page 83. The discussion of individual chemicals includes a reference to the fact that if the ESL is less than background, then that ESL is not appropriate for use. Revise the report to provide justification for this method. It is suggested that a reference for this assumption also be provided (e.g., Efroymson *et. al* 1997).

30. Appendix F, Table 4.0-1. The last two columns on the right denoted a HI for Areas 1 and 2 and an HI for Area 3. However, as the estimation is based on a single chemical, it appears that these columns should be labeled as HQs, not HIs. Revise accordingly.