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November 14, 2003

Ms. Sandra Martin
State of New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East
Building One
Santa Fe, New Mexico 87505-6303

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 Assessments for the Phase III RFI Report for Solid Waste Management Unit (SWMU) 16-021(c)-99, Task 1 Deliverable.

Dear Ms. Martin:

Enclosed please find the deliverable for the above-referenced work assignment. The deliverable consists of risk and ecological assessment review comments on Los Alamos National Laboratory's (LANL) "Phase III RFI [Resource Conservation and Recovery Act Facility Investigation] Report for Solid Waste Management Unit [SWMU] 16-021(c)-99" dated September 2003.

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

The estimates for airborne concentrations were based upon a LANL-derived particulate emission factor (PEF). The text indicated that the default PEF that was applied in the Phase II RFI report was applied in this risk assessment. It was assumed that NMED has previously reviewed and approved the derivation and input parameters used to develop the PEF as part of NMED's review of the Phase II RFI. No comments were drafted

concerning the derivation of the PEF.

The list of surrogates, provided by the Superfund Technical Support Center (email dated 10/1/03), were also reviewed. TechLaw concurs that the proposed surrogates as suggested by the State are acceptable for use. For acenaphthylene and phenathrene, we have commonly seen pyrene applied as a surrogate compound, and for endosulfan sulfate, typically toxicity data for endosulfan is applied.

The report (Section 6.2.1) indicates that the approach for the ecological risk assessment was developed in partnership between NMED and the Department of Energy, thorough the High Performing Team. While comments were generated, NMED should review the overall approach to ensure that it followed any agreements made as a result of this partnership.

Given the extent of the comments, it is anticipated that the risk assessment will need to be re-done. It is also anticipated that a review of the revised risk assessment will need to be conducted and that additional comments may be generated as a result of this review. At this time, TechLaw does not want to anticipate potential corrective measures, however, it does appear that remediation will be required. It is likely that removal of canyon sediments could be a selected remedy, as noted in the email from Ralph Ford-Schmid (dated 10/10/03); however, evaluation of the risk reduction strategy should be based upon the finalized risk assessment results and is expected to be addressed in the following Corrective Measures Study.

The document is formatted in Word. The deliverable was emailed on November 12, 2003 to Sandra_Martin@nmenv.state.nm.us and to Ms. Darlene Goering at Darlene_Goering@nmenv.state.nm.us of your staff. 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. Dave Cobrain, NMED
Mr. John Kieling, NMED
Ms. Darlene Goering, NMED
Ms. Paige Walton, TechLaw

TASK 1 DELIVERABLE

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT REVIEW COMMENTS ON THE PHASE III RFI REPORT FOR SOLID WASTE MANAGEMENT UNIT (SWMU) 16-021(C)-99, LOS ALAMOS NATIONAL LABORATORY SEPTEMBER 2003

Human Health and Ecological Risk Assessment Support

Submitted by:

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Submitted to:

Mr. David Cobrain
State of New Mexico Environment Department
Hazardous Waste Bureau
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Santa Fe, New Mexico 87505

In response to:

Work Assignment No. 06110.130

November 14, 2003

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT REVIEW COMMENTS ON THE PHASE III RFI REPORT FOR SOLID WASTE MANAGEMENT UNIT (SWMU) 16-021(C)-99, LOS ALAMOS NATIONAL LABORATORY SEPTEMBER 2003

General Comments

1. One of the goals of a Resource Conservation and Recovery Act (RCRA) Facility Investigation Report (RFI) is to delineate the nature and extent of contamination. The discussions provided in Section 5.2, Phase III Conceptual Model, indicate that there has been significant Cañon de Valle and Martin Spring downstream sediment transport, with primary concern being high concentrations of barium. However, the report does not appear to provide any data to show downstream impact by the transport and migration of barium. It appears that additional data may be needed in order to fully assess the downstream impacts, and thus subsequent risks to ecological receptors, downstream of Cañon de Valle and Martin Spring. Address the potential data gap and discuss the extent of the barium contamination as a result of the downstream redistribution.

2. Laboratory background values were used to identify inorganic 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. It is unclear whether 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. The terms sediment and soil are used interchangeably throughout the risk assessment. In some cases, the soil, till, and tuff are referred to as sediment, but in other instances, sediment refers to sediment associated with surface water bodies. It is suggested that a clear delineation between soil and sediment be maintained throughout the report.

4. Chromium was evaluated in the risk assessment as trivalent chrome. However, the report did not provide a discussion as to whether any differentiation between hexavalent and trivalent chrome was conducted. Assuming that all the chrome is in the form of trivalent chrome is not conservative and most likely underestimates the risk. In natural conditions, chrome is present as a ratio of trivalent to hexavalent chrome of 1:6. Unless analytical evidence, adequate justification, and/or a site-specific chrome ratio is provided demonstrating that all chrome detected at the site is trivalent chrome, then chromium should be evaluated as total chromium, and an appropriate ratio of trivalent to hexavalent chromium be applied. Revise the report accordingly.

5. The Executive Summary of the report indicates that there are no radionuclides of concern at the site. However, the risk assessment includes several radionuclides in its analyses. The Executive Summary and discussion of the nature and extent of contamination must be revised to address the potential radiological constituents of concern.

6. The ecological risk assessment should contain a table that clearly indicates what values were applied from the EcoRisk database, each toxicity reference value for each receptor species, and the concentrations used to obtain the hazard quotients for species. Neither Appendix L nor its attachments contain tables, which delineate this information. Revise the report accordingly.

Specific Comments

1. Section 1.5, COPC Screening Methodology for Human Health Risk Assessment, page 1-17. The last sentence of the second paragraph states that essential nutrients (i.e., calcium, sodium, magnesium, potassium, and iron) were eliminated from the human health risk assessment. While studies have indicated that calcium, sodium, and potassium are relatively non-toxic, studies have shown there to be an upper intake limit for iron and magnesium. The United States Department of Agriculture (USDA) Food Safety and Inspection Service and the National Academy of Science (NAS) Food and Nutrition Board have developed upper intake levels (ULs) which should applied in determining a soil screening level (SSL) that should be used in assessing essential nutrients toxicity. If site concentrations of magnesium and iron are below the SSL, they may be eliminated from further consideration in the risk assessment. Revise the report accordingly.

2. Figure 1.5-2, COPC Screening Methodology for water, page 1-20 and Section 1.5.3, Comparison to Regulatory Standards (Water Only) page 1-21. The flow diagram and the text indicate that New Mexico Water Quality Control Commission (NMWQCC) standards and/or Federal maximum contaminant level (MCLs) will be used as the primary screening values to determine whether a chemical should be carried forward in the risk assessment. However, the NMWQCC standards and MCLs are not solely risk-based numbers, but also incorporate technology limitations, and as such comparison of site data to these numbers will not provide an indication of whether there is acceptable risk. The use of these values may be helpful as a tool if no risk-based screening numbers are available or for assessing remediation alternatives, but should not be used to select chemicals of potential concern (COPCs) for use in a baseline risk assessment. Rather, the selection of COPCs for water should primarily be based upon comparison to the residential tap water screening levels (either Region 6 or Region 9), as noted on the left site of the flow diagram. If there are no tap water screening levels available, and toxicological data are not available to support the derivation of the tap water screening values, then the NMWQCC and/or MCL may be appropriate for use. Revise the diagram and the selection of COPCs accordingly.

3. Table 3.4-2, Screening of Inorganic Chemicals Detected in Cañon de Valle Surface Water Samples, page 3-30. The table provides a column for Environmental Protection Agency (EPA) EPA Region 6 tap water preliminary remediation goals (PRGs); however, for most chemicals, Region 6 PRGs were deemed "not applicable". It appears that the PRGs were only presented on the table if the NMWQCC and/or MCLs were not available. As noted in a previous comment related to Section 1.5, the PRGs should be the primary screening level used in determining COPCs for use in a risk assessment. Thus, the Region 6 tap water PRGs should be listed in the table. According to the protocol outlined in Section 1.5 of the report, if Region 6 PRGs are not available, Region 9 tap water PRGs would be used. It is noted that for arsenic (both maximum detected and maximum undetected values) and the maximum detected iron, were eliminated from further evaluation based upon the comparison to the MCL; however, the reported chemical concentrations were above the Region 9 tap water PRGs. Therefore, arsenic and iron should have been retained as a COPC. Revise the table to include all available Region 6 tap PRGs and Region 9 tap water PRGs for those chemicals without an associated Region 6 value and modify the list of COPCs and risk calculations accordingly.

4. Table 3.4-5, Screening of Organic Chemicals Detected in Cañon de Valle Surface Water Samples, page 3-35. Similar to the above comment, Region 6 tap water PRGs were for the most part not provided and Region 9 tap water PRGs were not included in the table for those chemicals without an associated Region 6 tap water PRG. The maximum undetected values of naphthalene, tetrachloroethene and trichloroethene exceeded their respective Region 9 tap water PRGs. While tetrachloroethene and trichloroethene were retained for further analysis, naphthalene was eliminated from consideration. Even though the justification for eliminating naphthalene was due to infrequent detections, the fact that naphthalene was detected above acceptable risk levels and that other PAHs have been selected as COPCs in other media is sufficient justification to retain naphthalene for additional analysis. Additionally, consistent methodology should be followed; other infrequently detected constituents exceeding screening limits were retained as COPCs (i.e., methylene chloride and nitroglycerine). Revise the table to include all Region 6 tap water PRGs, and Region 9 tap water PRGs for those chemicals without an associated Region 6 value, and modify the list of COPCs and risk calculations accordingly.

5. Section 6.2.1.1, Scoping, Screening and Problem Formulation, page 6-10. The text indicates that the ecological risk screening methodology was based upon the EcoRisk Database, version 1.2 (2000). However, EcoRisk has been upgraded to version 1.5 (2002). This newer version was available prior to the date of the RFI report. While it is noted that the report indicates that repeating the methodology with the newer version would not change the outcome, the report should include a discussion of the major differences between versions 1.2 and 1.5 of EcoRisk. It is also not clear whether toxicity reference values (TRVs) from version 1.2 or 1.5 were applied in the risk assessment. Modify the report to clarify these issues.

6. Section 6.2.2.2, Aquatic Assessment, page 6-12. This section provides a lengthy discussion on the results of toxicity testing that has been conducted to determine whether the concentrations in sediments have impacted the benthic macro-invertebrate community. The results of the study has shown a decrease in numbers of species and potential toxicological impacts. In addition, the report implies that these results may be due more to the loss of habitat due to drought conditions than to contaminant loading into the surface water. The last sentence of this section, however, indicates that if there are pockets of sediment causing adverse effects on the aquatic community, the benthic community would most likely avoid these areas. If the stream is in fact being highly impacted by drought, then this would equate to a decrease in area of available habitat. Given these conditions, the benthic community would be more likely to be pushed into areas of unfavorable habitat due to competition. This would result in multiple stresses on the organisms. It appears that under the current drought conditions, the preservation of habitat is critical to the health of the stream community and that even small impacts by site contaminants could be detrimental. Revise the report to address these issues.

Appendix K – Human Health Risk Assessments for Cañon de Valle and Screening Risk Assessments for Martin Spring Canyon

7. Section 3.1.2, Comparison to Background Concentrations, page K-3. Site maximum concentrations were compared to LANL background values (BVs). While Appendix I discusses the results of the statistical comparison of data sets, the report does not provide the BVs that were used for the comparison to site maximums nor was a table indicating the comparison results and BVs used included with the report. In addition, the report should clarify whether the BV represented the average background concentration or the 95% upper tolerance limit (UTL). In addition, on page II-1 it is stated that the maximum value is compared to the background UTL or the background value (BV), suggesting that these are two different things. Revise the report to address these issues.

8. Section 3.1.3, Comparison to Background Concentrations, page K-3. The screening action levels (SALs) used in comparison of site chemical concentrations are summarized in Table K 1. There is general agreement with the values used for the SALs, with the exception of trichlorofluoromethane. The SAL is listed as 12,000 mg/kg, which appears to be quite elevated. The revised New Mexico Soil Screening Guidance (NMSSG) (currently under peer review), the Region 9 PRGs, and the Region 6 PRGs provide a SAL for residential soil in the 300 to 500 mg/kg range. Please review the calculations for the derivation of the SAL for trichlorofluoromethane and revise the table and assessments accordingly. It is noted that the site maximum concentration would still be below 10% of the most conservative SAL listed above.

9. Section 3.2.3, Comparison to Risk-Based Sediment Screening Levels, page K-5. The SALs used in comparison of site chemical concentrations are summarized in Table K.3. There is general agreement with the values used for the SALs, with the

exception of hexachlorobenzene (3 mg/kg), indeno(1,2,3-cd)pyrene (6.2 mg/kg), and trichlorofluoromethane (12,000 mg/kg). For hexachlorobenzene and indeno(1,2,3-cd)pyrene, the revised NMSSG, the Region 9 PRGs, and the Region 6 PRGs and the provide SALs for residential soil of 0.3 mg/kg and 0.62 mg/kg, respectively. In addition, the SAL for trichlorofluoromethane is in the 300 to 500 mg/kg range. Please review the calculations for the derivations of the SALs for hexachlorobenzene, indeno(1,2,3-cd)pyrene, and trichlorofluoromethane and revise the table and assessments accordingly. It is noted that the site maximum concentrations would still be below 10% of the chemical's respective SALs listed above.

10. Section 5.1.1, Estimation of Exposure Point Concentrations, page K-8. It appears that one site-specific Particulate Emission Factor (PEF) was used in the risk assessment. However, evaluation of construction worker exposures typically consider greater levels of particulate emissions due to heavy equipment traffic on unpaved roads or air emissions resulting from large-scale earth moving activities. Procedures to derive a construction worker PEF is described in USEPA's *Supplemental Guidance for Development Soil Screening Levels for Superfund Sites, Peer Review Draft* (March 2001). Revise the risk assessment to discuss why use of one PEF value for all exposure scenarios is considered adequate.

11. Section 5.1.4, Source Area, page K-9. The report indicates that there is a low potential of volatility of chemicals from the soils, and thus, vapor-phase concentrations of COPCs were not included in the risk assessment. The text should be clarified to indicate that the use of a volatilization factor only applies to volatile organics and that the few organic compounds that were retained as COPCs are not volatile organics and therefore, the use of a volatilization factor would not apply to the COPCs.

12. Section 5.2, Quantification of Chemical Intake, page K-10. The discussions of how the overall chronic daily intake (CDI) is estimated, as well as the CDI for the site soil, sediment, surface water, and dermal contact, refer to several input parameters such as the contact rate, exposure frequency, exposure duration, inhalation and ingestion rates, skin adherence factors, fractions ingested/inhaled, and skin surface areas. However, the text does not define what values were used for these input parameters nor does the text reference where these input values are defined. Revise the text to include a reference to Table K-7 where these parameter values are defined.

13. Section 5.2.3, Dermal Contact with Soil, Sediment, and Surface Water, page K-11. The methodology outlined to assess dermal contact with surface water is appropriate only for inorganic constituents. Newer methods have been developed to evaluate the dermal risks associated with organic constituents in water. These methods are detailed in EPA's *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment* (EPA/540/R/99/005, September 2001). Revise the report to use the latest dermal risk assessment guidance methodology.

14. Section 7.2, Noncancer Hazard Characterization Methods, page K-15. While it is conservative to sum all chemical-specific Hazard Quotients (HQs) to derive a pathway specific Hazard Index (HI) and multi-pathway Total HI, this methodology is not strictly accurate. The HI is more appropriately the sum of all HQs that have the same critical effect or affect the same target organ. It is recommended that the risk assessment be revised to state that as a first conservative estimate of the Total HI, all chemical HQs in all pathways will be assumed to be additive. Then if the Total HI using this methodology exceeds the target HI of 1.0, a more accurate target-organ/critical effect HI will be calculated.

15. Section 7.3.3, Construction Worker, page K-17. Since the Total HI for the construction worker exceeds 1.0 when the conservative assumption of additivity of all chemical HQs is used, a refined analysis should be conducted for this scenario with separate HIs calculated to reflect target-organ/critical effects. For example, the major risk drivers have the following target organ or critical effects: TNT (liver), RDX (prostate), barium (kidney). Revise the report to calculate a more accurate HI for the construction worker scenario.

16. Table K-7, Exposure Factors Used to Estimate Intake of COPCs. In reviewing the table of exposure factors, it appears that most of the data were taken from United States (US) EPA 1997 and 1991. According to the reference list provided in Appendix K, the 1997 reference is for the "Health Effects Assessment Summary Tables" and the 1991 reference is the "Role of the Baseline Risk Assessment in Superfund Remedy Selections Decisions". It appears that either the references on the table were mislabeled or the references were not included in the reference list. However, the values in the table were reviewed against the recommended input parameters outlined in USEPA's *Supplemental Guidance for Development Soil Screening Levels for Superfund Sites, Peer Review Draft* (March 2001) and USEPA's *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment* (EPA/540/R/99/005, September 2001). An assumption was made that the environmental worker closely resembled that industrial worker as defined in the above referenced document. The following modifications to the input parameters listed in Table K-7 should be made as noted below.

Environmental Worker (RME)	Construction Worker (RME)
EF – 225 days/year	IRinh – 0.83m^3/hour (20 m^3/day)
ED – 25 years	IRing - 330 mg/day (RME and CME)
AT (noncarcinogens) – 25 years	Soil-to-Skin AF – 0.3mg/cm^2 (RME and CME)
IRinh – 0.83m^3/hour (20 m^3/day)	SA – 3300 cm^2
SA – 3300 cm^2	

Table K-8, Toxicity Factors for COPCs. Several discrepancies were noted as follows:

- The dermal absorption factors (ABSd) are all referenced to New Mexico's SSG. This guidance has undergone subsequent updates. In general, all

inorganics should have an ABSd of zero. Please revise the ABSd values accordingly. It is recommended that the Region 9 PRG tables be used as a reference.

- An oral reference dose (RfDo) is listed for benzo(a)pyrene, however, the Integrated Risk Information System (IRIS) does not provide an RfDo. Clarify the reference and value.

- An RfDo for 1,2-dichloroethane is available from National Center for Environmental Assessment (NCEA) (3.0E-2 mg/kg/day).

- It is unclear whether the mercury is elemental mercury or methyl mercury. The values for the RfDo is listed as 3.0E-4 mg/kg/day; however, this is the value listed in Health Effects Assessment Summary Tables (HEAST) not IRIS. The RfDo for mercury in IRIS is based on methyl mercury and is 1.0E-4 mg/kg/day. Clarify the speciation of mercury and clarify the toxicity datum and reference.

17. Appendix K, Attachment 1, Section 2.0, Comparison to Surface Water Screening Levels, page 2. As noted previously, NMWQCC standards and MCLs are not solely risk-based numbers, but also incorporate technology limitations, and as such comparison of site data to these numbers will not provide an indication of whether there is acceptable risk. The use of these values may be helpful as a tool if no risk-based screening numbers are available or for assessing remediation alternatives, but should not be used to select COPCs. Revise Attachment 1 to select Martin Spring Canyon COPCs for water based upon comparison to the residential tap water screening levels (either Region 6 or Region 9). If there are no tap water screening levels available, and toxicological data are not available to support the derivation of the tap water screening values, then the NMWQCC and/or MCL may be appropriate for use.

18. Appendix K, Attachment 1, Section 4.0, Comparison of Results, page 2. The report indicated that risks were only estimated for those chemicals in Martin Spring Canyon that were elevated above those present in Cañon de Valle. The theory is that if the concentrations were less than those at Cañon de Valle, the risks due to exposure to contaminants in Martin Spring Canyon would be less. This rationale is adequate; however, the discussion of the results is complicated by the fact that some constituents have higher concentrations in Martin Spring Canyon than at Cañon de Valle. The report should provide a table summarizing the input parameters and results for the risks calculated and associated with Martin Spring Canyon. The text must also quantify the total risk to the receptors in Martin Spring Canyon, and not just qualitatively discuss the comparative magnitude of risk. Revise the report to clearly demonstrate that cumulative risks at Martin Spring Canyon are within acceptable ranges.

19. Appendix I-1, Attachment 1, Quantile Test Results, Tables 5, 6, 7, and 8. There is inconsistency in conclusions of whether the test passed or failed when the table k value was equal to the observed k value. In some cases, the test was indicated as "pass" while in a few others, "fail". Revise the conclusions for consistency. A conservative approach would be to assume that if the test statistic and the observed statistic are equal, the test would fail.

Appendix L – Ecological Risk Assessment for Cañon de Valle

20. Section 2.1, Overview. Page L-4 indicates that the present-day contamination concentrations and inventories are expected to the worst-case. However, Section 5.2 of the report states that there has been significant contaminant transport downstream of Cañon de Ville. These two statements appear to contradict each other. Please clarify what data and concentrations will be used to represent the worst-case scenario.

21. Section 2.2, Habitat Description and Exposure Pathways. The last paragraph indicates that as the contaminated soils only occupy a small area in the canyon floor, the direct ingestion of soil is considered a minor pathway. While the results of a risk assessment may show this to be a minor pathway, the baseline risk assessment must include all complete exposure pathways. The direct ingestion of soil is a complete pathway, and as such must be addressed in the risk analysis. Revise the risk assessment to include direct ingestion of soil.

22. Section 4.1, Terrestrial System. Several constituents were not included in the screening assessment, as the EcoRisk version 1.2 did not contain toxicological criteria for the respective constituents. Risk assessments rarely rely on only one source for toxicological criteria. While it is noted that avian and invertebrate toxicity data may in fact not be available, other sources and studies for avian toxicological criteria should be reviewed to determine whether toxicity data is available. Revise accordingly.

23. Section 6.2.2, Toxicity Testing. While the use of the midge as a test species is acceptable, discuss the sensitivity of the midge compared to the *Ceriodaphnia dubia*, which is often used by toxicological laboratories to test sensitivity to metals in water.

24. Section 7.1.4.1, Estimated ESLs for the Mexican Spotted Owl. The footnote of table L-8 defines the dose as the TRV divided by 0.6 kg (owl body weight). Typically the screening level exposure dose incorporates the exposure point concentration, ingestion rate, area use factor and body weight. Clarify how the dose was determined.

25. Attachment L-1, Section 4.4, Radionuclides, page 9. The text indicates that the only radionuclide the exceeded background concentrations was cesium. However, this is inconsistent with the human health risk assessment conducted for the trail user. Under this scenario, rubidium also exceeded background concentrations and was

carried forward in the analysis. Discuss rubidium concentrations and justify the exclusion of this radionuclide from the discussion.