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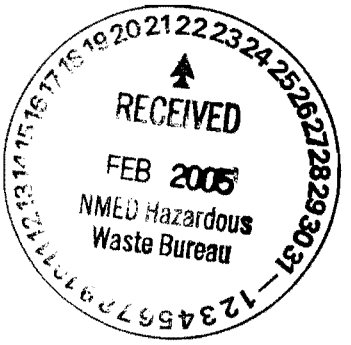

February 16, 2005

Mr. David Cobrain
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. 06110.290.0002; State of New Mexico Environment Department, Santa Fe, New Mexico; Human Health and Ecological Risk Assessment Support; Review of the DSS Site 1080 Risk Assessment, Sandia National Laboratory, Task 2 Deliverable.

Dear Mr. Cobrain:

Enclosed, please find a deliverable for the above-referenced work assignment, which addresses the technical review of the Sandia National Laboratory's (SNL) "DSS Site 1080 Risk Assessment."

In the cover letter sent to Ms. Paige Walton by Mr. William Moats, Mr. Moats indicated that the risk assessment review should address his following concerns:

1. A general review of the assessment;
2. Do the radiological risk methodologies conform to NMED and/or Environmental Protection Agency (EPA) guidance;
3. Is the radiological risk an incremental risk or a total risk;
4. Is an incremental radiological risk or a total radiological risk being added to the chemical risk; and
5. If the methodology is not correct as proposed, what methodology should be used?

The radiological risk as presented in the risk assessment appears to be a total risk/dose above background. The report appears to call this amount of risk/dose above the background an incremental dose/risk. The approach taken for assessing risk/dose due to radionuclides is a little "old-fashioned". Most facilities use the code RESRAD to conduct a dose assessment. However, it appears that Sandia applied the radiation risk

guidance provided in Chapter 10 of the Environmental Protection Agency's "Risk Assessment Guidance for Superfund Sites" (EPA/540/1-89/002). While technically this approach may be applied, the use of RESRAD allows for a more thorough analysis of various pathways and the interaction between pathways. While sufficient data were not contained in the risk assessment report to run RESRAD, some assumptions were made and version 6.22 of the code was run. The resulting total effective dose equivalent (TEDE) that resulted from this analysis was similar in magnitude to the estimated doses provided in the risk assessment. It is not fully clear how the external exposure dose was estimated using the equations provided in Appendix A. For future risk assessments, it is suggested that RESRAD be used for conducting the dose assessment.

The list of radionuclides presented in the risk assessment appears to be incomplete. For example, the uranium isotopes U-235 and U-238 are listed as being constituents of potential concern. The facility may have used enriched uranium, which would explain low concentrations of U-234, however, U-234 is naturally occurring and would be expected to be present in the subsurface soil sampled. As the analytical data results were not provided with the risk assessment, it is suggested that Mr. Moats review the list of analytes and ensure that all radionuclides that could potentially be present in the soil were included for analysis. It is thought that once the analyte list and actual soil results are reviewed, additional radionuclides may be added to the list of potential constituents of potential concern.

This deliverable was emailed to you on February 16, 2005 at David_Cobrain@nmenv.state.nm.us and to Mr. William Moats at wpmoats@sandia.gov. A hard (paper) copy of the deliverable will be sent to you 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. William Moats, NMED
Ms. Paige Walton, TechLaw

TASK 2 DELIVERABLE

RISK ASSESSMENT REVIEW COMMENTS ON THE DSS SITE 1080, SANDIA NATIONAL LABORATORY, NOVEMBER 2004

Human Health and Ecological Risk Assessment Support

Submitted by:

TechLaw, Inc.
560 Golden Ridge Road
Suite 130
Golden, CO 80401-9532

Submitted to:

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

In response to:

Work Assignment No. 06110.290

February 17, 2005

RISK ASSESSMENT REVIEW COMMENTS ON THE DSS SITE 1080, SANDIA NATIONAL LABORATORY, NOVEMBER 2004

General Comments

1. The risk assessment refers to an incremental total effective dose equivalent (TEDE) and a TEDE. It appears that the incremental TEDE refers to the amount of dose/risk above natural background and that the incremental TEDE represents the total risk/dose above background. Please clarify if this assumption is correct, and if not, please discuss what is meant by incremental TEDE.

2. The methodology used to estimate the risk/dose due to radionuclides is a little antiquated. It appears that a combination of the methodology outlined in Chapter 10 of the Environmental Protection Agency's "Risk Assessment Guidance for Superfund [RAGS] Sites" (EPA/540/1-89/002) and the code RESRAD were applied. The procedure applied was hard to follow, mainly because the report did not provide any intermediate calculations and results. Further, it was not fully clear how the external dose was estimated using the algorithms provided in Appendix A. The use of the code RESRAD, without incorporating the RAGS equations, would provide a more thorough and better estimate of radiological dose and risk and would allow for easier review. Please provide a table that summarizes the results for all intermediate equations. Also, clarify how the external dose was estimated. It is also suggested that in the future, risk assessments be conducted using RESRAD.

3. The quality assurance/quality control (QA/QC) samples collected consisted of two trip blanks and one equipment blank. No field duplicates were collected. Duplicates are typically collected to determine the laboratory precision for each sample matrix. It is not clear how the data can be identified as defensible for use in a risk assessment without collection of the minimal QA/QC samples, specifically duplicates. In addition, it is not clear what type of data validation was conducted: holding times, calibrations, sample specific chemical recovery, quantitation and detection limits, and identification of tentatively identified radionuclides. Discuss the defensibility of the data for use in a risk assessment when only minimal QA/QC samples were collected.

4. It does not appear that the isotope U-234 was included in the analyses. U-234 is a naturally occurring radioisotope, and since U-238 and U-235 were detected, it seems odd that U-234 was not detected and included in the risk assessment. Discuss why U-234 was excluded from the risk assessment.

5. Surface runoff was identified at a potential fate and transport mechanism at the site. While the report identified this pathway as having low significance, no surface soil sampling appears to have been conducted to verify this conclusion. Provide additional justification for the exclusion of surface soil sampling.

6. If no surface contamination is present, it is agreed that exposure to fauna (such as

deer mice, avian species, and larger predatory animals) is unlikely. However, food chain uptake (though biota) was identified at a potential fate and transport mechanism at the site. While the report identified this pathway as having low significance, no ecological analyses were conducted to provide justification of this assumption. At a minimum, the native and non-native vegetation in the area should be discussed along with a discussion of the root depths of the plant species present. If the root zone for any of the plants is at least five feet, then a phytotoxicity analysis is warranted. Revise the report to address this issue.

7. The risk assessment does not appear to include an evaluation of chemical toxicity due to the radioisotopes. For example, uranium has an associated chemical toxicity, and should have been included in the non-radiological risk analysis as well as the radiological risk analysis. Revise the risk assessment to address the chemical toxicity of the radionuclides.

8. Constituents that do not have a background value and that were detected above the minimal detectable activity (MDA) or concentration (MDC) were carried forward into the risk assessment. However, the report does not address how non-detects were handled in the event that a constituent was at least positively identified in one sample. Typically if a COC is positively detected in at least one sample, non-detects are carried forward at one-half the sample quantitation level or MDA/MDC. Discuss how non-detects were handled in above cases.

9. Appendix A indicates that three land uses, industrial, residential, and recreational, are considered for all solid waste management units (SWMUs) at Sandia. However, the risk assessment for DSS Site 1080 does not address risks associated with recreational uses. Discuss why this receptor was excluded from the assessment.

10. Appendix A provides a lot of information and equations not applicable to the risk assessment for DSS Site 1080. It is suggested that extraneous information and equations be removed from the appendix, to limit confusion to reviewers.

11. A table showing the intermediate results in the risk calculations should be provided to facilitate review. This table should include the calculated ingestion and/or exposure doses for each pathway. Revise the risk assessment to include this information.

Specific Comments

1. Section IV. Comparison of COCs to Background Levels. The text indicates that when a detection limit of an organic compound was too high, the organic was retained as a constituent of concern (COC). However, the report does not provide a table which shows the comparison of detection limits or sample quantitation limits to a risk-based criterion. For example, how was the detection limit determined to be high; was the detection compared to a residential soil screening limit? Discuss what criteria were applied in assessing detection limits. Also, if a detection limit was determined to be high, was the organic included as a COC at a concentration equal to

the detection limit or at the detected analytical concentration?

2. Section IV. Comparison of COCs to Background Levels. The text indicates that a conservative approach was taken for comparing site concentrations to background. The maximum detected site concentration was compared to the maximum detected background concentration. This is not a conservative approach. Typically, a conservative approach involves the comparison of the maximum detected site concentration to the 95% upper confidence level (UCL) of the mean for background. If the results of this screening indicate that a constituent may exist at a concentration higher than background, a statistical comparison of the two data sets (typically conducted using the Wilcoxon Rank Sum test) is conducted as well as graphical comparisons (histograms) of the data sets. The report should be revised to use the 95% UCL for background concentrations.

3. Section IV. Comparison of COCs to Background Levels. Iron, magnesium, calcium, potassium, and sodium were excluded from the risk assessment as these constituents were considered essential nutrients. 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 be 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.

4. Section V, Fate and Transport. The report states that "because groundwater is approximately 480 feet below ground surface, the potential for COCs to reach groundwater through the unsaturated zone above the water table is extremely low." However, no justification for this conclusion was provided. Typically, the detected soil concentrations are compared to soil-to-groundwater screening levels, based upon a dilution attenuation factor (DAF) of 20. If site concentrations are above the SSLs, then there is concern that COCs could impact groundwater, and additional analyses may be warranted. Revise the report to include a comparison of the site concentrations (maximum detected concentration) to SSLs. (Refer to the New Mexico Soil Screening Guidance, http://www.nmenv.state.nm.us/hwb/data/NMED_Tech_Bckgrnd_Doc_Dev_SSL-Rev2.0-Feb-2004.pdf).

5. Section VI.3, Pathway Identification. A residential scenario is included in the risk assessment. However, the report indicates that no intake routes though plant, meat, or milk are considered appropriate, but no justification for this conclusion was provided. Typically these exposure pathways are addressed in a risk assessment, unless adequate justification, such as salinity of soil, etc., can be provided. Discuss why these exposure pathways are not appropriate for the residential scenario.

6. Section VI.4.2, Results. While the maximum concentration of polychlorinated biphenyl (PCB) is below the EPA screening level of 1 mg/kg, PCBs should not be excluded from the risk assessment. The risk assessment must address cumulative risk, and this includes the risk associated with PCBs. Revise the risk assessment to include PCBs.

7. Section VI.5, Identification of Toxicological Parameters. It is assumed that route extrapolation from oral toxicity values was used for evaluating dermal exposures. Please clarify.

8. Section VI.6.2, Risk Characterization. It is not clear why no hazard indices are presented in Table 9. It is not clear if the values are due to rounding or whether hazards were not estimated. There should be some level of hazard for all of the nonradiological COCs for both oral, dermal, and inhalation pathways, with the exception of the inhalation pathway for cyanide. Clarify the hazard quotients and hazard indices.