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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

February 1, 2002

Dr. Inés Triay, Manager
Carlsbad Field Office
Department of Energy
P. O. Box 3090
Carlsbad, New Mexico 88221-3090

Mr. John Lee, General Manager
Westinghouse TRU Solutions LLC
P.O. Box 2078
Carlsbad, New Mexico 88221-5608

RE: COMMENTS ON GEOTECHNICAL ANALYSIS REPORT, JULY 1999 TO JUNE 2000
WIPP HAZARDOUS WASTE FACILITY PERMIT
EPA I.D. NUMBER NM4890139088

Dear Dr. Triay and Mr. Lee:

The Hazardous Waste Bureau (**HWB**) of the New Mexico Environment Department (**NMED**) has reviewed for technical adequacy the September 2000 document entitled "Geotechnical Analysis Report for July 1999 – June 2000", which NMED received on October 29, 2001. The Department of Energy Carlsbad Field Office and Westinghouse TRU Solutions LLC (**the Permittees**) submitted this annual report in compliance with Permit Condition IV.F.1.b and Permit Attachment M2, Section M2-5b(2).

Attached are NMED's comments on this report. Note that NMED has commented extensively on the Exhaust Shaft Hydraulic Assessment Program (Section 9), as this is the first time such information has been provided to the agency. Please submit your response to these comments within thirty (30) calendar days from the date you receive this letter. NMED may consider a petition for a deadline extension, provided that a written justification and the expected submittal date are given.

If you have any questions regarding this matter, please contact Phillis Stevens at (505) 428-2518.

Sincerely,

Steve Zappe
Permits Management Program

Attachments
NMED Comments
NMED Spreadsheet

cc: James Bearzi, Chief, HWB
John Kieling, Manager, Permits Management Program, HWB
Phillis Stevens, HWB
Will Fetner, HWB
David Neleigh, EPA Region 6
Connie Walker, TechLaw, Inc.
[redacted]

NMED Comments
Geotechnical Analysis Report for July 1999 – June 2000

1. Section 3.1.2, Instrumentation (page 3-3, paragraph 2) – This indicates the collar displacement from the extensometer in the Salt Handling Shaft was read as 0.814 inches on January 4, 2000. This extensometer was installed in 1982, a difference of 18 years. If the reading was a cumulative displacement, the displacement rate was calculated using 14 years. Please explain why 14 years was used to calculate the displacement rate of 0.058 in/yr, since the prior year's displacement rate was calculated using 18 years. If, instead, this reading was an annual displacement and the previous reporting period's value was used, please provide this value and the elapsed time between the readings. To prevent confusion and minimize the review time, Calculation Sheets, which include equations and all inputs for all derived values and are separate from the narrative, should be provided in the report.

2. Section 3.1.2, Instrumentation (page 3-3, paragraph 2) – This states that only one of the original nine extensometers that were installed in the Salt Handling Shaft remain functional. Are there plans to replace/repair the other instruments that have been nonfunctional since 1993? If so, when will they be replaced? If not, please include justification for not replacing them.

3. Section 3.1.2, Instrumentation (page 3-3, last paragraph) – This indicates that one of the four earth pressure cells is non-functioning and the other three report negative readings. Are these cells calibrated regularly? Are there plans to replace the non-functioning cell? The contact pressure recorded for the prior reporting period ranged from -7 to -31 psi, while this reporting period range was from -0.4 to -28 psi. The lower readings differ by an order of magnitude. Please discuss.

4. Table 3-1 (page 3-8) – This table is incomplete in that it lacks the previous reporting period's displacement readings for the extensometers, this reporting period's readings, and the elapsed time between the readings (see Footnote 2 on page 3-8). Please tabulate the displacement readings (the period which is the subject of this report and the previous period) for the 1,566' and the 2,059' levels. Indicate the elapsed time between the readings.

5. Table 3-1 (page 3-8) – This table reports an "instrument malfunction" at the 1071' level in the Waste Shaft. Was the reading an outlier or was the instrument actually broken? If the reading was an outlier, what was the decision process to throw the number out? If the instrument is broken, are there plans to replace/repair the nonfunctioning instrument?

6. Section 3.2.2, Instrumentation (page 3-8, paragraph 3) – This section should discuss the impact of only two readings at the 1071' level of the Waste Shaft on the accuracy of the derived value of 0.007 in/yr.

7. Section 3.2.2, Instrumentation (page 3-11 and in other places) – The statement is made that the displacement rates are considered acceptable. Please cite your references and/or documentation that justify this conclusion. Indicate any mitigating circumstances in your discussion.

8. Section 3.3.2, Instrumentation (page 3-13, paragraph 2) – This section states that there is a possible transducer malfunction in the collar anchor. Please justify your conclusion and indicate whether the instrument will be replaced/repaired.

9. Table 3-2 (page 3-16) – This table reports no displacement readings for three extensometers in the Exhaust Shaft Station due to instrument malfunctions. Please include a schedule for repairs/replacement for these three instruments.

10. Table 4-1 (page 4-5) – This table does not correlate with the corresponding table in the prior year's report. Please explain how the closure rates for the years 1998 to 1999 are derived from the data for 1998 and 1999 in Table 4-1 (page 41) in the prior report.

11. Table 4-2 (page 4-10) – Please see Comment 1 regarding Calculation Sheets.

12. Section 5.3, Analysis of Extensometer and Convergence Point Data (page 5-7, footnote 3) – This section refers to a document entitled "Geotechnical Analysis Report for July 1999 – June 2000 Supporting Data." Please furnish this document to NMED.

13. Tables 5-3 and 5-4 (pages 5-8 and 5-9) – An attempt to recreate the rate change percentages resulted in several anomalies that may be due to rounding errors (see highlighted numbers on the attached spreadsheet). Please furnish the equation used in deriving these percentages.

14. Section 5.3, Analysis of Extensometer and Convergence Point Data (page 5-6, paragraph 3) and Table 5-3 (page 5-8) – These suggest that while most of the accelerations in vertical convergence rates are located in the southern areas of the drifts and may be attributed to Panel 2 mining, an intersection near the Waste Shaft (W30 S700) shows a 30.8% acceleration that may not be insignificant. The prior year's report indicated it was 51.5%. Please discuss this acceleration.

15. Table 6-1 (page 6-3) – Units for the values for the column titled, "Collar Displacement Relative to Deepest Anchor", in the current report are reported as centimeters whereas the same values are reported in the previous year's report as inches. Which is right? Were these the actual readings? Please provide a corrected table.

16. Table 6-2 (page 6-4) – An attempt to recreate the percent rate change yielded different values (see attached spreadsheet). The equation, (a-b)/b, which was used in Tables 5-3 and 5-4, was used for the third column on the attached spreadsheet. For the fourth

column, the equation used was: (a-b)/a, which resulted in values closer to those furnished in Table 6-2. Why was a different equation used for this table?

17. Section 6.5, Analysis of Convergence Data (page 6-5, paragraph 2) – The statement is made that for the eastern end of N1100 and N1420, the wire convergence meters showed a decrease in annual convergence rate relative to the rate reported for the previous reporting period. However, no figures for those rates were reported in the prior report. Please explain.

18. Section 8, Geoscience Program, (page 8-3) –Section 8.1 and 8.3 make reference to Tables 7-1 and 7-2 of the supporting data document, but these tables are not included. The report is incomplete and cannot be evaluated without referenced documentation.

19. Section 9.1, Hydrologic Monitoring Background (page 9-1, paragraph 1, last sentence) – When were the quarterly inspection video recordings started (e.g., since May 1995 or before)? Are they still on-going? How was the reported flow of 1-3 gallons per minute (**gpm**) calculated? Is this the latest flow rate (February 2000?) or is it the current average since the first quarterly video? NMED needs a more precise meaning of the stated flow rate (note that a consistent rate of 1 gpm would create a total discharge of approximately 526,000 gallons in one year).

20. Section 9.1, Hydrologic Monitoring Background (page 9-1, paragraph 2, 2nd sentence) – Regarding the reported depth of 40 to 80 feet, does this depth interval depict the location of the Santa Rosa Formation or the depth interval of the perched water table? Please note that based on Table 9-1, which shows specific depths of the Santa Rosa Formation, the average top of this formation is approximately 35 feet below land surface (**bls**) and the average bottom is approximately 59 feet bls. Also, where in the list of references is DOE (1999)? Is this DOE (2000b)?

21. Section 9.3, Water Level Monitoring (page 9-2, paragraph 1) – Note that based on Figure 9-5, the screen of the piezometers straddle only the Dewey Lake formation; the gravel pack, however, does penetrate both the Santa Rosa and Dewey Lake Formations. Are these formations hydraulically connected? The Santa Rosa Formation is under water-table conditions (page 9-1, paragraph 2); what about the Dewey Lake? Since both monitor wells and piezometers penetrate the Dewey Lake, how does this affect the water level measurements (i.e., do the Permittees calculate influences, if any, from the Dewey Lake)? Some other WIPP wells screened in the Dewey Lake show depth to water over 100 feet bls. It would be helpful if the Permittees provided a more detailed breakdown of the construction details of the monitor wells and piezometers (e.g., a table showing individual well screens and filter pack intervals, total depths, etc.; perhaps add this information to Table 9-1 in Page 9-5). Please note that NMED has limited geological and hydrogeological information on the Santa Rosa and Dewey Lake formations (most is based upon the SAND 78-1596 Geological Characterization Report, the Permittees' Part

B Permit Application [April 12, 1996], and the existing Permit). NMED requests additional or more detailed/recent geological and hydrogeological information on these formations not included in these other documents.

22. Section 9.3, Water Level Monitoring (page 9-2, paragraph 2, 1st sentence) – Are the monthly water measurements from the three wells and piezometers collected during the same events as the WIPP's Groundwater Level Monitoring Program (**WLMP**)? Were all the monitor wells and piezometers completed by October 1996?

23. Section 9.3, Water Level Monitoring (page 9-2, paragraph 2, 3rd sentence) and Figure 9-6 (page 9-9) – Historically, has the direction of groundwater flow been consistent over time when compared to Figure 9-6? From October 1996 to June 2000, there should have been approximately 45 water level measurement events.

24. Section 9.3, Water Level Monitoring (page 9-2, paragraph 2, 5th sentence) and Figure 9-6 (page 9-9) – NMED fails to see a western component of groundwater flow in the southern portion of the site; a south and southeast direction of flow is depicted in Figure 9-6 in the southern portion of the site.

25. Section 9.3, Water Level Monitoring (page 9-2, paragraph 3) – Based on this paragraph, the assumption is that a natural perched water table exists in the Santa Rosa Formation but the saturated conditions have been "augmented" by infiltration due to WIPP past and current surface conditions and activities (shaft constructions, surface water runoff, and evaporation and retention ponds). Because of the potential recharge attributed to the listed WIPP surface features, is it appropriate to assume that the Salt Water Evaporation Pond and the three storm water retention ponds are not lined or, if they are lined, their linings have been compromised?

26. Table 9-1 (page 9-5) – Typographical errors:

    - Drillhole C-2505: the bottom of the Gatuña Formation and the top of the Santa Rosa Formation do not match (should be either 38.6 or 39.6 feet)
    - Drillhole PZ-11: the interval for the Gatuña should be 12.5 - 34 feet (instead of 12-5-34)

    Also, we are assuming "TD" abbreviates "total depth", and this total depth refers to the depth of the drillholes and not of the Dewey Lake Formation (which can be several hundred feet thick).

27. Section 9.4, Water Quality (page 9-10, paragraph 1) – Ground water parameters and their analysis values were not tabulated for the sampling event of February 2000. Please furnish this information. Copies of laboratory analysis reports and chain of custody information are not required.

28. Section 9.4, Water Quality (page 9-10, paragraph 1, 2nd sentence) – Please state exactly how many sampling events were conducted in the monitor wells and piezometers from July 1997 to February 2000 and provide the date(s) of each event. Also, what parameters were analyzed in each of the sampling events (e.g., only a select list is shown in Table 9-2)? In order to better understand groundwater quality trends, it would be very helpful if a summary table could be created with results of analyses that exceeded MCLs and/or NMWQCCs standards since 1997.

29. Section 9.4, Water Quality (page 9-10, paragraph 2, 1st sentence) – Where is "Volume II Section 8"? Is this volume part of this submittal?

30. Section 9.4, Water Quality (page 9-10, paragraph 4, last sentence) – Based on Section 9.4.6, the metal Chromium (detected in well C-2507) should be added to the list of analytes that exceeded groundwater standards.

31. Table 9-2 (page 9-11) – Typographical errors:

    - NWQCC standard for silver is 0.05 mg/L instead of 0.1 mg/L
    - NWQCC standard for sulfate is 600 mg/L instead of 250 mg/L

32. Section 9.4.1, Total Dissolved Solids (page 9-11, paragraph 2, 1st sentence) and Figure 9-7 (page 9-12) – Figure 9-7 shows TDS concentrations obtained in February 2000 superimposed on a water level contour map from June 2000. To have a better concept of conditions during, or as close to, the sampling event in February, what was the direction of groundwater flow in February 2000? Was it consistent with June 2000?

33. Section 9.4.1, Total Dissolved Solids (page 9-11, paragraph 2, 1st bullet) – Please expand on the meaning of "... drainage collected from the WIPP underground..." Does the drainage refer to water recovered from the exhaust shaft only, or also include other areas of the underground? Also, we do not see the relevance of Figure 9-4 to this bullet; it appears that Figure 9-3 should be referenced instead. Where exactly is the Main Salt Pile Evaporation Basin? Is this the same as the Salt Water Evaporation Pond on Figure 9-3?

34. Section 9.4.1, Total Dissolved Solids (page 9-13, paragraph 1, 1st sentence) – Regarding the "earlier discussion" of the unique groundwater chemistry signature from well C-2507 and PZ-10: note that NMED cannot locate the referenced discussion on these wells in earlier text except for a brief mention of TDS concentrations in PZ-10 at the beginning of Section 9.4.1 (page 9-11). Section 9.4 (page 9-10) mentions a freshwater groundwater signature with well C-2505 and piezometer PZ-12 having less than 60% chlorides.

35. Section 9.4.1, Total Dissolved Solids (page 9-13, paragraph 1, 3rd sentence) – Typographical errors:

    - The location of C-2507 and PZ-10 should be reversed in the text (PZ-10 is located near the retention pond located south of the WIPP parking lot; C-2507 is closer to the retention pond near ERDA-9)
    - Figure 9-3 should be referenced instead of Figure 9-4.

36. Section 9.4.2, Chlorides (page 9-13, 4th sentence) – The text states that well C-2507 and piezometer PZ-10 show the lowest chloride concentrations; what about the statement in Section 9.4, page 9-10, that states "... well C-2505 and piezometer PZ-12 have less than 60% chloride, while all the other wells and piezometers have greater than 80% chloride"? Please expand. Also, the Figure referenced in sentences 6 and 7 should be Figure 9-3 instead of 9-4.

37. Section 9.4.2, Chlorides (page 9-13, last sentence) – The location of well C-2507 is better described as relatively near to a retention pond (close to ERDA-9) than "adjacent" to the same.

38. Section 9.4.6, Chromium (page 9-14) – Please provide the concentrations of chromium in well C-2507 for the past several years (include results with analytical summary table requested in Comment 28 above).

39. Section 9.4.7, Nitrate (page 9-14, 1st, 2nd and 4th sentences) – The NMWQCC standard for nitrate is 10 mg/L instead of 44 mg/L. Is there a third piezometer that contained high nitrate concentrations together with PZ-6 and PZ-12 (text reads "... PZ-12, PZ-6, PZ-C-2507 and...)? As stated in Comment 37 above, the location of well C-2507 should be better described as relatively near a retention pond than "adjacent" to the same.

40. Section 9.4.8, Mercury (page 9-14) – The EPA and NMWQCC standard for mercury is 0.002 mg/L (not 0.0002 mg/L). Do the Permittees have any plausible explanation for the exceedances observed in the two piezometers? Were the standards exceeded in previous sampling events? Please provide the concentrations exceeding the standards (include results with analytical summary table requested in Comment 28 above).

41. General Comments:

    - NMED is aware that the Permittees have been collecting samples from water originating from the cracks of the exhaust shaft (i.e., water captured in the catch basin of the shaft). Have the Permittees seen a correlation in the results of groundwater quality between these samples and those collected from the monitor wells and piezometers monitoring the Santa Rosa Formation? If so, can geochemical investigations more conclusively identify the origin of the water seeping into the exhaust shaft? We understand that by the time the water in the shaft reaches the catch basin its chemistry may have been significantly affected by the exhaust air (volume, temperature, humidity) and the makeup of the shaft wall itself (i.e., the Salado formation).

- Have tracer tests been attempted or performed in the Santa Rosa wells and piezometers to determine the groundwater flow characteristics and, perhaps, its eventual flow to the exhaust shaft?
- Are there any other Santa Rosa wells located outside the WIPP Property Protection Area as demarcated by Figure 9-3? If so, are these wells dry (or saturation points such as piezometer PZ-8), thus further demonstrating that the Santa Rosa water-bearing zone beneath the WIPP facility is mostly the result of WIPP surface activities?
- Only the exhaust shaft has been affected by the Santa Rosa perched water table due to the cracks in its liner. The other three shafts (air intake shaft, waste shaft and salt handling shaft) appear to have competent liners. Were the latter three shafts constructed with different techniques and/or construction materials when compared to the exhaust shaft?
- Although this has probably been documented elsewhere, have the Permittees considered engineering controls to minimize the infiltration of water to the Santa Rosa due to WIPP surface features and activities (salt storage area, salt water evaporation pond, miscellaneous retention ponds)? Examples: lining ponds, pumping and keeping ponds dry, capturing/minimizing/re-directing runoff, dewatering area near cracks of exhaust shaft, etc. Could continued seepage through the Exhaust Shaft cracks be a significant problem in the future?

NMED Spreadsheet for Comments 13 and 16

Table 5-3

Vertical Convergence Rates

0.567	0.512	10.7
0.649	0.562	15.5
0.601	0.476	26.3
0.708	0.64	10.6
0.61	0.493	23.7
0.748	0.673	11.1
0.805	0.526	53.0
1.001	0.653	53.3
0.982	0.867	13.3
1.909	1.604	19.0
3.219	2.661	21.0
2.427	2.131	13.9
2.692	2.329	15.6
1.549	1.3	19.2
1.885	1.647	14.5
2.537	2.077	22.1
2.011	1.681	19.6
1.155	0.931	24.1
2.287	1.601	42.8
2.042	1.274	60.3
1.278	1.111	15.0
1.123	0.996	12.8
1.214	0.928	30.8
0.725	0.656	10.5
0.512	0.451	13.5
0.55	0.479	14.8
1.43	1.293	10.6
0.915	0.772	18.5
0.641	0.563	13.9
1.128	0.925	21.9
0.885	0.662	33.7
0.863	0.693	24.5
1.634	1.162	40.6
0.573	0.518	10.6
0.644	0.581	10.8
0.581	0.505	15.0

Table 5-4

Horizontal Convergence Rates

0.708	0.64	10.6
0.748	0.673	11.1
1.001	0.653	53.3
1.155	0.931	24.1
0.863	0.693	24.5
0.833	0.741	12.4
0.879	0.747	17.7

Table 6-2

Vertical Convergence Rates

1998-1999	1999-2000	% Rate Change	
0.98	0.82	19.5	16.3
0.9	0.81	11.1	10.0
1.19	1.01	17.8	15.1
1.05	0.86	22.1	18.1
1.06	0.86	23.3	18.9
0.56	0.54	3.7	3.6
0.67	NA	NA	NA
3.35	3.06	9.5	8.7