



North Carolina Department of Environment and Natural Resources

Division of Waste Management

Beverly Eaves Perdue  
Governor

Dexter R. Matthews  
Director

Dee Freeman  
Secretary

Solid Waste Section

October 03, 2012

Mr. Tim Rogers  
Solid Waste Director  
460 B South Landfill Road  
Dudley, NC 28333

Re: Comments on Construction Quality Assurance Report for Phase 3 Construction  
Wayne County Municipal Solid Waste Landfill (MSWLF)  
Wayne County, North Carolina  
Permit No. 96-06, Document ID No. (Doc ID) 17328

Dear Mr. Rogers:

On September 14, 2012, the Division of Waste Management (DWM), Solid Waste Section (NC SWS) received "*the Construction Quality Assurance Report for Phase 3*" (CQA Report) at the Wayne County MSWLF. The CQA Report (Doc ID 17224) was prepared and submitted by Municipal Engineering Services Co., Inc. (MESCO), on behalf of Wayne County, to fulfill the requirement stated in the Permit Condition Number 6, Attachment 2 - Permit to Construct (PTC, Doc ID 13553). On September 25, 2012, a site visit and a pre-operative meeting were conducted with representatives from the NC SWS, Wayne County MSWLF, and MESCO for the purposes of walking over the site, documenting current conditions of the constructed Phase 3 expansion, and observing landfill gas collection and control system (LFGCCS) and landfill gas to energy (LFGTE) project at the landfill facility.

The NC SWS reviewed the CQA Report in accordance with Solid Waste Management Rules (the Rule) 15A NCAC 13B .1600, permit conditions set forth in the PTC for Phase 3, and the approved PTC Application (Doc ID 14016). Based on our review and observations concluded from the September 25, 2012 site visit, the NC SWS has comments on the CQA Report, and your response to the following comments will expedite completion of our review:

Soil Report

1. The Technical Specification (Section 3.2 – Subbase) and the CQA plan (the Section 4.2.1 – Base Liner System Subbase) specified that each compacted lift will be tested per six (6)-inch-lift for each 10,000 square feet or fraction thereof of compacted mass fill. However, the testing for in-place compacted fill was conducted at 3-foot-lifts. Please address the following concerns:

- i. Describe the deviations and the reasons for the deviation from the approved testing protocol.
  - ii. Provide a written certification, signed and sealed by the Engineer who is a professional engineer and registered in the State of North Carolina, which states that the constructed landfill subbase has sufficient and adequate shear strengths to safely support the designed landfill systems and approved waste loads despite the fact the density testing on the in-place fill deviates from the approved specification and CQA plan.
2. Has any in-place density testing been conducted at the compacted soil berm? Please provide the testing results.
3. Please address the following concerns from the December 19, 2011 testing result report:
  - i. The laboratory results of moisture density relationship (ASTM D 698) to determine the maximum dry densities of 111.9 pcf & 116.3 pcf are referenced in the testing result report (Attachment B) but not available in the CQA Report.
  - ii. The reported in-place moisture content of Test No. 21 is 90% which is likely a typo. Please make the necessary correction.
4. Please address the following concerns from the January 17, 2012 testing result report:
  - i. (Attachment A) There is no location of Test No. 131 on Figure 3; but there is Test No. 133 at two different locations. Please make the necessary correction.
  - ii. (Attachment A) On Figure 4, there is Test No. 147 at two different locations. Please make necessary correction.
  - iii. (Attachment A) On Figure 4, the Note indicated that "Test Nos. 136 through 155 were ..." The correct info of Test Numbers is 138 through 154 which is consistent with the "Date Sample" in the summary tables in Attachment B.
  - iv. (Attachment A) Please remove the locations & Test Nos. 153 & 154 from On Figure 5.
  - v. (Attachment B) Please provide the laboratory results of moisture density relationship (ASTM D 698) to determine the maximum dry densities of 121.7 pcf, 116.5 pcf, 121.5 pcf, 111.5 pcf, & 111.9 pcf which are referenced in the summary tables but not in the report.
  - vi. (Attachment B) The results of percent compaction for the following Testing Numbers are incorrect. Please verify the data and make the necessary corrections.  
Test Nos. are 97, 98, 118, 120, 122, 123, 127, 128, 130, 135, 136, 144, 152, 153, 161, 169, 171, 172, 174.

- vii. (Attachment B) The correct compaction effort of Test No. 144 is 93.4% of the  $\gamma_{d \max}$  which failed passing the criterion of 95% of the  $\gamma_{d \max}$ . Please clarify if the failed area has been re-compacted, reworked, or replaced and retested. Which Test No. is associated with this fail sample? If not, a non-conformance report must be provided in the CQA report and approved by the Engineer.
5. Please address the following concerns from the January 17, 2012 testing result report:
  - i. (Attachment A) There are two locations noted as Test No. 215 on the Figure 2; it is evident that one location is Test No. 216 which is missing on the drawing. Please make the necessary correction.
  - ii. (Attachment B) The results of percent compaction for the following Testing Numbers are incorrect. Please verify the data and make the necessary correction. Test Nos. are 181, 187, 198, 207, 230, 245, 252, 255, & 256, & 275.
  - iii. (Attachment B) The in-place wet density of 12,936 pcf of Test No. 209 is likely a typo. Please verify and confirm test result.
  - iv. (Attachment B) The max laboratory dry density of 1218 pcf used for Test No. 218 is likely a typo. Please verify and make the necessary correction.
6. According to the approved specifications and CQA plan, the testing frequency of in-place density on the backfill placed back into the anchor trench shall be one test per 6-inch lift per 500 feet of the trench. The trench has a depth of approximately 2 feet and linear length of approximately 2,610 feet. The number of the required in-place density shall be 24, not 6 (six) as present in the May 29, 2012 testing result report. Please provide the other 18 testing results.
7. Please address the following concerns associated with the Soil Liner Evaluation dated February 21, 2012:
  - i. (Attachment B) According to the laboratory data, the maximum density for TP-1, 0 – 1' shall be 112.2 pcf and 114.4 pcf for the sample of TP-4, 2' - 6. The moisture vs. density curves for TP-1 & TP-4 showing the "Moisture Density Relationship" prepared by Engineering & Environmental Science Company is not consistent with other data presented in Attachment B. Please make the necessary corrections.
  - ii. According to the approved CQA Plan and Rule 15A NCAC 13B .1624 (b) (8) (B) (i), for each lift a minimum of three test locations shall be established for testing moisture content, density, and a composite sample for recompacted laboratory permeability. Please explain why only one sample was collected from the first lift.
  - iii. Section 4.2.2 of the approved CQA Plan required that the specified tests must be conducted at a rate of one test per 5,000 cubic yard (CY). To construct a compacted clay

liner extending over a 21-acre landfill cell with a 2-foot thickness requires approximately 67,760 CY selected soil. It was expected that 14 soil samples were to be collected from the borrow pits or stockpiles and analyzed for specified soil testing. The CQA Report only provided soil testing on five (5) soil samples (TP-1 through TP-4, & TP-6). Please provide the testing results for the other 9 soil samples.

- iv. According to the testing specification for “Cohesive Soil Liner Test Pad” in Section 4.2.2 of the approved CQA Plan, the frequency for in-place moisture/density shall be three (3) tests per lift. The summary table indicated only one in-place moisture/density test was conducted at Lift 1. Please provide the in-place moisture/density test results for other two testing locations at the first lift.

#### Soil Liner Testing

8. Please address the concerns of Table 1 – Summary of Soil Density Test & Permeability:

- i. According to the data present in Table 1, 145 of 332 tested samples failed to meet the compaction effort requirement – greater than or equal to 95% standard Proctor maximum dry density (ASTM Test Designation D698) as specified in the Section 4.2.2(e) of the approved CQA Plan. Please explain why the test results are acceptable.
  - ii. Please confirm test results of in-place dry density and/or percent of compaction in Table 1 for the following test numbers: 1-6, 1-43, 3-7, 3-15, 3-6R, 3-36, 4-18, 4-45, & 3-66. Our calculations indicated the test results for the referenced test numbers are incorrect.
  - iii. The permeability test results for the samples (sample IDs are 1-36, 2-60, 3-2, 3-3 Reserve) shown in Table 1 are inconsistent with those stated in the laboratory result report in Attachment B. Please verify the data and make the necessary corrections.
9. (Table 2 – Summary of Proctor, Atterberg, & Grain Size). According to Section 4.2.2 of the approved CQA Plan, the test frequency for Atterberg Limits, Grain Size Distribution, and Visual Classification is one test per lift per acre. It was expected that 83 samples were to be collected from the 2-foot-thick compacted clay liner (CCL) and tested for the above-mentioned testing. Table 2 only presented test result data for 37 samples; please provide the other 46 soil sample testing results.

#### Geomembrane (60mil HDPE)

10. (Seam Control Form). The approved specifications and CQA plan require the seam being tested under pressure 30 psi for five minutes. Please verify the records for time periods for air pressure testing on page 27 through page 30; it is evident that “At Time Out” for the testing is the same as the “At Time In.” Please make the necessary corrections.
11. According to the As-Built Record Drawing (Sheet 1 of 1) – 60-mil Textured Geomembrane, there are approximately 464 locations where the deployed Geomembrane panels have been repaired. These repaired locations must be tested in field by the specified testing method as described in the approved specifications Sections 3.4.3 and the approved CQA plan – Section

4.2.5(d) to confirm the integrity of the seams. Please provide the “Geomembrane Repair Logs.”

#### Leachate Collection Systems/Pumps

12. The Specification and the approved CQA Plan [Section 4.2.7.(2)] required the stone aggregate that is placed around the leachate piping to be tested for (1) sieve analysis at the frequency of one test per 500 tons of stones and (2) concentrations of calcium carbonate per ASTM D4373 to ensure that the stone shall be non-carbonaceous mineral. Please provide the testing results for the CQA Report.
13. Please provide the documentation for the geotextile filter fabric used to wrap leachate piping and surrounding stone. The documentation should include shipping papers and manufacturer’s data sheets / certificates to confirm that the material properties of the geotextile meet the Specifications and the approved CQA Plan [Section 4.2.7.(3)].
14. Please provide the hydrostatic test results according to ASTM F2164 on the HDPE Dual Containment Force-main [Sections 4.2.8(3) & 4.3 of the approved CQA Plan].
15. Please provide the completed and signed meeting minutes including pre-construction, progress reports, and any trouble-shooting meetings according to the Section 4.3 of the approved CQA Plan.

#### As-Built Drawings

16. Please provide additional as-built drawings to show the following information:
  - i. The contour lines with 2-foot intervals of the top of the constructed compacted clay liner [Rule .1624(b)(7)].
  - ii. The contour lines with 2-foot intervals of the top of the constructed protective cover layer with the leachate piping cleanout locations, invert elevations of the sumps and risers (intakes of the pumps), LCR control panels, leachate piping sizes and gradients, and earthen berms/ haul roads.
17. (Sheet 1 of 1) When the base liner system is installed on the top of a slope, the thickness of each liner component (t) is measured in the direction perpendicular to the slope and is different from (or greater than) the direct survey measurement (d) which is measured vertically to the survey datum. Please verify if the values of the survey points on the As-Built Drawing of the liner components on the slopes of the earthen berm are final values of a layer thickness or survey measurements. If it is the survey measurement, then the as-built liner thickness is less than the approved one [This is because  $t = d * \cosine(\text{slope angle})$ ], and the County must provide the SWS a remedial approach to correct this problem.
18. (Sheet 1 of 1) Please describe or note the outlines shown surrounding the constructed Phase 3 cell. It is likely that one outline (on the south side) is the tie-in area, and the rest of the lines are the top of the earthen berm (inner slope side).

19. Since the County did not construct the Alternate Base Liner System, the completed Phase 3 landfill cell consists of 24-inch-thick compacted clay liner (CCL) overlain by the 60-mil HDPE geosynthetic liner (FML), a layer of geocomposite drainage material (GCDM), and 36-inch-protective layer. Please address the following concerns:
- i. Provide the laboratory testing results of interface friction angles of CCL/FML & FML/GCDM according to ASTM D5321.
  - ii. If the interface friction angles of CCL/FML & FML/GCDM are less than 26 degrees, the County must conduct a slope stability analysis (under both static and seismic loading conditions) on the final grades and permanent side slope (3 H to 1 V) of the MSWLF by using the test results from Comment No. 16 (i) to demonstrate the resulting minimum factors of safety are acceptable.

The following comments that had been discussed in the pre-operative meeting dated September 25, 2012 are reiterated here for your reference:

20. Please provide the well completion logs (GW-1 form) and survey coordinates for the new groundwater monitoring wells MW-14, MW-15, and MW-16.
21. Laboratory analytical results for the Appendix I constituents in the samples collected from new groundwater monitoring wells MW-14, MW-15, and MW-16 must be submitted to NC SWS for review.
22. Please provide the well completion logs (GW-1 form) and survey coordinates for the landfill gas monitoring wells MP-26 through MP-30.
23. Please provide the well abandonment logs (GW-30 form) for the piezometers installed inside the Phase 3 landfill cell.
24. The County will provide a modified Operation Plan to describe how the operation of LFGCCS and LFGTE projects can be smoothly and safely coordinated with daily operations of landfilling activities. A contract agreement to specify and define responsibilities associated with the aforementioned LFG projects between the County and Methane Power can be appended to the Operation Plan.

Please submit to the NC SWS the completed written responses and the hard copies of the requested additional documentation and the portions of the CQA Report which are subject to revision. One electronic copy of the completed submittal (the response letter and the completed CQA Report) is also required. The Solid Waste Section appreciates your efforts and cooperation in this matter. If you have any permitting questions, please contact Ming Chao at (919) 707-8251 or Christine Ritter at (919) 707-8254.

Sincerely,



Ming-Tai Chao, P.E.  
Environmental Engineer  
Solid Waste Section



Christine Ritter  
Hydrogeologist  
Solid Waste Section

cc:

Wayne Sullivan, MESCO  
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