



North Carolina Department of Environment and Natural Resources  
Division of Waste Management

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Solid Waste Section

July 21, 2010

Mr. Tom Miller  
Solid Waste Director  
P.O. Box 3289  
130 S. Queen Street  
Kinston, North Carolina 28501

Re: Comments on Permit to Construct (PTC) Application – Phase 2  
Lenoir County Municipal Solid Waste Landfill (MSWLF)  
Lenoir County, North Carolina  
Permit No. 54-09, Document ID No. (Doc ID) 9570

Dear Mr. Miller:

On December 1, 2009, the Division of Waste Management (DWM), Solid Waste Section (SWS) received the PTC application documents for Phase 2 development at the above-referenced MSWLF. Municipal Engineering Services Co., Inc. (MESCO) on your behalf submitted the PTC application documents which include:

- *Permit to Construct, Lenoir County Municipal Solid Waste Landfill Facility, Phase 2.* Prepared by MESCO in Garner, North Carolina, dated November 2009 (Doc ID 8970).
- *Design Hydrogeologic Study prepared for Lenoir County Subtitle D Landfill, Phase 2.* Prepared by MESCO in Garner, North Carolina, dated November 30, 2009 (Doc ID 8977).

The SWS has conducted a review of compliance with the Solid Waste Management Rule (Rule), 15A NCAC 13B .1600 et seq. The SWS hydrogeologist will review the *Design Hydrogeologic Study* and may request any additional information related to water quality monitoring and hydro-geology in a separate letter upon completion of his or her review. This letter is a review of the engineering related portions of the *Permit to Construct (PTC) Application – Phase 2*, and the SWS has comments on the application. Your responses to the following comments will expedite the review of the permit application:

**Section 1.0 Facility Plan**

1. (Section 1.2 – Landfill Capacity, on page 8) The proposed total capacity of 3,430,286 cubic yards (cy) for the Lenoir County MSWLF exceeds the permit-approved total capacity of 3,009,399 cy more than ten percent (%) resulting in a “substantial amendment” in accordance with N.C.G.S. 130A-294(b1)(1). The approved total capacity of waste disposal - 3,009,399 cy is consistent with the volume shown on the PTC - Phase 1 application which was approved by the SWS on May 30, 2003, the 7 May 2003 public notice posted on Kinston Free Press, and the DWM annual report. Lenoir County must either revise the proposed Facility Plan by changing the total capacity in consistent with the previously approved one or conduct a local government approval process in accordance with N.C.G.S. 130A-294(b1)(4) to adopt this new total capacity of 3,430,286 cy. The documents related to local government approval processes must be appended to the Facility Plan and subject to DWM review and approval.

2. Note that response to Comment No. 1 may necessitate changes of the existing phase delineation (both texts and drawings). Additionally, the proposing total capacity of waste disposal for each phase must be adjusted to incorporate the gross capacity of Phase 1 to 658,424 cy from the original approved capacity of 635,200 cy; but the total gross capacity must be the approved one stated in the Comment No. 1. **Gross capacity is defined as the volume of the landfill calculated from the elevation of the waste placement, top of the bottom liner protective layer, through the top of the final cover, including the daily cover.** Revise delineation to describe phases that do not exceed approximately five years of operating capacity.
3. Please provide drawings to show a minimum of two cross sections per operational area (Phase 1 through 6 and Phase 7 alone) delineating subgrade elevations, the base liner elevations, and proposed final grade elevations (lateral and vertical expansions) which are consistent with Drawings F2/ Sheet 4 of 10 through Drawings F8/ Sheet 10 of 10.
4. (Section 1.4) Please describe a routine schedule for leachate removal in accordance with Rule .1680(b)(3) and the information of the treatment facility which receives the leachate including discharge limits and agreement in accordance with Rule .1619 (e)(4)(C)(iii).
5. (Section 1.4.2) Please provide a summary of the final designed leachate volumes - average monthly values and surge volumes created by the synthetic storm events from HELP model in Section 2.

### **Section 2.0 Engineering Plan**

6. (Section 2.1.1.4 on page 14 & Section 2.2.4) Will the Lagoon has sufficient and adequate capacity to store the leachate generated from both Phase 1 and Phase 2 operation? What is the maximum duration for the on-site leachate storage? Please clarify.
7. (Section 2.1.1.4 on page 14) Please describe the proposed Leachate Collection System and summarize the conclusions from Section 2.2.4.
8. (Section 2.1.3) Please describe if the landfill development in compliance with vertical separation requirements based on the conclusions from the foundation and settlement analysis in Section 2.2.8.
9. (Section 2.1.4) There two survey bench marks shown on Drawing No. E1. Have these two established bench marks been used for survey control? If so, please revise the context in this section accordingly.
10. (Section 2.1.6 – Cap System Standards) Please provide the references of “the proper seeding and mulch of the erosive layer and other erosion control devices.” The references can be the approved erosion and sediment control plan and/or the North Carolina Erosion and Sediment Control Planning Design Manual.
11. (Section 2.1.6 – Cap System Standards & Section 6.1 - Introduction) Please correct the typographic errors stated below:
  - i. Replace “the closed landfill” by “the unclosed landfill” – the last sentence of the 2<sup>nd</sup> paragraph.
  - ii. Replace “the enclosed landfill” by “the unclosed landfill” – the last sentence of the 3<sup>rd</sup> paragraph.
12. (Section 2.17) Please provide a copy of the current legal agreement document between the Town of Kinston Wastewater Treatment Plan (WWTP) and Lenoir County MSWLF to demonstrate (i) the total quantity of leachate per month can be treated in the WWTP in the normal operating condition; (ii) the total quantity of leachate per month can be treated in the WWTP in the emergency operating condition; and (iii) the leachate pre-treatment standard.

13. (Section 2.2) Pursuant to Rule 15A NCAC 13B .1624 (b)(15), Lenoir County must provide a hard copy of the approval letter from the Land Quality Section of the Division of Land Resources to confirm that the submitted Erosion Control Plan (calculations and drawings) for developing and operating Phase 2 is in compliance with the requirements stated in the Sedimentation Pollution Control Law (15A NCAC 4). An electronic copy of the approved Erosion Control Plan submitted to the Land Quality Section must be appended to the Phase 2 PTC application.
14. (Section 2.2.1) Please provide the detail calculation processes and assumptions resulting in the required soil volumes for constructing components of the base liner (standard and/or alternative ones) and final cover systems.
15. (Section 2.2.1) “Phase 3” that is mentioned in the section is likely a typographic error of “Phase 2”. Please make necessary correction.
16. (Section 2.2.3 – HELP Model) Please provide the reasons or assumptions why the default waste characteristics of material texture number 19 – municipal waste with channeling, rather than the default values of material texture number 18 – municipal waste was selected as input data in the model.
17. (Sections 2.24 & 3.6.1) The pipe separation distance of 50-feet is specified in Section 3.6.1 (the first paragraph) and Section 2.2.4 (on page 126); this information is inconsistent with the one (100-foot space, center to center of lateral piping) shown on Drawing E7/ Sheet 9 of 15. Please clarify and make necessary corrections.
18. (Section 2.2.4 on Pages 123 & 124) Please provide a calculation example and/or sources to show how the following quantities are derived from:
  - i. 7.2-inch depth of precipitation for a 25-yr and 24-hr storm event;
  - ii. Average monthly flows for a 5-year period on a per acre basis – from January to December (on Page 123);
  - iii. Flow into perforation of pipe and vertical and horizontal flows through rock fill (on Page 123);
  - iv. The daily peak flow as shown by the HELP Model for a five year period, which is 40,953 gallons (on Page 124);
  - v.  $Q_{25} = 1,357.62$  gpm & pipe length 144 feet (on Page 124)
  - vi. 2,273 lf of 6” leachate line in Cell 1 (on Page 126).
19. (Section 2.2.4 – initial calculation on Page 123 & Section 2.1.1.4 on page 14) The proposed schedule for empty the lagoon is once per 1.9 months. This proposed schedule does not consider the leachate generated from Phase 1 area. Based on the data in the PTC - Phase 1 application, the designed annual leachate amount is approximate 4.5 million gallons. Lenoir County can also provide leachate volume generated from Phase 1 area for the last five years to support the calculation. Please clarify.
20. (Section 2.2.4 on Page 123 – system performance) What is the basis to assume that the largest area without garbage is approximately 5 acres? Will the Phase 2 area (approximately 9.23 acres) be divided into several cells? If so please add the information to the Section 1 – Facility Plan.
21. (Section 2.2.4 on Page 127 – system performance) Please provide the following information associated with the submersible pump:
  - i. The detailed hydraulic calculations based on the flow rates and total dynamic heads for sizing the pumps in the both normal operation and storm surge events. The pumps must have adequate capacity to safely remove the leachate volumes generated from for the worst scenario case described in this subsection and reduce leachate head to less than one foot in the LCS within 17.1 hours after a 24-hour, 25-year storm event.

- ii. The recommendations for adjustment of pump seating height to avoid intake screen or impeller plugged and level sensor blinded by deposits and routine pump maintenance.
  - iii. The pump performance curves and specifications for the selected pump must meet the ones shown on Drawing No. E9/Sheet 11 of 15.
  
22. (Section 2.2.4) Please address the following concerns associate with LCS Design Calculation:
  - i. Provide the filter design to meet soil retention criteria, flow criteria, and clogging criteria between the protection layer and non-woven geotextile enveloping the LCS and the protection layer and double bonded HDPE drainage net overlaid 60-mil HDPE geomembrane to comply with requirements stated in Rule .1624(b)(13)(A).
  - ii. Provide the design of drainage capacity (transmissivity and safety factor) of the double bonded HDPE drainage net to comply with requirements stated in Rule .1624(b)(12)(A).
  - iii. The results from the above-referenced designs must be the bases for selecting and specifying geotextile, geonet, and geocomposite material in Section 4 – Construction Quality Assurance Plan.
  
23. (Section 2.2.6) Please address the following concerns:
  - i. Please explain why no factor of safety (normally 1.2 to 1.5) was applied in the design of the required anchor trench. Please also revise the anchor trench detail on Drawing No. E8/Sheet 10 of 15 if the depth or runout is revised.
  - ii. Provide the reference(s) of the tensile strength, 168 psi, used in computing anchor trench for drainage net.
  
24. (Section 2.2.7) Please address the following concerns:
  - i. Please provide the copy of the portion of the reference – “*CETCO Design Manual*” used in the section. The current available design manual titled “Design and Construction of Water Containment Systems Using Bentomat CL” dated February 2009 using a different design approach.
  - ii. The reviewer has troubles to believe that designed interface friction angles of GCL/textured HDPE ( $13.^\circ$ ) and GCL/compacted clay liner ( $13.5^\circ$ ) can be safely (with factors of safety 5.53 & 2.71, individually) installed on a 3 (horizontal) to 1 (vertical) slope (slope angle is  $18.4^\circ$ ). The simplest form to calculate a veneer slope (infinite slope) safety factor (FS) is  $FS = \tan \delta / \tan \beta$ , without considering seepage force, cohesion, adhesion, buttress support, gas pore pressure, etc; where  $\delta$  is the interface friction angle, and  $\beta$  is the slope angle. In this case  $FS = \tan (13.5^\circ) / \tan (18.4^\circ) = 0.72$ , which is less than 1, i. g. a slope failure. Please re-examine the theory and design approach.
  - iii. The interface friction angles obtained in this section are inconsistent with the values used in Section 2.2.6. Please explain why two sets of data are used in the calculations.
  
25. (Section 2.2.8) Please provide the reports of foundation analysis (including bearing capacity analysis and settlement analysis) for Phase 2 area because the previous settlement analysis has completed only for Phase 1 area. The reports must include the assumptions, perimeters used for calculations, calculating processes, and literature references. It is advisable for Lenoir County that the foundation analysis should consider all loadings, including the total waste loads (considering the complete vertical expansions), baseliner systems, and the final cover systems, exerting on the subgrade soil.
  
26. (Section 2.2.8) Please address the concerns of the slope stability analysis:
  - i. The descriptions of the final cover system are inconsistent with those in the Sections 4 and 6. Please clarify.
  - ii. Based on the differences of the contours of the completed top of protective cover (87 – ft to 95-ft on Drawing E5/Sheet 7 of 15) and the final fill grades of phase 6 (100-ft to 226-ft on Drawing F8/Sheet 10 of 10), the approximately waste heights are ranging from 23-ft to 126-ft. Therefore, the maximum waste height is 126 feet, not 115 feet, which **excludes** the 5-ft-thick the baseliner

- and 4.5-ft-thick final cover components. Please make necessary correction in the contexts and re-run the slope stability analysis based on the new waste loading.
- iii. Provide the input and output data sheets generated from the computer program used for the slope stability analysis.
27. Please provide final cover system designs including:
- The veneer slope stability analysis to demonstrate the composite liner systems can safely stand on the proposed slopes and to determine the critical (lowest) friction angle in the cover system.
  - The lateral drainage system design must safely convey percolated flow from the cover system to surface water drainage systems. The designed system must consider the long term performance requirements such as described in GRI-GC8 (2001) and ASTM D4716 -08 and the predicted surcharges or loading conditions.
  - Provide the design of drainage capacity (transmissivity and safety factor) and filter design of the double bonded HDPE drainage.
  - The results from the design must be used as the bases to select each component consisting of the final cover system and reflected in the specifications in Section 4.

### **Section 3.0 Materials and Construction Practices**

28. (Section 3.4.1 on page 149) The description of the last paragraph says that “Upon request, the Flexible Membrane Liner manufacturer installer shall...” Is the Flexible Membrane Liner manufacturer installer a typographic error of the GCL manufacturer installer? Please clarify.
29. (Sections 3.6 & 4.2.6) The specification indicates that “no permeability, grain size, or other tests are required for this material” to construct protective cover. Lenoir County needs to properly address the following concerns:
- If no grain size testing is proposed for the earthen material used for protective cover, what assurance is there to confirm the earthen material containing no particles or objects greater than  $\frac{3}{4}$  inches in largest dimension and to prevent the proposed filter material (250-mil double bonded HDPE drainage net and non-woven geotextile) from physical clogging.? Please clarify.
  - If no testing of hydraulic conductivity is required for the constructed protective cover, how the data for the protective layer used in the HELP Model can be verified and confirmed and how to verify that the selected geocomposite material will not be clogged by the fines from the protective cover? Please clarify.
30. (Section 3.10.1) The procedures to develop a permeability “window” are inconsistent to those described in Section 4.2.10 and Section 6.3 (b). Please clarify.
31. Since the Section 3 is almost the duplicate of the Section 4, please revise Section 3 by incorporating all responses of the comments on the Section 4 to Section 3 as well.

### **Section 4.0 Construction Quality Assurance (COA) Plan**

32. Please provide the specifications associated with excavation, cleaning/grubbing, site protection (including environmentally sensitive areas) and restoration. The specifications must stress that during the courses of these activities, BMPs in the approved Erosion and Sediment Control Plan must be implemented.
33. (Section 4.1- Introduction) Please address the following concerns:
- Please define the role and responsibility of “Project Engineer, CQA Engineer, CQA inspector, Project Superintendent, Project Manager” which have been randomly mentioned throughout the Section 4.

- ii. Please define the roles and responsibilities of the owner/operator (Lenoir County) and manufacturers.
  - iii. This CQA Plan shall be prepared for constructing all landfill components described in the permit application including final cover systems; therefore, please revise the Contractor's responsibility accordingly.
34. (Section 4.2.2 – Base Liner System Cohesive Soil Liner) Please describe the construction approaches to tie-in the compacted clay liners in Phase 2 area to the ones underneath the Phase 1, and add the tie-in details to the drawings.
35. (Sections 4.2.2 – Base Liner System Cohesive Soil Liner, 4.2.10 –Closure Cohesive Soil Cap & 6.3 - Cohesive Soil Cap) Please address the following concerns:
- i. Provide specification of the percent (%) of fine (% passing of 3/4-inch [Section 2.1], 3/8-inch [Section 4.2.2(m)], #60 sieve [Section 4.2.3 (3.3)], and #200 sieve) and the plastic index (PI) ranges for the selected clay liner material.
  - ii. Provide explanations why the ASTM Method 2487 is not proposing for classifying soil type on samples from borrow pit, test pad, and in-place compacted clay liner if the soil index tests are proposed to run for this project?
  - iii. What provisions of surface preparation and protection of compacted soil liner are there in the end of each working day and the final lift [preparing the finished surface stated in Paragraph (m)] ?
  - iv. In the Paragraphs (h) & (n), should the area requires to be reworked or replaced also be retested? Please clarify.
36. (Sections 4.2.2(o) & 4.2.10(o)) What provisions are there to repair the holes after the survey stakes are pulled out of the soil surfaces? Please clarify.
37. (Section 4.2.3 – Alternative Base Liner System) Please address the following concerns:
- i. The qualifications of the third party laboratory to be retained for CQA testing of the GCL must be specified in the Paragraph 1.4.B.
  - ii. The TR404bm is obsolete specification for Bentomat "ST" please use the current one TR400st.
  - iii. In Table 1, the ASTM D 6243-09 is the method adopted by the waste industries for testing interface and internal shear strength of GCL, and the ASTM D 5321-08 is the method for testing interface shear strength of soil/geosynthetic or geosynthetic/geosynthetic. Please revise the testing methods. Additionally, the hydration duration, consolidation, normal loading range, and shear rates must be specified.
  - iv. In Table 1, the specified minimum values of interface friction angles may need to be revised according to the response to Comment No. 24, and the minimum value of the interface shear strength must be specified for preventing geomembrane slipping off GCL on a slope surface while in construction.
  - v. The proposed CQA testing frequency for each testing item in Table 1 is less than that adopted in the waste industry standard. The Solid Waste Section would like to recommend the testing frequency be increased twice more than the proposed ones in Table 1.
  - vi. The Paragraph 2.4 must specify procedures to handle and manage the GCL material which fails CQA testing.
  - vii. Since this section proposes that HDPE material must meet the standard specification stated in GRI test Method GM13 (the last paragraph in page 185 and third paragraph in page 187), please also specify the revision number and issuance date. It is evident that the Table2 (a) in page 186 is not the current one described in GRI-GM13, revision 9, dated June 1, 2009.
38. (Sections 4.2.4, 4.2.11, & 6.4) Please provide product specifications for the flexible membrane liner (FML) - 60-mil double textured HDPE and 40-mil LLDPE including, but not limited to:

- i. Product dimensions per roll, label and packing and delivery.
  - ii. Product on-site inspection and acceptance/rejection.
  - iii. Product on-site shipping, handling, and storage.
39. (Section 4.2.4) The first sentence of the last paragraph proposes the 60-mil HDPE liner will be placed in direct contact with moist cohesive soil liner. What about the condition of the alternate liners (18-in-thick CCL and GCL)? Please clarify.
40. (Section 4.2.4 – Preparation for Geomembrane Deployment, Paragraph (c) - Verification) The CQA testing properties and frequencies are inconsistent. The Paragraph (c) (the third sentence) proposes to conduct CQA testing in accordance with Table 2(a) of GM13-9 of 12 for each roll delivered to the site. Later, this paragraph (the last sentence) proposes to conduct testing on limited properties for one (1) roll out of four delivered to the site. Please clarify.
41. (Sections 4.2.4, 4.2.11, & 6.4 – Paragraphs 2(b) & 3(d) Weather Conditions) Please specify the allowable ranges of ambient temperatures when the FML panels are deployed and seamed.
42. (Section 4.2.4 (2) – Field Panel Placement) Please address the following concerns:
  - i. Specify deployment and installation of the FML panels follow the manufacturer’s recommendations and sound and accepted engineering practices.
  - ii. When is the time for panel placement? For example, as practical as possible, the FML panel shall be placed over the constructed CCL (Alternate 1) or GCL (Alternate 2) after the Engineer inspected and accepted in writing (certification).
  - iii. What is the provision for preventing FML from exposure of unexpected unfavorable environment? For example, unroll only those sections which will be anchored, seamed, and covered in one day.
43. (Section 4.2.4 (3) – Field Seaming) Please provide the drawings to show typical details of the FML panel seam processes – fusion welding and extrusion fillet welding.
44. (Sections 4.2.4 (4), 4.2.11(4), & 6.4(4) – Seam Preparation) Please specify that application of any solvent for cleaning /preparing the seam surface is prohibited.
45. (Sections 4.2.4 (5), 4.2.11(5), & 6.4(5) –Test Seam) Please address the following concerns:
  - i. When and how the tensiometer will be calibrated?
  - ii. Will there be a stand-by calibrated tensiometer on site while seaming is performing?
  - iii. Will the samples (coupons) of test seam be tested in shear as well by a calibrated tensiometer?
  - iv. What is the constant separation rate (inch per minute) of the tensiometer while testing?
  - v. What are passing/failure criteria for peel and shear testing?
46. (Sections 4.2.4, 4.2.5, 4.2.11, 4.2.12, 6.4, & 6.5) Are there reasons why the ASTM methods – D6392-08 or GRI-GM 19 are not adopted for the destructive seam testing? The ASTM D4437-08 is not applicable to destructive testing according to the scope of the test method. Please clarify.
47. (Sections 4.2.4 (6), 4.2.11(6), & 6.4(6) – General Seaming Procedures) Please address the following concerns:
  - i. Specify seaming procedures at locations of sumps and pipe (leachate collection piping or landfill gas vent piping) penetrations and provide the drawings to show typical details of seaming at above-mentioned locations.
  - ii. What practices are there to be executed for eliminating cutting and patching of large wrinkles that become trapped?
  - iii. If needed, what tack welds will be used while seaming panels?

- iv. What provisions are there to manage/ protect unseamed edges at the end of each working day from unfavorable environment?
  - v. What provisions are there to manage/ protect the subgrade (CCL and or GCL) of FML from surface water run off and excessive moist?
  - vi. What provisions are there to dictate the timing/schedule to backfill anchor trenches after the FML panels are installed and seamed?
48. (Sections 4.2.5(a)(3), 4.2.12(a)(3), & 6.5(3)) The specified procedures that must be followed in the event of a non-complying air pressure test are inconsistent between Sections 4.2.5, 4.2.11, and Section 6.5. The detail and completed procedures stated in Section 6.5(3) shall be followed. Please revise the specifications in Sections 4.2.5(a)(3) and 4.2.12(a)(3) accordingly.
49. (Sections 4.2.5 (c)) Please specify the constant separation rate (inch per minute) of the testing machine to determine if the HDPE seam samples pass or fail the specified strength criteria.
50. (Sections 4.2.5 (d) & 4.2.12 (d)) Please specify the pass/fail criteria including assessment of the test results for the destructive seam testing conducted in a third party laboratory. The reviewer does not believe the proposed approach in this Paragraph (d)(1) is sufficient and adequate enough to assure the quality of the constructed landfill base and cover liner systems based on the research results and evolving waste industrial standards. Therefore, the specification - GRI-GM 19 is recommended. The pass/fail criteria stated in the specification has recently been approved for use in the other landfills in the State of North Carolina.
51. (Section 4.2.5 (d)(2)) The Paragraph (c) must address the repair procedures pertaining to the FML underlain by the alternate liner # 2 (CCL and GCL) conditions. Please clarify.
52. If unexpected reasons should HDPE liners be exposed or buried for extended periods of time, prior to their joining to their joining to adjacent, subsequent panels, what provisions are there to protect leading edge of HDPE liners from machinery/equipment operation, construction activities, and weather (UV)? Please clarify.
53. Specify the approaches and documentations associated with constructed HDPE liner acceptance.
54. Please address the following concerns for construction and backfilling anchor trenches:
- i. Specify the earthen material (type & maximum grain size, etc.) and the minimum compaction effort (by ASTM D698) for the compacted backfill in the anchor trenches.
  - ii. Specify field QC testing methods and frequencies on the compacted backfill in the anchor trenches.
  - iii. Provisions to prevent standing water or softening of the adjacent soils while the trench is open.
  - iv. Provisions to protect base liner system components from trench backfilling.
  - v. Specify the construction sequences/ schedules for backfilling anchor trenches and the installation of base liner system components [compacted clay liner, geosynthetic clay liner, geomembrane (HDPE liner), and geocomposite].
55. (Section 4.2.6) Please specify the schedule for installing protective cover and LCS after the installation HDPE liner has been completed and acceptance of HDPE liner has been granted.
56. (Section 4.2.6 – Select Backfill, Page 196) The specification requires the select backfill containing no particles or objects greater than ¾ inches in largest dimension, which has been screened. Please provide the specification of earthen material screening processes, if the on-site borrow pit is used. If select backfill will be obtained from off-site borrows, the sieve analysis report from the borrow pit or the quarry must be submitted to Engineer for approval prior to use. The report shall be a portion of the CQA report. Please clarify.

57. (Section 4.2.6, Page 196) To avoid any confusion, please specify the locations to use selected backfill and backfill and incorporate the specified locations on Drawing E8/Sheet 10 of 15 – cohesive soil liner details.
58. (Sections 4.2.6, 4.2.13, & 6.6 - Geocomposite Property Table) please address the following concerns:
  - i. Please provide the product trade name of the geocomposite material manufactured by SKAPS industries.
  - ii. Please specify the geocomposite testing frequencies.
  - iii. The testing of transmissivity of the geocomposite material, testing conditions (vertical loadings, hydraulic gradients, hydration times, and boundary conditions must closely simulate the field conditions and consider long-term performance requirements for both base liner and final cover systems. Please explain how the specified testing conditions (in Note 1) are selected.
59. (Sections 4.2.6, 4.2.13, & 6.6) Please provide specifications for the HDPE geocomposite drainage material including, but not limited to:
  - i. Product descriptions, dimensions per roll, label and packing and delivery.
  - ii. Product manufacturer specification and confirmation testing results (including testing properties, methods and frequencies).
  - iii. Product on-site inspection and acceptance/rejection.
  - iv. Product on-site shipping, handling, and storage.
60. (Sections 4.2.6, 4.2.13, & 6.6) Please specify that the patch to be used for repairing the damaged geocomposite must be the same type material of the selected geocomposite.
61. (Section 4.2.6 – Protective Soil Cover) Please address the following concerns:
  - i. What is the thickness of the completed erosive layer and how to verify/confirm the final thickness? Please clarify.
  - ii. What provisions are there to repair the damaged base liner components – geocomposite, geomembrane, GCL, CCL during the course of constructing 3-foot-thick protective soil cover? Please clarify.
62. (Section 4.2.7) Please provide product data sheet for all HDPE piping including lateral piping, header piping, sump, and risers consistent with the submitted drawings.
63. (Section 4.2.7, Paragraph (2)) Please address the following concerns:
  - i. Define “no fines.” Will this mean no stone in any batches have a size less than 1 inch (NC DOT # 5 stone has a size range 1 to 1.5 inches) based on the sieve analysis results? Please clarify.
  - ii. The stone size described in Section 4.2.7(2) - NC DOT # 5 is inconsistent with the one - NC DOT # 57 or # 5 (shown on Drawing E9/Sheet 11 of 15 (Details of Typical Sump & Riser Section). Please clarify and make necessary correction.
  - iii. Specify the test method and frequency for the proposing sieve analysis test. The test results must be a portion of the CQA report.
  - iv. Specify that the stone for encasing leachate pipe shall be a clean washed hard non-carbonaceous mineral (e.g. quartz) which must be chemical compatible with leachate, and the maximum acceptable concentration of calcium carbonate for the stone/rock aggregate per ASTM D4373.
  - v. Specify the hydraulic conductivity of the granular material - NC DOT # 5 stone and QA/QC testing protocols (methods and frequencies).
64. (Section 4.2.7) Please identify the locations of gate valves and manholes with invert elevations on the Drawings E7/Sheet 9 of 15 and P1/Sheet 3 of 11.

65. (Section 4.2.7) Please address the following concerns with the Paragraph (6) - leachate collection trenches:
  - i. Provide at least two (2) bench marks on the Drawing E7/Sheet 9 of 15.
  - ii. Specify the QC testing requirements (methods and frequencies) for the repaired base liner components (CCL, GCL, or FML) or geocomposite drainage nets which are damaged by construction of leachate collection trenches.
  - iii. Specify the dimensions of the constructed trench.
  - iv. Provisions to prevent standing water or softening of the adjacent soils while the trench is open.
66. (Section 4.2.7 – Paragraphs (3) &(7)) Has the selected geotextile been properly designed for filtration to prevent the stone and leachate piping from clogging by fine particles inside the 3-foot-thick earthen protective layer? Please clarify.
67. (Section 4.2.7) Please provide specifications procedures for installing the leachate piping and backfilling leachate collection trenches and sump construction in consistent with Drawing E9/Sheet 11 of 15.
68. (Section 4.2.7) The specification must include:
  - i. The final as-built drawings that are prepared, signed and sealed by a Land Surveyor registered in the State of North Carolina confirm that the thickness of the fill material and the invert elevations, lengths, and slopes of the piping required by the plan, drawings and specifications is actually in place.
  - ii. The certification signed by Engineer confirms that the material (properties and dimensions) and construction required by the plan, drawings, and specifications are actually in place.
  - iii. The as-built drawings and certification must be appended to the CQA report.
69. (Section 4.2.8) The specification requires installation HDPE containment force main in conformance with ASTM D2321, but the trench details shown on Drawing E8 / Sheet 10 of 15 are not consistent with the requirements specified in ASTM D2321. Please clarify and make necessary corrections.
70. (Section 4.2.8) The Paragraph (3) must specify the methods of testing (e.g. ASTM D2837), applied constant pressures (e.g. 1,600 psi for cell classification 335434C as referenced in ASTM D3350), and testing protocols.
71. (Sections 4.2.10 & 6.3) Please address the following concerns:
  - i. Are there specifications to ensure that the 12-inch intermediate soil cover is well prepared and constructed prior to install a compacted clay liner? Additionally, to verify the thickness of the soil clay liner, a baseline survey at 50-ft grid points on top surface of constructed intermediate soil cover must be specified.
  - ii. In the Paragraph (d) (on pages 201 & 252) the referenced testing methods for moisture & density testing – ASTM D2488 is incorrect. Please specify the correct testing method ASTM D2487.
  - iii. In the Paragraph (g), the effective confine pressure and hydraulic gradient for the ASTM D5084 must be specified. The specified values shall be representative of field conditions.
  - iv. In the Paragraph (l), please provide the bentonite and soil mixture procedures.
  - v. In the Paragraph (o), the proposed method that is verifying and confirming the thickness of the in-place soil clay liner by surveying at 100-ft grid points over the final cover is inconsistent with the approach depicted in Section 3.10.1 – survey at 50-ft grid points, which is consistent with specifications for baseliner components. Please clarify.
72. (Sections 4.2.11 & 6.4) Please address the following concerns:
  - i. Please specify the surface characteristics (smooth, single-sided or double-sided textured) of the LLDPE geomembrane which shall be consistent with the details shown on Drawing E12/Sheet 14 of 15.

- ii. The specified properties of the 40-mil LLDPE are not matching those in the standard specification of GRI test Method GM17 (revision 6, dated June 1, 2009). If the intention is using GM17 to specify the LLDPE product properties, please use the current one; otherwise, it is advisable for Lenoir County to ensure that the specified LLDPE products are available in the market.
  - iii. In Paragraph 1(c) – Verification, what are the QA/QC testing protocols (methods, frequencies, passing criteria, etc)? Please clarify.
73. (Sections 4.2.11(2) & 6.4(2) t) Please address the following concerns:
- i. Specify deployment and installation of the FML panels follow the manufacturer’s recommendations and sound and accepted engineering practices.
  - ii. When is the time for panel placement?
  - iii. What is the provision for preventing FML from exposure of unexpected unfavorable environment? For example, unroll only those sections which will be anchored, seamed, and covered in one day.
74. (Section 4.2.12) Please address the following concerns:
- i. Specify the constant separation rate (inch per minute) of the testing machine to determine if the LLDPE seam samples pass or fail the specified strength criteria in Paragraph (c).
  - ii. If unexpected reasons should LLDPE liners be exposed or buried for extended periods of time, prior to their joining to their joining to adjacent, subsequent panels, what provisions are there to protect leading edge of LLDPE liners from machinery/ equipment operation, construction activities, and weather (UV)? Please clarify.
  - iii. Specify the approaches and documentations associated with deployed LLDPE liner acceptance.
75. (Sections 4.2.13 & 6.6) Please specify the CQA material confirmation testing requirements including test methods and frequencies by a third party laboratory.
76. (Sections 4.2.13(2) & 6.6(2)) Please address the following concerns:
- i. Provide the filter design data to meet soil retention criteria, soil flow criteria, and soil clogging criteria (including calculation processes, assumptions, and theories, and references) between the erosive layer and the double bonded HDPE drainage net overlaid 40-mil LLDPE geomembrane.
  - ii. Should the earthen material used for constructing erosive layer be selected according to the specified long-term performance of geocomposite drainage net (see Comment No. 27)? Please specify testing methods, frequencies, and selection criteria on earthen material from on-site stockpiles and borrow pits.
  - iii. What is the thickness of the completed erosive layer?
  - iv. Please specify methods or approaches to verify and confirm the thickness of the completed erosive layer.
  - v. What provisions are there to repair the damaged base liner components – geocomposite, geomembrane, GCL, CCL during the course of constructing 3-foot-thick protective soil cover? Please clarify.
77. (Sections 4.2.14(1) & 6.7(1)) The Sections specify that NC DOT No. 5 stone will be used in the construction of gas venting system, but #57 stone is shown in the trench details on Drawings P9/Sheet 11 of 11 and E12/Sheet 14 of 15. Please clarify.
78. Please address the following concerns for construction and backfilling anchor trenches:
- i. Specify the earthen material (type & maximum grain size, etc.) and the minimum compaction effort (by ASTM D698) for the compacted backfill in the anchor trenches.
  - ii. Specify field QC testing methods and frequencies on the compacted backfill in the anchor trenches.
  - iii. Provisions to prevent standing water or softening of the adjacent soils while the trench is open.

- iv. Provisions to protect base liner system components from trench backfilling.
  - v. Specify the construction sequences/ schedules for backfilling anchor trenches and the installation of final cover system components [compacted clay liner, geomembrane (LLDPE liner), and geocomposite].
79. The granular material proposed to be filled into landfill gas collection trench is not consistent - # 5 stone (in Sections 4.2.14 & 6.7) vs. # 57 stone (on Drawing E12/Sheet 14 of 15). Please clarify and made necessary correction.
80. (Section 4.3) In addition to the components of the CQA Report mentioned in this section, the following components, but not limited to, need to be included the report:
- i. All parties (name & contact information) involved the landfill construction and their duties and services.
  - ii. All QA/QC data (including landfill gas vent system), as-built drawings certified by a surveyor registered in North Carolina pertaining to construction of final cover system.
  - iii. Completed and signed meetings (pre-construction, progress, and trouble-shooting) minutes
  - iv. Hydrostatic testing report for non-perforate leachate collection piping.
  - v. Daily and monthly reports summarized the construction activities and signed by Engineer.
  - vi. A series of color photographs of major project features.

#### **Section 5.0 Operations Plan**

81. (Section 5.1, 3<sup>rd</sup> Paragraph, on Page 221) Please describe the information (type, capacity, and performance specifications) of the pumps to be routinely used for removing leachate from the sumps to the lagoon and the high-flow pump to remove leachate form a storm surge event. The data for sizing the pump must be consistent with the ones in the Engineering Plan (see Comment No. 21) and Drawing No. E9 / Sheet 11 of 15. How many pumps will be available and functional at the facility? Is the pump stationed or potable (roller-mounted) one? Is there a stand-by pump for emergency or downtime?
82. (Section 5.1, Section 5.2.11.f. & Section 5.6) The Solid Waste Section will not approve the proposed Recirculation Plan because the proposed composite base liner system and the leachate collection system for Phase 2 development and operation do not meet those requirements stated in the Leachate Recirculation Guidance (Guidance), which can downloaded from the web site: <http://wastenotnc.org/swhome/lrcg.html>. Additionally, the DWM's records indicated that Lenoir County has not submitted the Solid Waste Section a final report on the pilot leachate recirculation project at Phase 1 area for a review and approval. However, if Lenoir County intends to recirculate the on-site leachate as a permanent leachate management tool, please revise the HELP MODEL, the base liner and the leachate collection systems and submit a pilot study plan in accordance with the Guidance. Otherwise, please remove the Section 5.6 and leachate recirculation proposal throughout the PTC application.
83. (Section 5.1, 7<sup>th</sup> Paragraph, on Page 221) Please add the thickness, at least 6 inches, of the daily soil cover to this paragraph.
84. (Section 5.1, 7<sup>th</sup> Paragraph, on Page 221 & Section 5.4 – Appendix II) Has this proposing alternative daily cover - synthetic cover been approved by DWM to use at Phase 1 area? If so, please provide the DWM approve letter appended to the Appendix II.
85. (Section 5.1, 7<sup>th</sup> Paragraph, on Page 221 & Section 5.4 – Appendix II) If this synthetic material is proposed to be used as an alternative daily cover (ADC), please revise Section 5.4 by adding the following minimum requirements:
- i. The manufacturer's specifications – material (engineering properties, dimensions, and characteristics) and installation.

- ii. The synthetic material must be biodegradable; otherwise, Lenoir County must demonstrate this ADC will not impede leachate downward percolation to the constructed LCS and not enhance the lateral seepage occurring on the side slopes.
- iii. Proposal for a 90-day trial schedule and notification requirements.
- iv. Demonstration Report: Statements in detail of how this ADC application complies with Rule .1626(2)(b) and any other pertaining information including, but not limited to manufacturer's specifications for the selected ADC, final employment approaches, and photos – employment, in-placed (with anchors/weights) and removal of ADC.

After inspection, the Solid Waste Section may approve Lenoir County to use this ADC according to the approved Demonstration Report for the Lenoir County MSWLF, Solid Waste Permit Number 54-09. Should another types / kinds of ADCs be used at this landfill, prior to employment, a request for permit modification – updated Operations Plan must be submitted by Lenoir County to DWM for a review and approval. Application for a permit modification must be prepared in accordance with applicable statutes and rules in effect on that date and will be subject to a permitting fee

86. (Section 5.1, 6<sup>th</sup> Paragraph, on Page 222) It is likely the reference of Section 5.3 for groundwater and surface water monitoring frequency is incorrect. Please provide the correct reference.
87. (Section 5.2.4 - Explosive Gases Control, on Page 225) Please address the following concerns:
  - i. Provide the tentative schedules for the completion of installation of the proposed methane monitoring probes and for conducting the first round quarterly methane gas sampling.
  - ii. Please add the following minimum requirements of the written report (signed, sealed, and dated by a Professional Engineer or Professional Geologist registered in the State of North Carolina) to this section after the installation of the proposed methane monitoring probes is completed. The report includes, but not limited to (a) a scaled as-built drawing depicting the locations of the gas probes which are surveyed by surveyors register in the State of North Carolina; (b) well construction records (completed GW-1 form), well & boring logs, groundwater tables, and descriptions of any deviations from the original plan; and (c) the report will also describe the schedules (the firm date) for the first methane gas sampling event and the follow-up quarterly sampling events.
88. (Section 5.2.5) Please add the following sentence to the end of the Paragraph b. – “In addition, the Division of Air Quality and local fire department must approve the activity prior to burning.”
89. (Section 5.2.11) The Paragraph a. proposes that “the initial lift of solid waste will be placed over cell 1 that ... ditch.” There is no descriptions of Phase 2 will be divided by cells in the Facility Plan, please clarify. If this is a practice of stormwater and leachate control for active and inactive cells as shown Drawing No. P3/ Sheet No. 5 of 11 to pursuant Rule .1625(b)(1)(D), please make detail description in this Section.
90. (Section 5.2.12) Please address the following concerns:
  - i. Please add record keeping requirement to the Paragraphs b and c.
  - ii. Please add the following paragraph to this Section:

*The leachate collection system must be maintained in accordance with 15A NCAC 13B .1626(12)(a). For any cell(s) constructed utilizing on-site native soil as protective cover, the leachate collection lines shall be cleaned at least once per year and a remote camera inspection completed once every five (5) years. The Division may consider reduction in frequency for cleaning and inspection, upon written request from the Facility, after the first five years, pending the documented results of the cleaning and remote camera inspection.*

- iii. To facilitate the leachate line cleaning and inspection, the Solid Waste Section strongly recommends that the cleanouts be installed at both ends of the 8-inch header pipes and one end of the 6-inch lateral pipes, tee to the 8-inch header pipes and extended to the areas outside the waste footprints. The smooth bends (cleanout riser bends and all drain bends) must be provided for easy access by the conventional water jet equipment and video camera (with push rods), which are normally able to reach 500 feet inside the pipe from one end of the pipe. To do so, in the event that obstruction is encountered inside a line, the high-pressure jetting equipment can easily reach the blocks from both cleanouts at either ends of the pipe; and the video camera can provide the causes of blockage. If Lenoir County agrees the above-mentioned recommendations, please revise this Leachate Management Plan and Drawings No. E7/ Sheet 9 of 15 & P2/Sheet 4 of 11 accordingly.
  - iv. What provisions are there to address the sump maintenance and the prevention and cleanup of potential accumulation of the fines in the sump for the normal operation periods and during the courses of maintaining leachate collection piping? Please clarify.
91. (Section 5.4 – Appendix II – Synthetic Cover Operation Plan)
- i. What are dimensions for each roll of the synthetic cover?
  - ii. What are the proposing overlap lengths (sides & ends)?
  - iii. If tires are used as anchors to weight down the ADC panels, what provisions are there pertaining to tire storage (tire is prohibited from landfill).
92. (Section 5.5 – Appendix III – Explosive Gas Control Plan) The Solid Waste Section suggests that at some locations two probes (one shallow and one deeper) clustered in one boring is required. Shallow probe will be installed at a depth of 6-feet below the grade; the deeper one will be installed above the groundwater table. Because wastes will be disposed of in the cell of Phase 2 at the elevations several feet below the proposed 6-foot well depth. The boring logs indicate the subgrade of Phase 2 is overlain a clayey and silty sand formation. If the preferential paths for landfill gas migration exist in this formation, the shallow-depth probes may not detect the landfill gas migration. Additionally, the Gas Control Plan concludes that “the various depths of the monitoring probes are to ensure a stable monitoring point. Therefore, if Lenoir County agrees with the aforementioned recommendation, please revise the Gas Control Plan accordingly.
93. (Section 5.5 – Appendix III – Explosive Gas Control Plan) This section reports there are four (4) existing gas monitoring probes installed at this landfill, but the existing probes are not shown on the drawings. Please add the locations of existing methane monitoring probes surrounding Phase 1 to the Drawing F-1/Sheet 3 of 10 & Drawing P8/Sheet 10 of 11.
94. (Section 5.6) Please address the following concerns:
- i. Provide the approval document to demonstrate that Kinston Wastewater Treatment Plan accepts leachate generated from Lenoir County MSWLF for disposal.
  - ii. Provide the locations and details of the leachate head detection wells on the drawing (s) which needs to be referenced to this section.

### **Section 6 Closure Plan**

95. (Section 6.1, the 3<sup>rd</sup> paragraph on Page 250) In this Phase 2 PTC application, the estimated maximum inventory of wastes ever on-site over the active life needs to include the maximum in-placed wastes from both Phases 1 and 2 areas; and the estimated maximum inventory of wastes will be likely more than the reported volume of 511,000 cubic yards. Please clarify.

### **Section 7 Post-Closure Plan**

96. (Section 7.1 – Description of Maintenance Activities on page 269) Please address maintenance and repair requirements pertaining to:
- i. Facility security (fencing, gates, and signage),

- ii. Roads access to monitoring points,
  - iii. Components of the on-site monitoring networks (groundwater monitoring wells and landfill gas vents & probes),
  - iv. Silt up sediment basins and surface drainage features,
  - v. Leachate seepages and outbreaks,
  - vi. Fertilization and mow of vegetations and removal of tree saplings.
  - vii. Protection the permanent benchmarks for waste boundaries.
  - viii. What provisions are there to repair (may including QA/QC testing if liners are damaged) the reported damaged cap system due to settlement, erosion, animal burrows, etc?
  - ix. Please provide the references of the monitoring plans for water quality monitoring and landfill gas monitoring programs.
97. (Section 7.1) Maintenance and operation of any leachate collection system must be described in detail in the post-closure plan. This should provide for frequency of monitoring, operating, cleaning of collection lines or other maintenance, and testing of leachate. The post-closure plan should also describe pump maintenance, pump repair and replacement, leachate lagoon repair and maintenance, and leachate removal and treatment, if applicable. If a change in frequency of any activities is planned during the post-closure period, a description of the method used to determine the necessity or feasibility of the change must be described in the plan. Please revise the plan accordingly.
98. (Section 7.1) The Post-Closure Plan must to describe the closure requirements of the on-site leachate lagoon. The lagoon closure plan must be submitted to the Division for a review and approval prior to commencing closure activities. The costs associated with the closure activities and closure certification report must be added to the post-closure care cost estimates. Please revise the Post-Closure Plan and cost estimates accordingly.
99. Please address the recording keeping requirements for inspection, repair, and maintenance activities during the 30-year post-closure care periods. All documents must be placed in the facility operating records in accordance with Rule .1626(10).
100. (Section 7.2) The cost estimates need to add the costs associated with items (roads, fencing, signage, mowing & fertilization of vegetation, maintaining erosion control devices and stormwater / surface drainage systems, etc.) mentioned in Comment No. 96 and costs related to administration/ record keeping and the certification report. Please revise the cost estimates accordingly.

### **Drawings**

101. (Drawing F-1/Sheet 3 of 10) Please add the following features to the drawing in accordance with Rule .1619(d):
- i. Monitoring locations for Phase 1 including methane monitoring probe locations (MP-01 through MP-14), a surface water sample location (SW-3), and a leachate sample locations (Lagoon).
  - ii. Scale house, sediment basins & traps, and soil borrow site on the north / northeast side of Phase 1.
  - iii. Existing leachate collection and storage system for Phase 1 operation (Rule .1619(d)(3)).
  - iv. The street/ road name (Hodges Farm Road?) to the site entrance.
102. (Drawings F-1/Sheet 3 of 10 & P8/Sheet 10 of 11) Please add the locations (with identifications) of existing methane monitoring probes surrounding Phase 1.
103. (Drawing E7 / Sheet 9 of 15) Please address the following concerns:
- i. Provide the trench details for the dual containment force main (4-inch carrier by 8-inch containment).
  - ii. The 16 oz/sy non-woven geotextile enclosing the sump area is shown on this drawing. What provisions are there to prevent the long-term performance of the geotextile from biological clogging?

104. (Drawing E8/Sheet 10 of 15) Please address the following concerns:
- i. Add the GCL layer to the anchor trench detail and indicate this layer is required for Alternate Base Liner System.
  - ii. Add the liners tie-in details of connecting Phase 1 and Phase 2 baseliner systems (see Comment 34).
105. (Drawings No. E12/Sheet 14 of 15 & P9/Sheet 11 of 11) Please address the following concerns:
- i. According the descriptions of the final cover system in Section 2.1.6, the proposed 40-mil HDPE FML is likely a typographic error of 40-mil LLDPE FML. Please make necessary correction.
  - ii. Correct the inconsistent stone sizes (#57 vs. #5) to be used in the trench.
  - iii. Provide details of the properly connection between the geosynthetic liners to the gas vent casing (seal "boots" around the vent pipe) to prevent the final cover system from surface water intrusion/penetration.
  - iv. Please add anchor trench detail to the figure consistent with the Sections 3.10.
106. (Drawing P8/Sheet 10 of 11) Please add the identification numbers next to the proposed methane monitoring probes.
107. (Drawing P9/Sheet 11 of 11) The hydraulic conductivity value of the 18-inch thick compacted clay cover is missing. Please make necessary correction.

Lenoir County needs to provide the Solid Waste Section a new submittal (including a written hard copy and an electronic copy) which incorporates requested information, document, revisions, and responses. These comments are intended to expedite the review of the referenced application, and in no way do they restrict the Solid Waste Section's right to request additional information during the technical review process.

The Solid Waste Section appreciates your efforts and cooperation in this matter. If you have any questions or would like to schedule a meeting to discuss this matter further, please contact me at (919) 508- 8507.

Sincerely,



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

cc:

Wayne Sullivan, MESCO  
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