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13 March 2019

Mr. Michael A. Melito
Delaware Department of Natural Resources and Environmental Control (DNREC)
Division of Waste and Hazardous Substances
Solid and Hazardous Waste Management Section
89 Kings Highway
Dover, Delaware 19901

RE: Professional Services under Contract No. NAT-15374 for
Environmental Investigation and Remediation Services for
Delaware Recyclable Products, Inc. (SW-15/02)
19 0131 04-D DRPI 3rd Party Eng Review Vertical Expansion SW15-02
EA Project No. 1531811

Dear Mr. Melito:

EA Engineering, Science, and Technology, Inc., PBC (EA) has reviewed the Delaware Recyclable Products, Inc. (DRPI) Landfill Permit Application in accordance with our scope of work (described below). We have developed draft comments in this letter for DNREC's review and use in response to the applicant.

SCOPE OF REVIEW

EA performed a general review of the Engineering Report and design drawings (listed below) to gain an overall understanding of the proposed vertical expansion:

- Permit Modification Application, Part VI – Engineering Report for Vertical Expansion, DRPI Industrial Landfill, New Castle, Delaware prepared by Geosyntec Consultants dated July 2018
- Vertical Expansion Design Modification Application, DRPI Industrial Waste Landfill, New Castle, Delaware prepared by Geosyntec Consultants dated July 2018

EA performed a detailed review of Chapters 4, 5, and 8 and Appendices VI-D, VI-E, and VI-H of the Engineering Report. EA's review focused on evaluating the methodologies utilized in the engineering analyses, evaluating the input values utilized in the engineering calculations, and confirming the results of the calculations. EA did not perform a detailed review of drawings, specifications, or the construction QA Plan.

EA developed a list of questions/concerns for DNREC to consider in making comments to the Applicant, as well as a list of suggested specific comments to the Applicant. These are included in two separate sections in this letter.



ITEMS FOR DNREC'S INFORMATION AND CONSIDERATION

1. Delaware Regulations Governing Solid Waste (DRGSW) 6.1.3.6 requires Applicants to illustrate that the facility is not within 200 feet of a fault that has had displacement during Holocene time. The Engineering Report does not appear to address this.
2. Section 4.3 Proposed Liner System Components. Page VI-13. 1st Paragraph. The Applicant states that a geosynthetic clay liner (GCL) is "equivalent to 24-in. thick of compacted clay liner." This equivalency is not demonstrated in the Engineering Report. Does DNREC accept this equivalency?
3. Appendix VI-D.3: Settlement of Liner System. Methodology is sound and no issues were identified with the input parameters or the results.
4. Appendix VI-E.1: Leachate Management System Evaluation. EA did not review the details of the calculations from 2005.
5. Appendix VI-E.2: Pipe Structural Stability Calculations. Methodology is sound and no issues were identified with the input parameters or the results.
6. Appendix VI-H.2 Cover System Veneer Stability on Side Slopes. Page 3. The Applicant has stated that ". . . a veneer stability failure of the liner system does not pose a threat to human health or the environment and a failure could be easily repaired . . ." Does DNREC concur with this statement? No analysis is included in the Engineering Report that indicates what the impact of a veneer slope failure could be. This statement is also the basis for selecting a minimum factor of safety of 1.25 for slope stability in lieu of 1.5 if a failure could pose a threat to human health or the environment.
7. Appendix VI-H.3 Landfill Stability Analysis. Methodology is sound and no issues were identified with the input parameters or the results.
8. Appendix VI-H.5 Geomembrane Strain Due to Localized Differential Settlement. Methodology is sound and no issues were identified with the input parameters or the results. The calculation shows that a grade reversal could occur if a 1.5-foot radius void developed 5 feet below the landfill cap. The Applicant has stated that the grade reversal could be repaired by ". . . adding soil to maintain positive drainage." Is DNREC in agreement with this approach?
9. Appendix VI-H.6 Geomembrane Puncture Resistance – Cover. Methodology is sound and no issues were identified with the input parameters or the results.

DRAFT COMMENTS TO THE APPLICANT

1. Section 5.1 Introduction. Page VI-17. 9th bullet. Revise " 1×10^{-3} cm/sec" to " 1×10^{-2} cm/sec."
2. Appendix VI-D.1: Geomembrane Puncture Resistance – Liner. Page 3. Justify selection of MFs = 0.5 (sub-rounded particles) for AASHTO No. 57 stone, which is typically angular.



3. Appendix VI-D.1: Geomembrane Puncture Resistance – Liner. Page 6. Check reference to Figure 2 in the bearing capacity calculation.
4. Appendix VI-D.2: Liner System Veneer Stability on Side Slopes. Page 2. Confirm Equation 1, third term, should " $\sin (2B)$ " be " $2 \sin (B)$ "? Confirm calculations are correct or revise, if needed.
5. Appendix VI-E.1: Leachate Management System Evaluation. The calculation states that runoff is not expected to occur from the open area during operations (10 to 15 acres cited in the calculations). Explain why the HELP model input shows 100% of that area can runoff. Presumably, modeling it this way would under-represent the estimated leachate head on the liner calculated by the HELP model.
6. Appendix VI-E.1: Leachate Management System Evaluation. Justify why average head on liner versus maximum head on liner from the HELP model output is used to demonstrate compliance.
7. Appendix VI-H.1: Geocomposite Drainage Layer Evaluation. Explain why the average annual head on the cap versus the maximum head on the cap from the HELP model output is used to justify that the final cover system drainage layer capacity is sufficient.
8. Appendix VI-H.1: Geocomposite Drainage Layer Evaluation. Are the calculated d_{85} and d_{15} of the protective soil included in the Technical Specifications?
9. Appendix VI-H.2 Cover System Veneer Stability on Side Slopes. Page 2. Confirm Equation 1, third term, should " $\sin (2B)$ " be " $2 \sin (B)$ "? Confirm calculations are correct or revise, if needed.
10. Appendix VI-H.2 Cover System Veneer Stability on Side Slopes. Page 5. An interface friction angle of 25 degrees is used in the calculations for the condition below the geomembrane, but the Technical Specifications only require a minimum interface friction angle of 23 degrees. Explain how this is protective or modify the calculation or the Technical Specifications to be consistent.
11. Appendix VI-H.4 Analysis of Final Cover System Settlement. The calculation states that "Consolidation parameters for the waste are discussed in the calculation package entitled 'Settlement of Liner System' . . ." Please explain why the Modified Coefficient of Consolidation used in this calculation is 0.22 and the Modified Coefficient of Consolidation used in the "Settlement of Liner System" calculation is 0.12. Make changes to the calculation as warranted.



EA appreciates the opportunity to assist you on this project. If you have any questions or comments, please feel free to contact me at 410-329-5135.

Sincerely,

EA ENGINEERING, SCIENCE,
AND TECHNOLOGY, INC., PBC

A handwritten signature in blue ink, appearing to read 'Mark Gutberlet', with a long horizontal stroke extending to the right.

Mark Gutberlet, P.E., BCEE
Project Manager

cc: G. Porter (EA)
G. Tizard, P.E. (EA)