



26 March 2019

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

Re: Review of: *Permit Modification Application (Volumes 1, 2, and 3) for Vertical Expansion*
DRPI Industrial Landfill (July 2018)
Solid Waste Permit No: SW-15/02
19 0315 02-D DRPI Permit Application Response 2 SW-15-02

Dear Michael:

This letter and associated documents are submitted to the Delaware Department of Natural Resources and Environmental Control (DNREC) on behalf of Delaware Recyclable Products, Inc. (DRPI) in response to your review of the Permit Modification Application for Vertical Expansion for the DRPI Industrial Landfill Site (SW-15/02). As requested in your 15 March 2019 letter, Table 1 contains point-by-point responses to your comments. Where appropriate, revisions have been incorporated in to the Permit Modification Application and either replacement pages or full replacement sections (when many pages were revised) are attached for replacement.

Following completion of the Cell 6-2B grading, minor adjustments were made to the final grading plan in the southeast corner of the site in order to tie in to the existing clay cap. These minor edits have resulted in changes to a number of figures and drawings and revised pages are listed in Attachment A. The associated stormwater calculations were subsequently reviewed and updated to ensure accuracy with the minor revisions in the grading plan. In addition, in reviewing the full permit application package, additional typos were corrected in the Closure and Post Closure Plan (Part XI) and these pages are also included, in addition to the updated financial assurance.

In regards to the proposed change in chemical used for leachate pretreatment, DRPI has updated the TIER II inventory in DNREC's online tracking system.

A compiled electronic copy of the attached pages has also been included, as requested. A full permit application package can be provided upon request when the application is deemed complete. Please see Attachment A for a list of documents attached.

DRPI Response to Comments

26 March 2019

Page 2

Please call or email us if you have any questions.

Respectfully submitted,

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Copies to:

- Barry T. Sutch, P.E., Senior Area Engineering Manager Greater Mid Atlantic, Waste Management
- Brian P. Bolvin, P.E., Site Engineer, Delaware Recyclable Products, Inc. (Electronic Only)
- Richard Klonowski, District Manager, DRPI (Electronic Only)
- Jarod Freese, EP Manager, DRPI (Electronic Only)
- Jason Sunde, Environmental Program Administrator, SHMWS (Electronic Only)

Attachment A – List of Documents Attached

ATTACHMENT A: List of attachments to the Response to Comments 2

1. Part V Operations and Maintenance Plan
 - a. Operational Cover. page V-14
 - b. Fire Prevention. page V-43.
2. Part V, O&M Plan, Appendix A Contingency Plan
 - a. Odor, page V-A-18
3. Part V, O&M Plan, Appendix E, Leachate Pretreatment plan
 - a. Fully revised Leachate Pretreatment Facility O&M plan
 - b. Figure V-E-1
 - c. Figure V-E-2
4. Part VI, Engineering Report
 - a. Section 5. Page VI-17
5. Part VI-D.1, Liner Geomembrane Puncture Resistance
6. Part VI-H.4 Cover Settlement Evaluation
7. Part VI-J Soils Specification 02055
8. Permit Drawings
 - Drawing 8 – Leachate Management and Groundwater Control System Plan
 - Drawing 9 – Leachate Management System Profiles
 - Drawing 26 – Landfill Gas Management Details I

Other Revised Documents:

9. Part III – Application Form Page 2
10. Permit Drawings
 - Drawings 13 – Grading Plan
 - Drawing 17 – Final Cover System Details IV
 - Drawings 19 and 20 – Channel profiles
 - Drawing 21 – Waste Filling sequence
 - Drawings 22-23 – Site Cross Section insets
11. Part V – O&M, Figure V-3 Capping Sequence and page V-4
12. Part VI pages 1 and 10
13. Part VI-B – Disposal Capacity
14. Part VI-E-1 Figure 1
15. Part XI Closure Plan
 - a. Pages XI-1 to XI-5, Page XI-19, Tables XI-1, XI-2
 - b. Attachment XI-1 Financial Assurance Documentation
16. Part VI-G Stormwater Management System Calculations

TABLE 1
Response to Comments 2
DRPI Permit Application for Vertical Expansion

Comment	Response to Comment
<p>1. Please make the following modifications throughout the above listed documents, as applicable:</p> <p>a. Please revise all document titles, references, headers, and footers, as applicable.</p> <p>b. Please update all "Table of Contents", as applicable.</p>	<p>This has been updated.</p> <p>This has been done.</p>
<p>PART V- OPERATIONS AND MAINTENANCE PLAN</p>	
<p>2. 3.4.1 Operational Cover:</p> <p>a. Please correct the typo contained in the first paragraph of the section.</p>	<p>This has been done. Please see attached revised page V-14.</p>
<p>3. 4.5 Fire Prevention Plan:</p> <p>a. Please revise paragraph 5 of the section. DRPI must immediately report a fire to DNREC, and must submit a written account of the fire, as per permit conditions.</p>	<p>This change has been made. Please see attached revised page V-43.</p>
<p>APPENDIX V-A: CONTINGENCY PLAN</p>	
<p>4. 6.8 Odor:</p> <p>a. Please update the cover material frequency in the first paragraph of the section.</p>	<p>This change has been made. Please see attached revised page V-A-18.</p>
<p>APPENDIX V-E: LEACHATE PRETREATMENT FACILITY</p>	
<p>5. Section 1.2.3 Leachate Pretreatment System:</p> <p>a. Please update paragraph 1 of the section. The DRPI landfill recently changed the compound used to remove hydrogen sulfide from leachate.</p>	<p>This change has been made throughout. Please see updated Leachate Pretreatment O&M Manual (entire document).</p>
<p>6. Section 2.4 Non-Compliance Notification Requirements:</p> <p>a. Please correct the typo contained in the second paragraph of the section.</p>	<p>This correction has been made. Please see updated Leachate Pretreatment O&M Manual (entire document).</p>
<p>7. Section 3.3 Operator Responsibility:</p> <p>a. Please correct the typo contained in the first paragraph of the section.</p>	<p>This correction has been made. Please see updated Leachate Pretreatment O&M Manual (entire document).</p>

**TABLE 1 (cont'd)
Response to Comments 2
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Comment	Response to Comment
b. Please correct the typo contained in the 8th item listed in the section.	This correction has been made. Please see updated Leachate Pretreatment O&M Manual (entire document).
8. Section 5.1.1 Normal Operation:	
a. Please correct the typo contained in the last paragraph of the section.	This correction has been made. Please see updated Leachate Pretreatment O&M Manual (entire document).
9. Section 5.2.2 Operator's Duty:	
a. Please update the frequency of the air release valve inspections, to be consistent with Section 5.1.2.	This correction has been made. Please see updated Leachate Pretreatment O&M Manual (entire document).
10. Section 5.2.4 Emergency Operation:	
a. Please correct the typo in the section and the section heading.	This correction has been made. Please see updated Leachate Pretreatment O&M Manual (entire document).
11. Section 5.3.2 Operators Duty:	
a. Please correct the typo in the heading for the section.	This correction has been made. Please see updated Leachate Pretreatment O&M Manual (entire document).
b. Please update the product used to achieve discharge limits.	This correction has been made. Please see updated Leachate Pretreatment O&M Manual (entire document).
12. Section 5.3.4 Emergency Operation:	
a. Please correct the typo in the section.	This correction has been made. Please see updated Leachate Pretreatment O&M Manual (entire document).
13. Section 7.1 Process Operations Records:	
a. Please update the product noted in the third item of the section.	This correction has been made. Please see updated Leachate Pretreatment O&M Manual (entire document).
14. Section 8.1 General	
a. Please Correct the typo contained in the first paragraph of the section.	This correction has been made. Please see updated Leachate Pretreatment O&M Manual (entire document).
15. Section 8.3 Preventative Maintenance:	
a. Please correct the typo contained in the second paragraph of the section.	This correction has been made. Please see updated Leachate Pretreatment O&M Manual (entire document).
16. Section 9.2 Vulnerability Analysis:	
a. Please correct the typo contained in the ninth item in the section.	This correction has been made. Please see updated Leachate Pretreatment O&M Manual (entire document).

**TABLE 1 (cont'd)
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Comment	Response to Comment
<p>17. Section 10.4.1 Manholes: a. Please correct the typo contained in the last paragraph of the section.</p>	<p>This correction has been made. Please see updated Leachate Pretreatment O&M Manual (entire document).</p>
<p>18. Section 10.4.3 Lighting: a. Please correct the typos (2) contained in the section.</p>	<p>This correction has been made. Please see updated Leachate Pretreatment O&M Manual (entire document).</p>
<p>19. Section 10.4.4 Electrical Hazards: a. Please correct the typo contained in the section.</p>	<p>This correction has been made. Please see updated Leachate Pretreatment O&M Manual (entire document).</p>
<p>20. Section 10.5.7 Summary of Safe Practices in Sewers, Pumping Station Wet Wells, and Other Confined Areas: a. Please correct the typo contained in item b of the section.</p>	<p>This correction has been made. Please see updated Leachate Pretreatment O&M Manual (entire document).</p>
<p>21. Figure V-E-2: a. Please update the chemical reference (Odophos) contained in Note 2 of the figure.</p>	<p>This correction has been made. Please see updated Leachate Pretreatment O&M Manual (entire document).</p>
<p>PART VI: ENGINEERING REPORT</p>	
<p>22. Section 5.1 Introduction 9th BulletPoint: a. Please revise the hydraulic conductivity from 1×10^{-3} cm/s to 1×10^{-2} cm/s, as per Delaware's <i>Regulations Governing Solid Waste</i> (DRGSW) Section 6.4.2.2.1.</p>	<p>The requested revision has been made. See attached page VI-17.</p>
<p>23. Appendix VI-D.1 Liner Geomembrane Puncture Resistance Page 3: a. Please justify the selection of $MF_s = 0.5$ (sub-rounded particles) for AASHTO No. 57 stone, which is typically angular.</p>	<p>The selection of MF_s has been updated to 1.0, which is more conservative, and is included in a revision of this calculation package. The revision lowers the lowest factor of safety from 7.4 to 3.8, which is still adequate.</p>
<p>24. Appendix VI-D.1 Liner Geomembrane Puncture Resistance Page 6:</p>	

**TABLE 1 (cont'd)
Response to Comments 2
DRPI Permit Application for Vertical Expansion**

Comment	Response to Comment
<p>a. Please verify and revise (if necessary) the reference to Figure 2 in the bearing capacity calculations.</p>	<p>The reference to Figure 2 should have been a reference to Figure 5, which was inadvertently not included in the calculation package. A revision of this calculation package has been prepared with the figure reference revised. Figure 5 (an excerpt from NAVFAC, 1986) is now included in the calculation package.</p>
<p>25. Appendix VI-D 2 Liner System Veneer Stability on Side Slopes Page 2: a. Please confirm Equation 1, third term. Should "sin (2B)" be "2 sin (B)"? Please confirm the calculations are correct and revise if necessary.</p>	<p>Per Equation 59 in "Influence of Water Flow on the Stability of Geosynthetic-Soil Layered Systems on Slopes" by Giroud et al., the third term of this equation has the term $2\sin\beta\cos\beta$. However, a double-angle trigonometric identity was used to simplify the equation for input into a spreadsheet. The trigonometric identity is $\sin(2\beta) = 2\sin\beta\cos\beta$. The equation as presented in the calculation package is correct.</p>
<p>26. Appendix VI-E.1 Leachate Management System Evaluation: a. 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 percent 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.</p>	<p>Performing the HELP analysis by allowing no runoff from the active face would not properly model actual conditions during landfill operations. During landfill operations, when waste placement is occurring below the containment berms, water that runs off the surface of the landfill will become leachate instead of stormwater. When the surface runoff reaches the low point adjacent to the containment berms, it will then infiltrate into the waste above the leachate sump, where leachate is intended to collect in order to be pumped out into the leachate transmission system and, therefore, will not contribute to head on the liner. Performing the HELP analysis allowing no runoff from the active face would effectively force this surface runoff (in the model) to infiltrate prior to reaching the low point adjacent to the containment berm, which would artificially (and incorrectly) show higher heads on the landfill liner than would actually occur under typical landfill operations. It is also noted that, because all liner at DRPI (with the exception of a small portion of overfill liner that doesn't include a containment berm on the low end of the cell and, therefore, surface runoff will never be restricted) has already been constructed, the condition being discussed herein will never occur in the future at DRPI.</p>

TABLE 1 (cont'd)
Response to Comments 2
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Comment	Response to Comment
<p>b. Justify why the average head on liner versus maximum head on liner from the HELP model output is used to demonstrate compliance.</p>	<p>The head on liner value that is used to demonstrate compliance corresponds to the average peak daily value, which is the average head over the modeled liner system area on the single day in 30 years on which the peak head occurs. This value is considered reasonable as this value is expected to affect a significantly larger liner area than the maximum peak daily value that occurs at only one location on the liner system (in this case, at a location, as shown in the model output, 192.4 feet from the leachate pipe or drainage corridor) and, for this maximum leachate head to be a driving force for leakage through the liner (which is the reason for limiting head on the liner to less than one foot), a defect in the geomembrane would have to occur at exactly the location where the maximum head occurs.</p>
<p>27. Appendix VI-H.1 Geocomposite Drainage Layer Evaluation: a. Are the calculated d_{85} and d_{15} of the protective soil included in the Technical Specifications?</p>	<p>The requirements related to the O95 of the geotextile and the d_{85} and d_{15} of the protective cover soil have been added to the Soils specification. See revised Specification Section 02055.</p>

TABLE 1 (cont'd)
Response to Comments 2
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Comment	Response to Comment
<p>b. Explain why the average annual head on cap versus the maximum head on cap from the HELP model output, used to justify the final cover system drainage layer capacity, is sufficient.</p>	<p>The purpose of using the HELP model in this case is to design the geocomposite drainage layer for the cap, which doesn't have any regulatory performance criteria. The primary concern with buildup of liquid in the cap soils is the potential for veneer slope stability failure. The area of the cap that is the limiting factor for performance of the geocomposite is the top deck of the landfill (i.e., where the slopes are the least steep), which is the location for which this calculation was performed. The location of the landfill where veneer failure is likely to occur is on the sideslopes of the landfill (i.e., where the slopes are the steepest). Because the peak daily values shown in the HELP model output only occur over a short period of time and temporary buildup of liquid in the cover soils on the top deck of the landfill will not lead to veneer failure, use of the average annual head on the cap to design the cap geocomposite is considered appropriate.</p>
<p>28. Appendix VI-H.2 Final Cover System Veneer Stability Evaluation:</p> <p>a. Please confirm Equation 1, third term shown on Page 2. Should "sin (2B)" be "2 sin (B)"? Please confirm the calculations are correct and revise if necessary.</p>	<p>Refer to the response to comment for Comment 25.a.</p>

TABLE 1 (cont'd)
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Comment	Response to Comment
<p>b. Page 3 of the appendix stated that "...a veneer stability failure of the liner system does not pose a threat to human life or the environment and a failure could easily be repaired..." 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. Please provide justification for selecting the less conservative safety factor for veneer stability failure. Additionally, please provide analysis that indicates the impact of a veneer slope failure.</p>	<p>The veneer stability is typically associated with sliding of the top two feet of the soil cover system (i.e., at the soil/geomembrane interface). The triggering mechanism is typically linked to surface erosion due to channel/terraces overtopping. The terraces have been designed to convey a 24-hour, 25-year storm event without overtopping, which exceeds the requirements of DRGSW §6.6.2.1 (i.e., features must convey 2-hour, 10-year design storm). Because the cover soil is designed with terraces separated 30 feet vertically, the potential longitudinal extent that may slide in case of veneer failure is constrained by these terraces. In addition, failure typically takes place progressively starting near the toe and moving up the slope. The progressive nature of the failure mechanism coupled with typical failure depths (two feet) minimizes the impact to human life. Similarly, because the final cover system components are clean, sliding of the soil cap would not result in environmental damage. As a result, the selected factor of safety of 1.25 for design of veneer stability is considered appropriate.</p>
<p>29. Appendix VI-H.4 Final Cover Settlement Evaluation:</p> <p>a. The calculation states "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 used on the "Settlement of Liner System" calculation is 0.12. Please make changes to the calculation as warranted.</p>	<p>The modified coefficient of consolidation was previously updated from 0.22 to 0.12 in the Liner Settlement Evaluation calculation package to reflect the consolidation characteristics of construction and demolition debris waste. The same change was not made in the Final Cover Settlement Evaluation at that time. The Final Cover Settlement Evaluation calculation package has been updated to use a modified coefficient of consolidation of 0.12 to be consistent with the Liner Settlement Evaluation calculation package. This reduces the maximum estimated settlement of the cover system from 5.5 feet to 5.2 feet and the maximum calculated grade change from 2.5 percent to 2.2 percent on the sideslopes. The maximum calculated grade reduction on the top of the landfill remains the same at 0.08 percent. The maximum calculated strain is reduced from 0.17 percent to 0.13 percent.</p>

**TABLE 1 (cont'd)
Response to Comments 2
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Comment	Response to Comment
PERMIT DRAWINGS (DRAWINGS NOS. 1-28)	
30. Drawing 8 of 28:	Drawing 8 of 28 has been revised to remove the extra label, add the Underdrain Riser 5D, and update the leachate corridor points. Drawing 9 has also been revised.
a. Please update the constructed and proposed areas for Cells 1 - 3 Overlay.	
b. Please verify that all underdrain and leachate risers are shown on the drawing and are plotted correctly.	
c. Please clarify the leachate corridor points shown on the drawing.	
31. Drawing 26 of 28:	Drawing 26 of 28 has been revised (Rev 4).
a. Please correct the location of the arrow shown on Detail 2-25 for the 6"x4" HDPE reducer.	