

September 10, 2024

***Via Email***

New Hampshire Department of Environmental Services

Michael Wimsatt  
Director, Waste Management Division  
*michael.wimsatt@des.nh.gov*

Jaime Colby  
Supervisor, Engineering and Permitting Section  
*Jaime.M.Colby@des.nh.gov*

**Re: NCES Permit Modification Request**

Dear Director Wimsatt and Ms. Colby,

I write in continued representation of North Country Alliance for Balanced Change (“NCABC”) concerning North Country Environmental Services Landfill’s (“NCES”) proposed modifications to its solid waste permit application dated June 21, 2024, revised July 26, 2024 (the “Proposed Modifications”). Attached please find an opinion letter prepared by Anirban De, Ph.D., P.E., which highlights the deficiency resulting from the high leachate levels at NCES and the Proposed Modifications. Please make this letter and the attached letter from Dr. De part of your record in this matter.

Approving the Proposed Modifications would be akin to codifying NCES operating under emergency conditions. Allowing NCES to operate under such conditions can have dire consequences, up to and including landfill slope failure. As Dr. De notes in his letter, these types of failures have caused numerous fatalities. What is more, sustained high leachate levels can have negative environmental consequences, including leachate infiltration into surface water. The Proposed Modifications do not alleviate these concerns and, in fact, raise even more concerns.

Pursuant to Env-Sw 805.06(e), “[l]eachate collection and removal systems shall be designed to maintain *one foot or less* of hydraulic head on all portions of the liner . . . during routine operations including the 25-year storm event with a duration equivalent to the time of concentration of the drainage area of the component being sized.” (Emphasis added.) Further, “[l]eachate collection and removal systems shall be designed . . . in a manner which shall . . . [n]ot allow a hydraulic head *greater than one-foot* to exist on any portion of the liner system . . . for longer than *7 days*.” Env-Sw 805.06(f)(1) (emphasis added). In the same vein, when it comes to a facility operating plan, “[r]outine facility operations, including operations during the 25-year storm event, shall not result in more than *one foot* of hydraulic head on the liner system(s).” Env-Sw 806.05(b)(1) (emphasis

added). It is the operator's responsibility to limit the leachate generated at a facility "by properly planning the sequenced development of the facility, properly managing stormwater infiltration and inflow, minimizing the active area of the landfill and applying cover." Env-Sw 806.05(b)(2).

Because the Proposed Modifications will not result in compliance with these regulations and, indeed, will only exacerbate NCES's deficiency, as set forth in Dr. De's letter, the Proposed Modifications should be denied. *See* Env-Sw 315.10(a) ("All applications to modify a permit shall be reviewed in accordance with Env-Sw 304 and Env-Sw 305."); Env-Sw 305.03(b)(1) ("A requested approval shall be denied if . . . [t]he proposed activity does not meet the applicable requirements of RSA 149-M and the solid waste rules.").

On behalf of my client NCABC, I respectfully request that the Department reject NCES's Proposed Modifications for the reasons set forth in Dr. De's letter. Thank you for your attention to this matter, and please let me know if you have any questions.

Very truly yours,



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Enclosure

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**ANIRBAN DE, Ph.D., P.E.**

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To:

Ms. Amy Manzelli, Esq.  
BCM Environmental & Land Law, PLLC  
3 Maple Street  
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9 September 2024

Subject:

Review:

1. 14 June 2024 Letter of Deficiency
2. 26 July 2024 Proposed Modifications: Solid Waste Permit Application  
– North Country Environmental Services Landfill, Bethlehem, New  
Hampshire

Dear Ms. Manzelli:

As per the agreement of service with BCM Environmental & Land Law, PLLC (BCM), I have reviewed the 14 June 2024 Letter of Deficiency issued by the New Hampshire Department of Environmental Services (NHDES) and the 26 July 2024 Type II Modification to the Solid Waste Management Permit for the North Country Environmental Services (NCES) Landfill, located in Bethlehem, New Hampshire.

In this letter, I present my comments related to the deficiency resulting from the high leachate levels and the proposed permit modifications. Specifically, the leachate conditions and permit modifications which impact the engineering design and operations are the focus of this review.

### **1. Adverse Impact of High Leachate Level over the Liner**

According to federal and state regulations and prevailing standard landfill operating practice, the leachate head over the liner must be maintained at a height less than 12 inches during routine operations, including up to the 25-year, 24-hour storm event. In its letter, NHDES has listed hundreds of instances within the last one year when the leachate head was higher than 12 inches. In fact, the leachate head was as high as 116 inches (9 ft 8 inches), which is almost ten times of what is allowed.

A high leachate level in a landfill can lead to multiple serious operational and stability issues, as follows:

a. A high leachate level creates a high hydraulic gradient, which can drive leachate flow through a liner system. Though geosynthetic liners are expected to be free of defects and holes, in reality there are minor defects in welding, which normally do not pose as a major problem when the leachate level is low, but will act as passage for leachate when a deep pool of leachate is allowed to pond over the liner.

b. A high leachate level (as high as nearly 10 feet) will make the waste material near the bottom of the landfill remain in a fully saturated state. This has two problems: (i) waste material will weigh more when it is saturated than when it is unsaturated and (ii) the shear strength of the saturated waste material will be lower. As a result, it will be more likely for the material to experience a stability failure.

c. Furthermore, the elevated leachate levels will generate high pore water pressures at the bottom of the landfill, which will reduce the effective normal stress. A high effective normal stress is necessary for maintaining a relatively high shear strength in the bottom liner. The shear strength will reduce when pore water pressure rises and effective stress reduces. This will increase the likelihood of a landfill slope failure, with the failure surface passing through the base of the landfill.

With reference to items (c) and (d) above, numerous landfill slope failures have been attributed to elevated leachate levels and consequent increase in pore water pressure. Most of these failures have been catastrophic and some caused numerous fatalities. Many such failures are well-documented in technical literature and citations to four of them [References 1 - 4] are included at the end of this letter.

d. Based on observations made at other landfills where similar high leachate levels were observed over extended periods of time, a high leachate level may cause leachate to seep out of the landfill face, especially on the downhill side. This will cause surface erosion and may lead to leachate entering stormwater ditches and polluting surface water bodies, unless it is checked in a timely manner.

## **2. Permit Modification: Anticipated Leachate Generation Quantities (Section 4.1.1)**

The anticipated leachate generation rate will not be included as part of the proposed modification. This is an unusual permit condition which also raises a question. The leachate generation rate for a properly designed and permitted landfill is usually included as a permit condition. The actual generation rate is measured and periodically reported to the permitting agencies. If the design is sound and the landfill is operated properly, then the actual generation rate is usually close to, but lower than, the rate predicted during design.

It is not usual for the anticipated leachate generation rate to be simply removed from the permit. If the anticipated leachate generation rate needs to be modified based on actual measurements during operations, then the revised value should be stated in the permit. An investigation should be carried out to understand the underlying cause why the actual leachate generation rate is deviating from the value that was anticipated during design. It is not appropriate to accept a deviation without investigating the reason and to not include any anticipated value in the permit.

### **References:**


1. “The July 10 2000 Payatas Landfill Slope Failure”, by Jafari, N. H., Stark, T. D., and Merry, S., *International Journal of Geoengineering Case Histories*, Vol. 2, Issue 3. 2013. DOI: <http://dx.doi.org/10.4417/IJGCH-02-03-03>
2. “Reconnaissance of the July 10, 2000, Payatas Landfill Failure”, by Merry, S.M., Kavazanjian, Jr., E., and Fritz, W. U., *Journal of Performance of Constructed Facilities*, Vol. 19, No. 2. 2005. DOI: [https://doi.org/10.1061/\(ASCE\)0887-3828\(2005\)19:2\(10](https://doi.org/10.1061/(ASCE)0887-3828(2005)19:2(10)
3. “Mechanism of the December 2015 Catastrophic Landslide at the Shenzhen Landfill and Controlling Geotechnical Risks of Urbanization”, by Yin, Y., Li, B., Wang, W., Zhan, L., Xue, Q., Gao, Y., Zhang, N., Chen, H., Li, T., and Li, A., *Engineering*, Vol. 2, Issue 2. 2016. DOI: <https://doi.org/10.1016/J.ENG.2016.02.005>
4. “Municipal Solid Waste Slope Failure. II: Stability Analyses”, by Stark, T.D., Eid, H. T., Evans, W. D., and Sherry, P.E., *Journal of Geotechnical and Geoenvironmental*

Review comments – NCES Landfill, Bethlehem, New Hampshire  
9 September 2024

*Engineering*, Vol. 126, No. 5. 2000. DOI: [https://doi.org/10.1061/\(ASCE\)1090-0241\(2000\)126:5\(408\)](https://doi.org/10.1061/(ASCE)1090-0241(2000)126:5(408))

Please let me know if you have questions about my comments and/or require further discussions.

Sincerely,



Anirban De, Ph.D., P.E.