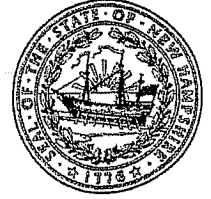




The State of New Hampshire  
**DEPARTMENT OF ENVIRONMENTAL SERVICES**



Thomas S. Burack, Commissioner

December 12, 2008

SENT VIA E-MAIL AS A .PDF AND VIA FIRST CLASS MAIL

John Gay, E.I.  
North Country Environmental Services, Inc.  
3 Pitkin Court  
Montpelier, Vermont 05602

**Subject:** North Country Environmental Services (NCES) Applications to Modify Permit # DES-SW-SP-03-002 for Stage IV Phase II of the NCES Landfill, Trudeau Road, Bethlehem, New Hampshire

Dear Mr. Gay:

In accordance with the provisions of Env-Sw 304.07 of the NH Administrative Rules for Solid Waste Management (Rules), the New Hampshire Department of Environmental Services (DES) has completed its review of the above referenced applications to modify permit #DES-SW-SP-03-002. The review included information submitted in the permit application documents cited as items 1. - 10. below, as well as information provided by abutters, town officials, and persons participating in the public hearing process that commenced on September 16, 2008 and closed on October 16, 2008. Both applications are hereby denied for reasons explained in this letter. In addition, DES's response to public comment and hearing testimony is attached to this letter as Appendix A.

**I. Background**

On November 30, 2007 NCES submitted the following applications for permit modification:

1. Type 1B permit modification application seeking approval to redesign portions of the Stage IV Phase II solid waste landfill located on Trudeau Road in Bethlehem<sup>1</sup>; and
2. Type II permit modification application seeking approval to construct the modified facility.<sup>2</sup>

<sup>1</sup> WMD document log #200700211.

<sup>2</sup> WMD document log #200700211.

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Those modifications propose to develop 1,300,000 cubic yards of permitted Stage IV capacity within the boundaries of a 51 acre area comprised of a 10 acre lot and a 41 acre lot. A permit for Stage IV of the landfill was previously granted by DES in 2003. Under the provisions of that permit, construction of Stage IV was to have occurred, in part, on land outside of the 51 acre area. The combined effect of the Town of Bethlehem's 1992 ordinances prohibiting construction or expansion of a private landfill, a 2001 New Hampshire Supreme Court decision that those ordinances do not apply to the 51 acre area, and a 2004 New Hampshire Supreme Court ruling on the extent to which local approvals are necessary for landfill expansion effectively limited expansion activities to within the 51 acre area.

The pending applications propose to modify the plan that was approved by DES in 2003 by shifting the Stage IV development to the 51 acre area. Under the revised plan, NCES would construct the Stage IV expansion on top of the existing landfill. The additional waste would be contained utilizing near-vertical mechanically stabilized earth (MSE) berms.

Subsequent to submitting the applications described in paragraphs 1-2 above, NCES submitted the following additional permit application information:

3. On February 25, 2008, additional information in response to a DES letter dated February 8, 2008 requesting certain information to complete the application.<sup>3</sup>
4. On March 11, 2008, additional information in response to a DES letter dated March 3, 2008 requesting certain information to complete the application.<sup>4</sup>
5. On April 7, 2008, additional information in response to a DES letter dated March 12, 2008 requesting certain information to complete the application.<sup>5</sup>
6. On May 16, 2008, the "NCES Stage IV/Phase II Fill Area Characterization."<sup>6</sup>

By letter dated May 30, 2008, DES notified NCES that the application was complete and that DES was commencing a technical review of the proposal. The documents constituting the complete application were those enumerated above as items 1.- 6.

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<sup>3</sup> WMD document log #200800038.

<sup>4</sup> WMD document log #200800041.

<sup>5</sup> WMD document log #200800061.

<sup>6</sup> WMD document log #200800083.

On July 15, 2008, DES held a public information meeting in Bethlehem, providing an opportunity for interested persons to obtain information from both the applicant and DES concerning the applications, the application process, and the facility.

By letter dated September 10, 2008, DES notified NCES that it had completed its technical review and determined there were certain issues of concern that warranted additional attention, including design drawing and specification inconsistencies, MSE berm design concerns, and groundwater contamination conditions indicating NCES's mismanagement of the leachate collection system and/or a release through the existing landfill liner system.

On September 16, 2008, DES held a public hearing in Bethlehem to receive public testimony on the application, and left the public hearing record open through October 16, 2008 for receipt of written testimony.

In response to DES's September 10, 2008 letter, NCES submitted the following additional information to supplement the application information previously submitted:

7. A letter report dated September 29, 2008<sup>7</sup>, providing information in response to items of concern listed as A, B and C in DES's September 10, 2008 letter.

8. A letter dated October 13, 2008 addressing groundwater contamination concerns listed under item D of DES's September 10, 2008 letter, including as attachments a Liner Leakage Analysis dated October 14, 2008, prepared by CMA Engineers, Inc. and a Hydrogeologic Analysis dated October 17, 2008, prepared by Sanborn, Head & Associates, Inc.<sup>8</sup>

9. Additional information to address item D of the September 10, 2008 letter, identified as "Analysis of Site Hydrogeologic Conditions Relative to Potential Leachate Leakage – Monitoring Well MW-402U/L Area" dated October 24, 2008, prepared by Sanborn, Head & Associates, Inc.<sup>9</sup>

10. A letter dated November 7, 2008 with attached plans, providing a revised MSE berm and liner design between stations 0+00 to 12+25 and between 28+00 and 36+14.<sup>10</sup>

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<sup>7</sup> WMD document log #200800153.

<sup>8</sup> DES electronic document ID #4143113.

<sup>9</sup> DES electronic document ID #4144804.

<sup>10</sup> WMD document log #200800178.

## **II. Reasons for Denial**

DES denies the requested permit modifications on the basis of two issues. First, for the reasons stated below, DES concludes that the MSE berm and liner design does not comply with the requirements of Env-Sw 1103.01(a), Env-Sw 1103.01(b) and Env-Sw 1004.01. Second, for the reasons stated below, DES can not conclude at this time that the proposed facility can comply with Env-Sw 1002.02(d). Both of these issues are discussed in detail below.

### **A. MSE Berm/Liner Design**

The 2039 lineal feet of mechanically stabilized earthen ("MSE") berm between stations 0+00 and 12+25 and between stations 28+00 and 36+14, as depicted on sheets C-29 to C-31 of the design plans, form part of the containment system for the landfilled waste and must conform to all applicable requirements of the Rules. Based on a thorough review of the original MSE berm design submitted with the application on November 30, 2007,<sup>11</sup> DES notified NCES by letter dated September 10, 2008 that the berm design was deficient. In response, the applicant submitted a revised MSE berm design on November 7, 2008<sup>12</sup> to replace the original design. For reasons stated below, DES has determined that the revised design of the MSE berm and its associated liner do not meet the requirements of Env-Sw 1103.01(a), Env-Sw 1004.01 and Env-Sw 1103.01(b) of the Rules.

The design of the above noted portions of the MSE berm shows a double liner system consisting of two HDPE geomembrane liners, separated by drainage geocomposite, placed on the near-vertical (1 foot of run to 5 feet of rise or 1:5) inside face of the MSE berm. The design also includes a "shingled" or hanging installation of geosynthetic clay liner over every three lifts of the MSE berm. The use of the two HDPE geomembrane liners on such a steep slope departs significantly from the conventional and generally accepted design standards for solid waste landfill liner systems. Conventional landfill liner system design specifications involve liner installation on slopes of approximately 3:1 (3 feet of run to 1 foot of rise, or 3:1) or less.

Double liner systems deployed on slopes of 3:1 or less have a known track record of constructability, durability, and performance that demonstrates their ability to protect human health and the environment.

Constructability describes the technical and engineering barriers to construction of the landfill. A typical landfill design with 3:1 slopes has well understood

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<sup>11</sup> WMD document log #200700211.

<sup>12</sup> WMD document log #200800178.

constructability issues, and the technical and engineering issues have largely been addressed. NCES's near-vertical slope for its double liner system presents new and significantly more difficult constructability issues.

Durability describes the likelihood of failure with time. Double liner systems deployed on a 3:1 slope are well understood, and have existed under New Hampshire landfills for years. As the slope increases to the near-vertical slope as designed by NCES, the durability of the system diminishes. For example, vertical slopes place a greater stress on liner sections where they are welded together, at the base where the vertical wall angles sharply to the base of the landfill, and on the anchor point where the liner system anchors into the top of the wall. Any defects in construction are also reflected in durability.

Performance of landfills with double liner systems on a 3:1 slope is similarly well documented and understood in New Hampshire and throughout the country. Double liner systems are designed to collect leachate flowing through the landfill, and to prevent contamination of soil and groundwater under and adjacent to the landfill. As the risks associated with constructability and durability of the near-vertical liner slope increase, so does the risk of performance failure increase.

DES has been unable to find an example of a similar landfill liner application, in which HDPE geomembrane liner material has been successfully deployed and anchored along such extreme slopes over a distance comparable to the revised MSE berm design. Given the lack of similar projects to review, DES is unwilling to rely solely upon the applicant's analyses for expected performance. The proposed design poses a greater risk of failure, compared to conventional designs. NCES proposes to install, seam, test and anchor the geomembrane liners on a near-vertical MSE berm. Each of these elements of NCES's liner design pose additional failure risks, which increases the overall risk of failure of the liner system. Issues of concern to DES include: the constructability of the liner on the near-vertical berm wall; the efficacy of the anchor trench design for such a high, steep installation; and the tensile and shear stresses that will exist. DES finds that the cumulative increases in risk are unacceptable and unwarranted, and pose unnecessary risks to human health and the environment.

Moreover, DES has determined that approval of such a design would set a precedent that would significantly decrease the minimum standards for landfill design in the State, potentially resulting in higher risk designs and construction at other landfill facilities in New Hampshire. Acceptance of such increased risks would be inconsistent with DES's role to protect human health and the environment, and are inconsistent with the existing criteria for approval of landfill design.

DES views the above outlined concerns as technical deficiencies in the proposed design. As a result of these deficiencies, DES has identified several provisions of the

applicable Rules that are either not met, or for which there is substantially insufficient or ambiguous information that precludes a determination that the proposed facility modifications will comply with the applicable requirements of the Rules. The proposed design does not comply with the applicable requirements of the Rules as outlined below:

- Env-Sw 1103.01 General Design Requirements provides under Env-Sw 1103.01(a) that “[a] facility shall employ best practicable technology(s) and sound engineering practices in meeting the applicable design requirements in the solid waste rules.” For the reasons outlined above, the subject design fails to comply with this rule.
- Env-Sw 1004.01 Basic Design Requirements provides under Env-Sw 1004.01(a) that “[t]he design of a facility shall be compatible with achieving the universal environmental performance requirements in Env-Sw 1002.” Env-Sw 1002 Universal Environmental Performance Requirements provides under Env-Sw 1002.01 that “[f]acilities shall be located, designed, constructed, operated and closed in a manner that conserves natural resources and is protective of the natural environment, human health and safety.” Because the subject design has a greater risk of liner failure when compared to more conventional designs and therefore has a greater risk of releasing leachate and/or landfill gas to the environment, the proposed design does not meet the cited requirement. DES’s analysis of the issues of constructability, durability and performance, as outlined above, also supports a finding that the design fails to comply with Env-Sw 1004.01 and Env-Sw 1002.
- Env-Sw 1103.01 General Design Requirements provides under Env-Sw 1103.01(b) that “[w]here options exist relative to design concepts, preference shall be given to the option which provides:
  - (1) The least complex alternative(s) for facility construction, operation and maintenance; and
  - (2) Exhibits the required performance standard(s).”

The subject design fails to comply with this rule. The proposed MSE berm/liner design requires deployment of a liner system on 2039 lineal feet of 39 foot high wall at a near-vertical 1:5 slope. This liner system is untried, essentially experimental in nature, and is significantly more complex with respect to its construction, operation, and maintenance when compared to deployment of a liner system on a conventional 3:1 slope.

Therefore, in accordance with Env-Sw 305.03(b)(1) and (2), DES denies the applications.

## **B. Groundwater Contamination**

Beginning in 1996, DES required that NCES apply a tracer compound, sodium bromide, to the NCES Landfill, Stage II and Stage III. The NCES Landfill has been constructed, in part, on top of the footprint of the former unlined landfill (waste removal and relocation into Stage I of the lined landfill began in December 1991 and was completed in October 1993). The bromide tracer was required to be added to the landfill operations for the Stage II and Stage III lined portion of the landfill to aid in differentiation of groundwater quality impacts associated with the previous releases from the former unlined landfill from a failure of the existing double HDPE geomembrane leachate liner collection system. Because sodium bromide was not added to the unlined landfill, detection of bromide concentrations above background values in any monitoring wells downgradient of the landfill would indicate that there were liner leak issues.

Volatile organic compounds or elevated concentrations of bromide have been detected in groundwater monitoring wells located downgradient from the landfill, including wells MW-402U, MW-403L, B-913M, B-919U, B-921M, B-921U and B-304UR. The detection of the VOC contaminants and elevated concentrations of bromide indicate that the operation of the existing landfill has resulted in releases of regulated contaminants in violation of condition #9 of Groundwater Management and Release Detection Permit #GWP-198704033-B-005 (Groundwater Permit), which was issued to the applicant in November 2007.

The key issues of concern relative to these detections of VOCs and elevated concentrations of bromide were outlined in Section D of DES's September 10, 2008 technical review letter. In that letter, DES requested that additional information be provided to further evaluate the source of the VOCs and the elevated concentrations of bromide detected in downgradient monitoring wells. In response to this request for additional information, the applicant provided the documents listed as application information items 8. and 9. above.

These documents provide a detailed hydrogeological and engineering analysis of the situation to support NCES's contention that the landfill liner system is not leaking and is not the source of the elevated concentrations of bromide and VOCs detected in several monitoring wells. In these documents, NCES concludes that the releases are not due to a leaking liner system and are most likely due to known leachate spills and an accidental discharge of leachate to stormwater systems during 2006 construction events.

Because NCES's hydrogeological and engineering analysis relies on a number of assumptions regarding aquifer properties, construction history, and the current condition of the existing landfill liner system that are not verified by independent field or environmental data, the analysis is not conclusive. DES does not agree that the analysis demonstrates that the liner system is not leaking. Until NCES completes the on-going corrective action plan and produces data to demonstrate that the work has resulted in achieving DES-approved performance standards for groundwater remediation, DES concludes that the landfill liner system is or may be a contributing factor to the contamination in the monitoring wells.

There is uncertainty as to whether the VOCs and elevated concentrations of bromide detected in the downgradient wells are the result of NCES's own mismanagement of the leachate collection system. By virtue of the past spills and releases from the leachate collection system (the occurrence of which NCES has acknowledged), NCES has raised doubt as to the source of the VOCs and elevated concentrations of bromide. The bromide tracer's function is to detect the presence of leaks in the liner system. To the extent NCES is now unable to satisfy DES that the landfill liner is not the source of the groundwater contamination, it is due in large measure to NCES's own operational failure at the facility.

Env-Sw 1002.02(d) provides in pertinent part that "[f]acilities and practices shall not contaminate surface or groundwater in violation of...the conditions of any permit issued by DES..." Based upon the groundwater quality conditions, the analysis and data presented, and the status of the corrective action plan implementation, DES concludes that there have been releases that have in fact contaminated groundwater in violation of the conditions of the facility's Groundwater Management and Release Detection Permit. Because the contamination detected at the site is consistent with what would be expected with a release from the liner system and because NCES has not demonstrated to the satisfaction of DES that there is no ongoing release from the facility, DES can not conclude at this time that the proposed facility can comply with Env-Sw 1002.02(d). Therefore, in accordance with Env-Sw 305.03(b)(2), DES can not approve the application.

Until the remedial actions are fully implemented and soil and groundwater performance data are collected, DES will not have sufficient information to determine the source of the contaminated groundwater and to conclude that it has been remediated.

In summary, and for the reasons outlined in this letter, DES hereby denies the requested applications for permit modification.



### **III. Continuing Groundwater Management Obligations**

Irrespective of this permit decision, DES notes that the applicant remains responsible to continue and complete the ongoing remedial work as required by Groundwater Management and Release Detection Permit #GWP-198704033-B-005.

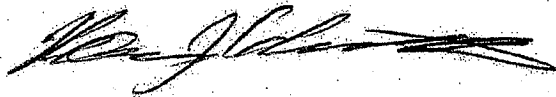
Correspondence regarding the proposed groundwater performance standards, as contained in NCES's October 13, 2008 response to the September 10, 2008 DES Comment Letter, will be issued by DES under separate cover.

### **IV. Appeal**

In accordance with RSA 149-M:8 and Env-Sw 305.03(a)(3), this decision issued by DES may be appealed to the Waste Management Council as provided under RSA 21-O:9, V and Env-WMC 200.

If you have any questions regarding this decision, please contact me at the letterhead address, via telephone at (603) 271-1997, or via e-mail at michael.wimsatt@des.nh.gov.

Sincerely yours,



Michael J. Wimsatt, P.G., Director  
Waste Management Division

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#### Appendix A: Response to Public Comments

CC: Bryan Gould, Esq., Brown, Olson & Gould  
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