



July 27, 2010
File No. 2002-015

Paul M. Gildersleeve, P.E.
Solid Waste Management Bureau
New Hampshire Department of Environmental Services
29 Hazen Drive
P.O. Box 95
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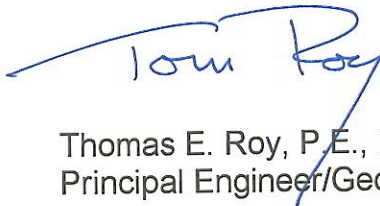
Re: April 2010 Permit Application Comments
North County Environmental Services Landfill
Bethlehem, New Hampshire

Dear Paul:

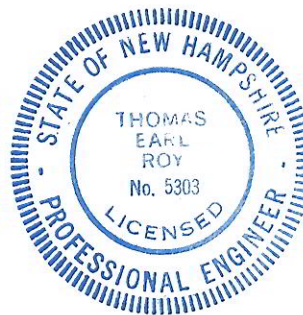
The Town of Bethlehem requested that I submit the attached comments on the Town's behalf for the North County Environmental Services' April 2010 permit modification application.

If you have any questions or comments, please contact me at 228-0008.

Sincerely,
Aries Engineering, Inc.



Thomas E. Roy, P.E., P.G.
Principal Engineer/Geologist



JPJ:kd

Enclosure: April 2010 Permit Application Comments

cc: David Lovejoy, Chair, Town of Bethlehem, Board of Selectmen
Brenda Keith, Boutin & Altieri, PLLC

North Country Environmental Services
April 2010 Stage IV, Phase II Permit Application Comments
Prepared by
Aries Engineering, Inc.
July 2010

Introduction

As requested by Boutin and Altieri, PLLC on behalf of the Town of Bethlehem (Town), Aries Engineering, Inc. (Aries) evaluated North Country Environmental Services' (NCES') April 29, 2010 Stage IV, Phase II Type I-B permit modification application (April permit application) for NCES' Trudeau Road landfill facility (facility) in Bethlehem, New Hampshire.

The April permit application proposed to expand the facility's municipal solid waste disposal capacity by approximately 1,100,000 cubic yards by expanding the landfill footprint within the 51-acre parcel where solid waste disposal is allowed. The April permit application proposed to construct an overlay liner in the landfill Stage I, Phases I, II and III areas to comply with New Hampshire Department of Environmental Services (Department) solid waste rules Env-Sw 805.07 for leachate leak detection and location isolation.

To conduct this evaluation, Aries assessed the April permit application, the Department's July 1, 2010 correspondence requiring that NCES must submit additional information to satisfy the provisions of solid waste rules Env-Sw 315 for technical review of the April permit application, and NCES' July 16, 2010 response to the Department's July 1, 2010 correspondence.

Following are Aries' April permit application comments and opinions. Aries' comments and opinions are based on the information evaluated, and are subject to revision based on our receipt and evaluation of new information.

Application- Attachment A

1. The April permit application, and information presented by NCES representatives at a June 2010 Public Information meeting, indicated that a substantial amount of waste, estimated to be approximately 42,000 cubic yards, would be excavated and relocated to other portions of the landfill to accommodate proposed Stage IV, Phase II construction. Aries anticipates that there would likely be substantial landfill gas and odor emissions during waste relocation. The April permit application indicated that odor misting and odor neutralizing chemicals would be primary odor control measures. However, it is unlikely that these measures will substantially control landfill gas and odor emissions. The April permit application should be revised to specify ceasing construction activity during times of Town resident odor or landfill gas emission complaints, and specify provisions to stabilize the waste relocation area by using physical odor and gas controls such as temporary cover. Construction work could then continue when the Department

determines that the sources of odor complaints have been controlled and conditions have improved. The April permit application should be revised to specify NCES will provide the Town Board of Selectmen with the status of odor control measures in response to Town resident complaints.

2. The April permit application proposed to reconstruct Stage I leachate sumps and consolidate the separate Stage I phase sumps into a single sump. However, the April permit application did not include details such as the sequencing of each phase sump reconstruction. These details should be provided by NCES for further analysis. It will also be particularly important to evaluate construction sequencing and precautions to protect the existing liner system. Aries anticipates that regardless of the construction precautions taken and construction quality assurance program employed, there is a substantial likelihood that the existing liner may be damaged by construction activity, potentially in areas that would not be readily apparent. Such latent liner damage would likely adversely affect the leachate containment system. Similar construction-related damage to the containment system was reported by NCES to have occurred in the northern downchute area where damage to the flexible membrane liner caused the release of leachate and landfill gas to the environment. Further, construction activity for Stage IV, Phase I also apparently caused a leachate release to the environment that contaminated area groundwater¹. In light of the complexity of leachate sump reconstruction in the Stage I area, and the history of past facility construction leachate releases and construction defects, it will be important to prepare detailed construction and construction quality assurance measures to limit accidental construction-related leachate releases, and latent construction defects to the leachate and landfill gas management system. The April permit application should therefore be revised to include these important details for further evaluation.
3. The April permit application included a proposal to construct an “overlay liner” over Stage I, Phases I, II and III to comply with Department rules Env-Sw 805.07 *Leak Detection and Location System Design Standards*. While the proposed overlay liner geonet component has the potential to comply with the travel time requirement of these rules, it is not clear that the overlay liner design would comply with rule requirements under Env-Sw 805.07 (b) (2) that the leak detection and location system shall be designed to “Provide a means for isolating the *potential location* of the leak (emphasis added)”. It appears that the overlay liner is not designed to isolate the potential location of a leak, such that further remedial action could be focused in that location. As currently proposed, the overlay liner would *reduce* the current ability to identify potential leaks located in the Stage I, Phase I, II and III areas, which currently have separate secondary leachate collection systems for each phase. Therefore the design should be revised to comply with the design standard under Env-Sw 805.02 (3) for a leak detection *and location system* that does not reduce current facility leak location identification capabilities.

¹ *Corrective Action Plan*, SHA, November 24, 2009

4. The April permit application did not include sufficient details indicating how landfill gas under the proposed overlay liner would be adequately controlled, and indicated that such details would be provided in the final design. However, in light of past facility environmental contamination migration due to uncontrolled landfill gas emissions², it is important that landfill gas control measures be provided by NCES as part of the April permit application to allow assessing the adequacy, constructability, and reliability of the proposed sub-overlay liner landfill gas management system. The April permit application should therefore be revised to include these important engineering design details.

Section III – Technical Specifications

1. *Section 02276, High Density Polyethylene (HDPE) Liner:* This section should expressly indicate that HDPE liner construction and testing techniques will achieve liquid-tight and gas-tight seams and seals. Prior NCES construction work in the north part of the landfill included liner modifications that did not provide a gas-tight seal, and subsequently allowed landfill gas to discharge to the environment³, in a fashion that NCES representatives concluded contaminated site groundwater.
2. *Section 13001, Site Safety and Contingency Work Plan Outline:* While landfill fires and explosions are unlikely at a well-designed and operated landfill, the potential adverse environmental and public health impacts of fire or explosions are serious enough to justify prior response planning. A Federal Emergency Management Agency, United States Fire Administration, National Fire Data Center (FEMA) May 2002 report⁴ recommended that landfills prepare contingency plans to deal with emergencies such as fires. This is particularly important because landfill fire controls may require special fire suppression foam or smothering techniques other than typical fire suppression with water. Further, landfill fires may require special health and safety precautions to deal with potential toxic gas and smoke emissions. Contingency planning will be particularly important since proposed construction includes excavating, staging and disposing of 42,000 cubic yards of waste. Exposing this waste will likely increase the potential for air intrusion into the landfill (which could increase the risk of landfill fire) and would expose the excavated waste to conditions potentially supporting a landfill fire. The April permit application included a fire and explosion contingency plan outline, but did not include a detailed fire and explosion contingency plan. Accordingly, to comply with FEMA recommendations the April permit application should be revised to include a contingency plan prepared in cooperation with Town fire, emergency, and police representatives to address the issues reflected in FEMA's May 2002 landfill fire report.

² *Corrective Action Plan*, SHA, November 24, 2009

³ *Correspondence to the Department*, NCES, September 16, 2009 and November 5, 2009

⁴ *Landfill Fires, Their Magnitude, Characteristics, and Mitigation*, FEMA, May 2002

Section IV- Revised Operating Plan

1. *Section 6.0, Contingency Plan* should be revised to include detailed planning for potential fires and explosions following FEMA recommendations. As presented, the April permit application does not consider special training requirements for Town fire, police, and emergency response representatives. Nor are special fire suppression techniques, such as foam or smothering with inert material specified. Further, special health and safety precautions by fire, police, and emergency response representatives may be required. Training and special equipment provisions for Town first-response representatives should be included in the contingency plan, which should be developed in cooperation with Department and Town representatives. This would be consistent with FEMA recommendations that all personnel should operate according to the same plan under a strong Incident Command System since landfill fires usually include a multi-agency response.

Section V- Design Report (sic)

1. *Section VI: Design Report, Construction* further described proposed waste excavation and sump consolidation and reconstruction. As previously indicated in these comments, there is a substantial likelihood of leachate, landfill gas and odor releases during proposed construction work. Further, there is also a substantial potential for the creation of latent containment construction defects that could result in the release of leachate or landfill gas to the environment. Accordingly, besides proper construction design, experienced resident engineering services, and effective construction quality assurance, it will be important to have a working groundwater release detection network to allow detecting and responding to *any* release, as required by Department rules. In a May 19, 2010 correspondence, the Department indicated that to assess the effectiveness of remedial work described under the current Corrective Action Plan (CAP) developed to correct groundwater contamination resulting from leachate and landfill gas releases, groundwater performance standards would be achieved when the following are attained: There is an apparent downward trend in groundwater bromide and volatile organic compound (VOC) concentrations; a statistical analysis of groundwater data confirms the apparent downward trends consistent with the site conceptual model; and background groundwater bromide and VOC concentrations are attained. Since there is a substantial likelihood of contaminant releases due to proposed construction activity, Aries recommends that all three remedial performance standards be attained and sustained in the release detection network before the Department considers approving the April permit application, as appropriately revised to comply with the Department's rules. This would allow detecting *any* releases from the facility as required by Department rules, without prior facility releases interfering with the detection of, and prompt response to potential future facility releases.

2. *Leachate management*: This section indicated that proper leachate management techniques were described in construction notes on sheet C-10. However, it is not clear that sheet C-10 construction notes will be adequate alone to describe proper leachate management techniques. Aries recommends that the design report section also include a detailed description of leachate management techniques to be used during construction.

Appendix A- Design Calculations

1. *Section 5, Maximum Head on Liner* indicated a safety factor of 1.11 for 30 feet of waste disposed of above the proposed Stage IV, Phase II liner. However, the literature indicates that a larger safety factor of approximately 1.75 or more may be warranted due to decreased transmissivity of the geonet layer with age⁵ and other factors such as filter fabric clogging⁶. In light of the Department's expectation of increased storm frequency and intensity (which could generate more leachate than anticipated) and published concerns of decreased leachate management system efficiency with age, the Department should require increasing the minimum Stage IV, Phase II factor of safety to 1.75 for the proposed leachate collection system.

General Comment

1. As previously indicated in these comments, there is a substantial likelihood of leachate, landfill gas and odor releases during proposed construction work. Further, there is also a substantial potential for the creation of latent sump leachate containment construction defects that could result in the release of leachate or landfill gas to the environment. Accordingly, besides proper construction design, adequate resident engineering services, and effective construction quality assurance, it will be important to have a working groundwater release detection network to allow detecting and responding to *any* release, as required by Department rules. Since there is a substantial likelihood of contaminant releases due to proposed construction activity, Aries recommends that all three remedial performance standards outlined in the Department's May 19, 2010 correspondence and discussed further in these comments (apparent downward contaminant concentration trend, statistical confirmation of the decreasing contaminant concentration trend, and attaining background contaminant concentrations) be attained and sustained in the release detection network before the Department considers approving the April permit application, as appropriately revised to comply with the Department's rules.

⁵ *Transmissivity of Geonets in Secondary Leachate Collection Systems of Waste Containment Facilities*, Thesis, Department of Civil Engineering, University of British Columbia, December 1993

⁶ *Leachate Clogging Assessment of Geotextile and Soil Landfill Filters*, Koerner and Koerner, EPA, September 1995