



North Country Environmental Services, Inc.



June 1, 2001

Mr. Michael McCluskey  
Waste Management Division  
New Hampshire Department of Environmental Services  
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Concord, NH 03301-0509

3 Pitkin Court  
Montpelier, Vermont 05602

(802) 223-7221  
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**RE: North Country Environmental Services, Inc. Landfill  
Landfill Facility - Bethlehem, N.H  
Stage I Secondary Detection System Flows  
Investigation Report and Response Action Plan (NHDES Env-Wm 2506.09)  
{Via facsimile; (603) 271-2456, 2 pages – originals to follow conventional mail}**

Dear Mr. McCluskey:

This letter serves as notification that two lined landfill cells (Phases II and III of Stage I) at the above referenced facility exceeded the 100 gallons per tributary acre per day (g/a/d) threshold as allowed by the above referenced New Hampshire Department of Environmental Services Rule.

The average flow in the secondary leachate collection systems of Phases II and III in April were 223.41 and 149.28 g/a/d, respectively. Env-Wm 2506.09 (e) and (f) require that an investigation be performed to evaluate the potential cause(s) and appropriate response actions when flows exceed 100 g/a/d.

In the past several years, the facility has experienced increased flows in the secondary leachate collection systems in Phases II through IV of Stage I, coinciding with periods of higher precipitation and during the spring thaw. Historically, flows have diminished to below action levels later in the spring and continued to be below action levels through the summer, fall and winter months. The primary and secondary liners were not welded together in the anchor trench during the various phases of construction of Stage I and what North Country Environmental Services, Inc. (NCES) believes to be the source of the increased flow in the secondary detection systems. Water which infiltrates at the toe of the slope and temporarily "perches" in the granular backfill in the anchor trench and placed around the conduit, leachate force main pipe and tanks, located near the toe of the slope over time wicks up through the geocomposite between the primary and secondary liners. The occurrence of higher secondary detection flows without similar changes in primary flows in conjunction with results of prior sampling and laboratory analysis of water pumped from the secondary detection systems supports the premise that the source of the water is infiltration of "clean" water rather than leakage through the primary liner.

In an attempt to eliminate the situations detailed in paragraph three above subsurface piping was installed during the month of December 2000 near the toe of the slope to provide an outlet for water which infiltrates and perches on the lower permeability natural soils in the area. The project involved installing 6-inch diameter perforated SDR-35 polyvinyl chloride (PVC) pipe bedded in 1½-inch crushed stone wrapped in nonwoven geotextile from the anchor trench to the north, beyond the toe of the crushed rock drain. From there, solid pipe was extended to the treatment swale from Detention Pond No. 3 located to the north. Just beyond the toe of crushed

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rock drain, perforated PVC laterals from the pipe draining from the anchor trench were installed to the east and west. The laterals were also bedded in crushed stone and wrapped in geotextile.

The effectiveness of the pipe is likely to have been impacted by the fact that the trench backfill along the laterals significantly settled over the winter allowing the majority of stormwater runoff and drainage from the landfill cap to collect and infiltrate at the toe of slope directly over the subsurface drain pipe.

### **Recommended Response Action**

To further limit infiltration at the toe of the Phase III and IV slopes in the future, we recommend that the upper 12-18 inches of soil and stone from the southern most limit of the crushed stone drain to the invert of the existing drainage swale adjacent to the consolidation building (drains west to east) be excavated and removed. This area will be bound to the west by the approximate location of the secondary detection tank of Stage IV and the existing Phase II and III pump shack to the east. The subgrade will be graded from south to north at a minimum of 2 percent. This area will receive a layer of either Geosynthetic Clay Liner (GCL) material or Polyethylene Geomembrane Liner (PEL) to help reduce surface water infiltration to the anchor trench area. The GCL or PEL would be backfilled with a 12" layer of granular drainage media and then covered with a layer of topsoil. All disturbed areas will receive an erosion control grass seed mix, fertilizer and mulch.

To limit further infiltration at the toe of slope near Phase II, we recommend that a PEL be placed in the invert of the swale extending from the east of the shed along the toe of slope to the base of the gabion-lined swale. The swale would be over excavated 6 to 12 inches. The PEL will be placed on the subgrade with the upper edge on the landfill side extending beneath the geosynthetic clay liner (GCL) and geocomposite of the crushed stone drain and the lower edge on the road side extending up to the shoulder of the road. Once installed the PEL would be overlain with a 12" layer of granular drainage media and then covered with a layer of topsoil. Consistent with the above, all disturbed areas will receive an erosion control grass seed mix, fertilizer and mulch.

We believe these measures will further limit infiltration along the toe of the slope, which is believed to be the source of water resulting in the seasonally elevated secondary detection flows. NCES would like to proceed with this work as soon as possible. Should you have any questions please do not hesitate to contact me at (802) 223-7221.

Sincerely,  
NORTH COUNTRY ENVIRONMENTAL SERVICES, INC.



Joe Gay, E.I.  
Permits, Compliance and Engineering

- C: Larry Lackey, North Country Environmental Services, Inc. (via e-mail)  
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