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July 8, 2013

Mr. Paul Gildersleeve, P.E.
NHDES Waste Management Division
Permitting & Design Review Section
29 Hazen Drive, P.O. Box 95
Concord, NH 03302-0095

**RE: North Country Environmental Services, Inc., Trudeau Road, Bethlehem, NH
Stage IV Phase II-B Landfill Expansion
Leak Detection Flows/Repair Summary
Permit #: DES-SW-SP-03-002
CMA #865-B.2**

Dear Mr. Gildersleeve:

On behalf of North Country Environmental Services, Inc. (NCES), CMA Engineers, Inc. is providing documentation of observed damage to the existing Stage I Phase III lining system abutting the Stage IV Phase II-A/B Landfill Expansion Project, and an assessment of how the damage relates to recent leak detection flows. Leak detection flows recorded in the Stage I Phase III sump have exceeded the Action Leakage rate of 25 gallons per acre per day (gpad) periodically since construction of Stage IV Phase II-A was completed in 2011. A site sketch locating the subject areas is attached.

Pike Industries survey personnel located the damaged areas using site coordinates. The damage is at the southwestern limits of Stage I Phase III, just inside and north of the anchor trench. A summary of the observed damage is presented in the table below.

<u>Location</u>	<u>N</u>	<u>E</u>	<u>Elev.</u>	<u>Description</u>
1	641149.94	994013.24	1347.39	2' x 4' Stage I Phase III – Thru primary & secondary
2	641144.27	994006.81	1347.56	2' x 4' Stage I Phase III – Thru primary & secondary

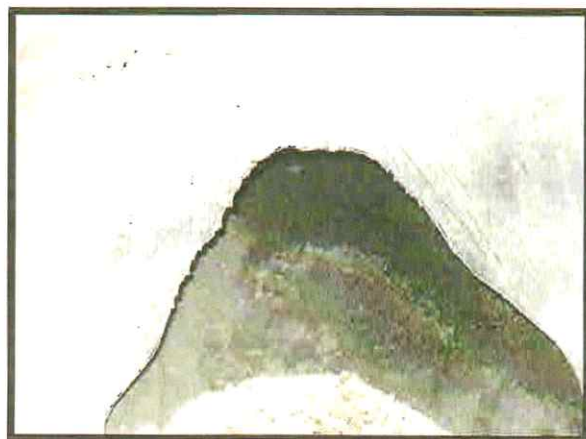
The observed damage at locations 1 and 2 was immediately inboard of the Stage I Phase III anchor trench on the uppermost portion of the landfill side slope where the expansion ties into Stage I Phase III. It appeared the damage occurred prior to Stage IV Phase II construction, likely during construction, operation or closure of Stage I. Waste was not located over these locations as the limits of Stage I waste had been offset from the anchor trench to provide freeboard and to accommodate cap construction. As such, these damage locations had not been exposed to leachate, or essentially even any clean water, due to their location at the top of the cell side slope. These damaged areas had subsequently been sealed by the final Stage I cap. Prior to Stage IV Phase II construction, therefore, the previous damage in Stage I did not result in measurable flows in the leak detection system or leakage from the landfill.

Stage IV Phase II-A construction in 2011 changed conditions in this area in two ways. First, southern berm construction created a low bowl where clean stormwater collected. The stormwater was drained from this area by a temporary stormwater pipe installed during Stage IV Phase II-A construction. This drain was recently decommissioned. During subsequent winter months, the pipe froze and stormwater ponded in the project area. Additionally, the pipe had become silted on at least two occasions, also causing ponded water. Even when drained, the bowl area collected storm water and remained saturated.

Second, 2011 construction removed the Stage I cap from the area over Stage I Phase IV. Damage areas 1 and 2 are located within the ponded water area and within or immediately adjacent to the area where the cap was removed. Damaged areas 1 and 2 therefore became exposed to a steady supply of free water from clean runoff due to this temporary interim construction condition. The removal of the cap over Stage I Phase III in May 2013 further exposed the damaged area to ponded stormwater and saturated conditions.



Location 1



Location 2

Damage locations 1 and 2 were repaired by replacing the primary and secondary liners with new Stage IV Phase II-B liners. The new liners were extended down slope over the damaged areas and tied into competent Stage I liner. As shown on the Primary and Secondary Liner Plans in the Stage IV Phase II-B Record Drawings, primary liner panel P-2 and secondary liner panel S-26 were extended to the north to cover and replace these damaged areas.

As previously reported in the January 4, 2013 letter to NHDES referenced in the Type II permit, chemical analysis of the leak detection fluid indicates that 90 percent of the flow was clean water. Damage areas 1 and 2 likely contributed a substantial portion of this clean water in the leak detection system. Repair of this damage and completion of Stage IV Phase II-B construction should substantially reduce leak detection flows.

A summary of recent Stage I Phase III leak detection flows is attached. As indicated in the attachment, elevated leak detection flows have been recorded during construction as the lining system was uncovered and the area was exposed to heavy rainfall. In particular, from June 5 through June 19, the Stage I Phase III leak detection system was open to precipitation to facilitate Stage IV

Phase II-B liner construction and tie-in. All stormwater within the southern construction area drained into the leak detection system during this time interval. This also was a period of heavy precipitation as evidenced by Stage I Phase III leak detection flows generally exceeding 100 gpad and peaking at 733 gpad. The leak detection system was re-sealed on June 19 with the completion of the primary liner tie-in.

Stage I Phase III leak detection flows have subsequently lessened and are trending downward. As the leak detection system was likely flooded during the previous weeks by construction-phase stormwater, it may take some time for the various components of the system, such as the drainage sand, to drain. NCES will continue to monitor leak detection flows until the Stage I Phase III sump is decommissioned. This is scheduled to occur later this month.

In summary, the observed and documented damage has been repaired. This was accomplished by extending the new to old liner system tie-in beyond the damage areas, thereby replacing this damaged liner. The repair work and completion of Stage IV Phase II construction should substantially reduce leak detection flows to rates.

Should you have any questions, please do not hesitate to call.

Very truly yours,
CMA ENGINEERS, INC.



Robert J. Grillo, P.E.
Project Manager

RJG:amh

cc: Kevin Roy, NCES
Joe Gay, NCES

NCES Stage I Phase III Secondary Flow Summary

	gpd	gpad	Totalizer gallons
5/25/2013			151,312
5/26/2013	663	169	151,975
5/27/2013	804	205	152,779
5/28/2013	910	232	153,689
5/29/2013	680	173	154,369
5/30/2013	670	171	155,039
5/31/2013	675	172	155,714
6/1/2013	672	171	156,386
6/2/2013	447	114	156,833
6/3/2013	671	171	157,504
6/4/2013	427	109	157,931
6/5/2013	447	114	158,378
6/6/2013	450	115	158,828
6/7/2013	452	115	159,280
6/8/2013	439	112	159,719
6/9/2013	442	113	160,161
6/10/2013	224	57	160,385
6/11/2013	445	114	160,830
6/12/2013	2874	733	163,704
6/13/2013	1371	350	165,075
6/14/2013	456	116	165,531
6/15/2013	458	117	165,989
6/16/2013	225	57	166,214
6/17/2013	577	147	166,214
6/18/2013	577	147	167,368
6/19/2013	969	247	168,337
6/20/2013	452	103	168,789
6/21/2013	223	51	169,012
6/22/2013	224	51	169,236
6/23/2013	219	50	169,455
6/24/2013	218	50	169,673
6/25/2013	438	100	170,111
6/26/2013	394	90	170,505
6/27/2013	109	25	170,505
6/28/2013	109	25	170,723
6/29/2013	439	100	171,162
6/30/2013	113	26	171,162
7/1/2013	113	26	171,387
7/2/2013	231	53	171,618
7/3/2013	217	49	171,835
7/4/2013	544	124	172,379
7/5/2013	260	59	172,379
7/6/2013	260	59	172,898
7/7/2013	350	80	173,248
7/8/2013	343	78	173,248
7/9/2013	343	78	173,933
7/10/2013	295	67	174,228

3.92	Acres (pre 6/20/13)
4.40	Acres (on 6/20/13)

RED BOLD TEXT = Phase I Stage III Secondary open to stormwater

Stage 1 Phase 3 Secondary Flow, GPAD

