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LETTER OF TRANSMITTAL

To: Ms. Karlee Kenison, P.G.
 NH Department of Environmental Services
 29 Hazen Drive, P.O. Box 95
 Concord, New Hampshire 03302-0095

Date: October 24, 2008
 Job #: 1003.06

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1	October 24, 2008	SHA memo regarding additional hydrogeologic analysis - MW-402U Area

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Remarks: Karlee -- as per my voice-mail message from earlier today, at the request of Joe Gay of NCES, we are submitting the above-referenced technical memorandum to NHDES. The attached memo presents the findings of additional hydrogeologic analysis for the area of site monitoring wells MW-402U/LR.

cc: Joe Gay, NCES (w/ enclosure)
 Kevin Roy, NCES (w/ enclosure)
 Bob Grillo, CMA (w/ enclosure)

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MEMORANDUM

To: Joe Gay, NCES
From: Paul Rydel 
File: 1003.06
Date: October 24, 2008
Re: Analysis of Site Hydrogeologic Conditions Relative to Potential Leachate Leakage –
Monitoring Well MW-402U/L Area

As requested, Sanborn, Head & Associates, Inc. (SHA) prepared this memorandum to document the findings of our additional analysis regarding site hydrogeologic conditions in the area of monitoring wells MW-402U (screened in the Upper Till Unit), and MW-402LR, which is screened in the Stratified Drift Unit (underlying the Upper Till). As described in our October 17, 2008 memorandum, there is a strong downward component to groundwater flow from the Upper Till Unit to the Stratified Drift Unit in the area of MW-402U/LR. Thus, from a groundwater monitoring perspective, the Stratified Drift Unit, which extends beneath the area of the Stage I Landfill upgradient of these wells, is the principal groundwater flow unit in which we would expect to find downgradient impacts from leakage from the Stage I liner system. Based on these conditions, our prior memorandum concluded that the history of VOC detections in the groundwater samples collected from Upper Till well MW-402U are consistent with a shallow, local VOC source proximate to that well (i.e., the previously-reported leachate releases associated with the leachate load-out building), and not a release from the landfill liner system.

As requested, we have prepared this memorandum to present our findings with regard to our review of recent analytical results for site leachate samples, in light of the hydrogeologic conditions described in our October 17, 2008 memorandum. This analysis builds upon the findings presented in our previous memorandum, which presented a conservative estimated value for groundwater flow in the Stratified Drift Unit (through a section 100 feet wide [approximately the width of the Stage I / Phase IV Landfill]) in the area of MW-402LR downgradient of the Stage I / Phase IV landfill of 1,885 gallons per day (GPD). This value may be used to further assess potential groundwater quality effects associated with the estimated typical leachate leakage rates through the Stage I liner system, as presented in the October 14, 2008 memorandum prepared by CMA Engineers, Inc., following the approach presented below.

As described in the CMA memorandum, the maximum calculated leakage rate for the Stage I / Phase IV landfill, located upgradient from well MW-402LR, is 1.5×10^{-4} GPD. When compared to the estimated groundwater flow volume through the Stratified Drift Unit in this

area of the site (1,885 GPD), this results in a "dilution factor" of approximately 1.3×10^7 or about 13 million (assuming complete mixing of leachate from the point of the leak[s] through the saturated thickness of the Stratified Drift Unit). This dilution factor may then be applied to assess the potential effects of the leakage of leachate through the Stage I / Phase IV liner system (at the rates calculated by CMA) on local groundwater quality in the Stratified Drift Unit (i.e., as monitored by well MW-402LR). For example,

- Recent analytical data for leachate samples collected from the Stage I Landfill secondary collection system, which were provided as Exhibit C of NCES' October 13, 2008 letter to NHDES, include data from a September 11, 2008 sampling round. Based on these recent data, of the VOCs detected in the secondary leachate samples, tetrahydrofuran (THF) and tert-butyl-alcohol (TBA) were reported at the greatest concentrations; ranging up to 1,400 micrograms per liter (ug/l) for THF.
- Applying the above-referenced dilution factor to the THF concentration of 1,400 ug/l (i.e., assuming no attenuation of VOC concentrations in the leachate as it leaked through the Stage I / Phase IV secondary liner system and underlying vadose zone), at the rates predicted by CMA, yields a potential VOC concentration in groundwater in the Stratified Drift Unit of about 1.1×10^{-4} ug/l. This predicted concentration is far less than the typical analytical reporting limits for VOCs in groundwater of about 1 to 10 ug/l. This analysis thus indicates that, based on the recent secondary leachate analytical data, the calculated leakage rate for the secondary liner system is insufficient to result in detectable concentrations of VOCs in downgradient groundwater in the Stratified Drift Unit.

PLR/RSS:plr

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