STATE OF NEW HAMPSHIRE

INTER-DEPARTMENT COMMUNICATION

DATE: 03/13/08
AT(OFFICE): PA&DRS

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

FROM: Michael E. Guilfoy, P.E., Administrator
Solid Waste Management Bureau

SUBJECT: **Status of Stratified Drift Aquifer at the NCES Property**

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

CC:

Stratified-Drift Aquifer at NCES Property

The public has expressed concern relative to the potential threat the existing and proposed landfill poses to the aquifer underlying the NCES property. The following describes the stratified-drift aquifer that underlies the NCES facility.

The NCES facility is located on a stratified-drift aquifer. In New Hampshire, stratified-drift aquifers are potentially valuable sources of groundwater depending on water quality, their size (lateral extent and saturated vertical thickness which determines storage), transmissivity (capability to transmit groundwater which is relatively high in coarser sands and gravel) and hydraulic connection to dependable sources of adjacent good quality surface water.

In the Statewide groundwater reconnaissance conducted by the U. S. Geological Survey in the 1970s, the property was within an area designated as an area "inferred to be underlain by medium to very coarse sand or sand and gravel with sufficient saturated thickness to have high potential to yield water" (Cotton, 1976). This conclusion was based on the presence of sand and gravel at the land surface and a 1954 test well southwest of the intersection of Route 302 and Trudeau Road,

Subsequent, more detailed investigations by the USGS, including subsurface drilling logs, demonstrate that there is not enough coarse granular material with sufficient saturated thickness to have a high potential to yield water (Flanagan, 1996).

This recent report shows that the stratified-drift aquifer in this area is a little less than 4 square miles in area. About 60 percent of the area is in the adjacent Gale River watershed and is not characterized relative to its potential productivity. That part of the aquifer in the Ammonoosuc River watershed is characterized as having a transmissivity generally less than 1000 ft^2/day and a saturated thickness of productive material generally less than 20 feet. One small area in the western part of NCES property is designed with 40 saturated feet and a transmissivity greater than 1000. In addition, a small area west of the intersection of Route 302 and Trudeau Road has a saturated thickness of 80 feet and a transmissivity reaching 2000. (Major stratified-drift aquifers

in the state have transmissivities greater than 2000 ft^2/day and saturated thicknesses greater than 40 feet.)

Potential production from the aquifer beneath the NCES facility is extremely small. The area contributing groundwater to the site is very small because it is near the upper reaches of the groundwater basin flowing northward to the Ammonoosuc River. Most of the groundwater in the aquifer south of the site flows southerly within the Gale River watershed. The saturated thickness (storage) of the productive zones within the aquifer is generally very limited. Aquifer material is predominately fine grained (silt and sand with lesser amounts of clay and gravel). Thus, the capability to transmit groundwater is small. Hydraulic conductivity tests just northwest of Stage I suggest a transmissivity value of about 1100 ft^2/day. In contrast, major aquifers have transmissivity values above 2000 ft^2/day. It is noted that the U.S. Geological Survey assigned a saturated thickness of less than 20 feet (limited storage) and a transmissivity of less than 1000 ft^2/day to the rest of the aquifer.

Groundwater flow from the NCES site contributes water in a northerly direction toward the Ammonoosuc River. Springs, including the Main Seep, along the steep valley wall above the river have generally been interpreted to be at the contact between the bottom of the stratified-drift aquifer and underlying till. Thus, at that point (i.e., at the seeps), the stratified-drift aquifer is not connected directly to the river. Downstream where the southern riverbank topography changes from the steep valley wall to flatter terrain, the stratified-drift aquifer is in contact with the river. Based on a test well drilled in 1954, it was estimated that the potentially most productive area within the stratified-drift aquifer in this part of the Ammonoosuc Valley is near the intersection of Route 302 and Trudeau Road. This area is over 0.8 mile from the NCES facility.

Cotton, J. E., 1976a, Availability of ground water in the middle Connecticut River basin, west-central New Hampshire: U.S. Geological Survey Water Resources Investigations Report WRI 76-18, scale 1:125,000, 1 sheet)

Flanagan, S.M., 1996, Geohydrology and water quality of stratified-drift aquifers in the Middle Connecticut River Basin, west-central New Hampshire: U.S. Geological Survey Water-Resources Investigations Report 94-4181, 224 p., 8 pls.

Legality of Siting a Landfill over the Aquifer

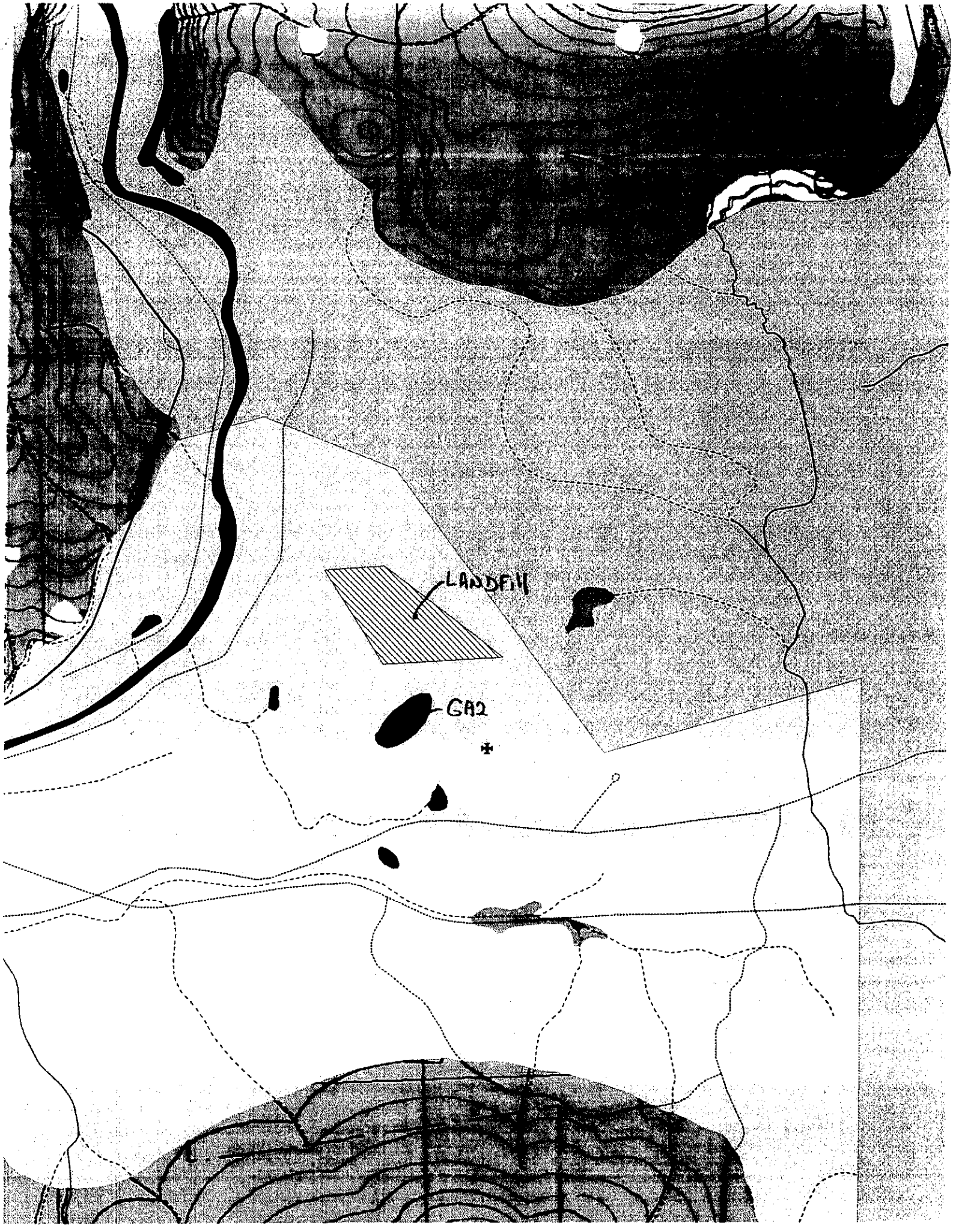
RSA 485-C establishes 4 classifications for groundwater GAA, GA1, GA2 and GB. Env-Dw 900 sets out rules whereby a "local entity" may request the reclassification of groundwater within an aerial extent depending on its use and relative value. The classifications above are listed in descending order of protection with GAA the most protective followed by GA1 and GA2. All other groundwater is classified GB by default.

RSA 485-C:12 prohibits the siting of a *new* landfill over an aquifer that is classified GAA. There are no prohibitions for uses over an aquifer with any other classification. For groundwater to be classified GAA it must be within a wellhead protection area for wells presently being used or well sites that have been identified for future use.

The aquifer under the NCES landfill is classified as GB and GA2 and there are no prohibitions against siting a landfill in this location, further even if the aquifer could be reclassified to GAA it would not necessarily preclude expansion of the landfill since the

expansion may not meet the definition of a new facility in Env-Dw 901.03(k).

A solid waste landfill is a potential contaminate source listed by RSA 485-C:7. Also leachate is a regulated substance subject to the best management practices in Env-Wq 400. It is the Department's position that landfill operations in compliance with its permit meet the intent of the BMPs.


LANDFILL
GA2

The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES

Thomas S. Burack, Commissioner

March 12, 2008

Mr. Eugene Martin
Senior Project Manager
Casella Waste Systems, Inc.
3 Pitkin Court
Montpelier, Vermont 05602

SUBJECT: TYPE 1B and II PERMIT MODIFICATION APPLICATIONS/STAGE IV PHASE I CONSTRUCTION FOR NORTH COUNTRY ENVIRONMENTAL SERVICES/LOCATED AT 581 TRUDEAU ROAD, BETHLEHEM, NEW HAMPSHIRE/DES-SW-SP-03-002/WMD LOG #200700211; 200800038; 200800041

Dear Mr. Martin:

The New Hampshire Department of Environmental Services, Waste Management Division (Department) has completed a review of the above-cited application for a Type 2 and Type IB Permit Modifications. In accordance with the requirements of the New Hampshire Solid Waste Rules (Rules) [ref. Env-Sw 304.03], the Department has determined that the applications are incomplete.

To complete the applications, the following information must be provided to satisfy the provisions of Env-Sw 315 and support a technical review of the completed applications:

> Sheet C-47, Detail 108 shows the anchor trench at the REB shelf from Sta. 5+00 to 7+25. Sheet C-29 shows similar stationing for the REB shelf. Please explain why Sheet C-29 and Sheet C-47, Detail 108's REB shelf stationing is different from Tensar's REB shelf stationing (Sta. 4+80 to 7+54.7).

Please address the above comments by submitting three copies of the required information at your earliest convenience. Be certain to note the revision date on each replacement page. Continued review of your applications will commence upon receipt of this information.

Note that in accordance with the provisions of Env-Sw 304.05(d) of the Rules, an incomplete application that becomes a dormant application shall be deemed denied. As defined by Env-Sw 102.54 of the Rules, a dormant application is one that the applicant fails to complete within 12 months of the date the application is deemed to be incomplete by the Department.

If you have any questions, please contact me.

Sincerely,

Wayne A. Wheeler, P.E.
Solid Waste Management Bureau
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Town of Sugar Hill, Board of Selectmen
Town of Lancaster, Board of Selectmen
Town of Dalton, Board of Selectmen
Town of Easton, Board of Selectmen
Town of Littleton, Board of Selectmen
Town of Franconia, Board of Selectmen
Robert J. Grillo, P.E., CMA Engineers