OhioEPA

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Craig W. Butler, Director

APR 0 9 2015

Mr. Tim Gourley
Lake County Department of Utilities
Lake County Administration Center
105 Main Street, P.O. Box 490
Painesville, Ohio 44077

Re: Lake County Solid Waste Facility
Director's Authorization
Non-Approval
Municipal Solid Waste Landfills
Lake County
MSWL018755

Subject: Lake County Solid Waste Facility, Lake County
Ohio Administrative Code (OAC) Rule 3745-27-10(E)(9)(b)
Response to Request to Grant Reinstatement

Dear Mr. Gourley:

On September 15, 2014, and November 25, 2014, the Ohio Environmental Protection Agency (Ohio EPA), Division of Materials and Waste Management (DMWM), Northeast District Office (NEDO), received the documents titled *"Response to Ohio EPA's June 3, 2014 Request for More Information"* and "*Results of Tritium Analysis*," respectively, for the Lake County Solid Waste Facility (Facility) located in Lake County. These documents were submitted by Mannik & Smith Group (MSG) on behalf of the Board of Lake County Commissioners (BLCC) pursuant to OAC Rule 3745-27-10(E)(9)(b), and requested reinstatement of the ground water detection monitoring program for specific monitoring wells at the Facility and to release the owner or operator from the obligation to comply with the ground water quality assessment monitoring program. The assessment monitoring program was implemented in 1997 due to the detection of statistically significant changes in several wells for sodium, chloride, barium and chemical oxygen demand during the January 1997 sampling event. On October 8, 2012, an *Alternative Source Demonstration* (*ASD*) was submitted by MSG for the SSIs identified during the October 2012 ground water sampling event at the Facility. The *ASD* was submitted for chloride at monitoring well MW-2A, chloride at monitoring well MW-16, barium at monitoring well MW-21, and sodium at monitoring well MW-21.

Ohio EPA previously reviewed the Facility's April 18, 2014 *ASD*, a revision of the earlier October 8, 2012 submittal, determined that the April 2014 revised *ASD* contained a number of data gaps, and requested that the Facility provide additional information in order for the agency to evaluate the adequacy of the *ASD* to comply with OAC Rule 3745-27-10(E)(9)(b). The Facility's *Response to Ohio EPA's June 3, 2014 Request for More Information* and *Results of Tritium Analysis* were submitted in response the request for the

information outlined above.

Pursuant to OAC Rule 3745-27-10(E)(9)(b), the owner or operator may demonstrate that a source other than the sanitary landfill facility caused the contamination, or that the statistically significant change(s) resulted from error in sampling, analysis, or statistical evaluation or natural variation in ground water quality, and request that the director approve reinstatement of the detection monitoring program.

The September 15, 2014, and November 25, 2014, documents concluded that statistically significant change(s) in chloride at monitoring well MW-2A, chloride at monitoring well MW-16, barium at monitoring well MW-21, and sodium at monitoring well MW-21 were due to naturally occurring brine in the Chagrin Shale. Ohio EPA has reviewed the September 15, 2014, and November 25, 2014, documents and has identified the following inadequacies in the *ASD*:

Leachate Data: The following statement in the Facility's response (page 3), while factually correct, is misleading: "*The leachate sample port is located downstream of all leachate collection system for all of the LCSWF units.*"

The leachate chemical analytical data including tritium presented in the *ASD* is for a sample that represents a mixture of leachate from the leachate collection system within active Disposal Unit C4, and from the toe drains around closed unlined Disposal Units A/D, B, C1, C2, and C3. Unlike disposal unit C4, Disposal Units A/D, B, C1, C2, and C3 are not designed with best available technology (BAT), and are not underlain with a leachate collection system. Ohio EPA does not consider the contribution of leachate from the toe drains to be representative of the unlined portions of the Facility; therefore, the leachate sample is not representative of the entire facility. This is consistent with Ohio EPA's interpretation of similar leachate collection systems at other municipal waste facilities. Therefore, comparisons between water quality in downgradient assessment wells and leachate are of limited significance. No conclusions can be drawn regarding the source of contaminants in downgradient wells from the leachate data presented in the submitted documents.

Trilinear and Stiff Diagrams: The Facility prepared revised trilinear diagrams and Stiff diagrams for each downgradient well and leachate over time (1997 to 2013). However, most of the trilinear diagrams are missing date labels on the data points on those diagrams, making it difficult to determine if there are trends in composition over time. Trilinear and Stiff diagrams show differences in ground water chemistries when comparing upgradient wells to those located downgradient of the limits of waste in both the Till and Bedrock-Till Interface (BTI) Significant Zones of Saturation (SZSs). The trilinear and Stiff diagrams show that downgradient wells have higher concentrations of the common waste-

derived parameters chloride and sodium. This is consistent with the Facility's recent statistical re-evaluation comparing background and downgradient wells indicating SSIs for chloride and sodium in downgradient wells MW-21 (BTI SZS), MW-2A and MW-16 (Till SZS). This data does not support the *ASD*, and supports the landfill being the source of elevated chloride in these wells.

Vertical Gradient Calculations: The results indicate that downward gradients were measured during at least one of the two events in 10 of the 14 well pairs. Also, it appears that there is a consistent downward gradient in six of the 14 well pairs. It is inconclusive whether such results support migration of sodium, chloride, and barium from the shale or not. The Facility claims that diffusion is an important mechanism by which contaminants migrate in low seepage velocity settings such as exist at the Facility, and diffusion may be the process by which sodium, chloride, and barium migrate from the shale ground water zone to the BTI SZS and Till SZS. If diffusion is an important transport mechanism in ground water beneath the site, it is just as likely, or more likely, that the source of common waste derived parameters such as sodium and chloride is the landfill; particularly the unlined portions of the landfill.

Chloride:Bromide Ratios: The Facility calculated chloride:bromide ratios for a total of 15 Till SZS and BTI SZS wells for sampling results from the December 2011 and 2013 sampling events (Attachment E). The chloride:bromide ratios are overwhelmingly consistent with dilute ground water/landfill leachate, not brine. This does not support the claim that brine in the Chagrin Shale hydrostratigraphic zone is the source of chloride in the overlying BTI and Till SZSs.

Tritium Data: Ohio EPA disagrees with the Facility's assertion that tritium data supports the conclusion that ground water in assessment Till SZS well MW-16 and assessment BTI SZS well MW-21 is too old to have been impacted by waste- derived chloride, sodium, and barium.

The Facility's claim that eight wells of the nine tested wells have "tritium-free" water (as defined by BLCC as tritium less than 1.0 TU) is inaccurate and misleading. Taking into account error, the result ranges of two downgradient wells exceed 1.0 TU. Two of the nine tested wells, downgradient Till SZS well MW-16 (3.93 TU ± 0.13 TU) and downgradient shale zone well MW-25 (.86 ± 0.24 TU) exceed 1.0 TU. Further, side gradient Till SZS well MW-4A (<1.24 TU), upgradient Till SZS well MW-10A (<1.01 TU), and downgradient shale zone well (<1.03) have detection levels above 1.0 TU.

According to the USGS (Christensen, Parkhurst, Hunt, and Athay, 2006) and others [(Clark and Fritz, 1997) (Ravikumar and Somashekar, 2011)

and (Singh and Somashekar, 2013)], tritium concentration alone generally cannot be used to quantitatively date ground water, but can be used to qualitatively determine if ground water is modern (less than 50 years in age) or submodern (older than about 50 years in age) (Clark and Fritz, 1997).

According to Clark and Fritz (1997):

A quantitative interpretation of ground water mean residence times may not be possible, and only qualitative interpretations can be made:

- *< 0.8 TU Submodern-recharge*
- *0.8 to 4 TU Mixture between submodern and recent recharge*
- *5 to 15 TU Modern (<5 to 10 years)*
- *15 to 30 TU Some "bomb" ^3H present*
- *> 30 TU Considerable component of recharge from 1960's or 1970's*
- *> 50 TU Dominantly the 1960's recharge*

Two of the three affected downgradient wells, i.e., Till SZS well MW-16 (3.93 ± 0.13 TU) and BTI SZS well MW-21 (0.75 ± 0.09 TU), have tritium concentration ranges that exceed 0.8 TU indicating a mixture of submodern and recent recharge. Therefore, the submitted tritium data does not support the Facility's claim that there is a source other than the landfill that caused the statistical difference in waste-derived parameters in the affected wells.

Increasing Chloride Concentrations in MW-2A: Concentrations of chloride in MW-2A have steadily increased from 650 mg/L to 780 mg/L over the last three sampling events between June 2013 and June 2014. The steady increase in chloride is inconsistent with brine in the shale being the contaminant source.

Based on the above-noted information, I cannot determine that the statistically significant changes in chloride at monitoring well MW-2A, chloride at monitoring well MW-16, barium at monitoring well MW-21, and sodium at monitoring well MW-21 were from a source other than the sanitary landfill facility; due to an error in sampling, analysis, or statistical evaluation; or from natural variation in ground water quality.

Therefore, I cannot approve reinstatement of ground water detection monitoring at monitoring wells MW-2A, MW-16, and MW-21. The owner or operator shall comply with the ground water quality assessment program pursuant to OAC Rule 3745-27-10(E).

You are hereby notified that this action of the Director of Environmental Protection (Director) is final and may be appealed to the Environmental Review Appeals Commission

pursuant to Ohio Revised Code Section 3745.04. The appeal must be in writing and set forth the action complained of and the grounds upon which the appeal is based. The appeal must be filed with the Commission within thirty (30) days after notice of the Director's action. The appeal must be accompanied by a filing fee of $70.00 made payable to "Treasurer, State of Ohio." The Commission, in its discretion, may reduce the fee if by affidavit it is demonstrated that payment of the full amount of the fee would cause extreme hardship. Notice of the filing of the appeal shall be filed with the Director within three (3) days of filing with the Commission. Ohio EPA requests that a copy of the appeal be served upon the Ohio Attorney General's Office, Environmental Enforcement Section. An appeal may be filed with the Environmental Review Appeals Commission at the following address:

Environmental Review Appeals Commission
77 South High St., 17th Floor
Columbus, Ohio 43215

If you have any questions concerning this letter, please contact Clarissa Gereby, DMWM, NEDO at (330) 963-1224.

Sincerely,

Craig W. Butler
Director

CWB:CG:cla

cc: Jarnal Singh, Ohio EPA, NEDO, DMWM
Laura Kuns, Lake County Health Department