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Ted Strickland, Governor
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December 22, 2008

RE: GROUND WATER QUALITY ASSESSMENT REPORT EAST LIVERPOOL LANDFILL, INC

Tim Haaf
Waste Management
851 Robison Rd. East
Erie, Pennsylvania 16509-5339

Dear Mr. Haaf:

The Ohio Environmental Protection Agency (Ohio EPA) has completed its review of the document, "Ground-Water Quality Assessment Report, East Liverpool Landfill, Columbiana County, Ohio, dated December 2005. The document was prepared for East Liverpool Landfill, Inc. by Eagon & Associates, Inc. of Worthington, Ohio, and it was received by Ohio EPA on December 29, 2005. The aforementioned report contains the first determination of rate, extent, and concentration of any waste derived constituents found to have been released from the landfill, pursuant to Ohio Administrative Code (OAC) Rule 3745-27-10(E)(7).

Upon completing a review of this document, Ohio EPA has determined that the following violations existed:

1. **OAC Rules 3745-27-10(C)(1), 3745-27-10(C)(6), 3745-27-10(C)(7), 3745-27-10(C)(8), and 3745-27-10(E)(4)(e)(i):**

   The owner/operator is in violation of these rules requiring statistical methods that are designed to ensure monitoring results that provide an accurate representation of ground water quality at the background and downgradient assessment wells, are appropriate for assessment monitoring, meet all applicable performance standards, are conducted each time the owner/operator assesses ground water quality, and are described in detail.

   Section 5.1.1 of the Ground Water Quality Assessment Report (GWQAR) discusses the use of statistical analysis methods to determine which parameters were above background in the Mahoning Coal/Mine Spoil significant zone of saturation (SZS). In particular, this section is limited to the following description of the statistical methods:

   > "In order to determine which parameters were above background levels in the SZS, interwell statistical analyses were performed on data from wells completed in the SZS. As shown on...Figures 4 through 7, monitoring well MC-5 is upgradient and monitoring wells MC-1 and MC-4 and piezometer MC-13 are sidegradient to the limits of solid waste placement. Water-quality

> data from these wells was used as background data to perform interwell statistical analyses on the downgradient wells in the monitoring network. Interwell prediction limits and nonparametric prediction limits were used to determine the statistical background limit for all inorganic parameters included in Appendix I to OAC 3745-27-10. Any volatile organic compound (VOC) listed in Appendix I was considered above background if it was detected above the practical quantitation limit (PQL) for that compound."
>
> "The data from the most recent sampling event (5/09/05 for most of the wells) was compared to the statistical background limit to determine if the parameter was above background. The results of the statistical analyses are included in Appendix D."

Section 5.2.1 of the GWQAR discusses the use of statistical analysis methods to determine which parameters were above background in the Upper Freeport Coal/Mine Spoil uppermost aquifer system (UAS). In particular, this section is limited to the following description of the statistical methods:

> "In order to determine which parameters were above background levels in the UAS, interwell statistical analyses were performed on data from wells completed in the UAS. As shown on...Figures 8 through 11, monitoring wells UF-3, UF-10, UF-11, and piezometers UF-1R, UF-2, and UF-8 are upgradient to the previous and existing limits of solid waste placement. Figures 8 through 11 also show monitoring well UF-7 to be sidegradient to the previous and existing limits of solid waste. Since UF-1R, UF-2, UF-3, UF-7, UF-8, UF-10, and UF-11 are either side or upgradient of all areas of previous and existing solid waste placement, water-quality data from these wells were used as background data to perform interwell statistical analyses on the downgradient wells in the monitoring network. Interwell prediction limits and nonparametric prediction limits were used to determine the statistical background limit for all inorganic parameters included in Appendix I to OAC 3745-27-10. Any volatile organic compound (VOC) listed in Appendix I was considered above background if it was detected above the practical quantitation limit (PQL) for that compound."
>
> "The data from the most recent sampling event (5/09/05 for most of the wells) was compared to the statistical background limit to determine if the parameter was above background. The results of the statistical analyses are included in Appendix F."

The use of statistical analyses is not required while conducting an assessment program, however, when the owner/operator chooses to use statistics, the rules require that all customary and appropriate statistical procedures and analyses are

well documented and followed. Sections 5.1.1 and 5.2.1 of the GWQAR do not adequately document the statistical software, statistical methods, procedures, and analyses that were utilized and followed while conducting assessment and making a first determination of rate, extent, and concentration. This might have been acceptable if the assessment plan for this facility adequately documented the statistical software, statistical methods, procedures, and analyses that were to be utilized and followed during the assessment program to make a determination of the rate, extent, and concentration, but it did not. In essence, the owner/operator has never provided a detailed discussion, in either the assessment plan or report, which explains the statistical software, statistical methods, procedures, and analyses that were utilized and followed during the assessment program. Ultimately, the use of statistical analyses during an assessment program requires an even higher level of detail and due diligence than is required during detection monitoring, as a result of a much larger constituent list (Appendix I and II) and the need to identify all potential waste derived constituents down to the MDL. This being the case, the assessment program plan and/or report should have essentially contained all the elements of a formal statistical analysis plan. The following bullets highlight some additional irregularities committed by the owner/operator in the process of using statistics for the purposes of determining rate, extent, and concentration:

- It appears that some form of statistical analysis program was utilized, but it is not clear which program was used or if all statistical analyses were conducted using an owner/operator generated program based in a spreadsheet;

- The details of the specific outlier testing that was performed, whether or not it was performed on the pooled background data or was performed on each background well independently, and what criteria were utilized to determine when background data should be considered an outlier, and whether or not outliers were screened out of the process of calculating statistical limits;

- It appears statistical analyses were limited only to Appendix I constituents;

- It also appears that statistical analyses were limited only to detections above the PQL;

- The background data set included ground water data that came from wells and piezometers that were never formally part of the assessment program and are not upgradient of the landfill;

- It is unknown if trend analyses of the background data were conducted and what the potential impacts of existing trends in background may have had on the resultant statistical limits that were calculated. Were the background

data exhibiting trends screened out of the process of calculating statistical limits?; and

- Why it was appropriate to base the first determination on the results of a single statistical analysis from only one semiannual event (05/09/05)? Not one semiannual statistical comparison in assessment occurred before or after this event.

In order to return to compliance with these rules, the owner/operator must provide the detailed information regarding the statistical software, statistical methods, procedures, and analyses that were utilized and followed during the assessment program. The owner/operator needs to also address the aforementioned bullet points and submit a revised GWQAR containing all of this information to Ohio EPA for review. Should the owner/operator determine that any of these changes will result in a new interpretation regarding the full determination of the rate, extent, and concentration of all waste derived constituents at the site, the owner/operator should revise the GWQAR accordingly.

2. **OAC Rules 3745-27-10(C)(1) and 3745-27-10(C)(4):**

The owner/operator is in violation of these rules requiring monitoring results that provide an accurate representation of ground water quality at the background assessment wells, and establishes background ground water quality by analyzing ground water samples collected from hydraulically upgradient wells.

Section 5.1.1 of the GWQAR discusses how background ground water quality was defined in the Mahoning Coal/Mine Spoil SZS. In particular, this section is limited to the following discussion of how background ground water quality was determined:

> "As shown on...Figures 4 through 7, monitoring well MC-5 is upgradient and monitoring wells MC-1 and MC-4 and piezometer MC-13 are sidegradient to the limits of solid waste placement. Water-quality data from these wells was used as background data to perform interwell statistical analyses on the downgradient wells in the monitoring network."

Section 5.2.1 of the GWQAR discusses how background ground water quality was defined in the Upper Freeport Coal/Mine Spoil UAS. In particular, this section is limited to the following discussion of how background ground water quality was determined:

> "As shown on...Figures 8 through 11, monitoring wells UF-3, UF-10, UF-11, and piezometers UF-1R, UF-2, and UF-8 are upgradient to the previous and

> existing limits of solid waste placement. Figures 8 through 11 also show monitoring well UF-7 to be sidegradient to the previous and existing limits of solid waste. Since UF-1R, UF-2, UF-3, UF-7, UF-8, UF-10, and UF-11 are either side or upgradient of all areas of previous and existing solid waste placement, water-quality data from these wells was used as background data to perform interwell statistical analyses on the downgradient wells in the monitoring network."

As indicated by the owner/operator above, background ground water quality for the Mahoning Coal/Mine Spoil SZS was determined by pooling the water quality data from sidegradient wells MC-1 and MC-4, with upgradient well MC-5. In addition, background ground water quality for the Upper Freeport Coal/Mine Spoil UAS was determined by pooling the water quality data from sidegradient well UF-7 with upgradient wells UF-3, UF-10, and UF-11. This is not acceptable. In the case of the Mahoning SZS, sidegradient wells MC-1 and MC-4 are more than 1,000 feet from waste placement along the extreme western boundary of the landfill facility, which incidentally is also the downgradient boundary of the landfill facility. These are clearly not upgradient wells and their ability to provide an accurate representation of background ground water quality is questionable. In the case of the Upper Freeport UAS, sidegradient well UF-7 is more than 700 feet from waste placement along the extreme southern boundary of the landfill facility in an area of poorly defined ground water flow characterized by a very flat hydraulic gradient. It is clearly not an upgradient well and its ability to provide an accurate representation of background ground water quality is also questionable.

In order to return to compliance with these rules, the owner/operator needs to eliminate the ground water quality data from wells MC-1, MC-4, and UF-7 from the background data set, recalculate statistical limits as necessary, re-evaluate the determination of rate, extent, and concentration, and submit a revised GWQAR accordingly.

3. **OAC Rules 3745-27-10(C)(1), 3745-27-10(C)(6)(e), and 3745-27-10(C)(7)(e):**

The owner/operator is in violation of these rules for using a statistical method during the assessment monitoring program for volatile organic compounds (VOCs) that requires the practical quantitation limit to be exceeded before the VOC concentration would be considered statistically above background (and therefore a waste derived constituent), does not ensure monitoring results that provide an accurate representation of ground water quality at the background and downgradient assessment wells, and failed to gain approval from the Director or his authorized representative before using this statistical method.

According to Sections 5.1.1 and 5.2.1 of the GWQAR:

> "Any volatile organic compound (VOC) listed in Appendix I was considered above background if it was detected above the practical quantitation limit (PQL) for that compound."

In assessment it is no longer appropriate to use detection at or above the PQL for a VOC as a statistical trigger above background. This is because there is already statistical evidence of a release (which triggered the assessment program) and the focus of additional assessment investigation and sampling becomes the identification of all waste derived constituents that are impacting ground water. This includes all waste derived constituents that are detected between the method detection limit (MDL) and the practical quantitation limit (PQL). This also includes all Appendix II constituents that are detected. A review of the ground water data reports from 2005 revealed the presence of the following Appendix I and II waste derived constituents between the MDL and the PQL in assessment ground water samples from both the Mahoning Coal/Mine Spoil SZS and the Upper Freeport Coal/Mine Spoil UAS:

- MC-3: acetone, thallium, and mercury;
- MC-6: acetone, chloroethane, mercury, 1,1-dichloroethane, and vinyl chloride;
- MC-7: acetone and chloroethane;
- MC-8: acetone, benzene, chloroethane, dichlorodifluoromethane, and 1,1-dichloroethane;
- MC-9: acetone, chloroethane, dichlorodifluoromethane, 1,1-dichloroethane, and vinyl chloride;
- UF-4: acetone and mercury;
- UF-5: acetone;
- UF-7: acetone;
- UF-12: acetone;
- UF-13: acetone;

- UF-14: acetone, mercury, and silver;
- UF-15: silver;
- UF-16: mercury and silver;
- UF-17: chloroethane;
- UF-18: chloroethane, mercury, and thallium; and
- UF-19: acetone, chloroethane, and mercury.

The statistical procedures used by the owner/operator failed to identify these additional waste derived constituents, and the GWQAR does not contain any reference to or discussion of these waste derived constituents.

In order to return to compliance with these rules, the owner/operator needs to specify a more appropriate statistical method for identifying all waste derived constituents (including any Appendix I and II constituents), and submit a revised GWQAR to Ohio EPA for review. Should the owner/operator determine that any of these changes will result in a new interpretation regarding the full determination of the rate, extent, and concentration of all waste derived constituents at the site, the owner/operator should revise the GWQAR accordingly.

4. **OAC Rule 3745-27-10(E)(5)(b):**

The owner/operator is in violation of this rule that requires any monitoring well that is used or needed to make the determination required in paragraph (E)(6) of this rule to be sampled as part of the ground water quality assessment monitoring program.

Section 5.1.1 of the GWQAR discusses how background ground water quality was defined in the Mahoning Coal/Mine Spoil SZS. In particular, this section is limited to the following discussion of how background ground water quality was determined:

> "As shown on...Figures 4 through 7, monitoring well MC-5 is upgradient and monitoring wells MC-1 and MC-4 and piezometer MC-13 are sidegradient to the limits of solid waste placement. Water-quality data from these wells were used as background data to perform interwell statistical analyses on the downgradient wells in the monitoring network."

Section 5.2.1 of the GWQAR discusses how background ground water quality was defined in the Upper Freeport Coal/Mine Spoil UAS. In particular, this section is limited to the following discussion of how background ground water quality was determined:

> "As shown on...Figures 8 through 11, monitoring wells UF-3, UF-10, UF-11, and piezometers UF-1R, UF-2, and UF-8 are upgradient to the previous and existing limits of solid waste placement. Figures 8 through 11 also show monitoring well UF-7 to be sidegradient to the previous and existing limits of solid waste. Since UF-1R, UF-2, UF-3, UF-7, UF-8, UF-10, and UF-11 are either side or upgradient of all areas of previous and existing solid waste placement, water-quality data from these wells was used as background data to perform interwell statistical analyses on the downgradient wells in the monitoring network."

As indicated by the owner/operator above, background ground water quality for the Mahoning Coal/Mine Spoil SZS was determined by pooling the water quality data from sidegradient wells MC-1, MC-4, and piezometer MC-13, with upgradient well MC-5. In addition, background ground water quality for the Upper Freeport Coal/Mine Spoil UAS was determined by pooling the water quality data from sidegradient well UF-7 with upgradient wells UF-3, UF-10, and UF-11, and piezometers UF-1R, UF-2, and UF-8. A quick review of ground water data results back through 2007 did not reveal any analysis results from any of these piezometers (MC-13, UF-1R, UF-2, and UF-8). This is not acceptable. If ground water data from these piezometers is used for the purposes of making a first determination, as they were, these piezometers should have been designated as formal assessment monitoring wells and sampled semiannually according to this rule.

In order to return to compliance with these rules, the owner/operator needs to eliminate the background ground water quality data from piezometers MC-13, UF-1R, UF-2, and UF-8 from the background data set, recalculate statistical limits as necessary, re-evaluate the determination of rate, extent, and concentration, and submit a revised GWQAR accordingly.

5. **OAC Rules 3745-27-10(A)(1), 3745-27-10(E)(6), and 3745-27-10(E)(7):**

The owner/operator is in violation of these rules for failing to determine the full impact of the facility on the quality of ground water, failing to determine the full concentration, rate, and extent of migration of all waste derived constituents detected in the ground water, and failing to document the full concentration, rate, and extent of migration of all waste derived constituents detected in the ground water.

A review of the ground water data reports from 2005 revealed the presence of the following Appendix I and II waste derived constituents above the MDL in assessment ground water samples from both the Mahoning Coal/Mine Spoil SZS and the Upper Freeport Coal/Mine Spoil UAS:

- MC-3: acetone, thallium, and mercury;
- MC-6: acetone, chloroethane, mercury, 1,1-dichloroethane, and vinyl chloride;
- MC-7: acetone and chloroethane;
- MC-8: acetone, benzene, chloroethane, dichlorodifluoromethane, and 1,1-dichloroethane;
- MC-9: acetone, chloroethane, dichlorodifluoromethane, 1,1-dichloroethane, and vinyl chloride;
- UF-4: acetone and mercury;
- UF-5: acetone;
- UF-7: acetone;
- UF-12: acetone;
- UF-13: acetone;
- UF-14: acetone, mercury, and silver;
- UF-15: silver;
- UF-16: mercury and silver;
- UF-17: chloroethane;
- UF-18: chloroethane, mercury, and thallium;
- UF-19: acetone, chloroethane, and mercury.

The GWQAR does not contain any reference to, or discussion of, the aforementioned waste derived constituents that were identified (detected) in ground

water samples during 2005. In assessment, the focus of additional investigation and sampling becomes the identification of all waste derived constituents that are impacting ground water. This includes all waste derived constituents that are detected above the MDL. This also includes all Appendix II constituents that are detected.

In order to return to compliance with these rules, the owner/operator needs to address the presence of these waste derived constituents and revise the GWQAR accordingly to adequately discuss and describe the full rate, extent, and concentration of these waste derived constituents in ground water.

The following were not cited as violations; however, more information is required in order to determine compliance with the applicable rules:

1. **OAC Rules 3745-27-10(B)(3), 3745-27-10(C)(1), and 3745-27-10(C)(4):**

Compliance with these rules cannot be determined at this time. It appears that the owner/operator collected ground water samples that are not representative of ground water quality in the geologic unit being monitored, did not ensure monitoring results that provide an accurate representation of ground water quality at the background and downgradient wells, and established background by including wells that are not upgradient of the landfill, when upgradient well(s) are present.

A review of the ground water data that makes up the background data set revealed the inclusion of ground water data that does not appear to be representative of true background ground water quality, but may be outliers, affected by elevated sample turbidity, or from well(s) that aren't upgradient of the landfill. Generating statistical limits and conducting statistical comparisons using unrepresentative background ground water data could lead to a failure to identify ground water contamination when it truly exists. The following sub-sections describe in more detail the specific cases where it appears unrepresentative background ground water data has been incorporated into the background data set:

a. The background values for arsenic in well MC-1 appear to drive the statistical comparisons for arsenic in the Mahoning Coal/Mine Spoil SZS. The nonparametric limit for arsenic in the SZS is tied to an arsenic concentration of 0.026 mg/L from MC-1, more than twice the MCL for arsenic. First and foremost, MC-1 is not upgradient of the landfill. MC-1 is sidegradient, and as such, may not truly represent background that has not been affected by past or present operations at the landfill. Furthermore, upon closer inspection of the background data for MC-1, it appears that arsenic concentrations are closely related to elevated sample turbidity in ground water samples from this

well. In particular, the two highest background concentrations of arsenic from this well, 0.026 mg/L and 0.025 mg/L, also have the highest recorded sample turbidity. As such, these results are likely affected by sample turbidity and are probably not representative of true background ground water quality. Sample results that are not representative of true ground water quality should not be used for defining the background quality of ground water from which statistical limits are calculated. Even with these elevated values for arsenic in the background data set for the SZS, arsenic has been statistically identified as a waste derived constituent affecting ground water. Re-evaluation of the background data set of MC-1 with respect to turbidity affected arsenic data may reveal that the extent of the arsenic contamination in the SZS is more widespread than currently determined. To demonstrate compliance with these rules, at a minimum, the owner/operator should conduct a regression analysis of the MC-1 background arsenic and turbidity data to determine if there is a relationship, or at what turbidity level a relationship between arsenic and turbidity is established. Arsenic data proven to be turbidity affected should be removed from the background data set and a new statistical limit for arsenic should be calculated. However, Ohio EPA would prefer that all MC-1 ground water quality data currently incorporated into the background data set be removed and new comparisons of ground water quality for purposes of the assessment be conducted since MC-1 is not a true background well in the SZS. The GWQAR should be revised as appropriate. Furthermore, should the owner/operator determine that any of these changes will result in a new interpretation regarding the full determination of the rate, extent, and concentration of all waste derived constituents at the site, the owner/operator should revise the GWQAR accordingly;

b. The background values for thallium in UF-11 appear to drive the statistical comparisons for thallium in the Upper Freeport Coal/Mine Spoil UAS. The nonparametric limit for thallium in the UAS is tied to a thallium concentration of 0.0088 mg/L from UF-11, more than four times the MCL for thallium. Closer inspection of the thallium data from this well and the rest of the background wells by Ohio EPA revealed that with the exception of this one detection of thallium, all of the thallium background data in the GWQAR is non-detect. As such, this concentration appears to be an outlier or laboratory error and is probably not representative of true background ground water quality. It is not clear why this lone elevated sample result for thallium did not get flagged as an outlier. To demonstrate compliance with these rules, the owner/operator should re-evaluate the outlier testing that was conducted on the background data for thallium to verify that everything was handled appropriately. In addition, the owner/operator needs to provide the details of the outlier testing procedure that was followed. Sample results that

are not representative of true ground water quality should not be used for defining the background quality of ground water from which statistical limits are calculated. It is important to note that thallium was identified in at least two downgradient wells (see comments 2 and 4) and appears to be a waste derived constituent. The GWQAR should be revised as appropriate. Furthermore, should the owner/operator determine after re-evaluating the background thallium data and statistics that a new interpretation regarding the full determination of the rate, extent, and concentration of all waste derived constituents at the site is justified, the owner/operator should revise the GWQAR accordingly; and

c. The background values for zinc in UF-3 appear to drive the statistical comparisons for zinc in the Upper Freeport Coal/Mine Spoil UAS. The nonparametric limit for zinc in the UAS is tied to a concentration of 1.9 mg/L from UF-3. This concentration was recorded during the 04/14/1998 sampling event. The next highest concentration for zinc from this well is 0.098 mg/L, more than an order of magnitude less. It is important to note that there are a number of other constituents detected in the UAS during the 04/14/1998 sampling event that have been identified as outliers. In particular, both barium and zinc were flagged as outliers from well UF-2, and barium was flagged as an outlier from well UF-3. The zinc concentrations from UF-2 and UF-3 are nearly identical. As such, this concentration appears to be an outlier or laboratory error and is probably not representative of true background ground water quality. It is not clear why this lone elevated sample result for zinc from well UF-3 did not get flagged as an outlier. The owner/operator should re-evaluate the outlier testing that was conducted on the background data for zinc to verify that everything was handled appropriately. In addition, the owner/operator needs to provide the details of the outlier testing procedure that was followed. Sample results that are not representative of true ground water quality should not be used for defining the background quality of ground water from which statistical limits are calculated. Should the owner/operator determine after re-evaluating the background zinc data and statistics that a new interpretation regarding the full determination of the rate, extent, and concentration of all waste derived constituents at the site is justified, the owner/operator should revise the GWQAR accordingly.

2. **OAC Rule 3745-27-10(E)(6)(a)**:

Compliance with this rule cannot be determined at this time. It appears that the owner/operator did not adequately determine the rate of migration of all waste derived constituents in the ground water.

Sections 5.1.3 and 5.2.3 contain the calculations of the rate of contaminant migration in the both the Mahoning Coal/Mine spoil SZS and the Upper Freeport Coal/Mine spoil UAS. The calculated flow rates are 3.9 feet/year and 0.8 feet/year, respectively. However, these flow rate calculations do not appear to match what is being seen in the field as far as contaminant migration is concerned. This is especially true for the Upper Freeport Coal/Mine spoil UAS, where at the submitted flow rate calculation of 0.8 feet/year (0.026 inches/day), ground water contamination would take 100 years to go 80 feet. This does not match what the field data tells us about the site, where ground water contamination plumes have dimensions that extend up to 2000 feet long, and where it is clear that contamination has migrated in the UAS distances greater than 250 feet (which, based on a flow rate of 0.8 feet/year would have required at least 300 years of travel time). The same problem exists for the Mahoning Coal/Mine spoil SZS, where the submitted rate calculation resulted in a flow rate of 3.9 feet/year. Again, based on this flow rate the ground water contamination would take 100 years to go 390 feet. This does not match what the field data tell us about the site, where ground water contamination plumes have dimensions that extend over 1000 feet, and where it is clear that contamination has migrated in the SZS distances greater than 400 feet (which, based on a flow rate of 3.9 feet/day would have required at least 102 years of travel time).

An Ohio EPA review of the rate calculations in Sections 5.1.3 and 5.2.3 revealed the owner/operator used a default effective porosity of 0.1 in both calculations. A cross check of this value with Table 3-1 in U.S. EPA's Guidance Document on the Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities (1989), revealed that the owner/operator chose an effective porosity value that better mimics soils such as silt or silt loam. A quick check of Applied Hydrogeology (Fetter, 1988) on the hydrology of coal revealed the following:

> "Coal contains bedding planes cut by fractures that are termed cleat. Cleat is similar to joint sets in other rock...Coal is often an aquifer and yields water from the cleat and bedding."

Therefore, it seems appropriate that coal be considered a fractured rock and not a soil or porous media, like silt or sandstone. With this in mind, it appears that a more appropriate default effective porosity of 0.01, or smaller, should have been used in the rate calculation. However, the owner/operator always has the option of calculating an effective porosity based on pump test data.

To demonstrate compliance with this rule, the owner/operator needs to revise the GWQAR to contain rate of migration calculations that use a more appropriate value of effective porosity (0.01 or smaller) for coal, or are based on effective porosity calculations resulting from on site pump test data from the SZS and UAS.

If you have any technical questions regarding this review, please contact Mark Kroenke at (330) 963-1225. Please submit all correspondence to Jerry Weber, Division of Solid and Infectious Waste Management, Northeast District Office, Ohio EPA, 2110 East Aurora Road, Twinsburg, Ohio 44087.

Sincerely,

Jerry W. Weber, RS
Environmental Specialist
Division of Solid and Infectious Waste Management

JWW:cl

cc: Mark Kroenke, DDAGW-NEDO
Al Razem, Eagon & Associates
Robert Morehead, Columbiana County Health Department
File: [Kurko/LAND/East Liverpool Landfill/GRO/15]