

Response to Comments

Bluegrass Containment, LLC – Groundwater Assessment Report

Agency Interest #3287 / Application I.D. AIN20140002

The Kentucky Division of Waste Management (DWM), Solid Waste Branch received the Groundwater Assessment Report from Bluegrass Containment, LLC (Permit No. 092-00009) for review on November 21, 2014. A public notice was issued on August 1, 2018 with a thirty (30) day comment period.

The following includes the comments received and provides DWM's response:

Comment 1: The proposed reduced parameter list generally appears to be well thought out and should be fairly effective in evaluating constituent trends. The composite parameter COD, however, seems to add very little to the evaluation because results have poor reproducibility and are subject to numerous interferences. Bluegrass Containment, LLC (Bluegrass) requests parameter COD be removed from the draft permit.

Response: COD has been significantly elevated in the facility's leachate samples. Additionally, COD has consistently exceeded the statistical limit in downgradient Well G-6, which the Groundwater Monitoring Report received by DWM on 01-31-18 concluded has "most likely" been impacted by leachate migration.

COD levels are fairly consistent in the monitoring wells, and a strong correlation exists between COD levels and the degree of contamination present in the downgradient wells. For instance, monitoring wells with low background chloride concentrations (G-4 and G-5D), have low levels of COD. Well G-6, which has elevated chloride concentrations, also has COD at levels that exceed the statistical limit.

Therefore, COD is clearly a useful indicator parameter to monitor for leachate impacts to groundwater at this landfill.

No changes were made to the permit as a result of this comment.

Comment 2: The added parameter boron is more than a little out of the ordinary since it is not even included on the 401 KAR 48:300 Section 10 characterization list, let alone the standard groundwater monitoring parameter list for a contained, residual, or CDD landfill. Please provide DEP's rationale and specific groundwater monitoring data for including boron as a testing parameter at Permit 9.

If boron is added to the parameter list, at the prescribed semiannual sampling frequency, it would take at least four years to collect sufficient background data to perform the first round of statistical analysis and Bluegrass Permit 9 would not be any closer to permit termination than it is today. Bluegrass proposes a waiver for any assessment plan and investigation related to boron that might be required because of an identified statistical exceedance. If the results of the initial sampling conducted by the Cabinet are typical of future results, the statistical limit might be at the detection limit - resulting in statistical exceedances at one or more of the monitoring wells. That outcome may trigger another round of assessment to a groundwater monitoring program began in 1992 –26 years later.

Response: Boron is both highly soluble and a common groundwater pollutant associated with coal-combustion residuals like those emplaced in the landfill. Boron is also virtually absent in natural groundwater in Kentucky.

Chemical analysis has also shown boron to be present in the landfill leachate at levels exceeding site background. Four boron samples have been collected from the landfill leachate. Two of these samples were collected directly from the leachate collection tank on 7-5-18. (One sample was collected from the surface of the leachate column and one sample was collected from deeper within the column.)

The other two samples were collected from the secondary containment pit surrounding the leachate collection tank; one of these two samples was collected on 11-2-17 while the leachate tank was overflowing and the leachate was pooling in the secondary containment pit – this sample was collected directly from the pooled leachate.

Boron concentrations in the four leachate samples were elevated compared to naturally-occurring background levels in upgradient wells. Boron sampling data has been provided to the permittee and is part of the administrative record.

Boron is therefore an excellent indicator parameter to monitor at this site for releases of waste constituents to groundwater pursuant to 401 KAR 48:300 Section 10(4), 401 KAR 48:300 Section 11(2), 401 KAR 48:300 Section 11(4) and the landfill operating permit.

Moreover, note that boron has been demonstrated to have significant impacts to both human and environmental receptors. (See: https://www.epa.gov/sites/production/files/2014-09/documents/summary_document_from_the_ha_for_boron.pdf)

KRS 224.10-100, “*Powers and duties of cabinet*” states, “... *the cabinet shall have the authority, power, and duty ...*” to “*Provide for the prevention, abatement, and control of all water, land, and air pollution, including but not limited to that related to particulates, pesticides, gases, dust, vapors, noise, radiation, odor, nutrients, heated liquid, or other contaminants...*” (Emphasis added.)

Note that 401 KAR 48:300 Section 8 makes no mention of “permit termination” as a goal of groundwater assessment and corrective action. Furthermore, no provision exists in regulation for a “waiver” for assessment and corrective action if contamination attributable to landfill operations

is present in groundwater. As long as the landfill has confirmed groundwater contamination pursuant to 401 KAR 48:300 Section 8, the permit cannot be terminated and groundwater monitoring will be required.

With regard to sampling frequency, the permittee can monitor groundwater more frequently than the permit requires. More frequent sampling would provide more data, resulting in a better statistical dataset.

Because of a conflict in regulation, [for residual landfills, 401 KAR 48:300 Section 11(2) requires semiannual monitoring while 401 KAR 48:300 Section 11(4) requires quarterly monitoring], DWM has allowed continued semiannual monitoring at this site. However, DWM is not obligated to do so. (See 401 KAR 30:020 Section 4, which states, *“In the event that any of these administrative regulations are found to be contradictory, the more stringent provisions shall apply.”*)

Note that DWM is not approving the present assessment report because groundwater contamination has been shown to be absent at this landfill. DWM agrees with the permittee that in lieu of requiring additional groundwater corrective action at the present time, the permittee be granted the opportunity to monitor the landfill in a manner that will help determine the efficacy of the corrective actions taken to date and to determine if additional corrective actions are required to protect human health and the environment pursuant to 401 KAR 47:030 and 401 KAR 48:300 Section 8.

Both Well G-7 and Well G-8 are useful for that purpose.

No changes were made to the permit as a result of this comment.

Comment 3: In previous discussions, the Cabinet seemed inclined to reduce the number of wells to be monitored. Based on historical water quality data, there appeared to be a consensus that continued sampling at wells GB-1, G-5D, and G-4 would contribute little to an on-going or improved understanding of contaminant fate and transport, and for that reason discontinuing sampling at those wells might be justified. For what purpose are these wells being included?

Response: Well GB-1: The Groundwater Monitoring Plan submitted to DWM on 11-21-14 stated that *“Subsequent semi-annual chloride results from well G-8 indicate a steadily increasing trend that likely will continue until peak concentrations similar to those for Well GB-1 have migrated downgradient. A longer duration, less highly concentrated, and somewhat smoother version of the well GB-1 time-series chloride graph is considered to be a reasonable predictive model for future chloride concentrations in well G-8”*.

Chloride levels in well G-8 continue to rise and have substantially exceeded the peak concentration of 300 mg/L detected in well GB-1 on 4-7-05. The chloride sample collected from well G-8 on 5-23-18 showed a concentration of 423 mg/L. Given that the trend of chloride concentration in well GB-1 has not proven to be a reasonable predictor of chloride concentrations in well G-8, it appears that these wells may be monitoring different portions of the plume (i.e., well GB-1 is monitoring the edge of the plume and well G-8 is monitoring the central portion of the plume). Given that

continued monitoring of well GB-1 potentially provides data regarding the horizontal extent of the leachate plume, it should be retained as a monitoring location.

Well G-4: In the past, ammonia concentrations have been elevated in well G-4 compared to upgradient wells GB-1 and G-9. Ammonia is present at significantly elevated concentrations in the facility's leachate samples. Therefore, it appears likely that well G-4 has been impacted by landfill operations.

Well G-5D: Since 2005, arsenic has been detected above the 10 µg/L detection limit in 21 of 169 samples collected at the Bluegrass #9 landfill, and of these 21 detections, eleven occurred in well G-5D. There were multiple exceedances of the US EPA MCL for arsenic of 10 µg/L, and while no exceedances of the Kentucky MCL were reported, arsenic was twice detected at concentrations exceeding 40 µg/L. The Assessment Report states that "*only well G-5D appears to represent natural water chemistry that has not been impacted by coal mining and processing activities*". Arsenic is detected regularly in the landfill leachate at concentrations that exceed the US EPA MCL and occasionally exceed the Kentucky MCL. Because well G-5D has not been impacted by coal mining and processing activities, acid-mine drainage is not likely to be the source of the elevated arsenic.

Well G-5D was installed deeper than the other monitoring wells to evaluate the vertical extent of groundwater contamination. DWM had raised concerns regarding the vertical extent of the chloride plume detected in well G-2, given that this well had a 25-foot well-screen and the difference in chloride concentrations detected in well G-2 compared to adjacent wells G-5 and G-6. As a result of these concerns, the facility collected depth-controlled chloride samples at 6-foot intervals within well G-2. However, the sampling methodology was insufficient to differentiate discrete water-bearing zones and it was not determined whether stratification exists in the chloride plume. Well G-2 was abandoned in October 2014; in order to help determine whether vertical stratification exists in the chloride plume, the landfill permit requires continued monitoring of G-5D.

No changes were made to the permit as a result of this comment.

Comment 4: It is agreed that continued monitoring at Well G-8 only for chloride makes sense because of the upward trend. However, adding additional parameters to Well G-8, and also applying the proposed parameter list to Well G-7 is excessive and contradicts the basis for adding these assessment wells per the DEP approved 2009 groundwater investigation report. Other than characterization sampling, Well G-7 previously has been used only for water level measurements in order to determine groundwater constituent flow patterns as part of the Well GB-1 assessment investigation. Wells G-7, G-8, and G-9 were added to triangulate groundwater flow patterns and determine the extent of elevated chloride concentrations relative to Well GB-1. Since groundwater flow patterns are now well-established, Bluegrass proposes that Well G-7 be eliminated from further monitoring requirements. The consequences of requirements that are above and beyond established regulations and previously approved groundwater assessments can be substantial.

Response: The 2009 groundwater report referred to in this comment is irrelevant to the present action.

Well G-8 is required to be monitored because of the upward trend of chloride, which is also elevated in the leachate. Chloride concentrations in well G-8 continue to increase and the most recent data shows a concentration of 425 mg/L.

Moreover, cadmium MCL exceedances ($>5 \mu\text{g/L}$) have also been documented in three separate DWM samples taken from well G-8, including $6.60 \mu\text{g/L}$ on 10-30-13; $7.84 \mu\text{g/L}$ on 5-1-14; and $10.30 \mu\text{g/L}$ on 5-23-17. Note the upward trend in these detections.

As a consequence of these exceedances, the full set of monitoring parameters is required for monitoring of G-7 and G-8.

No changes were made to the permit as a result of this comment.

Comment 5: It appears that Bluegrass already has sufficient data from previous sampling events to conduct statistical analysis for sulfate, calcium, and ammonia that are not on the 401 KAR 48:300 Section 11 list of required parameters for any type of landfill. Since identified statistical exceedances for these parameters are not specifically required by solid waste regulations, Bluegrass proposes a waiver for any assessment plan and investigation that might be required because of an identified statistical exceedance. Bluegrass has already conducted multiple assessments at the site and identified sources, rate and extent, and pathways. At this point, the proper focus of additional monitoring should be on whether or not conditions are improving. This could best be done simply by evaluating time-series trend plots of the constituents that are good indicators of previously-identified impacts.

Response: 401 KAR 48:300 Section 10(4) and 401 KAR 48:300 Section 11(4) require the monitoring and characterization of groundwater at residual landfills for parameters based on analysis of the waste. Sulfate and calcium are components of the coal combustion wastes disposed at this landfill, and ammonia has been shown to be elevated in the leachate.

DWM agrees that *“the proper focus of additional monitoring should be on whether or not conditions are improving”*. That is precisely what the permit is written to accomplish. The wells monitored and the parameters monitored in them should help determine if groundwater pollution is improving.

Note that because groundwater pollution can be manifested in increasing levels of parameters that are already elevated, in detections of elevated levels of additional parameters that were previously not elevated (or both), it is necessary to test groundwater for a list of parameters based on waste analysis, which is what both the permit and regulation require.

Well G-1 was previously located at the northeast corner of the landfill, immediately adjacent to the boundary of the permitted waste disposal area. During closure activities, Well G-1 became “artesian”, and fluid consistent with the composition of leachate began to flow from the top of the well casing. Eventually, a PVC riser was added to the well casing to increase the top-of-casing elevation to mitigate the discharge of leachate to the environment. However, this proved

ineffective. The water level in well G-1 continued to rise and leachate eventually flowed from the elevated riser pipe. The well was abandoned in October 2014.

Note that the only way a properly constructed monitoring well can become artesian and discharge leachate is if a direct hydrologic connection exists between the waste and the screened interval of the well. It is possible that significant groundwater pollution has occurred, and groundwater monitoring must therefore continue.

DWM agrees with the permittee that in lieu of requiring additional groundwater corrective action at the present time, the permittee will be granted the opportunity to monitor the landfill to determine the efficacy of the corrective actions taken to date and to determine if additional corrective actions are required to protect human health and the environment.

As stated previously, no provision exists in regulation for a “waiver” for assessment and corrective action if contamination attributable to landfill operations is present in groundwater.

No changes were made to the permit as a result of this comment.

Comment 6: The Construction Progress Report for the final cover was approved by the Cabinet in July 2009, over 9 years ago. Please identify any circumstances that will require additional monitoring after the four years of continued monitoring as proposed and described in the draft permit.

Response: Groundwater monitoring will be required as long as groundwater contamination attributable to the landfill is demonstrated to be present pursuant to 401 KAR 48:300 Section 8.

No changes were made to the permit as a result of this comment.

Comment 7: If the evaluation of additional data indicates downward trends for all constituents of concern at all monitoring wells over a two-year period (four sampling events) might the Cabinet favorably receive a request for permit termination based on an abbreviated Groundwater Assessment Report update at an earlier time than is specified in the draft permit (i.e., in two years rather than four years)? Bluegrass’ request for reevaluation after four sampling events is consistent with the regulations that govern petitioning the cabinet for reduced monitoring parameters.

Response: Groundwater monitoring will be required as long as groundwater contamination is demonstrated to be present pursuant to 401 KAR 48:300 Section 8.

Note that no equivalency exists between reducing monitoring at a site without groundwater pollution and terminating a permit for a site that has confirmed groundwater pollution.

As stated above, 401 KAR 48:300 Section 8 makes no mention of “permit termination” as a goal of groundwater assessment and corrective action. Furthermore, no provision exists in regulation for a “waiver” for assessment and corrective action, or for DWM acceptance of an “abbreviated Groundwater Assessment Report” if contamination attributable to landfill operations is present in groundwater.

As long as the landfill has confirmed groundwater contamination pursuant to 401 KAR 48:300 Section 8, the permit will not be terminated and groundwater monitoring will be required.

No changes were made to the permit as a result of this comment.

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