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NCDENR
North Carolina Department of Environment and Natural Resources

Dexter R. Matthews, Director | Division of Waste Management | Michael F. Easley, Governor
William G. Ross Jr., Secretary

October 28, 2004

Mr. Thomas Yanoschak, P.E.
and Mr. Timothy Grant, L.G.
Camp Dresser & McKee
5400 Glenwood Avenue, Suite 300
Raleigh, North Carolina 27612

RE: Black Bear Disposal, LLC,
a subsidiary of Waste Industries, USA, Inc.
Site Study, March 2004, as Revised September, 2004
Camden County, North Carolina

Dear Mr. Yanoschak and Mr. Grant,

The revisions submitted in mid-September for the above referenced Site Study for the proposed Black Bear Disposal Facility have been reviewed for hydrogeologic concerns by the Solid Waste Section. There still appears to be several items in the Report that require clarification, revision, or additional information. Please respond to the following questions and comments:

Section 3 - Local Characterization Study:

3.2 The drawings still do not indicate the "surface water drainage patterns" as required by Rule .1618(c)(2)(G).

3.8 There is still an incorrect reference to the Dismal Swamp Canal being located "approximately 7,000 feet west of the proposed landfill footprint". The actual distance is only about half that referenced.

3.9 There is also another incorrect reference that the Dismal Swamp Canal is "close to 1.5 miles west of the site".

Drawings 3-2A and 3-2B: The "match line" references on these two drawings incorrectly reference 3-1 rather than 3-2.

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Section 4 - Site Hydrogeologic Investigation:

- The review comments for the Site Hydrogeologic Investigation Report appear after the Site Study review, since it was submitted as a separate report.

Section 7 - Facility Plan:

Drawing SD-2, Site Development, shows the majority of the required minimum 300 foot buffer taken up with an Access Road and Borrow Pit/Stormwater Pond. One of the main purposes of the buffer is to provide an area for ground-water monitoring, and should there be a contaminant release, an area for attenuation, water quality assessment, and possible corrective action. Generally borrow pits are not permitted in the buffer area or within 300 feet of the waste disposal unit. While sedimentation basins are sometimes allowed in the buffer area, there must remain sufficient room for ground-water monitoring and possible assessment and remediation.

The response did not adequately address these concerns:

- Based on the N.C. Groundwater Rules (15A NCAC 2L), ground-water monitoring is required at the review boundary, which is located about 125 feet from the waste boundary. There must be sufficient room between the review boundary and the compliance boundary, which is about 250 feet from the waste boundary, to allow for water quality assessment and corrective action to prevent a contaminant plume from exceeding the 2L Groundwater Standards at the compliance boundary. Most of the buffer area must be reserved for this purpose.

- Borrow activities at landfill sites, if excavating into the water table, are generally located a minimum of 300 feet from the waste boundary, and preferably across a ground-water divide or discharge feature.

- Sedimentation basins at landfill facilities are generally constructed so as to maintain a minimum of two feet separation from the seasonal high water table.

The currently proposed landfill design does not provide adequate room to effectively monitor ground and surface water and assess and remediate a potential contaminant release. The proposed extensive sedimentation basins, which go below the water table, in effect would create an infiltration ring around the lined landfill unit. This could create an inward gradient underneath the landfill which would make ground-water monitoring difficult. It could also force any leachate leakage from the landfill to travel deeper in the aquifer before moving to an effective discharge feature. This design would change the hydrology of the site, making it difficult to predict ground-water flow paths, and therefore difficult to monitor effectively. It appears that a different design and/or larger buffers may be needed to correct these problems.

- During a recent site visit, I noticed a new house under construction on the Charles Roberts property. It does not appear that the minimum 500 feet buffer from wells or residences is achieved from the existing or new house at this general location. (The new house and well need to be indicated on the Local Characterization Map drawing.)

Drawings LC-1 and LC-2: If it is assumed that the Seasonal High Water Table is near Ground Surface, then the proposed Grading Plans do not appear to meet the requirement that the "bottom elevation of the base liner system is a minimum of four feet above the seasonal high ground-water table", Rule .1624(b)(4).

Section 8 - Preliminary Geotechnical Evaluation:

The revised text for Section 8 is confusing. For example page 8-5 is a blank page that merely states "Keep Figure 8-1". However a new revised Figure 8-1 is also included as part of the Report. A similar problem is present with pages 8-11, 8-12, and 8-15. It also appears that Figures 8-2 and 8-3 are missing from the Revised Text of the Report.

8.5.3 Why would "water levels measured in the test borings and piezometers" "not necessarily be considered to represent stabilized groundwater levels"?

8.6 Section 8.6 indicates a potential for significant settlement of up to 62.7 inches. Rule .1624(b)(4) requires "A MSWLF unit shall be constructed so that the *post settlement* bottom elevation of the base liner system is a minimum of four feet above the seasonal high water table".

Section 4 - Site Hydrogeologic Report:

4.2 Since the ditches and borrow areas largely control surface water flow and shallow ground-water flow, it is very important to understand the surface water flow patterns and present this information in detail in the Report.

- The text in the Response to Comments and Drawing 1 depict a somewhat different and contradictory description of surface water flow from that described in Section 4.2.1 and Sections 4.12 and 4.13.

- For the Barnhill borrow pit, what is the expected life for the entire operation? Where will borrow activities be taking place during the life of the proposed landfill and the post-closure monitoring period? Will pumping rates and discharge locations continue as per the current operation or will there be significant changes to the operation in the future? Please provide a copy of the mining permit and discharge permit.

- For the Camden Yards borrow pit, also provide the same information as that requested above for the Barnhill pit. The intermittent pumping of the pit and discharge into the north ditch create a situation of constantly shifting ground-water flow for the upper part of the aquifer. Will the changing conditions create soil stability problems? Will it create a flushing effect that could enhance movement of potential contaminants? How will this affect the ability to monitor ground and surface water in this area?

4.3 The Report needs to clearly identify the major lithologic (hydrogeologic) units of the uppermost aquifer and provide the basic hydraulic characteristics for each unit, as required by Rule .1623(a)(4)(E). The last paragraph on page 4-8 seems to indicate a layer of "1 foot of tilled topsoil", "a thin layer of sandy silt/clay", and the predominant layer of "sand with varying amounts of shell and silt" as being the major lithologic units.

Table 1 The Sand Filter Intervals and Bentonite Seal Intervals are contradictory for most of borings B-1 through B-7 shallow. For the deep borings, the effective Sand Filter Intervals have been extended to the bottom of the borehole, since the annular space below the screen was filled with filter sand. The Date of Construction for Borings B-3 and B-7 are inconsistent with the dates on the Boring Logs.

Table 1 (continued) The Well Construction Diagrams do not identify the Date of Construction for the B-1 through B-7 shallow borings, the GP borings, or borings B-35 through B-44.

Table 2 My estimates for Effective Porosity values using the Soil Classification Triangle are significantly different from those reported in Table 2. Part of the difference may be due to the fact that the definitions for the range of soil particle sizes defining sand, silt, and clay for the Soil Classification Triangle are different from those used in the USCS Soil Classification System.

4.7 While there is a good discussion of Seasonal High Water Table, there does not appear to be any specific estimate of the Seasonal High Water Table values. There does not appear to be any specific discussion of Long-term Seasonal High Water Table or their estimated values.

Table 3 On the back side of Table 3, information is provided for piezometers not previously referenced in the Report. The text and appendices need to be updated to reflect the addition of these borings and geoprobes.

4.8.1.2 The Screen Midpoint Separation value for the B-4 well nest location is incorrect. This could also change the Vertical Gradient value calculated for B-4. Why does the B-4 location show an upward gradient for the 2-06-04 data? Normally only the saturated portion of the shallow well screens should be used for vertical gradient calculations. However, in this case it appears all of the shallow well screens were fully saturated, therefore the screen midpoints can be used.

4.8.2 Hydraulic conductivity (porosity and effective porosity) need to be provided "for each lithologic (hydrogeologic) unit of the uppermost aquifer".

Table 6 It is not clear how the Hydraulic Conductivity values were determined. Appendix D has raw data and graphs, but I am still not able to find any actual Hydraulic Conductivity calculations or values in the appendix.

Table 7 Refer to previous comments regarding Effective Porosity values. How were the Average Permeability values calculated? I was not able to duplicate the values in Table 7.

4.12 Refer to previous comments regarding somewhat contradictory statements regarding shallow ground-water flow and surface water flow.

4.13 The Report states "Eventually, water from the County will be supplied to the area, eliminating the need for domestic wells." When does the County plan to provide a community water supply to this area? Would it be provided for all of the residents in the vicinity of the landfill, or just those near Highway 17?

- The Potentiometric Contour Map indicates that the mining operations are pulling ground-water from the proposed landfill site across the northern ditch otherwise believed to serve as a discharge feature for shallow ground-water flow. Since the details of future mining operations are uncertain, how will this affect the ability to monitor ground and surface water effectively at the proposed landfill site?

Drawings:

- On Sheet 1, what are the structures located near boring GP-20?

- For Sheet 2, the 13ft. ground-water contour in the vicinity of Boring B-4 Shallow does not appear to accurately reflect the water table data in this area. What is the cause of the apparent ground-water sink in the vicinity of boring B-8? It appears that an additional 7ft. ground-water contour is needed in the vicinity of boring B-20. Likewise, it appears that the 13ft. and 12ft. ground-water contours need to be extended and an additional 11ft. ground-water contour added in the vicinity of boring B-26. The ground-water elevation for GP-13 should be 12.02. The ground-water contour in the vicinity of GP-132 seems to indicate there is still the possibility of some ground-water flow to the south and south east. Please comment on why the south/south-easterly element of ground-water flow discussed in the previous Report is no longer featured in the Revised Report. Based on this drawing, there still appears to be some south and southeasterly ground-water flow for the eastern part of the proposed landfill.

Sheet 3: I did not find the cross-sections shown on a plan map for the site, but it appears a number of the borings shown on cross-section A-A' depart significantly from a direct line drawn across the site from west to east.

Sheet 3 (continued) This distortion can lead to a misunderstanding of the information presented on Sheet 3. It should also be noted on the drawing that there is a 80 fold difference in the vertical and horizontal scales for the cross-sections.

- The B-4 well nest is located (south)west of boring B-37, and should therefore be located before B-37 on the cross-section.

- Generally solid lines are used to depict actual data and dashed lines to depict inferred data, however the reverse appears to show the Silty Clay layer for boring B-4. On what basis is this Clay layer inferred to be present at this general depth up to 1400 feet away below borings B-37, B-39, and GP-32?

- Since most of the shallow borings and geoprobes have no Boring Log information, on what basis was the topsoil, silt/clay, fine sand, and sand with silt and shell layers determined on the cross-sections? The Field Logs for these shallow borings also appear incomplete and inadequate to form a basis for these determinations.

- For boring B-3, the deep layer of Medium Sand/Shell Frags does not appear to be accurately shown on the drawing. What is the basis for inferring the extended lateral extent of this layer?

- The ground-water elevation for B-3 Shallow is not consistent with the 10ft. equipotential line drawn. Otherwise, the water table data and flow lines seem to indicate ground-water discharge to the ditch located near boring GP-18, however the top of the water table is not shown to intersect the ditch. Please explain.

- For boring B-21, the soil layers shown on the diagram do not appear to accurately reflect the description in the Field Notes in Appendix C. What is the basis for establishing a clay layer to be present in boring GP-18?

- The ground-water elevation for boring B-1 Shallow seems inconsistent with the equipotential lines and ground-water flow lines drawn.

- The Sandy Clay layer appears to be inaccurately drawn for boring B-7. What is the basis for extending this Sandy Clay layer eastward under boring B-8? The Monitoring Well Detail for boring B-8 does not indicate the presence of a Sandy Clay layer.

- For cross-section B-B', what is the reason for the Clay layer shown for boring GP-18? The water table elevations in the vicinity of GP-18 indicate the possibility of some shallow ground-water discharge to the ditch, but this is not illustrated on the drawing. Again, this is somewhat unclear since the water table does not intersect the ditch.

- Because of the length of the facility from east to west, additional north-south cross-sections are needed to better illustrate the hydrogeology of the site.

Appendix A - Boring Logs and Well Construction Diagrams:

- Several of the deep borings were drilled significantly deeper than where the well screens were placed. When this is done the annular space below the screened interval should be plugged with a relatively inert material that is less permeable than the formation materials. Since for these borings filter sand material was used, this leaves a more permeable conduit for potential migration of contaminated ground water. Therefore, when these borings are abandoned it will be necessary to drill out the boreholes to full depth and then grout the annular space from the bottom of the borehole to the top in a manner that meets the requirements for permanent well abandonment in 15A NCAC 2C .0113(a)(2).

- Boring Logs and Well Construction Records need to be provided for wells and piezometers installed during all hydrogeologic studies that are referenced in this Report.

Appendix C - Field Notes:

- The top of some of the Field Note logs got cut off during the copying process. For this reason some of the logs can not be identified. I was not able to find logs for all of the borings and geoprobes.

Appendix D - Slug Test Data:

- Note previous comment regarding apparent lack of hydraulic conductivity calculations and values in Appendix D.

Please note once again that the proposed Black Bear Disposal Facility in Camden County is a somewhat unique site in that the hydrology of the shallow portion of the uppermost aquifer is largely controlled by man-made features, such as ditches, borrow pits, sedimentation basins, and the landfill itself. Therefore it is important that the effect of all these features be clearly understood regarding how they shape the ground and surface water flow regime. These issues could significantly affect the design of the landfill and its associated appurtenances, such as the erosion and sedimentation control features.

It will be very important to design the landfill facility in such a way so as to allow adequate buffers for effective ground and surface water monitoring. The buffers must also be sufficient to allow for possible water quality assessment and corrective action, if this should ever become necessary.

Please respond to the questions and comments raised above, and provide additional information and revisions as necessary. Also please contact me at you earliest convenience to arrange for a meeting to discuss these issues so we can expedite the review process. You may contact me at (919) 733-0692, extension 258.

Sincerely,

Bobby Lutfy

Bobby Lutfy
Hydrogeologist
Solid Waste Section

cc:	Jim Barber	Solid Waste Section
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