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July 19, 2012

Mr. Warren Halle
National Waste Managers, Inc.
2900 Linden Lane, Suite 300
Silver Spring MD 20910

Dear Mr. Halle:

The Maryland Department of the Environment (the "Department") acknowledges the receipt of two copies of the Phase III Report (Phase III), dated March 22, 2012, in response to our March 4, 2011 comment letter for the proposed Chesapeake Terrace Rubble Landfill. The document was submitted on your behalf by Golder Associates. The following comments are presented based on the review of the Phase II and Phase III reports.

The Department finds the Phase II Report is insufficient in information, as required by COMAR 26.04.07.15, to adequately evaluate the Phase III. The Department has identified the following issues regarding the Phase II Report:

1. The highest predicted groundwater levels for the Lower Patapsco were determined using hydrographs from four USGS observation wells located seven to ten miles away from the site and one offsite residential well. The highest predicted water elevations are crucial to the design of the landfill and should be obtained from site specific data. The USGS wells are irrelevant to provide this site specific data. Residential well groundwater levels provided in the March 23, 1998 Response to Comments do not support the direction of flow through Area B in the Phase II most recent submittal. Groundwater in Wells 45, 54, and 61, identified as screened in the Lower Patapsco, was above the highest predicted groundwater for Area B. Borings will need to be drilled in the Lower Patapsco under Area B and 12 consecutive months of data collected to determine the site specific highest predicted groundwater elevations to ensure the site will maintain the required 3-foot buffer.

2. The highest predicted groundwater contour maps for Area TA from the December 5, 2003 Phase II Addendum and the December 22, 2004 Phase II Addendum, which is reproduced in the response to the March 2011 MDE comments, shows the direction of flow changed from southeasterly in 2003 to southwesterly in 2004. In addition, the highest predicted contours from the December 2003 Phase II Addendum show 99 feet mean sea level (msl) in the western corner of Area TA. The "Permanent Groundwater Monitoring Well Plan" from the March 2012 submittal shows the highest predicted contour in that area of TA to be 97 feet msl. The same issue occurs in Area TB. The highest predicted water level in 2003 is 69 feet msl and changes to 68 feet msl in the March 2012 report. Why would a highest predicted elevation decrease?

3. Drawing 8, West Section Composite Cell Top of Subbase Grading Plan, shows a berm with 2:1 slopes separating Areas TA and TB, and the subbase contours go from 106 to 90 feet. Based on the highest predicted groundwater elevations submitted in the 2003 and 2004 Phase II submittals, the Department is concerned the 3-foot buffer will not be met where Area TA transitions to TB. The highest predicted groundwater elevation in the most recent submittal near the berm was 97 feet in Area TA. Please provide evidence that this area will meet the 3-foot buffer requirement.

4. COMAR 26.04.07.15(5) requires cross sections in sufficient detail, orientation, and number to clearly identify subsurface conditions at the site. The geology beneath the site is complex, and the cross sections do not clearly delineate the transitions between the four designated hydrogeologic areas. In addition, site borings B-2, B-3, B-5, B-15, B-16, B-19, B-20, B-21, B-22, B-23, B-26, and B-27 show two perched water tables. Additional borings are needed to identify how localized each perched area is across Areas B and TA. The cross sections should evaluate whether these localized groundwater zones are discreet or hydrogeologically connected throughout the site. For example, does the surficial sandy layer under Area A interconnect with any of the perched layers shown in Area TA per boring B-19, and is the confined aquifer beneath Area TB hydraulically connected to the confined aquifer beneath Area B? To properly evaluate the site, more borings are needed along the "boundary" of Area TA. The Department would recommend spatial gaps of more than 300 feet between borings be filled with additional borings throughout the site. The new cross sections should adequately characterize the transition of Area TA to Areas A, B and TB.

5. The Phase II and the March 22, 2012 Response to Comments indicate in Attachment 7, Revised Groundwater Monitoring Plan and Appendix D Groundwater Level Elevation, that MW-12 and MW-13 are damaged and cannot be sampled or used to obtain water levels. During the August 2011 water level reading event, groundwater contours were inferred for these wells by adding the average difference in water levels between MW-12 and MW-13 and the respectively next closest wells. MW-12 and MW-13 should be properly abandoned and replaced. To properly characterize the site hydrologic conditions, you must obtain true groundwater elevations from replacement wells instead of taking the inferred average difference from MW-12 and MW-13.

6. As noted in the previous comments, groundwater flow has not been properly characterized for the site. Due to the groundwater flow discrepancies already noted and to maintain consistency, 12 months of consecutive monthly water levels readings are required for each well onsite. This includes the replacement wells for MW-12 and MW-13 and any additional wells screened in the Lower Patapsco. The collected data shall be used to produce updated contour maps depicting elevated, depressed, and highest predicted groundwater contours as required under COMAR 26.04.07.15(4). A map with current functioning wells and additional well locations should be approved by the Department prior to the start of the 12-month measurement period to ensure coverage is adequate.

7. The Department must have background water quality data prior to issuing the permit and believes the previous sampling events conducted in 1989, 1997, and 2004 are inadequate. The 1989 and 1997 data in the Phase II reports notes the metals analysis for both events was field filtered. Total metals analysis is required. The 2004 data did not include data for MW-1, MW-2, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, and MW-13. Background data for all wells must be established. The Department notes MW-12 and MW-13 have damaged casings and cannot be sampled. If any other well listed cannot be sampled, please inform the Department of their status and propose replacement well locations. The Department requires a minimum of four samples to establish background from each well currently onsite and the additional wells requested. These additional samples should be obtained using the same low-flow methods proposed in Section 16.3 and 16.6 of the groundwater monitoring plan. As sampling of the Lower Patapsco Aquifer is proposed in the groundwater monitoring plan, four rounds of background water quality data acceptable to the Department will be required for wells screened in this aquifer prior to waste placement. Samples are to be analyzed for parameters included on Tables I and II (attached).

8. Cross Section C-C', Plate 4, dated December 5, 2003, Phase II Addendum, shows a sand layer, clay layer, and another sand layer above the massive clay in borings B-20, B-21, B-22, and B-26. This upper clay layer is at thicknesses of 35, 44, 24, and 44 feet, respectively. As mentioned in Comment 4, these borings show two perched water tables above and below this upper clay layer. Drawing 16, Detail 4, Clay Dam Detail shows a continuous sand layer from minimum 35 feet to a maximum depth of 100 feet. The proposed underdrain in this detail would only drain water from the bottom perched layer. Please address this shallow clay layer in the design of the clay dam for the landfill and draining of perched water from the bottom of the cell floor. You must submit borings which show whether the upper clay is continuous to the west and to the south of the proposed clay dam. If the clay is present, please provide stability analysis of the upper perched aquifer, clay, and clay dam. Please also submit data characterizing zones of recharge which may affect the clay dam.

The Department will require a revised Phase II Report to address Comments 1 through 8. The revised Phase II Report should include all information required under COMAR 26.04.07.15 to facilitate review, as the information in previous Phase II volumes and addendums has been inconsistent.

The Department has the following comments regarding the March 2012 Phase III submittal:

9. Clay Dam Investigation

a. The Department commented numerous times on the impacts of perched water withdrawal behind and under the proposed clay dam, the ability to mitigate perched water during dam construction on 2:1 side slopes of the landfill, and the evaluation of the effect of pore pressure that may be created due to perched water removal for clay dam and liner stability. In the response to Comment No. 2a, you replied "Fill that is compacted to the specified requirements established, based on conventional moisture density zone designation, and saturation will be roughly 80% to 90%". You have not demonstrated how the clay dam could be constructed while managing perched water flow between the underlying soil layers at different elevations of the side slope prior to placing the 15 foot thick clay dam. Please note it is impossible to place and compact 80% to 90% saturated clay soil on the side slopes of the landfill. We have major concerns on the constructability and integrity of the proposed clay dam and the cell floor of the landfill while submerged under perched water (see Clay Dam Detail 4, on Drawing 16). Also, you have stated liquefaction is "not a factor" without properly evaluating the underlying hydrologic soil conditions. You must thoroughly evaluate the clay dam design and the underlying soils and address all of the Department's comments.

b. You have responded under Comment No. 2b that "the soils in and immediately behind the dam liner cannot be saturated during the landfill operation because the presence of the under drain" and clay dam. As previously mentioned, borings B-2, B-3, B-5, B-15, B-16, B-19, B-20, B-21, B-22, B-23, B-26, and B-27 show two perched water tables. The Department believes the clay dam will sit on top of a soggy wet side slope where perched water will continuously seep behind the clay dam. The clay dam will not stop seeps from flowing behind the dam, and the seeps will continuously saturate the clay dam resulting in dam failure. Also, the earthwork construction equipment will not be able to work on the side slope or properly compact the clay dam.

c. You have responded to the Department's comment concerning hydraulic factors on the underlying soils under Response No. 3i stating there will be "no effect in the very dense sandy silt soils by withdrawing perched water except cessation of perched water during cyclic dry periods when the seasonal perched water level decreases by several feet naturally". You also stated under Response No. 2b that liquefaction is not likely to occur due to the nature of the underlying clays and very dense sands. However, borings indicate that the underlying soils are silt sand, silt clay, and a thick layer of clay with two perched water zone conditions that were not included as part of your evaluation for the clay dam design, nor identified during the Phase II investigation. To address comments raised by the Department, you must properly evaluate the underlying soils for the design of the landfill and clay dam constructability, and the ability of the underdrain to manage different perched water zones.

d. In Attachments 4 and 5, you have attached two flat plate dilatometer (DMT) test results for saturated and drained soil simulations for rapid drawdown perched water level occurrence Cross Section X-X', near Boring No. B 2 on top of Cell No. 10. Additionally, a 500 pound per square feet (psf) load was applied to evaluate settlement along the top slope of the cell to simulate loads to be created by the construction activities. The applied load analysis for settlement on the top of the landfill and the assumed load evaluation is too low, and the analysis did not include dynamic loading for waste and different equipment used during construction and operation of the landfill, as well as static loading of the landfill during operation and closure. Please be advised a simple front loader rough braking would easily exert approximately 1500 psf (Citation from: Caterpillar, Specification for 963D Track Loader, http://www.cat.com/cda/layout?m=308800&x=7. Website Access: 06/04/2012). The DMT investigation should be conducted at close intervals at maximum depth for soil characteristics and values to predict settlement and to confirm the degree of homogeneity of the underlying soils. This is then used to compare the penetration resistance performed at different locations over the site. Please be advised, the application of preload in the shallow silty sand that may exhibit quick drainage seems fruitless, since the applied preload surcharge is only 500 psf, well below the applied landfill load stress of 1200-1600 psf. The load application you have used is likely to be much less than the natural pre-consolidation stress due to perched water fluctuations, dry conditions and the proposed underdrain. Furthermore, the use of consolidation tests for settlement computations may be unreliable because of clay swelling from the upper perched zone and shrinkage due to water removal by the underdrain in the lower perched zone and landfill loading.

e. In Attachment 2, you have included liquefaction potential evaluation for granular soils for Hydrologic Areas A and TA. The area where you conducted liquefaction potential evaluation is not subject to the proposed clay dam or perched water withdrawal. The liquefaction evaluation should be done for Hydrologic Area B and properly evaluate the underlying soils where the proposed clay dam and perched water underdrain is to be constructed. Therefore, the evaluation did not address liquefaction for the proposed clay dam design and perched water withdrawal.

f. In the response to Comment No. 3iii, regarding the removal of the water and its impacts on slope stability and shear strength of the materials under the clay dam, you stated: "lowering the water table in the dense sand will not produce significant settlement" and the void space cannot increase when water is removed. Please note, the borings do not indicate dense sandy soils underlain behind the proposed clay dam. If this were the case, there would be no need for the underdrain and all perched water could move freely. Based on Phase II boring logs, the site is underlain with silt sand and clay. Therefore, perched water could not flow in and out of the underlying soils freely, due to the cyclic pressure generating increased pore pressure conditions in the underlying soil that may liquefy. To date, you have not provided the Department with the quantity of water flow in the perched layer to make an accurate assumption that there will not be any settlement.

g. The evaluation to demonstrate external loading factor for construction equipment in Response No. 3iv as "vibration associated with landfill operations to be less than the vibration associated with the dam liner construction" is inadequate. The evaluation did not take into account activities that revolve around landfill construction and operation. These would involve external loading for different types of equipment and, mode of inertia exerted by equipment such as vertical, horizontal, torsional (rocking) and longitudinal vibration during construction of the landfill. Additionally, the evaluation should include horizontal and vertical loading that would be exerted by different types of construction equipment, a fully loaded truck of rubble waste, compacting effort to reach the maximum desired density by equipment for different lifts, inertia exerted by compactors, and dynamic and static loading for short and long term for the life of landfill. The evaluation must include the potential loss of bearing capacity or settlement of side slopes and cell floor due to loss of perched water zones by draining under and over the clay soil layer. Also, in saturated loose to medium compact soils, landfill equipment would produce unacceptable shear strains exceeding the strength of the underlying soils and softening the soils peak shear strength. Moreover, this high shear deformation and decreased shear strength may lead to high pore pressure buildup generated by construction equipment. Please note liquefaction usually occurs within a depth of 50 feet with improper perched water management resulting in cyclic shear stresses on the side slope of the landfill. This can easily produce progressive buildup of pore water pressure that significantly reduces the effective stress which controls the strength of the inner berm slope of the landfill. Therefore, for practical purpose, the effective stress after several cycles of shear strain may be ultimately reduced to zero leading to liquefaction.

h. Response to Comment No. 3v did not address the concern raised by the Department; instead it articulated on laboratory shear strength soil tests results to demonstrate liner system stability at other landfills. The demonstration must be site specific by evaluating the underlying soils that behave differently in the field than lab samples. Based on the Phase II boring logs, the onsite soils are not dense sandy soil as you claimed in your report and may behave differently when subjected to different conditions. Therefore, to properly evaluate shear strength of the liner system for the clay dam, please evaluate the onsite soils.

i. The letter in Attachment 4 for undisturbed Soil Testing and Settlement Analysis was not signed. Please sign the letter for documentation.

10. Response to Comment No. 1 and the revised Operations Plan Section 12.7.7 contradict each other. In response to Comment No. 1, you responded "While only one working face is expected to be in use on any given day, there may be multiple locations where filling could occur on a rotating basis, and the "working face" may shift between these locations depending upon weather and filling conditions". But in Section 12.7.7 of the Operations Plan, it states "Due to potentially diverse nature of material being disposed, NWM anticipates that no more than two filling areas will be designated as active working face on any given day." Please be consistent with the explanations.

11. In the response to Comment No. 2a, you have stated "The pore pressure does not exist in the unsaturated fill soils." The comment regarding pore pressure was not for the fill soils, but rather for the existing soils behind and underneath the proposed clay dam. This question has been asked numerous times and the answer you have given is always for the clay fill. Please look into the pore pressure of the sandy silt soil behind the clay dam liner.

12. In the response to Comment No. 2a, you have also stated "Fill that is compacted to the specified requirements established, based on conventional moisture density zone designations, will be roughly 80% to 90% saturated." If the fill is 80% to 90% saturated, the stability of the landfill can be comprised. Please clarify this statement.

13. In the response to Comment No. 4, you stated that *initially* "the perched water drain is daylighted to the impoundments on the floor of the excavation." Eventually the perched water will be daylighted outside the limits of the landfill as presented in Drawing 36. Additionally, Note #3 in Drawing #16 describes Cells 9, 7, and 5 being used as temporary impoundment areas. If these impoundments are being used simultaneously as the adjacent cells are being landfilled, please explain any stability issues that may arise between Cells 1 and 7, Cells 7 and 10, and Cells 9 and 10. Also, you have referenced Drawing 8 and Drawing 36, to present a perched water drain system. While Drawing 8 shows the clay dam, it does not show the pathway of the drain.

14. Drawing 36 illustrates the "Typical Concrete Headwall" in Detail 3 where the pipe is diverting the perched water into a Class I Riprap bedding area. Please state if all the perched water will be exiting out of this structure or if there are multiple headwalls to convey the perched water to the outside of the landfill. Drawing 8 shows the 100-year floodplain area at the exit of the Concrete Headwall. If all the perched water is exiting out of this structure towards the 100-year floodplain area, you may impact the floodplain and may require a permit from the Army Corps of Engineers and/or the Department's Water Management Administration.

15. In the response to Comment No. 15, you have stated "additional language has been added to this section under new Section 12.7.8, "Alternative Daily Cover Materials (ADCM)." The mentioned section states, "ADCM may be in use at site, with prior approval of MDE. At this time, the use of incinerator and/or fly ash and fabric-type alternative daily cover are proposed for use at this site." You also cited the use of incinerator ash by the Harford County Landfill and use of fly ash approved by the USEPA, PADEP, and CAL/EPA. Please be advised that the proposed landfill is a rubble landfill and COMAR 26.04.07.13.B.2 and .3 prohibits the use of industrial waste or byproducts, such as incinerator ash or fly ash. Therefore, incinerator ash or fly ash will not be allowed as ADCM.

16. Drawing 2 of the Phase III Permit Drawings, Chesapeake Terrace Rubble Landfill (Drawings) Site Entrance Depiction Note 1 states, "Construction of only one site entrance is required by Maryland Department of the Environment." The Department does not limit the number of entrances to the landfill, but it is a County requirement to have only a single entrance. The letter from Anne Arundel County dated July 27, 2005, states that the zoning of the rubble landfill was approved in the form of a "special exception" and the condition stipulated allows only the use of Conway Road as the entrance to the landfill.

17. You responded to Comment No. 8 stating no wheel wash water is to be pumped to Basin No. 3, and Drawing No. 9 has been revised without showing where the collected wheel wash water will be drained or collected. Please explain how the wheel wash liquid will be collected and where it will be disposed of.

18. Drawing 11, Detail 1, Force Main Trunk Line #1 Profile shows the 60-inch HDPE storm drain below the leachate forcemain. Please revise the drawing to show the force main below the storm drain or design an encasement to protect the leachate line from pipe freezing and any other damages to the pipe.

19. As stated in Section 10.6 "Leachate Storage Tanks" on Page 10-5 of the Report, the storage tanks proposed for the facility will be 42-foot diameter, glass coated, bolted steel Aquastore Tanks manufactured by Engineered Storage Products, Inc. Since these tanks are single walled, some form of secondary containment is necessary to contain leaks and spills of leachate. It is stated that containment will be provided by an earthen berm located around each of the two leachate storage facilities. This measure is intended to fully contain a spill from the two 250,000 gallon leachate storage tanks located at each storage facility. Please provide volume calculations along with a larger scale drawing of the leachate storage facility showing that the containment area is sufficiently sized to provide the necessary storage volumes and the required freeboard for the facility.

20. As shown on Drawing No. 13, the leachate loading pad will include a sump to store spilled liquids. A pump and discharge pipe is located within this sump. However, there is no further description of how and when this liquid will be pumped from this tank. Since this sump will be regularly collecting stormwater falling on the leachate loading pad in addition to spilled leachate, an automated pump system should be provided to discharge this liquid back into the leachate storage tanks as necessary. Please show and describe such a measure in the Report and on the engineering plans. In addition, it is unclear how the leachate will flow from the storage tanks to the loading pad. Please provide details, notes, and profiles showing how leachate is conveyed from the leachate storage tanks to the loading pad.

21. On Drawing Numbers 25, 26, 27, and 28, 3:1 slopes are shown for the exterior slopes of the closure cap. Then, Section A-A' on Drawing No. 13 shows a 2:1 slope proposed for the exterior slope of the landfill perimeter berm for Cell 1 which slopes into the perimeter ditch. Details 1 and 2 on Drawing No. 16 also show that 3:1 slopes will transition into 2:1 at the landfill perimeter berm. It will be difficult to maintain the vegetation on the perimeter berm and within the stormwater ditch with these steep slopes. For this reason, 3:1 slopes are recommended for these areas.

    In addition, there are stability concerns with having 2:1 steep slopes on the landfill perimeter berm. In some areas of the landfill, it is proposed that 3:1 slopes of the completed landfill cap will transition into 2:1 slopes on the perimeter berm. A stormwater perimeter ditch will be located next to this berm, and an access road will parallel this ditch. On the other side of the access road, the grade will drop off to meet existing grade or will transition into stormwater management basins. The cross section described here represents a potential failure plane and should be analyzed. In the reports submitted to the Department to date, only two scenarios have been analyzed. The first one addressed the stability of the 2:1 interior slopes of the perimeter berm during construction (before the cell is completely filled with waste) taking into account the effects of perched water within this cross section. The second one analyzes the stability of the exterior slopes when the landfill reaches final capacity. The analysis was performed on sections located within Cells 5 and 10. Please submit a detailed slope stability analysis showing that all areas of the landfill will be stable when the landfill has reached final grades. The analysis should include various representative cross sections that address potential failure planes throughout the landfill in both the eastern and western sections of the facility.

22. Drawing 36, Detail 1, Perched Water Drain Trench-Plan View refers to Drawing 26 for the perched water drain outlet pipe, but Drawing 26 does not show this pipe.

23. Attachment 7: Groundwater Monitoring Plan, Section 16.2 states the landfill will collect quarterly water level measurements before, during, and after construction. Should a permit be issued, monthly water level readings are required. Please revise the language.

24. Attachment 7: Groundwater Monitoring Plan, Section 16.10 states MDE will be notified of any exceedance of a groundwater protection standard within one week of discovery. The Refuse Disposal Permit will require notification within 24 hours of discovery. Please revise the language.

25. Comment 20: The proposed well location for MW-24/25 is acceptable. Please also propose a well cluster location downgradient of leachate storage facility No.2.

If you have any questions concerning these comments or would like to schedule a meeting to discuss the comments, please contact Mr. Kassa Kebede, Head of the Construction & Maintenance Unit at (410) 537-3315.

Sincerely,

Martha Hynson

Martha Hynson, Chief
Solid Waste Operations Division

MH:KK:kk

Enclosure

cc: Ms. Veronica E. Foster, PE
Mr. Horacio Tablada

TABLE I
MONITORING PARAMETERS

VOLATILE ORGANIC COMPOUNDS	PQL (ppb)
Acetone	5.0
Acrylonitrile	5.0
Benzene	1.0
Bromochloromethane	1.0
Bromodichloromethane	1.0
Bromoform	1.0
Bromomethane	1.0
2-Butanone	5.0
Carbon disulfide	1.0
Carbon tetrachloride	1.0
Chlorobenzene	1.0
Chloroethane	1.0
Chloroform	1.0
Chloromethane	1.0
Dibromochloromethane	1.0
1,2-Dibromo-3-chloropropane	1.0
1,2 – Dibromoethane (EDB)	1.0
Dibromomethane	1.0
1,2 – Dichlorobenzene	1.0
1,4 – Dichlorobenzene	1.0
Trans-1,4-dichloro-2-butene	5.0
1,1-Dichloroethane	1.0
1,2-Dichloroethane	1.0
1,1-Dichloroethene	1.0
Cis-1,2-Dichloroethene	1.0
Trans-1,2-Dichloroethene	1.0
Methylene chloride	1.0
1,2-Dichloropropane	1.0
Trans-1,3-Dichloropropene	1.0
Cis-1,3-Dichloropropene	1.0
Ethylbenzene	1.0
2-Hexanone	5.0
Iodomethane	1.0
4-Methyl-2-pentanone	5.0
Methyl Tertiary Butyl Ether	2.0
Styrene	1.0
1,1,1,2-Tetrachloroethane	1.0
1,1,2,2-Tetrachloroethane	1.0

TABLE II
MONITORING PARAMETERS

ELEMENTS AND INDICATOR PARAMETERS	PQL (ppm)
Total Antimony	0.0020
Total Arsenic	0.0020
Total Barium	0.0100
Total Beryllium	0.0020
Total Cadmium	0.0040
Total Chromium	0.0100
Total Calcium	0.08
Total Cobalt	0.0100
Total Copper	0.0100
Total Iron	0.0050
Total Lead	0.0020
Total Nickel	0.0110
Total Magnesium	0.004
Total Manganese	0.0100
Total Mercury	0.0002
Total Potassium	0.39
Total Selenium	0.035
Total Silver	0.0100
Total Sodium	0.2
Total Thallium	0.0020
Total Vanadium	0.0100
Total Zinc	0.0100
PH	0.1 (SU)
Alkalinity	1
Hardness	0.5
Chloride	0.39
Specific conductance	1
Nitrate	0.06
Chemical oxygen demand	10
Turbidity	0.11 (NTU)
Ammonia	1
Sulfate	0.38
Total dissolved solids	10