2006-04 M

MARYLAND DEPARTMENT OF THE ENVIRONMENT
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November 27, 2006

Mr. Warren Halle, President
The Halle Companies
2900 Linden Lane, Suite 300
Silver Spring MD 20910

Dear Mr. Halle:

On April 14, 2005, the Maryland Department of the Environment (the "Department") received thirteen copies of the Phase III Permit Application Engineering Report and Specifications consisting of Volumes 1 of 2 and 2 of 2 for the proposed Chesapeake Terrace Rubble Landfill. Revised plans were submitted on August 21, 2006. The proposed landfill is to be located south of Odenton in Anne Arundel County, Maryland. Century Engineering submitted the report on your behalf.

The Department has completed its review of the Phase III Report. as well as the information discussed during the Phase III joint plan review meeting. In order for the Department to consider the Phase III permit application complete, the following comments must be fully addressed and submitted to us for review and approval:

A. General Comments: The following comments are generally applicable to the development of the plans and operational manuals for the proposed landfill.

1. Comparison of the proposed waste types listed in the application against those defined as acceptable wastes in the Anne Arundel County Solid Waste Management Plan (the "County Plan") and the Code of Maryland Regulations (COMAR) 26.04.07.13 for rubble landfills indicates that the proposed wastes in the Phase III Report do not match those listed by the County or in COMAR. Please note that Section 9-210(b) of the Environment Article, Annotated Code of Maryland, requires that the types of waste allowed to be accepted by a rubble landfill in a County is limited to those identified in the law, and is further restricted as specified by the local government in the County Plan. Rubble landfills may not accept municipal or industrial waste, and are limited to the specific waste streams allowed in the referenced authorities. The operations plan must be revised to clearly conform to the regulation and the list of approved wastes allowed in the County Plan.

2. A rubble landfill of this size and volume has the potential to generate significant amounts of landfill gas. The Department has come to recognize that there are two potential areas of concern that must be addressed. These are:

   a) The generation of hydrogen sulfide. The natural decomposition of gypsum-bearing waste such as plaster and wallboard in an anaerobic environment has the potential to create hydrogen sulfide gas. This can create significant odor problems, and if it occurs at sufficient concentrations, can have possible health implications for onsite workers.

GAS

EXHIBIT 4

b) The generation of methane. The Department has determined that rubble landfills can generate significant amounts of methane gas. Methane is a potent "greenhouse" gas, and can be combustible at concentrations between 5 and 15% of the atmosphere. Although landfill gas monitoring and control measures are not currently specifically required by COMAR 26.04.07.13-.18 and .21 for rubble landfills, the Department recognizes that a rubble landfill of the magnitude proposed is very likely to have to address these potential problems during its life, as have other rubble landfills in Maryland. Therefore, a soil gas monitoring system and a system for controlling landfill gas (e.g., by flaring or use as a fuel) must be included in the design for the facility. This plan must address a schedule for landfill gas monitoring, landfill gas monitoring probe networks based on size and volume of waste to be disposed, sample collection, record keeping and reporting, and actions to be taken in case of elevated gas levels. The authority for these requirements is COMAR 26.04.07.03A(1), (3), (5), and (6), and B(9).

3. The proposed final grades include provisions for a benched slope, with slopes of 3:1. Note that this is near the limits of constructability for modern capping systems, due to gravitational stresses between the layers of the closure cap, and difficulty in draining the expected volume of infiltrating liquid from the large area of the proposed landfill. Careful attention must be paid to the design of the drainage layer for the cap to insure that it can handle the volume of water anticipated in order to prevent slope failures due to hydraulic pressure on the overlying soils at the base of slopes. Please address the method of benching to be employed, including cap geomembrane anchoring and drainage of the benches, the overall waste cross-section, percent of slope, and all pertinent features in the legend and operation and maintenance manual. If this matter cannot be satisfactorily addressed, a less steep slope must be utilized.

4. The report discusses three possible access roads but only one is depicted on the plans, and that in a cursory and entirely incomplete manner. The means that will be employed to access this site for construction and operation must be designed and provided in the report. If more than one access is proposed or intended for use, or there is more than one option being considered, then all access roads must be depicted and thoroughly described.

5. In several areas detailed below, design elements or construction practices were discussed in the text but not depicted in the plans, or vice versa. The final report should provide a coherent document that provides discussion and amplification of the plans, particularly in the area of how the features shown on the plans are to be constructed, and how operations are to proceed.

6. The shop drawings included in Appendix C lacked page numbering and detailed descriptions of the intended use. Please include these in the next submittal.

7. COMAR 26.04.07.08C(2) requires the engineering drawings to be 24 inches wide and 36 inches long. Please revise your drawings to meet this requirement or request a variance in accordance with COMAR 26.04.07.26, and provide justification for the variance.

8. All pertinent features must be shown on the drawings and the intended use clearly identified in the legend. This includes all leachate collection pipes, laterals, leachate storage tanks, sumps.

pumps, pipe clean-outs, manholes, landfill cells and other features that are pertinent to the facility.

B. Geotechnical Comments: The following comments generally refer to specific elements of the design and the report.

I. In order to comply with the requirements of COMAR 26.04.07.16C(4), the liner system must be placed upon a foundation or base capable of providing support to the liner and resistance to pressure gradients above and below the liner to prevent failure of the liner due to settlement, compression and uplift, puncture, cutting, or activities at the landfill. The Phase III Report must address the following:

a. Page 6-2 and elsewhere - The manner in which the compacted subbase will be constructed in a series of compacted lifts of appropriate lift thickness; the soil characteristics; the type of compaction equipment to be used; the fitness of the foundation materials with respect to stability and permeability; and the anticipated compactive effort to be achieved by the various materials. The quality assurance and control, test sample repair, failed-area repair, and repair verification procedures to be used must be specified.

b. The construction and preparation of the subbase and liner system design layout, as well as the leachate collection system installation sequences, must be described in greater detail in the text, and not just on the plans. Minimum specifications for the performance of the materials must be provided, with references to the required ASTM or other relevant test protocols.

c. The manner in which the subbase and liner systems will be connected from one cell to another as the lined area is constructed sequentially over time must be described, with details provided in the plans.

d. Page 7-2 and elsewhere - You have proposed a clay plug inside the base of the interior landfill side slope to prevent groundwater seepage from entering the landfill's cell floor. Your proposal did not adequately address the engineering justifications for the performance of the clay plug or its capability in preventing groundwater seepage from entering the cell floor for the life of the landfill. Although the drainage system is estimated to produce 3.5 gallons per minute after the perched system is drained, no description of the manner in which this will be accomplished, the amount of water expected during the initial period, or the effect that this will have on construction is included. We are concerned that saturation of the clay over time may lead to solifluction or differential settlement in this area. The report must address the effectiveness of the clay plug in preventing groundwater buildup underneath the landfill, and the related stability of the liner system under load. It must also address in detail the means or methods of engineering remedies to be taken if problems are encountered with groundwater seepage entering the landfill's cell floor.

e. Note 3 on drawing No. 3 of 30 states "depiction of the clay dam design as based on information provided by others" for the clay dam design. Also, the Clay Dam Detail on drawing No. 18 of 30 shows the clay dam to be constructed at the toe of the subbase

slope while groundwater impinges on the top of the subgrade directly impacting the landfill's stability. The clay dam design lacks any groundwater modeling and groundwater volumes to rectify encountered problems. The proposed design is supposed to be based on site-specific conditions related to the construction of the cell floor rather than information gathered by others. The proposed design also lacks the required 3-foot groundwater buffer distance from the subgrade.

f. Additional slope stability analyses must be performed for both, the foundation area and the side slopes, assuming groundwater build-up behind the side slopes of the landfill, and continuous saturation of the clay plug.

g. The design for dikes and cut slopes should show the design layout with cross sections indicating the proposed grade and bearing elevations relative to the existing grade, along with details of the dikes and soil shear strength including all slope angles and dimensions.

h. The report did not address in detail activities to occur during construction of the landfill such as site preparation, aerial survey, clearing and grubbing, and borrow area management, and areas to be used for storage of materials, soil balance equations, and use of control benchmarks. The creation of soil stockpiles was mentioned in the text, but no identification of areas to be used for each cell was described in the plans. These elements must be provided for consideration of landfill operations and sediment and erosion control features. The report must address a general schedule for construction events, a landfilling sequence, cell acreages, and describe the manner in which the landfill will be constructed in greater detail than is provided in the plans, as required by COMAR 26.04.07.16A.

2. The effect of settlement on the proposed HDPE geomembrane is estimated and potential effects addressed. However, no such discussion is provided for the performance of the clay liner, and we are concerned that a clay liner might not accommodate the calculated 0.1% elongation it is likely to experience, especially across the distances to be encountered in the proposed landfill, which could amount to several feet. Also, there was no discussion of clay liner installation, quality assurance, or protective techniques in the plan. It is recommended that this alternative be removed from the proposal.

C. Technical Comments:

1. On page 4-1, the area and population to be served by the facility as specified in COMAR 26.04.07.16A(3)(b) is inadequately described. Please amplify.

2. Section 7.1 and Plan 14 of 30 and 15 of 30 - The description of the leachate storage tanks provided in Section 7.1 did not address means of leachate movement to the tank by gravity or by pump. Note that COMAR 26.04.07.16C(7)(e) requires that the leachate collection system be "designed to operate solely by the force of gravity in all areas where the system will directly underlie solid waste." Therefore, the pump sumps should be relocated outside of the landfill proper; unless a variance is requested and approved in accordance with COMAR 26.04.07.26.

3. On page 9-2, Section 9.2, Alternate Clay Liner – You propose one foot of clay as an alternate liner. This contradicts the Cell Liner Detail on drawing No. 13 of 30, which shows only a geomembrane liner. Please be specific in your design descriptions. Alternative liner designs may be proposed, but each alternate design must be completely described in plans, construction techniques and specifications, and quality assurance/quality control protocols. Also, if contemplated, the manner in which different cells possessing different liner designs will be interfaced must be described.

4. Page 9-2, Section 9.3.2 evaluates the stability of the 2:1 interior slopes, and finds them stable. However, the report also recommends that the granular drainage layer only be constructed in sections 20 feet high due to potential instability. This is unacceptable, as it would leave part of the liner uncovered and exposed for damage. Moreover, we have had experience with the failure of steep lined slopes during winter weather conditions when freeze-thaw in the drainage layer can seriously degrade the stability of the material. Please revise the design to significantly increase the stability of this system, and provide careful documentation of the actual constructability and stability of the liner and drainage layer at the revised design slopes.

5. Page 10-2, Section 10.1.3 and 4 – The HELP hydraulic model was used for estimating leachate volumes. However, although valuable for estimating long-term production in a landfill of significant thickness, this model does not provide a good estimate for "worst case" liquid volumes that would be encountered in an actual landfill environment. A more plausible "worst case" would occur following a heavy rain while the landfill cell is only partially filled with waste, but some waste is in the cell so the resulting liquid must be managed as leachate. This "worst case" scenario must be addressed in the operations manual, and either the pumps must be resized or alternative means for addressing the increased liquid volumes must be proposed.

6. The report must address in detail the minimum specifications for the impermeable liner to be used, and its ability to withstand the stress caused by hydrostatic forces, temperature variations, exposure to ultraviolet light, resistance to chemicals, foundation settlement, and construction and operational loading without compromising its integrity.

7. Section 12 – Sediment and erosion control calculations are noted, but the directions and notes provided in the Plans should be repeated here, particularly with respect to the phasing of tasks. The section lacks a discussion of stormwater management at the site. Instead, the plan references the wetland study presented in the Phase II Report. Please provide a detailed discussion of stormwater management features and capacities.

8. Page 13-1, Section 13.1 – The report references a scale house, maintenance facilities, and other features in a cursory manner with insufficient description, and these features are not reflected on the plans. The plans must describe and depict these features, as required by COMAR 26.04.07.16A(1) and (2).

9. Page 13-1 and 2, Sections 13.3 and .5 – The plan describes the landfill staff as consisting of only a landfill manager/scale operator and two equipment operators. This is inadequate staffing for a landfill proposing to accept 2100 tons per day on average. The plan does not address many of the daily tasks that must be performed in the operation of a landfill, such

as maintenance of sediment controls, hauling of cover material, inspection of waste dumped at the working face, traffic management, vehicle and equipment maintenance, litter control, environmental monitoring, and other routine activities. For example, Section 13.16 indicates that a "litter patrol" will be implemented, but no provision is made for these workers in the plan. Also, the plan only provides for load inspection by the scale operator, and none at the working face, where disguised unacceptable waste may be encountered. This section must be revised to specify a realistic staffing requirement for a landfill of the proposed scale, including sufficient operators, waste inspectors, truck spotters at the working face, mechanics, laborers, and supervisors.

10. Page 13-1 and 2, Section 13.4 – The plan only vaguely identified some of the equipment that will be needed to operate the site, and does not enumerate either adequately or completely the numbers and specifications of the equipment needed to operate a landfill that expects to receive over 2000 tons of waste a day. It also does not describe or adequately mention other equipment that is likely to be required, such as pumps in various capacities, generators, lighting for emergency work or operations in winter, and monitoring and safety equipment. This section must address all equipment required to operate the landfill in a safe and effective manner.

11. Page 13-2, Sections 13.5 and .6 – The proposed procedures for detection and management of unacceptable wastes are not adequate. In addition to procedures for performing inspections at the working face as well as at the scale house, plans for identifying and managing unacceptable waste of various kinds and amounts must be prepared. In addition to the potential for the receipt of hazardous materials, rubble fills may receive other unacceptable materials such as scrap tires, municipal household waste, liquids such as paints, fuels and lubricants, and pressure cylinders such as Freon and propane tanks and welding gases. Please expand this section accordingly.

12. Page 13-5, Section 13.10 – The phrase "weather permitting" should be removed from the discussion of the placement of intermediate cover.

13. Page 13-7, Section 13.17 – The plan notes that the operator will "not mix heavy traffic with light trucks" but does not describe how this will be accomplished. If a separate unloading area for pickups and other light vehicles will be provided, it must be depicted in the plan, or at least the operating procedures must be described if it is merely a separate part of the working face. Alternatively, this sentence may be deleted.

14. Page 13-7 and 8, Section 13.18 – The section on fire prevention and control is cursory and should be expanded. It should include provision for immediate notification of fire officials, and describe the responsibility and manner in which this will be accomplished.

15. Page 13-9, Section 13-19 – The section on odor control neglects to mention the generation of landfill gas and the potential for generation of hydrogen sulfide and other odorants due to the decomposition of gypsum wastes in the landfill. This section must be significantly expanded to address these issues. Also, given the size of the landfill and the traffic proposed, the section on dust control must be expanded. It is likely that dust control will be required on any day that it is not actively raining, and procedures for the control of

sediment drag-out will be required on all operating days. These issues must be addressed, and any necessary changes made to the manpower and equipment sections of the report.

16. Drawing 1 of 30, the Site Plan, lacks a scale. Although it can be calculated from the Maryland Grid Coordinate System markings, this is inconvenient. Please add a scale.

17. The West Section Perimeter Ditch on drawing No. 2 of 3 drainage area map shows that all stormwater is directed to Basin No. 1. The proposed basin may not be adequate enough to handle all stormwater generated by this portion of the landfill. Please address the adequacy of the basin to handle all stormwater collected for this portion of the landfill. This also applies to the eastern section of the landfill depicted on drawing No. 3 of 3 for Basins 2 and 3. Also, some of the sediment trap basins on the plan are not clear, partially shown, and obscured by heavy contours. To minimize confusion, please clearly depict complete sediment basins and profiles on a sheet for the designated cells to be served and address the adequacy of these basins during high storm events.

18. The title page on drawing No. 1 of 1 is entitled "Existing Conditions Drainage Area Map" while depicting soil classifications for the site. Also, the drawing page numbering lacks proper continuity.

19. The title page on drawing Nos. 1 of 3 through 3 of 3 is entitled "Developed Conditions Drainage Area Map" while depicting different types of soil classifications. Please revise the title page to reflect the proper title and drawing page number continuity.

20. On drawing Nos. 1 of 1 and 1 of 3 through 3 of 3, there is depicted a star with a note in the legend that says "Study Point". What was studied and why was this point selected for the study?

21. Drawing No. 1 of 30, Title Sheet refers to drawing Nos. 3 of 30 and 4 of 30 as "Initial Grading Plan". Neither of these drawings show bottom liner system detail except for inadequately depicted base grading contours. Please address in the operation and maintenance manual, as well as depict on the drawings, the liner system detail cross sections, landfill side slope design, and sump pump specifications.

22. Note 1 on drawing Nos. 3 of 30 and 4 of 30 "Cell Base Plan" for the proposed finished landfill states "Perimeter Finished Grade" and "Subgrade Geomembrane Liner"; this is confusing. Also, the drawings do not specify cell acreage, nor clearly depict the cell separation. This may result in inaccurate leachate volume calculations and pump specifications for the intended cell. Please clarify.

23. The drawings do not depict intermediate stages of landfill construction, including internal access roads and temporary construction entrances. Drawings that depict the landfill in various stages of construction are helpful in determining how the landfill will be constructed and accessed, as well as helping to determine where runoff will be pumped, which helps determine the required pump capacities, etc. Also, construction access roads and entries may require additional protection for liners and leachate collection system elements. Please clearly depict the proposed finished grade, subgrade, access roads, acreage of each cell and inter-cell berm separation on a clear sheet to minimize confusion,

in addition to the map projecting these features onto the base topographic map as required by the regulation. The cell floor must show the required minimum 2% slope, and be graded to maintain this slope after anticipated settlement under the projected load.

24. Drawings No. 7 of 30 and 8 of 30 depict a drainage ditch on the outside of the perimeter landfill access road. In the western corner opposite Cell 8, this exterior ditch appears to terminate without a sediment control structure. An appropriate means of runoff control must be applied in this area to the satisfaction of the local Soil Conservation District.

25. Drawings Nos. 1 of 2 and 3 of 30 show a crest in the middle of Cell 1 and 2 grading from an elevation of 108 to 111, a 2% slope, and sloping in both directions without any explanation in the text. This may create leachate build-up on the liner. Please address the purpose of this design and the reason behind it.

26. Drawings for the cell floor plan are confusing with too many features drawn on the map. Please show only the proposed base grade contours for Cell Nos. 1 through 10 and the minimum 2 % slope necessary to facilitate movement of leachate towards the leachate collection system on these drawings. Additional drawings may be added to depict other features.

27. The report failed to address leachate pipe selection and construction. The selected pipe materials should be indicated similarly on the plans and drawings as well as in the specifications, and should agree with the assumptions in the design calculations. Calculations that the specified piping will withstand anticipated loadings with acceptable maximum ring deflection must be included. The specifications must include:

    - Type of material piping,
    - Diameter and wall thickness,
    - Size and distribution of slots or perforations,
    - Seaming or other connections between pipes and different sizes and types of pipes;
    - Type of coatings used in the pipe manufacturing, and
    - Type of bedding material used to support the pipes.

28. The cell floor design shows individual cells to be served by a single pump. However, each cell pump must be designed with its own network having check valves and gate valves to control leachate and a gas vent with a screen.

29. The pump design lacked typical sum profile and section detail, liner pipe penetration and pipe connection detail. Please add these details.

30. The leachate collection system design must address the ability of the proposed leachate removal system to effectively remove leachate from the bottom of the landfill during worst case, high storm scenarios and over the life of the landfill. The report must address methods of testing the leachate head on the liner to insure that at all times it does not exceed the 1-foot regulatory limit.

31. The leachate main force header lacked leachate pipe flow calculations to justify the design. The design must prevent excessive full pipe flow or pipe angle deflection to insure free leachate movement through the pipe without scouring, etc.

32. A 6-inch leachate force main is proposed to be buried around the landfill at an elevation more than 30 feet higher than the sumps. Please address the effectiveness of this design for easy access for maintenance and for free movement of leachate to the storage tank over the life of the landfill.

33. A discussion of the leachate flow to the storage tank should be included. The discussion must address the effectiveness of the system over the life of the landfill. Also, it must address the system's ability to withstand the static pressure of the wastes.

34. Drawing No. 13 of 30, Cell Liner Detail, fails to depict the required 2 feet of compacted clay subbase with a maximum permeability of $1x10^{-7cm/sec}$, geomembrane liner specifications, or the 2-foot leachate drainage layer with a permeability of $1x10^{-3\ cm/sec}$ or greater.

35. The Sump to Pump House Section A-A and Landfill Side Slope Section C-C details on drawing No. 14 of 30 must clearly address pipe specification, functions, and leachate flow to the storage tank. All features that are depicted as part of the cross section must be clearly labeled on the plan and also addressed in detail in the report.

36. Leachate manholes section: The pump house and leachate manholes must be made of pre-cast concrete, concrete poured in place, or other acceptable materials, and must be waterproofed on the exterior. A drop pipe must be provided for leachate entering at an elevation of 24 inches or more above the manhole invert. All manholes must have a minimum diameter of 22 inches for access to the manhole during inspection and maintenance. Consideration must be given to the potential for the occurrence of explosive levels of methane gas in these structures.

37. The leachate collection system must be designed for each cell to convey leachate by gravity to leachate collection sumps, with level controls set in each collection sump to control and transfer leachate to the leachate storage tanks through underground piping. The system must be designed with sensors that turn the pump off at low levels and activate the pump at a predetermined level and sound an alarm in times of high water or power outages.

38. The submersible pumping systems in all cells should be designed in accordance with the National Electric Code Class 1, Division 1, Groups C and D hazardous locations. These locations have the likelihood for flammable gases to exist. Pumps must be two stage grinders or other pumps capable of handling biological solids. These details should be reflected in the report and the pumping station details reflected on the plan.

39. All pumping stations must be designed to be easily accessible and convey leachate via PVC piping within the perimeter berm to the leachate storage tank. Each pumping station should be equipped with adequate horsepower, duplex self-priming pumps, and with

grinder pump ability. Also, each pumping station in each cell must have an adjacent valve chamber that contains check valves.

40. The schematic pump station detail must show and label all pertinent parts on the drawing. The pump maintenance instructions supplied by the pump manufacturer must be clearly addressed and included in the report.

41. Drawing Nos. 3 of 30 through 17 of 30 showing bottom liner system details and the landfill subgrade, including the Clay Dam Detail on Drawing No. 18 of 30, should be depicted based on the anticipated maximum occurrence of the water table, to demonstrate the minimum 3-foot buffer separation between the highest observed/anticipated groundwater table and the subgrade.

42. The liner detail cross section design must depict the components of the liner, protective layer including berm design, anchor trench detail specification, methods to prevent geocomposite pull-back during waste placement, methods of liner tie-in, pipe penetrations. and pipe clean-out details.

43. Please address means of maintenance and checks for pumps. access to the sumps and leachate pipes to insure the proper functioning of the system and for maintenance purposes, methods to minimize future pipe clogging, and leachate equipment housing and safety appurtenances in the operation and maintenance plan.

44. On drawing Nos. 14 of 30 and 15 of 30, the Sump/Pump House and Pump House Cross Sections must show the percent of slope of the leachate carrier pipes, the liner system detail, and the required 3-foot base grade vertical buffer to the highest observed groundwater table.

45. The proposed pumps to remove leachate from the sumps should be sized to ensure removal of leachate at the expected rate of generation (see previous comment on the "worst case" scenario in paragraph C.4), and must have a sufficient operating head to lift the leachate at the required height from the sump to the access port. Also, the types of pumps to be used and their specifications must be indicated on the plans and drawings, as well as in the operation and maintenance manual specifications.

46. The specifications for the submersible pumps and motors must be included. The pumps must be designed specifically for leachate use, including totally submerged operation during each pumping cycle, and be readily removable or replaceable without dewatering of the wet well or disconnecting any pipes in the wet well. Each submersible pump must have the same capacity, and each must be capable of handling flows in excess of the expected maximum flow. Provisions must be made to automatically alternate the pumps in use to ensure the leachate head over the liner will not exceed 30 centimeters (1 foot) during the life of the landfill in accordance with COMAR 26.04.07.07C(12)(c)(iii).

47. The leachate collection system must be designed and constructed based on the calculated mean velocities for full flow, but not less than 2.0 feet per second. The layout for the leachate collection pipes should be designed to minimize leachate head loss due to a

greater than 45 degree angle when entering the main pipe. The pipes must be laid at a depth sufficient to prevent freezing.

48. A System Head/Pump Curve must be shown on the drawing. Use the pump curve supplied by the manufacturer and develop a system head curve for the pumping system that provides the greatest total dynamic head at the facility. The point of intersection between these two curves will be the design capacity for the pumping system.

49. An alarm system shall be provided and activated in case of power failure, overflow, pump failure, use of the lag pump, or any cause of pump station malfunction. Pump station alarms may be telemetered to the main maintenance office if it is manned 24 hours a day. If such a facility is not available, the alarm shall be telemetered to the main maintenance office during normal working hours and to the home of the person(s) responsible for the pump station during off-duty hours; or another acceptable alarm system may be proposed. An audiovisual alarm system with a self-contained power supply may be acceptable in some cases in lieu of the telemetering system, depending upon location, station holding capacity and inspection frequency. Consideration must be given to the potential for the occurrence of explosive levels of methane gas in these structures.

50. The leachate storage tanks on drawings Nos. 3 of 30 and 4 of 30 are identified as "leachate storage area 1, future 250,000 gallon leachate storage tank" and "250,000 gallon leachate storage tank". This specifications and construction sequence must be fully addressed in the operation and maintenance manual. You have proposed two 250,000-gallon leachate storage tanks to store all leachate that will be generated at the landfill. Please demonstrate that the proposed storage tanks can meet peak flow during occurrence of major storm conditions. This demonstration must also include the names of wastewater treatment plants that will accept the leachate, frequency of emptying the tanks, and detailed information for the storage tanks.

51. The operation manual must clearly address the adequacy of the proposed leachate storage tanks, and the pumps must be designed with a float cable system or equivalent to indicate liquid levels in the tank. The leachate levels must be recorded on a daily basis to monitor leachate production and storage capacity. Provisions for adequate storage tank capacity must be included in the design as a contingency in case of high rainfall events.

52. The pumping station design lacked an emergency shut off plan to override the cutoff switch in the pump station to prevent tank overflow. The design specification for the pumps and storage tanks must have a contingency plan and be clearly addressed in the operation and maintenance manual for facility. You should explore leachate disposal site options, and identify proposed facilities for leachate disposal in the plan.

53. The descriptions of the leachate storage tanks are inadequate, and must include the type of tank and description of safety mechanisms such as lighting fixtures or audible alarm systems for warning of leachate overflow, spill or leak management plans, cover systems, and methods to control odor.

54. The plan shows the proposed leachate storage tanks (No. 1 and No. 2) are inside the fill area. Please address this discrepancy.

55. Drawing No. 14 of 30 and 15 of 30 – The use of double-walled pipes for the force main is discussed, but no specific design details are provided. On this plan, it appears to indicate a 4" pipe inside an 8" pipe, but the means of constructing this system is not discussed. There is no discussion of the leachate pipe (header) method of connection, i.e., double-walled pipe to collect leachate via gravity or pump to the storage tank, how the outer pipe will be checked for the presence of liquid (which could indicate a leak in the force main) or what the fate of liquid in the outer pipe will be. Also, the collection pipes must ensure that the leachate collection piping will operate effectively over the life of the landfill, and material characteristics of the piping must be specified.

56. Plans 14 of 30 and 15 of 30 and the description of the leachate storage tanks provided in Section 7.1, did not address means of leachate movement to the tank by gravity or by pump. Note that COMAR 26.04.07.16C(7)(e) requires that the leachate collection system be "designed to operate solely by the force of gravity in all areas where the system will directly underlie solid waste." Therefore, the pump sumps should be relocated outside of the landfill proper, unless a variance is requested and approved in accordance with COMAR 26.04.07.26.

57. Drawing No. 15 of 30: the pump house plan must be designed to avoid turbulence near the intake of each pump. The pump control system must be located away from the turbulence of incoming flow to the pump station. The plan does not address the size of the proposed concrete base and its function. Please fully address these items in the design and in the operation and maintenance manual. Consideration must be given to the potential for the occurrence of explosive levels of methane gas in these structures.

58. Suitable devices for measuring leachate flow must be installed along with shutoff and check valves on the discharge line of each pump in a separate valve pit. Accumulated liquid in the valve pit must be drained to the wet well by gravity, and must incorporate an energy dissipater and a backflow preventer where appropriate.

59. The Leachate Sump Typical Section on drawing No. 15 of 30 must show the minimum required 2% slope for the sump floor.

60. The report proposes to build a clay dam to prevent groundwater seepage from entering the landfill cell floor, while a Perched Water Interceptor is also shown on drawing No. 18 of 30. It is unclear whether you intend to propose both plans, and how the Perched Water Interceptor will drain the accumulated groundwater. Please address in the report and on the drawings which plan is proposed and how the proposed plan will be implemented and able to withdraw perched water.

61. An Erosion and Sediment Control Plan approved by the local soil conservation district and an approved Stormwater Management Plan must be submitted to the Department prior to the approval of the Phase III plan as required by COMAR 26.04.07.16A(11). The Erosion and Sediment Control Plan failed to address calculations for the amount of sediment to be excavated and onsite sediment storage capacities.

62. The number and types of equipment to be used for day-to-day operation, including inclement weather operations, as specified in COMAR 26.04.07.16A(8)(b) is required.

63. The number of employees and their duties as specified in COMAR 26.04.07.16A(8)(c) is required. The operation and maintenance manual lacked a detailed description of the landfill operating procedures for the following: security, general inspection, qualifications of skilled personnel and manpower, inspection procedures, remedial maintenance, preventive procedures, communications, equipment and power failure.

64. The report must include a description of a general maintenance program for the following: facility equipment, site maintenance, berm and cover systems, leachate management, gas management, utilities, roads and drainage, and sediment and erosion control.

65. The report lacks detailed quality assurance and quality control (QA/QC) procedures for the foundation preparation to assure the adequacy of the subgrade, density testing of the compacted fill that can be performed to establish an adequate subgrade, and technical guidance regarding quality assurance procedures to be used during the pre-construction, construction and post-construction phases.

66. Similarly, the report lacks construction quality assurance and quality control procedures for the geosynthetic and alternative clay liner systems.

D. Closure & Post-Closure Plan

1. Section D-D on drawing No. 15 of 30 "East Section Cross Sections": Cells 12 and 14 seem to have very steep slopes. COMAR 26.04.07.21E(1) requires the cap to be installed with a minimum slope of 4 percent to facilitate drainage. The Department does not recommend that the maximum slopes be steeper than 3:1, unless it can be satisfactorily demonstrated that these slopes will be stable and constructible.

2. The plan did not address in detail closure activities, security, and post-closure maintenance and monitoring frequency requirements.

Based on the number and extent of the amendments required to these plans, we anticipate that a complete new submittal will be required (as opposed to submitting replacement pages for the existing report). Please refer to the document control number 1993-WRF-0225 when writing the Department regarding this application. If you have any questions concerning this matter, please contact Mr. Kassa Kebede, Head of the Construction and Maintenance Section, at (410) 537-3318.

Sincerely,

Edward M. Dexter, P.G., Administrator
Solid Waste Program

EMD:KK:sm
cc: Mr. Michael N. Armstrong
Mr. Horacio Tablada
Ms. Martha Hynson