

WAYNE Co.

2003

96012003

file
49-03

OPERATION/CONSTRUCTION MANAGERS

CIVIL/SANITARY ENGINEERS

**Municipal
Services**



**Engineering
Company, P.A.**

PO Box 97, Garner, North Carolina 27529 (919) 772-5393

PO Box 349, Boone, North Carolina 28607 (828) 262-1767

December 15, 2003

Ms. Ellen Lorscheider, Permitting Hydrogeologist
Solid Waste Section
Division of Waste Management
North Carolina Department of Environment and Natural Resources
401 Oberlin Road, Suite 150
Raleigh, NC 27605



Re: Design Hydrogeologic Study
Wayne County Subtitle D Landfill, Phase 2, Dudley, North Carolina
MESCO Project No. G01096.5

Dear Ms. Lorscheider:

Municipal Engineering Services Company, P.A. (MESCO) has completed this revision in response to your letter dated September 8, 2003 with regard to the Design Hydrogeologic Study for the proposed Phase 2 portion of the Wayne County Municipal Solid Waste Landfill (MSWLF) located in Dudley, North Carolina. The original study was submitted to the Section on January 9, 2003. This letter is intended to address the questions and comments that were included in your letter. The answers to your comments follow.

Application Report

Section Comment 1: Given the porosity, hydraulic conductivities and the gradients of the hydrogeology at this landfill, a discussion of the groundwater flow regime per rule .1623(b)(2)(H) is necessary. This discussion should tie together all the data and will aid in the design of the monitoring system.

This revision includes a section in the text that discusses the groundwater flow regime of the proposed landfill site (Section 4.3).

Section Comment 2: An estimation of the long-term seasonal high water table should be based on stabilized water table readings and hydrographs of wells in the area. The data from the piezometers installed during the site suitability investigation and the Phase 1 PTC investigation, in addition to the monitoring records for the monitoring wells for Phase 1, indicate that the potentiometric surface was much higher approximately 7 years ago. The lowering of the groundwater levels is probably due to drought conditions. I cannot accept that there is a correlation between the groundwater levels at the USGS well near Grantham, NC. It is acceptable that the meteorological data is from this location, and the meteorological data can be used to find a relationship between the historical local wells and the current well data. Well data from the adjacent closed landfill may also be looked at for historical data.

As we discussed during our meeting which took place on September 24, 2003, there is no question that a correlation exists between the USGS observation well and the Wayne County landfill area as the majority of the piezometers located on site exhibited a statistically significant correlation ($P < 0.05$) with the USGS well in Grantham, North Carolina. In this submittal, seasonal highs were calculated, not only for the Phase 2 piezometer locations, but also for the locations of the existing monitoring wells. This was done in order to satisfy your requirement that the feasibility of using the regression method to predict seasonal highs must first be proven by demonstrating that the seasonal highs for the existing monitoring wells estimated via this regression method unanimously exceed their respective highest-observed water levels. Their calculated seasonal highs are, as theoretically anticipated, higher than the observed highest water levels in their measurement history (see Table 1 for comparison of seasonal highs with observed highs expressed as H_{sh} and H_{oh} , respectively).

We also believe that estimating seasonal high water table levels by using meteorological data as a historical reference would be very difficult for the following reasons.

Reason 1 The biggest contributor to the seasonal fluctuation of water table is evapotranspiration (and phreatophytic consumption in areas close to a discharge zone). Rainfall usually contributes to the fluctuation only indirectly in the sense that, while the major portion of groundwater recharge is attributed to precipitation, its contribution to the increase of a water table is marginal, and many times delayed. This is because of 1) a fixed infiltration capacity of a soil limiting the amount of rainwater to reach the water table, and 2) a low vertical hydraulic conductivity of an unsaturated zone, which is many times lower than the corresponding horizontal hydraulic conductivity (a hydraulic conductivity measured by a field slug test is usually of horizontal direction). These two elements limit the amount of rainwater to immediately reach the water table, creating surface runoff. This implies that the response of a water table to a rainfall event is not always immediate, and sometimes non-existent, and that there is an upper cutoff limit above which the relationship between the rainfall amount and the rise of a water table becomes absent even if they otherwise exhibit linear correlation. This makes it hard to use the rainfall amounts as an indicator of the water table fluctuations.

Reason 2 It is fairly common to see in a hydrograph many short-term peaks that follow a heavy rainfall event of short duration. These peaks usually appear immediately following an excessive rainfall, and usually subsides within a few days with the water level back to the level prior to the peak. Because they coincide with the occurrences of heavy rainfalls, the peaks may be wrongly interpreted as the indications of groundwater recharge, when they are in fact caused by air entrapment during groundwater recharge (see Section 4.6.1 for further discussion). Since a rise caused by this phenomenon is solely attributed to a pressure increase within the unsaturated zone and does not represent a true increase in the water table level, an additional complexity will result in correlating the rainfall data with the water table fluctuations.

Reason 3 The relationship between meteorological parameters and the water levels are not always linear. For instance, one may encounter a situation where the ambient temperatures vary very little for an extended period of time while the levels of the water table continue to decline for the same period. Another situation may be where the amounts of precipitation remain zero for a period of time while at the same time the water table continuously declines. Either of these two scenarios is commonly experienced during dry seasons. Unfortunately, the theoretical correlation between the ambient temperatures and the water levels for the first scenario, and that between the

amounts of precipitation and the water levels for the second, would be zero, because the changes in the water level cannot be accounted for by either the temperatures or the precipitation. With the correlation being nearly zero, it is theoretically impossible to predict the outcome (water table) by using the reference variable (ambient temperature or precipitation).

For the above-stated reasons, it is our strong opinion that it is not feasible within practical realms to establish a sufficient level of correlation between the meteorological data and the fluctuations of water level enough so that long-term seasonal high water table elevations could be reliably predicted. It is therefore more appropriate to use the USGS observation well, which provides data that can be statistically correlated with the on-site water level data, as an alternative to the meteorological data as the reference variable.

Plan sheets, maps and cross-sections

Section Comment 3: Long term seasonal should be shown to be higher than this map. Monitoring well information taken during the baseline sampling in 1996 and 1997 show water in the background MW-1 to be over 10 feet higher than during the sampling taken during this investigation. A new long-term seasonal high potentiometric surface needs to be shown. All borings from all investigations need to be shown.

The long-term seasonal highs have been recalculated to include more up-to-date water level data available from the USGS observation well (NC-148) in Grantham, North Carolina. The recalculated seasonal highs are slightly higher than the previously calculated numbers due to inclusion of the new historical high water level at NC-148 recorded on April 10-11, 2003.*

While we do acknowledge that water levels in MW-1 have shown a decline of nearly 10 feet over the course of the years which can be attributed to a series of drought events experienced in the region, we also need to acknowledge the fact that the declines in the other monitoring wells exhibit varied total fluctuations ranging from 0.86 feet in MW-7 to 5.58 feet in MW-10 over the same period. As discussed in Section 4.8.5, the total fluctuations are dependent on the location relative to zones of discharge/recharge, which is well reflected in the fact that MW-1—the well that is located most upgradient and furthest distance from the zones of discharge—exhibits the highest total fluctuations than all the other existing monitoring wells that are located closer to the discharge zones. It is therefore important to acknowledge that the 10-foot decline of water table experienced in MW-1 will not apply globally to the entire site.

Likewise, the referenced USGS observation well exhibits a total “fluctuation” of 7.85 feet when only a subset of its daily data, as provided in Table 1, is used. Figure D-8 (Appendix D) further depicts that when only this subset of the USGS well data is compared with the data from MW-1, the two appear to show similar trend with a correlation coefficient (R) of 0.672 ($P < 0.05$). Similarly, Figure D-9, which plots data from MW-2 and NC-148, depicts the two locations exhibiting similar fluctuation pattern with $R = 0.810$ ($P < 0.05$).

With these observations, we are confident that the series of drought events experienced in this region that caused the significant decline of water table in MW-1 are well represented in the USGS observation well in Grantham, North Carolina, and that the seasonal high water levels presented in Plate 7 take these drought events into account. We therefore believe that artificially raising the seasonal high numbers simply because of the trend observed in a single monitoring well would

*This data is still provisional and subject to change per USGS.

result in an unnecessary over-estimation of seasonal high water table at the proposed landfill site, and therefore should not be implemented.

Section Comment 4: The vertical groundwater flow regime for this area needs to be characterized on a three dimensional flow net or the cross sections per .1623(b)(2)(G).

This issue is currently being handled in a separate correspondence. Please refer to our letter dated November 13, 2003 which has been sent to your attention.

Monitoring Plan

Section Comment 5: In order to keep all monitoring information in one document, leachate collection information should be included in the monitoring plan.

The monitoring plan has been revised to include descriptions of leachate collection points per your request. Their locations are also displayed on Plate A.

Section Comment 6: Plan should be for the entire permitted landfill, not for just the additional wells needed for Phase 2. A table of all wells, surface water monitoring points and the locations where leachate is to be tested should be included with the monitoring plan. The table should include whether it is upgradient, downgradient, upstream, downstream, etc.

The revised monitoring plan included in this submittal provides coverage for the entire permitted landfill, inclusive of the existing Phase 1 and the proposed Phase 2 areas.

Section Comment 7: Plate A, should be of a scale where all monitoring wells, surface water monitoring points and the location of leachate testing can be located on a single sheet.

The revised Plate A, which is included with this submittal, now shows the entire MSW facility as well as the closed sanitary landfill and the C&D unit located adjacent to the MSW facility. The plate also shows all monitoring wells, surface water monitoring points, and the locations of leachate collection.

Section Comment 8: The potentiometric lines shown on Plate A should be tied into the streams if it is considered to be discharging. The map should include at a minimum the distance to monitoring wells and points of compliance. If possible the discharge locations of the groundwater should also be on map, for example if groundwater is discharging to the stream on the east of the landfill, this stream should be included in potentiometric map.

The potentiometric contour lines as shown on the revised Plate A are now tied into the surface water features where possible. The elevations of the surface water bodies are assumed to be 0 to 2 feet higher than their respective ground elevations. The actual amount added to the ground elevation depends upon the location. The ground elevations used as the basis for the surface water elevations are inferred from the underlying topographic contour.

The revised Plate A shows the stream east of the landfill—an unnamed spring-fed tributary to Edwards Branch—in its entirety. The displayed potentiometric surface indicates that the

groundwater travels parallel with this tributary in the northern half of the displayed area with minimal discharge into the stream. Much of the discharge occurs in the later part of the stream past the access road where the groundwater exhibits southwest-ward flow. However, a differing discharging behavior of the groundwater may result under extreme wet or dry conditions which could shift the direction of groundwater flow more toward the stream, thereby significantly altering the way in which the ground and surface water bodies interact.

Also shown on Plate A is the compliance boundaries that satisfies Rule .1631 (a)(2)(A). Distances to the proposed monitoring wells from the phase limits are also displayed on Plate A.

Section Comment 9: Leachate testing locations should be as close to the waste as possible. Please contact me to discuss possible locations for leachate testing.

With the addition of the proposed Phase 2 unit, we are proposing an additional leachate collection point at the pump station located at the northern corner of the Phase 2. We believe that this location will be the closest available point to the waste where a collection of leachate sample can be facilitated, as this pump station is the first segment of the leachate collection system that appears above ground.

Note that the original leachate collection point, located at the end of the inflow pipe in the leachate lagoon, will be retained despite the addition of the aforementioned leachate collection point.

Section Comment 10: The text of the monitoring plan should include a detailed discussion of the geologic and hydrogeologic criteria, which was used to determine the number, spacing, location, and screen depths of the proposed monitoring wells.

The revised text of the monitoring plan includes detailed justifications of the placements and configurations of the monitoring wells in relation to the geologic and hydrogeologic settings of the site.

Section Comment 11: Monitoring plan may require additional wells due to changes in the potentiometric surface after the maps have been redrawn as mentioned above.

An additional monitoring well (MW-13) has been added to the list of proposed monitoring wells. This addition is intended to broaden coverage of the monitored area due to the extreme eastern portion of the groundwater exhibiting possible migration path to the stream on the east side of the landfill area. Under normal climatic conditions, the area of coverage that this monitoring well will provide will be limited to the extreme eastern portion of the cell. As discussed in our answer to Comment 8, however, this coverage may extend to include the eastern third of the cell under abnormal climatic conditions which could shift the groundwater flow slightly eastward in the area of MW-13. More discussions on this subject can be found in Section 5.2 of this submittal.

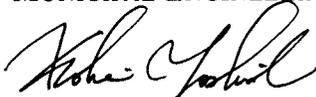
Additionally, this submittal includes revised Plates 6 and 7, which now display the single-day potentiometric surface and the seasonal high water table surface over the entire permitted area, per your request during our September meeting.

Please find included in this submittal the following items which will replace the corresponding items that were included in the original submittal.

- Main text
- Tables
- Plate 1 - General site map
- Plate 6 - Single day potentiometric map with flow directions
- Plate 7 - Long term seasonal high water table contour
- Plate A - Proposed monitoring well locations
- Table B-2 - Flow rate calculations
- Appendix D - Whole
- Appendix E - Text
- Appendix E - Plate A

Feel free to contact us at (919) 772-5393 if you have any questions or require more information.

Sincerely,
MUNICIPAL ENGINEERING SERVICES CO., P.A.



Kohei Yoshida
Hydrogeologist

Enclosures

cc: Mr. Lloyd Cook, Solid Waste Director, Wayne County
Wayne Sullivan, Project Manager, MESCO
Edward S. Custer, Jr., P.G., Ph.D.

North Carolina
Department of Environment and Natural Resources



Division of Waste Management

Michael F. Easley, Governor
William G. Ross Jr., Secretary
Dexter R. Matthews, Director

September 8, 2003

Mr. Lloyd Cook
Solid Waste Director, Wayne County
460B South Landfill Road
Dudley, NC 28333

Subject: Wayne County MSW Landfill Phase 2
Review of the Application for a Permit to Construct

Dear Mr. Cook,

I have received the Design Hydrogeological Study dated March 2003. I have completed an initial review of this document, according to the North Carolina Solid Waste rules 15A NCAC 13B. I have the following comments and requests for additional information.

Application Report

Given the porosity, hydraulic conductivities and the gradients of the hydrogeology at this landfill, a discussion of the groundwater flow regime per rule .1623(b)(2)(H) is necessary. This discussion should tie together all the data and will aid in the design of the monitoring system.

An estimation of the long-term seasonal high water table should be based on stabilized water table readings and hydrographs of wells in the area. The data from the piezometers installed during the site suitability investigation and the Phase 1 PTC investigation, in addition to the monitoring records for the monitoring wells for Phase 1, indicate that the potentiometric surface was much higher approximately 7 years ago. The lowering of the groundwater levels is probably due to drought conditions. I cannot accept that there is a correlation between the groundwater levels at the USGS well near Grantham, NC. It is acceptable that the meteorological data is from this location, and the meteorological data can be used to find a relationship between the historical local wells and the current well data. Well data from the adjacent closed landfill may also be looked at for historical data.

Plan sheets, maps and cross-sections

Long term seasonal should be shown to be higher than this map. Monitoring well information taken during the baseline sampling in 1996 and 1997 show water in the background MW-1 to be over 10 feet higher than during the sampling taken during this investigation. A new long-term seasonal high potentiometric surface needs to be shown. All borings from all investigations need to be shown.

The vertical groundwater flow regime for this area needs to be characterized on a three-dimensional flow net or the cross sections per .1623(b)(2)(G).

1646 Mail Service Center, Raleigh, North Carolina 27699-1646
Phone: 919-733-4996 \ FAX: 919-715-3605 \ Internet: www.enr.state.nc.us

96-06
Wayne Co
15WLF



State of North Carolina
Department of Environment and Natural Resources
Washington Regional Office

Michael F. Easley, Governor

William G. Ross, Jr., Secretary

DIVISION OF LAND RESOURCES
LAND QUALITY SECTION
February 4, 2003

LETTER OF APPROVAL WITH MODIFICATIONS

County of Wayne
ATTN: Mr. W. Lee Smith, III, Manager
Post Office Box 227
Goldsboro, North Carolina 27533

RE: Erosion and Sedimentation Control Plan No. Wayne-2003-028
Solid Waste Landfill - Phase 2
SR 1129 - Wayne County
River Basin: Neuse
Date Received: January 13 and February 3, 2003
Responsible Party: County of Wayne

Dear Sir:

This office has completed its review of the erosion and sedimentation control plan for the referenced 24.4 acre disturbance. Based on the information provided, we have determined the submitted plan for the filling and grading associated with the construction/operation of a solid waste landfill, if properly implemented and responsibly maintained, should meet the intent and minimum requirements of the Act. We, therefore, issue this LETTER OF APPROVAL WITH the following MODIFICATIONS.

1. A new erosion and sedimentation control plan, including the then appropriate non-refundable plan review fee, will be required prior to initiating any land disturbing activity associated with Phase 3.
2. The slopes are to be provided with an appropriate ground cover, sufficient to restrain erosion, on a monthly basis.

In 1973, the Sedimentation Pollution Control Act (copy available upon request) was enacted. It established a performance oriented program with the **OBJECTIVE** of **PREVENTING SEDIMENT DAMAGE** to adjoining properties and/or natural resources resulting from land disturbing activities through the use of reasonable and appropriate Best Land Management Practices, based on the approved plan and changing site conditions, during the course of the project. **AS THE DECLARED RESPONSIBLE PARTY YOUR RESPONSIBILITY** is to understand the Act and

County of Wayne
ATTN: Mr. W. Lee Smith, III, Manager
February 4, 2003
Page 2

comply with the following minimum requirements of the Act and the above listed modifications (if any):

- *an erosion and sedimentation control plan is only valid for 3 years following the date of initial approval, if no land-disturbing activity has been undertaken;*
- *the LATEST APPROVED soil erosion and sediment control plan will be used during inspection to determine compliance and a copy of the plan must be on file at the job site;*
- *unless the off-site borrow and/or disposal sites are identified in the erosion control plan, no earthen material is to be brought on or removed from the project site;*
- *except in the case of a storm related emergency, a revised erosion and sedimentation control plan must be submitted to and approved by this office prior to initiating any significant changes in the construction, grading or drainage plans;*
- *a buffer zone, sufficient to restrain visible sedimentation, must be provided and maintained between the land-disturbing activity and any adjacent property or watercourse;*
- *new or affected cut or filled slopes must be at an angle that can be retained by vegetative cover, AND must be provided with a ground cover sufficient to restrain erosion within the shorter of 15 working or 30 calendar days of completion of any phase (rough or final) of grading (RYE GRASS IS NOT in the APPROVED seeding specifications NOR is it an ACCEPTABLE substitute for the providing of a temporary ground cover);*
- *the CERTIFICATE OF PLAN APPROVAL must be posted at the primary entrance to the job site and remain until the site is permanently stabilized;*
- *unless a temporary, manufactured, lining material has been specified, a clean straw mulch must be applied, at the minimum rate of 2 tons/acre, to all seeded areas. The mulch must cover at least 75% of the seeded area after it is either tacked, with an acceptable tacking material, or crimped in place;*
- *in order to comply with the intent of the Act, the scheduling of the land-disturbing activities is to be such that both the area of exposure and the time between the land disturbance and the providing of a ground cover is minimized;*

County of Wayne
ATTN: Mr. W. Lee Smith, III, Manager
February 4, 2003
Page 3

- *a permanent ground cover, sufficient restrain erosion, must be provided within the shorter of 15 working or 90 calendar days after completion of construction or development on any portion of the tract (RYE GRASS IS NOT in the APPROVED seeding specifications NOR is it an ACCEPTABLE substitute for the providing of a nurse cover for the permanent grass cover); and,*
- *this approval is based, in part, on the accuracy of the information provided in the Financial Responsibility/Ownership form submitted with the project plans. You are required to file an amended form if there is any change in the information included on the form. This approval and the financial responsibility/liability cited in it does not automatically transfer with a change in project ownership.*

Be advised that to ensure compliance with the approved plan and the program requirements, unannounced periodic inspections will be made. If it is determined that the implemented plan is inadequate, this office may require the installation of additional measures and/or that the plan be revised to comply with state law. (Note: Revisions to the scope of this project without prior approval of the plan showing the changes can be considered a violation). Failure to comply with any part of the approved plan or with any requirements of this program could result in the taking of appropriate legal action against the financially responsible party (*County of Wayne*). One option is the assessing of a civil penalty of up to \$5000 for the initial violation plus up to \$5000 per day for each day the site is out of compliance.

In recognizing the desirability of early coordination of sedimentation control, we believe it would be beneficial for you and your contractor to arrange a preconstruction conference to discuss the requirements of the approved erosion and sedimentation control plan. Prior to beginning this project, **YOU ARE REQUIRED TO** either **CONTACT THIS OFFICE TO ADVISE** Mr. Richard Peed (252-946-6481, ext. 274) **OF THE CONSTRUCTION START-UP DATE**, contractor and on-site contact person **OR** complete and return the attached Project Information Sheet to the above named.

Acceptance and approval of this plan is conditioned upon your compliance with Federal and State water quality laws, regulations and rules. In addition, the land disturbing activity described in this plan may also require approval or permitting from other agencies - Federal, State or local. These could include the U.S. Army Corps of Engineers under Article 4.0.4. jurisdiction, the Division of Water Quality - Surface Water Section under stormwater regulations (contact Mr. Bill Moore, 252-946-6481, ext. 264), county, city or town agencies under other local ordinances, or other approvals that may be required. **This approval does not supersede any other approval or permit.**

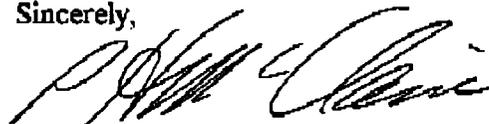
Please be advised that a rule to protect and maintain existing buffers along watercourses in the Neuse River Basin became effective on July 22, 1997. The Neuse River Riparian Area Protection and Maintenance Rule (15A NCAC 2B.0233) applies to a 50 (horizontal) foot wide zone along all perennial and intermittent streams, lakes, ponds and estuaries in the Neuse River basin. In riparian

County of Wayne
ATTN: Mr. W. Lee Smith, III, Manager
February 4, 2003
Page 4

areas, the rule prohibits land disturbance, new development and fertilizer use in the first 30 (horizontal) feet directly adjacent to the stream and/or coastal wetland vegetation. Clearing, seeding and a one-time fertilizer use to establish the grass is allowed within the riparian area 20 feet landward of the first 30 feet of riparian area, but new development is prohibited. For more information about the riparian area rule, please contact the Division of Water Quality's Wetland/401 Unit at 919-733-1786.

Please be advised that all land-disturbing activities affecting 5 or more acres are required to have a (Federal) NPDES permit. Enclosed is the Construction Activities General NPDES Permit - NCG010000 for this project. The responsibility for understanding and complying with this permit rests with you, the financially responsible party. Be aware that failure to comply with this permit could result in both the State and Federal governments taking appropriate legal action. Contact the Division of Water Quality - Surface Water Section at (252) 946-6481 should you have any questions regarding monitoring and record keeping requirements of the permit.

Sincerely,



Patrick H. McClain, PE
Assistant Regional Engineer

:pm

enclosures

w/o enc. cc: Lisa Hampton, Municipal Engineering Services
(via e-mail) Jim Mulligan, Division of Water Quality
Division of Solid Waste Management

CF

North Carolina
Department of Environment and Natural Resources



Division of Waste Management

Michael F. Easley, Governor
William G. Ross Jr., Secretary
Dexter R. Matthews, Director

January 24, 2003

Lloyd Cook
Solid Waste Director
Wayne County
460 B South Landfill Road
Dudley, NC 28333

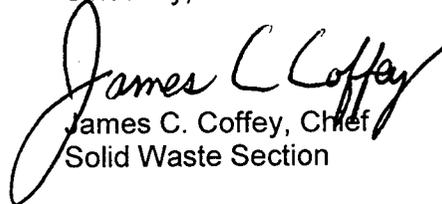
Re: Five-year Permit Review
Wayne County MSW Landfill
Permit No. 96-06

Dear Mr. Cook:

The Solid Waste Section has completed its review of the referenced permit. Wayne County may continue to operate Phase 1 of the landfill in accordance with the current conditions of permit until January 23, 2005 or until contours for Phase 1 on attached drawing F4 are reached.

If you have any questions or comments, please contact Sherri Coghill at (919) 733-0692, ext. 259.

Sincerely,


James C. Coffey, Chief
Solid Waste Section

cc: Mark Fry, DWM
Chuck Boyette, DWM

1646 Mail Service Center, Raleigh, North Carolina 27699-1646
Phone: 919-733-0692 \ FAX: 919-733-4810 \ Internet: www.enr.state.nc.us/

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FAX (919) 772-1176

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Boone, N.C. 28607
(828) 262-1767
FAX (828) 265-2601

LETTER OF TRANSMITTAL

TO Sherri Coghill
NCDENR Solid Waste Section
401 Oberlin Road
Raleigh, NC 27605

DATE	01/21/03	PROJECT NO.	G01096
ATTENTION	Sherri		
RE:	Wayne County Landfill Phase 1 Fill		

We are sending you, attached, the following items:

Agreement

COPIES	DATE	NO.	DESCRIPTION
1	1/21/03	-	Signed Copy of Phase 1 Fill

Transmitted per your request to Wayne Sullivan.

TRANSMITTED BY: Lisa Hampton, Garner Office



MUNICIPAL ENGINEERING SERVICES CO., P.A.

Post Office Box 97
Garner, N.C. 27529
(919) 772-5393
FAX (919) 772-1176

Post Office Box 349
Boone, N.C. 28607
(828) 262-1767
FAX (828) 265-2601

LETTER OF TRANSMITTAL

TO Sherri Coghill
NCDENR Solid Waste Section
401 Oberlin Road
Raleigh, NC 27605

DATE	01/23/03	PROJECT NO.	G01096
ATTENTION	Sherri		
RE:	Wayne County Landfill Phase 1 Fill		

We are sending you, attached, the following items:

Agreement

COPIES	DATE	NO.	DESCRIPTION
2	1/23/03	-	Signed Copies of Phase 1 Fill

Transmitted per your request to Wayne Sullivan and myself.

TRANSMITTED BY: Lisa Hampton, Garner Office

Project: G01096-WAYNE PH2 FACILITY

Wed January 08 10:02:26 2003

Site Volume Table: Unadjusted

Cut yards	Fill yards	Net yards	Method
--------------	---------------	--------------	--------

Site: G01096-WAYNE PH2 FACILITY

Stratum: phasel ex1sub23 fill-ph-1

13261

289934

276673 (F) Grid

1.97 years

Based on Average Space used
each year = 140,730 yds.

$$\frac{276,673}{140,730} = 1.965 \text{ years.}$$

Project: G01096-WAYNE PH2 FACILITY

Wed January 08 10:02:26 2003

Site Volume Table: Unadjusted

Cut yards	Fill yards	Net yards	Method
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Site: G01096-WAYNE PH2 FACILITY

Stratum: phase1 ex1sub23 fill-ph-1

13261	289934	276673 (F) Grid	1.97 years
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Based on Average Space used
each year = 140,730 yds.

$$\frac{276,673}{140,730} = 1.965 \text{ years.}$$

APPROVED
 DIVISION OF WASTE MANAGEMENT
 SOLID WASTE SECTION
 DATE 1/24/03 BY SLC

6.8 Closure Costs

The largest area to be closed within the permitted life will be 23.0 acres. Post Closure will be 30 years after closure.

Closure Costs:

Closure will consist of the following which costs are estimated as being done by a third party.

1. 18" of 1×10^{-5} cm/sec. soil cover;
2. 40Mil HDPE liner and Drainage Net
3. Erosion Control devices;
4. 24" Erosive layer;
5. Seeding and Mulching;
6. Mobilization/Demobilization;
7. Labor Costs; and
8. Stone for methane gas collection.
9. Geotextile for methane gas collection.
10. Vent pipes for methane gas collection.
11. Engineering Costs.

Estimate of Probable Costs:**1. 18" of 1.0×10^{-5} cm/sec. soil cover for 23.0 acres:**

Total yardage + 15% = 64,033 yd³ @ a cost of \$6.90/yd³
 \therefore Cost = \$441,827.70

2. 40 Mil HDPE Liner and drainage net cover for 23.0 acres

Total Footage + 15% = 1,152,162 ft² @ a cost of 0.85/ft²
 \therefore Cost = \$979,337.70

3. Erosion Control devices

Estimated costs @ \$40,000.00
 \therefore Cost = \$40,000.00

4. 24" Erosive soil layer for 23.0 acres.

Total yardage + 15% = 85,345 yd³ @ a cost of \$4.05/yd³
 \therefore Cost = \$345,647.25

5. Seeding and Mulching for 23.0 acres.

Estimated cost of \$1,500.00/acre
∴ Cost = \$34,500.00

6. Mobilization/Demobilization.

Estimated cost of \$97,485.63

7. Labor Costs.

Estimated cost of \$100,000.00
∴ Cost = \$100,000.00

8. Stone for methane gas collection.

Total estimated linear feet = 2,520 ft.
Total estimated volume for a 2'x1' trench = 5,040 ft³
with a density of 120lbs/ft³ total weight = 303 tons @ a cost of \$15.00/ton
∴ Cost = \$4,600.00

9. Geotextile for methane gas collection.

Total estimated linear feet = 2,520 ft.
Total estimated perimeter for a 2'x1' trench = 6 ft @ a cost of \$0.17/ ft²
∴ Cost = \$2,800.00

10. Vent pipes for methane gas collection.

Estimated cost @ \$500.00 each.
∴ Cost = \$1000.00

11. Engineering Costs for QA/QC of the soil liner and certification of closure.

Estimated cost = \$100,000.00
∴ Cost = \$100,000.00

Total of Estimated Probable Costs:

1. \$ 441,827.70
2. \$ 979,337.70
3. \$ 40,000.00
4. \$ 345,647.25
5. \$ 34,500.00
6. \$ 97,485.63
7. \$ 100,000.00
8. \$ 4,600.00
9. \$ 2,800.00
10. \$ 1,000.00
11. \$ 100,000.00

Total: \$2,147,198.28

7.2 Post Closure Costs

The largest area to be closed within the permitted life will be 23.0 acres. Post Closure will be 30 years after closure.

Post Closure Costs:

Methane gas and ground and surface will be monitored for 30 years after closure. The cap will also have to be monitored for the 30 year period.

1. Ground and Surface Water monitoring semiannually for 30 years for appendix I constituents and statistical analysis.

Estimated cost/sample = \$700.00/sample
Total annual samples = 2(8 wells + 4 surface) = 24 samples/year
Estimated cost = 30 years x 24 samples/year x \$700.00/sample
= \$504,000.00

∴ Cost = \$504,000.00

2. Methane Gas monitoring quarterly for 30 years.

Estimate \$500.00/quarter = \$2,000.00/year
Estimated cost = 30 year x \$2,000.00 = \$60,000.00

∴ Cost = \$60,000.00

3. Cap Monitoring and repairing any problems.

Estimate \$100,000.00 for the 30 years.

∴ Cost = \$100,000.00

4. Closure of sedimentation and erosion control devices.

Estimate \$20,000.00 for closure

∴ Cost = \$20,000.00

5. Leachate Management.

Estimate \$250,000.00 for the 30 years.

∴ Cost = \$250,000.00

6. Closure of leachate lagoon.

Estimate \$24,000.00 for Closure.

Total of Estimated Post Closure Costs:

- 1. \$504,000.00
- 2. \$ 60,000.00
- 3. \$100,000.00
- 4. \$ 20,000.00
- 5. \$ 24,000.00
- 6. \$250,000.00

Total \$958,000.00

OPERATION/CONSTRUCTION MANAGERS

CIVIL/SANITARY ENGINEERS

**Municipal
Services**



**Engineering
Company, P.A.**

PO Box 97, Garner, North Carolina 27529 (919) 772-5393

PO Box 349, Boone, North Carolina 28607 (828) 262-1767

January 3, 2003

Mr. Jim Barber, Supervisor Permits
NC Solid Waste Section
NC DENR
401 Oberlin Road
Raleigh, NC 27605

Re: Wayne County MSW Landfill Permit

Dear Mr. Barber:

I am writing on behalf of Wayne County concerning the renewal of the MSW Landfill Permit. The Permit for Phase 1 was issued in January of 1998 for a five year period. A survey was performed in January of 2002, which indicates that there is approximately 7.8 years of life remaining from that date. This would have Phase 1 closing in October of 2009; however, the County does not want to build Phase 1 to a peak prior to permitting Phase 2. Consequently, the County is revising the facility plan with the next permit revision. In the meantime, they are requesting a permit renewal of the existing permit to allow them to operate according to the permit. A revision to the permit for construction of Phase 2 will be forthcoming in the near future.

In the revised permit, Phase 1 will only be partially filled while Phase 2 is being constructed. Once Phase 2 is permitted for operation, it will be filled to approximately the same elevations as Phase 1. Prior to reaching these elevations a permit to construct Phase 3 will be submitted. One Phase 3 has been constructed and filled, the remaining Phases will be vertical expansions above Phases 1 thru 3.

Attached are drawings showing the existing fill of as of January 2002 and the permitted fill of Phase 1. There have been approximately 1,092,000 cubic yards of air space used since January of 1998 and there are approximately 1,662,500 cubic yards remaining if it were built to a peak.

If you have any question or need additional information, please do not hesitate to call. We look forward to hearing from you.

Sincerely yours,
MUNICIPAL ENGINEERING SERVICES CO., PA

D. Wayne Sullivan
Project Manager

Enclosures

Copy: Mr. Lloyd Cook w/enclosures