AMENDMENT TO PERMIT

MUNICIPAL SOLID WASTE AND CONSTRUCTION AND DEMOLITION LANDFILL FACILITIES

Permit Numbers:	**9606-MSWLF-1998** **9601-CDLF-1997**
Site Location:	**460B South Landfill Rd.** **Dudley, NC 28333**
Applicant:	**County of Wayne**
Applicant's Address:	**224 E. Walnut St., 3rd Floor** **Goldsboro, NC 27530**

MESCO Project Number
G15124

NORTH CAROLINA PROFESSIONAL SEAL 31020 ENGINEER STEVEN R. GANDY

4/14/16

Revised April 2016
January 2016

Submitted by the Garner Office of:

Municipal Services **Engineering Company, P.A.**

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LICENSE NUMBER: C-0281

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License No. C-0281

CIVIL/SANITARY/ENVIRONMENTAL ENGINEERS

SOLID WASTE MANAGEMENT

Municipal Services

Engineering Company, P.A.

SITE PLANNING/SUBDIVISIONS

SUBSURFACE UTILITY ENGINEERING (SUE)

April 4, 2016

Ming-Tai Chao, P.E.
Environmental Engineer II
NCDENR – Solid Waste Section
217 W. Jones Street
Raleigh, NC 27699

Re: Comments on the Permit Amendment Application for (Permit Application)
Wayne County Landfill Facility, Wayne County, North Carolina
Permit No. 9606-MSWLF-1998, Doc ID No. (DIN) 25782

Dear Mr. Chao:

In response to your letter dated March 18, 2016, we submit the following:

General

1. *The North Carolina Department of Environmental and Natural Resources(DENR) officially became the Department of Environmental Quality (DEQ) on Sept. 18, 2015 when Governor McCrory signed the 2015-2016 state budget into law. Please use the correct department name or its acronym NCDEQ throughout the Permit Application.*

Response: The text has been revised as requested.

MSWLF Unit (9606-MSWLF-1998)

Engineering Plan

2. *(Section 1.1) According to the Permit to Construct Application for the MSWLF – Phase 3 (DIN 14016) approved on June 13, 2011, the combined capacity of Phases 1 through 3 is 2,327,598 cubic yards (CY) which is summarized below:*

Phase	*Acreage*	*Air Space (CY)*
1	*23*	*1,100,000*
2	*21*	*685,711*
3	*21*	*541,887*
Total	*65*	*2,327,598*

However, the Phasing Table in Section 1.1 (on Page 7) of the Permit Application states the combined capacity of Phases 1 through 3 is 2,538,681 CY.

i. Is the landfill unit overfilled than the approved capacity of 2,327,598 CY?

ii. What is the in-place waste volume (in CY) of the MSWLF unit according to the latest survey data in 2015?

Response: We mistakenly had the wrong numbers in the chart. The chart has been revised to show the correct numbers.

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3. *(Section 1.1) As described in the Permit to Construct Application for the MSWLF – Phase 3 (DIN 14016) approved on June 13, 2011, the MSWLF unit has the approved total capacity of 5,365,695 CY, which is defined as the volume measured between the bottom of waste (or the top of the protective cover of landfill base system) and the top of the final cover of the landfill unit including the volume of daily cover and final cover system. To avoid any confusion, please define the approved total capacity in the Section.*

Response: We added the definition as requested under the "Phasing Table"

4. *(Section 1.1.7) Please add the following requirements to the subsection:*
   i. *The 20-year leachate disposal agreement – Utility Agreement between the County of Wayne and the City of Goldsboro will expire on March 3, 2020.*
   ii. *The County must submit the SWS a copy of the renewal leachate disposal agreement on or before March 3, 2020 to retain the life-of-site permit of the MSWLF unit.*

Response: We added the information as requested to the text and included the updated Utility Agreement.

Operations Plan

5. *(Section 2.1, On Page 40) Please address the following concerns:*
   i. *The program for corrective actions of leachate breakouts is placed in Section 2.8, Appendix VI of the Permit Application. Please correct the typo.*

   ii. *(Paragraph 8) Please provide the inspection frequency for the leachate breakouts, both routine and non-schedule inspections. The record keeping requirement of the inspection record.*

Response: The text has been revised.

The text in Paragraph 8 has been revised.

6. *(Section 2.2) On August 09, 2013 the SWS approved (DIN 19484) the County to operate the several non-disposal solid waste management units inside the Wayne County Landfill Facility according to the approved Operations Plan titled " Operations Plan for: Sorting Tear-off Asphalt Shingles for Recycling, Passive Composting In Borrow Pit #1, and Inert Debris Storage & Processing in Borrow Pit #1 (DIN 19483). If the County intends to continued operation of these units, please provide the revised or updated Operations Plan; the location of each active unit must be shown the Facility Plan drawing.*

Response: The Facility Plan drawing F1 has been revised to show the areas requested and the "Operation Plans" for the areas have been included in PART 2(C&DLF and LCID) Section 2.6.

7. *(Section 2.2.1, On Page 44) Should the mobile homes that originate in Wayne County, rather than Alamance County be acceptable for disposal or recycling at the landfill facility? Please clarify.*

Response: I have searched my document and the PDF that was sent to you and was unable to find "Alamance County" referenced anywhere.

8. *(Section 2.2.7) Please provide additional information and address some concerns of the Water Quality Monitoring Plan.*
   i. *Add the locations of the eleven (11) groundwater monitoring wells and three (3) surface water monitoring points to the operation plan drawings.*
   ii. *The monitoring well MW-1 was plugged and abandoned (P&A) in June 14, 2013. The P&A record (GW-30 form) must be submitted to the SWS for a review and approval.*
   iii. *Since the well MW-1R is replacing the MW-1, please provide the correct info throughout this Section.*

Response: All monitoring wells and surface water monitoring points have been added to Drawing F1 of the Facility Plan Drawings and Drawings E1 and E5 of the Engineering/Operation Plan Drawings. The facility drawing (F1) scale was also revised to allow better viewing of the features.

All references to MW-1 have been revised to MW-1R and the report/form and email approval have been included with this letter for your reference.

9. *(Section 2.2.12 Leachate Management Plan) Since leachate circulation is not proposed in the Permit Application, please state the generated leachate from the landfill unit will not be circulated.*

Response: The text has been revised.

10. *(Section 2.2.13) The landfill gas gathered from the gas collection and control system is treating and generating electricity at the on-site Landfill Gas To Energy Unit. Please provide the following information of this unit:*
   i. *The location of the unit including the flare which must be shown on the Facility Plan drawing*
   ii. *The ownership of the unit.*
   iii. *The current and valid NC Air Quality Permit for the flare system and engine/generator unit(s).*

Response: The flares have been added to Drawing F1 of the Facility Plan Drawings. We have also noted on this drawing ownership and Air Quality Permit numbers. A copy of the Air Quality Permits have also been added to Appendix A.

11. *(Section 2.5/Appendix III – Explosive Gas Control Plan – MSW & C&D) Since the SWS doesn't approve the new gas monitoring plan (referred email messages dated the March 14, 2014 [DIN 20729] & February 22, 2016 from Christine Ritter, the SWS Hydrogeologist to the County's representatives), the existing 25 gas monitoring wells installed around the landfill facility shall not be removed from the operation plan drawings. Please add all gas probes/wells to the operations plan drawings.*

Response: The Gas Probes have been added to Drawing F1 of the Facility Plan Drawings and Drawings E1 and E5 of the Engineering/Operation Plan Drawings. However, at this time the gas monitoring plan is under re-review, so the locations shown are current as of this submittal.

12. *(Section 2.10 Engineering /Operations Drawings) Please make corrections on the following drawings:*
    i. *(Drawing No. E2/Sheet No. 4 of 10)*
        a. *Mark/note the MSWLF-Phase 4 on the drawing.*
        b. *Are the fill contours of the in-place wastes for both MSWLF unit & C&DLF unit shown on the drawing generated from the latest survey result in 2015? If not, add the fill contours from the latest survey result in 2015 to the drawing.*
    ii. *(Drawing No. E4/Sheet No. 6 of 10)*
        a. *The drainage net shown in the "Typical Methane Gas Collection Well to Vent Conversion Detail) is 250 mil double bonded geosynthetic material which is inconsistent with that specified in the Section 3.6 (on Page 96) of the Closure Plan of the MSWLF unit .*
        b. *The existing "Typical Cap Closure Details" are associated with the MSWLF unit. Please note the details are associated with the MSWLF unit.*
        c. *Add the details of the final closure cover system and the passive venting system of the C&DLF unit to the drawing which must be consistent with the specification/descriptions described in the Closure Plan of the C&DLF unit.*
    iii. *(Drawing No. E8/Sheet No. 10 of 10)*
        a. *To avoid confusion, the "existing grade' should be the original grade prior to construction the landfill unit such as the one shown on Station 21+00 (MSW). The so call "existing grade" on other cross-sections should be the fill grades of in-place wastes which must be consistent with the latest survey result in 2015. Please replace the "existing grade" for a proper term for both MSWLF & C&DLF units.*
        b. *The intermediate fill grades for Phase 4 at Station 16+00 (MSW) is approximately ranging from 194 feet (at Station 8+20) to 190 feet (at Station 13+20) and to 180 feet (at station 13+75). The cross-section -Station 16+00 (MSW) is not consistent with the grades shown on Drawing No. E2/Sheet No. 4 of 10.*

Response: We have noted Phase 4 on Drawing E2 of the Engineering/Operation Drawings as requested. The existing contours shown are from the volume survey of 2015.

We have revised Drawing E4. We changed the 250 mil to 330 mil and noted that the C&DLF cap does not have the drainage net.

We have revised Drawing E8. We revised the existing grades and corrected the incorrectly shown fill.

Closure and Post Closure Plans

13. *(Section 3.1) Please provide the following rule-required info:*
    i. *Please state that the proposed post-settlement the slopes of the side and deck portions of the final cover system will be a minimum of 5 percent and a maximum of 25 percent [Rule 15A NCAC 13B .1627(c)(3)(A)]. The specific ranges of the surface slopes were approved in the PTC Application - Phase 3 (DIN 14016).*
    ii. *Please also provide the maximum inventory of wastes, in the latest surveyed volume in <u>cubic yard</u>, of ever on-sit over the active life of the landfill facility [Rule 15A NCAC 13B .1629(b)(1)(C)].*

Response: The text has been revised.

14. *(Section 3.6) This section indicates that the average annual discharge generated from the HELP model from 2004 Application is used for calculating the flow capacity of the proposed drainage net; however, the SWS has no record indicating that the referenced model results exist. Please provide the referenced HELP Model results.*

Response: The HELP Model was submitted with the Permit Applications for Phase 1, Phase 2, and Phase 3. The text has been revised to state "Phases 1-3 Permit Applications". We have included a copy of the Help Model from the Phase 3 Permit to Construct for your use.

15. *(Section 3.7) Please add the typical details of the proposed closure venting system to the closure plan drawing.*

Response: We have added a note to the closure drawing referencing the details on Drawing E4 of the Engineering/Operation Plans.

16. *(Section 4.1, Third paragraph) The landfill facility doesn't have any leachate collection tank, but a lagoon/surface impoundment to store leachate generated from the landfill units. Please make the correction to the description.*

Response: The text has been revised.

C&DLF Unit (9601-CDLF-1997)

Engineering Plan

17. *(Section 1.1, General) The approved total gross capacity for the C&DLF unit is 2,736,883 CY, consisting of air space of 2,478,749 CY and the final cover system with a volume of 258,134 CY. The gross capacity is defined in the Rule A NCAC 13B .0537(e)(2)(B). To avoid any confusion, please*
    - *i. State the C&DLF facility has a permitted gross capacity, not air space capacity, of 2,736,883 CY consistent with the described Pashing Table on Page 111.*
    - *ii. Provide the estimate of maximum inventory of C&D waste (in-placed waste estimate) on-site in cubic yard based on the latest survey data (in 2015).*

Response: The text has been revised.

18. *(Section 1.1.1) Please specify the thickness of each of the soil liner and the erosive later shall be measured perpendicular to the slope surface.*

Response: The text has been revised.

19. *(Section 1.2) Please provide additional info of the LCIDLF unit:*
    - *i. Describe the bottom elevation of the waste is at least four (4) feet above the seasonal high water table according to February 2012 Evaluation Report [Rule 15A NCAC 13B .0565(1)(b).*
    - *ii. Describe the extent of the waste footprint (in acre) of the LCIDLF [Rule 15. 15A NCAC 13B .0565(3)(h)].*
    - *iii. Describe the proposed excavation, grading, and/or final contours of the landfill slopes [Rule 15. 15A NCAC 13B .0565(3)(j)].*
    - *iv. Describe the approved total capacity of the LCIDLF unit is 41,716 CY which consists of air space of 35,263 CY and final cover system of 6,453 CY.*
    - *v. Describe the space utilization of the Phase 1 – the in-place waste volume and remaining capacity (in cubic yard).*

Response: The text has been revised in Section 1.2 and in Section 2.4.

Operations Plan

20. The groundwater underneath the unlined, closed MSWLF unit which is overlain by the active C&DLF unit is impacted by waste disposal activities; the implementation of the approved corrective action program to restore the groundwater quality is required by the Rule 15A NCAC 13B .0547(4), the Corrective Action Plan (DIN 8821), and the Permit Conditions stipulated in the Permit to Operate dated August 27, 2012 (DIN 16640). The Operation Plan must provide the following information and/or document.

i. Please provide the chronologic descriptions of the Corrective Action Plan (CAP) including the Sampling and Analysis Plan (SAP), the supplement, and/or revision since the CAP approval date of October 22, 2009. The approved documents or approval letters including the document identification number (DIN), date, and etc.

ii. Provide the findings and results according to the latest Corrective Action Evaluation Report (CAER). The CAER must be appended to the permit amendment application [Permit Condition No. 1, Attachment 3, of the Permit (DIN 16640)].

iii. The cost estimates for completion of the groundwater restoration/remediation based on the latest approved CAP. This cost for completion of the CAP must be a portion of the post-closure cost estimates.

Response: The text in [Part 2 (C&D and LCID)] Section 2.0 Operation Plans, "Section 2.7 Engineering/Operation Plan Drawing" has been changed to Section 2.8, and Section "2.8 Chronological Description of the Corrective Action Plan" has been added.

"Section 4.3 Corrective Action Plan Costs" has been added to [Part 2(C&D and LCID)] Section 4.0 Post-Closure.

21. The landfill gas collection and control system (LFGCCS) are installed and operated in the unlined, closed MSWLF unit, overlaid by the active C&DLF. Therefore,

i. The Operations Plan should describe the requirements of the operation, maintenance, inspection and decommission of the LFGCCS.

ii. The copy of the current, valid NC Air Quality permit No. 08885T03 shall be appended to the Operations Plan.

Response: The County does not own or operate the active flare or the electrical generation equipment. It is owned and operated by the gas developer. The County does own the stand by flare which in the case of emergency will be activated. There are no daily operation plans required by the air quality permits.

The Title V Permit is in the County's name and they are responsible for all reporting that is required by the Permit. There are reporting requirements and required maintenance time limits if any of the gas destruction units malfunction and/or shut down also if individual wells do not meet permitted requirements.

Gas extraction wells and collection lines may be abandoned in place if no longer functional, required by the air quality permit and/or not producing the quality of gas needed for electrical generation. The wells and lines are capped and left in place. Extraction wells that remain after capping will eventually be converted to vents.

The current copy of the NC Air Quality Permit No. 08885T04 has been added to Appendix A.

22. (Section 2.2) Please correct the typos and additional information:

i. (Paragraph 1 - Waste Acceptance and Disposal Requirements) The Alamance County mentioned in the "item j" is likely a typographic error.

ii. *(Paragraph 2 –Cover Material Requirements) The referenced Paragraph 10 for record keeping requirement is likely a typo.*

iii. *(Paragraph 9 e.) Please address the following concerns regarding the leachate breakout:*

a. In addition to the weekly inspection, the non-schedule inspections should be executed after a major storm event or a drenched raining season pass.

b. The inspection log/record should be placed in the facility operating record.

c. Section 2.8/Appendix VI -The Corrective Action for Leachate Break-Outs of the Part 1 MSWLF might be applicable for the C&DLF unit as well. If so, please place the reference of Section 2.8/Appendix VI in the Paragraph 9.

Response: I have searched the document and the PDF that was sent to you and was unable to find "Alamance County" referenced anywhere.

The reference to Paragraph 10 has been changed to the correct reference "Paragraph 11".

The text in item 9(e) has been revised.

Closure and Post Closure Plans

23. *(Section 3.1) Please provide the additional information or correct the typographic errors:*

i. *The estimated schedule of the C&DLF closure is approximately 24 years according to the Air Space Calculation in Appendix A. Please correct the typo.*

ii. *Please also provide the maximum inventory of wastes, in the latest surveyed volume in <u>cubic yard</u>, of ever on-sit over the active life of the landfill facility [Rule 15A NCAC 13B .0543(d)(3)].*

Response: The text has been revised.

24. *(Section 3.2) The largest area currently requiring a cap system for the C&DLF unit on top of the unlined, closed MSWLF (unit 2) shall be 40 acres according to Rule 15A NCAC 13B .0547(4) and consistent with the Section 3.7 – Closure Cost Estimates. Please revise the Section accordingly.*

Response: The text has been revised.

25. *(Section 3.5) Please provide additional information regarding the proposed gas venting system:*

i. *Please provide the total number of the gas vents to be installed over the 40-acre closure cover system (the standard rate/frequency is one vent per acre).*

ii. *Please provide a typical detail of the proposed venting system to the Closure Plan drawings.*

Response: The text has been revised. The details are shown on Drawing E4 of the Engineering/Operation Plan.

26. *(Section 3.7) The costs associated with installation of the passive gas venting system described in Section 3.5 is not completely included in the closure cost estimates.*

i. *Please add the costs for material & labor for geotextile, stone, and trenching & laying piping, and revise the final cost for the closure activities.*

ii. *Please note that the number of vents must be consistent with the response to the Comment No. 25.*

Response: The text has been revised to match the closure costs estimate. However, there was a mistake in the number of wells in the closure cost estimate and the post-closure cost estimate therefore the estimates were revised.

27. *(Section 4.1) Please describe the requirements of permit, operation, maintenance, & decommissioning of the existing LFGCCS at the landfill unit during the course of 30-year post-closure period.*

Response: The County does not own or operate the active flare or the electrical generation equipment. It is owned and operated by the gas developer. The County does own the stand by flare which in the case of emergency will be activated. There are no daily operation plans required by the air quality permits.

The Title V Permit is in the County's name and they are responsible for all reporting that is required by the Permit. There are reporting requirements and required maintenance time limits if any of the gas destruction units malfunction and/or shut down also if individual wells do not meet permitted requirements.

Gas extraction wells and collection lines may be abandoned in place if no longer functional, required by the air quality permit and/or not producing the quality of gas needed for electrical generation. The wells and lines are capped and left in place. Extraction wells that remain after capping will eventually be converted to vents.

28. *(Section 4.2) Please add the cost for completing the approved Corrective Action Plan to restore the groundwater quality underneath the unlined, closed MSWLF unit [referring the Comment No. 20.iii. Please note that the aforementioned costs are excluded from the two million dollar – PACA/ NCGS 130A 295.2(h)].*

Response: The text has been added to [Part 2 (C&D and LCID) Section 4.3.

Appendix A – Revised Facility Plan Drawings

29. *Please add the following information to the drawing [Rules 15A NCAC 13B .0537(d) & .1619(d)]:*
    - *i. (Drawing No. F1/Sheet No. 3 of 8) Locations of the passive composting unit, inert debris processing & storage unit, tear-off shingle storage unit, and landfill gas to energy unit/flare station.*
    - *ii. (Drawing No. F2/Sheet No. 4 of 8) Mark/note the MSWLF-Phase 4 on the drawing.*

Response: The drawings have been revised as requested.

Please find enclosed an Electronic copy of the revised Permit Application. If you have any questions or need additional information please don't hesitate to give us a call.

Sincerely,
MUNICIPAL ENGINEERING SERVICES CO., PA

Lisa H. Crawford

Lisa H. Crawford
Designer

Enclosures

2.2.3 HELP Model

INSERT FIRST HELP MODEL
STANDARD LINER SYSTEM (Alt. 1)
PHASE 3 OPEN 1st YEAR

```
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.04    (13 MARCH 1995)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:      C:\HELP3\WAYNE1.D4
TEMPERATURE DATA FILE:        C:\HELP3\WAYNE1.D7
SOLAR RADIATION DATA FILE:    C:\HELP3\WAYNE1.D13
EVAPOTRANSPIRATION DATA:      C:\HELP3\WAYNE1.D11
SOIL AND DESIGN DATA FILE:    C:\HELP3\WAYNE.D10
OUTPUT DATA FILE:             C:\HELP3\Wayne.OUT
```

TIME: 15:40 DATE: 10/01/2009

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*******************************************************************************************

   TITLE:  Wayne Co. Phase 3 Open 1st Year (Alt. 1)

*******************************************************************************************


     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                  LAYER  1
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER  12
          THICKNESS                    =     12.00   INCHES
          POROSITY                     =      0.4710 VOL/VOL
          FIELD CAPACITY               =      0.3420 VOL/VOL
          WILTING POINT                =      0.2100 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3113 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.419999997000E-04 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  4.20
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
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                    LAYER  2
                    --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  19
THICKNESS                    =     96.00   INCHES
POROSITY                     =      0.1680 VOL/VOL
FIELD CAPACITY               =      0.0730 VOL/VOL
WILTING POINT                =      0.0190 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0726 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                    LAYER  3
                    --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  14
THICKNESS                    =     36.00   INCHES
POROSITY                     =      0.4790 VOL/VOL
FIELD CAPACITY               =      0.3710 VOL/VOL
WILTING POINT                =      0.2510 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.4314 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.249999994000E-04 CM/SEC


                    LAYER  4
                    --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      0.25   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   33.0000000000     CM/SEC
SLOPE                        =      2.00   PERCENT
DRAINAGE LENGTH              =    100.0    FEET


                    LAYER  5
                    --------

            TYPE 4 - FLEXIBLE MEMBRANE LINER
              MATERIAL TEXTURE NUMBER  35
THICKNESS                    =      0.06   INCHES
```

```
POROSITY                      =      0.0000 VOL/VOL
FIELD CAPACITY                =      0.0000 VOL/VOL
WILTING POINT                 =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY           =      4.00   HOLES/ACRE
FML INSTALLATION DEFECTS      =      4.00   HOLES/ACRE
FML PLACEMENT QUALITY         =  3 - GOOD
```

LAYER 6

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 16

```
THICKNESS                     =     24.00   INCHES
POROSITY                      =      0.4270 VOL/VOL
FIELD CAPACITY                =      0.4180 VOL/VOL
WILTING POINT                 =      0.3670 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.4270 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  0.100000001000E-06 CM/SEC
```

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #12 WITH A POOR STAND OF GRASS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 200. FEET.

```
SCS RUNOFF CURVE NUMBER             =     91.70
FRACTION OF AREA ALLOWING RUNOFF    =      0.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE  =      1.000  ACRES
EVAPORATIVE ZONE DEPTH              =     22.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE   =      4.430  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE  =      7.332  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE  =      2.710  INCHES
INITIAL SNOW WATER                  =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS    =     36.487  INCHES
TOTAL INITIAL WATER                 =     36.487  INCHES
TOTAL SUBSURFACE INFLOW             =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
RALEIGH NORTH CAROLINA

STATION LATITUDE	=	35.87 DEGREES
MAXIMUM LEAF AREA INDEX	=	3.00
START OF GROWING SEASON (JULIAN DATE)	=	86
END OF GROWING SEASON (JULIAN DATE)	=	310
EVAPORATIVE ZONE DEPTH	=	22.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	7.70 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	66.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	70.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	72.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.07	3.73	4.15	3.40	4.01	4.34
6.40	5.77	4.77	2.84	3.25	3.46

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
41.50	43.50	51.50	61.50	69.30	75.90
79.70	78.80	73.20	61.80	52.40	43.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA
AND STATION LATITUDE = 35.35 DEGREES

****

ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.17	171227.125	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	35.134	127536.766	74.48
DRAINAGE COLLECTED FROM LAYER 4	12.0350	43686.902	25.51

PERC./LEAKAGE THROUGH LAYER 6	0.000003	0.010	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0011		
CHANGE IN WATER STORAGE	0.001	3.379	0.00
SOIL WATER AT START OF YEAR	36.487	132448.312	
SOIL WATER AT END OF YEAR	36.488	132451.687	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.069	0.00

****

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.69	4.49	3.27	1.63	1.94	6.85
	7.43	7.75	2.56	3.57	0.80	5.19
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	1.436	1.926	3.002	2.474	2.867	5.357
	6.192	4.364	2.866	3.385	0.395	0.870
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

LATERAL DRAINAGE COLLECTED FROM LAYER 4

TOTALS	1.6545	0.4259	2.1411	0.6815	0.3048	0.0001
	0.0013	1.8489	1.5869	1.3420	0.6555	1.3924
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 6

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 5

AVERAGES	0.0018	0.0005	0.0023	0.0007	0.0003	0.0000
	0.0000	0.0020	0.0017	0.0014	0.0007	0.0015
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

****

****

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 1

	INCHES		CU. FEET	PERCENT
PRECIPITATION	47.17	(0.000)	171227.1	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	35.134	(0.0000)	127536.77	74.484
LATERAL DRAINAGE COLLECTED FROM LAYER 4	12.03496	(0.00000)	43686.902	25.51401
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.00000	(0.00000)	0.010	0.00001
AVERAGE HEAD ON TOP OF LAYER 5	0.001	(0.000)		
CHANGE IN WATER STORAGE	0.001	(0.0000)	3.38	0.002

****

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******************************************************************************

              PEAK DAILY VALUES FOR YEARS    1 THROUGH    1
  ---------------------------------------------------------------------------
                                              (INCHES)      (CU. FT.)
                                             ----------   -------------
     PRECIPITATION                             2.94         10672.200

     RUNOFF                                    0.000            0.0000

     DRAINAGE COLLECTED FROM LAYER  4          0.30165       1094.97534

     PERCOLATION/LEAKAGE THROUGH LAYER  6      0.000000         0.00017

     AVERAGE HEAD ON TOP OF LAYER  5           0.010

     MAXIMUM HEAD ON TOP OF LAYER  5           0.311

     SNOW WATER                                1.65          5989.4712

     MAXIMUM VEG. SOIL WATER (VOL/VOL)                 0.2708

     MINIMUM VEG. SOIL WATER (VOL/VOL)                 0.1232

       ***  MAXIMUM HEADS ARE COMPUTED USING THE MOUND EQUATION.  ***

******************************************************************************
```

```
*******************************************************************************

                    FINAL WATER STORAGE AT END OF YEAR    1
    ---------------------------------------------------------------------
                     LAYER        (INCHES)       (VOL/VOL)
                     -----        --------       ---------
                       1            3.7283         0.3107

                       2            6.9688         0.0726

                       3           15.5405         0.4317

                       4            0.0025         0.0100

                       5            0.0000         0.0000

                       6           10.2480         0.4270

                   SNOW WATER       0.000

*******************************************************************************
*******************************************************************************
```

INSERT SECOND HELP MODEL
STANDARD LINER SYSTEM (Alt. 1)
PHASE 3 OPEN 5 YEARS w/25 FT. OF SOLID WASTE

```
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.04    (13 MARCH 1995)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:      C:\HELP3\WAYNE1.D4
TEMPERATURE DATA FILE:        C:\HELP3\WAYNE1.D7
SOLAR RADIATION DATA FILE:    C:\HELP3\WAYNE1.D13
EVAPOTRANSPIRATION DATA:      C:\HELP3\WAYNE1.D11
SOIL AND DESIGN DATA FILE:    C:\HELP3\WAYNE2.D10
OUTPUT DATA FILE:             C:\HELP3\Wayne2.OUT


TIME:  15:41              DATE:  10/01/2009


*******************************************************************************************

   TITLE:  Wayne Co. Phase 3  Open  5 Years  w/25 ft. of Solid Waste (Alt. 1)

*******************************************************************************************


     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                  LAYER  1
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER  12
          THICKNESS                  =     12.00   INCHES
          POROSITY                   =      0.4710 VOL/VOL
          FIELD CAPACITY             =      0.3420 VOL/VOL
          WILTING POINT              =      0.2100 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.3109 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.419999997000E-04 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  4.20
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
```

```
                    LAYER  2
                    --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  19
THICKNESS                    =    300.00   INCHES
POROSITY                     =      0.1680 VOL/VOL
FIELD CAPACITY               =      0.0730 VOL/VOL
WILTING POINT                =      0.0190 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0729 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                    LAYER  3
                    --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  14
THICKNESS                    =     36.00   INCHES
POROSITY                     =      0.4790 VOL/VOL
FIELD CAPACITY               =      0.3710 VOL/VOL
WILTING POINT                =      0.2510 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.4471 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.249999994000E-04 CM/SEC


                    LAYER  4
                    --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      0.25   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   33.0000000000     CM/SEC
SLOPE                        =      2.00   PERCENT
DRAINAGE LENGTH              =    100.0    FEET


                    LAYER  5
                    --------

            TYPE 4 - FLEXIBLE MEMBRANE LINER
              MATERIAL TEXTURE NUMBER  35
THICKNESS                    =      0.06   INCHES
```

```
POROSITY                      =      0.0000 VOL/VOL
FIELD CAPACITY                =      0.0000 VOL/VOL
WILTING POINT                 =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY           =      4.00   HOLES/ACRE
FML INSTALLATION DEFECTS      =      4.00   HOLES/ACRE
FML PLACEMENT QUALITY         =  3 - GOOD
```

LAYER 6

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 16

```
THICKNESS                     =     24.00   INCHES
POROSITY                      =      0.4270 VOL/VOL
FIELD CAPACITY                =      0.4180 VOL/VOL
WILTING POINT                 =      0.3670 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.4270 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  0.100000001000E-06 CM/SEC
```

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #12 WITH A POOR STAND OF GRASS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 200. FEET.

```
SCS RUNOFF CURVE NUMBER             =     91.70
FRACTION OF AREA ALLOWING RUNOFF    =     50.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE  =      1.000  ACRES
EVAPORATIVE ZONE DEPTH              =     22.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE   =      4.426  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE  =      7.332  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE  =      2.710  INCHES
INITIAL SNOW WATER                  =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS    =     51.947  INCHES
TOTAL INITIAL WATER                 =     51.947  INCHES
TOTAL SUBSURFACE INFLOW             =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
RALEIGH NORTH CAROLINA

STATION LATITUDE	=	35.87 DEGREES
MAXIMUM LEAF AREA INDEX	=	3.00
START OF GROWING SEASON (JULIAN DATE)	=	86
END OF GROWING SEASON (JULIAN DATE)	=	310
EVAPORATIVE ZONE DEPTH	=	22.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	7.70 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	66.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	70.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	72.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.07	3.73	4.15	3.40	4.01	4.34
6.40	5.77	4.77	2.84	3.25	3.46

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
41.50	43.50	51.50	61.50	69.30	75.90
79.70	78.80	73.20	61.80	52.40	43.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA
AND STATION LATITUDE = 35.35 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.17	171227.125	100.00
RUNOFF	2.922	10606.174	6.19
EVAPOTRANSPIRATION	34.737	126096.398	73.64
DRAINAGE COLLECTED FROM LAYER 4	9.5142	34536.723	20.17

PERC./LEAKAGE THROUGH LAYER 6	0.000002	0.009	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0009		
CHANGE IN WATER STORAGE	-0.003	-12.213	-0.01
SOIL WATER AT START OF YEAR	51.947	188568.828	
SOIL WATER AT END OF YEAR	51.944	188556.609	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.027	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	51.97	188651.125	100.00
RUNOFF	4.642	16851.811	8.93
EVAPOTRANSPIRATION	34.147	123952.344	65.70
DRAINAGE COLLECTED FROM LAYER 4	15.3364	55671.238	29.51
PERC./LEAKAGE THROUGH LAYER 6	0.000004	0.013	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0014		
CHANGE IN WATER STORAGE	-2.155	-7824.280	-4.15
SOIL WATER AT START OF YEAR	51.944	188556.609	
SOIL WATER AT END OF YEAR	49.789	180732.328	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.001	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	76.47	277586.125	100.00
RUNOFF	11.782	42767.832	15.41
EVAPOTRANSPIRATION	34.491	125200.812	45.10
DRAINAGE COLLECTED FROM LAYER 4	29.9091	108570.070	39.11
PERC./LEAKAGE THROUGH LAYER 6	0.000006	0.020	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0028		
CHANGE IN WATER STORAGE	0.289	1047.303	0.38
SOIL WATER AT START OF YEAR	49.789	180732.328	
SOIL WATER AT END OF YEAR	50.077	181779.641	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.094	0.00

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****

ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.20	171335.984	100.00
RUNOFF	3.196	11601.604	6.77
EVAPOTRANSPIRATION	34.319	124578.398	72.71
DRAINAGE COLLECTED FROM LAYER 4	7.5199	27297.225	15.93
PERC./LEAKAGE THROUGH LAYER 6	0.000002	0.009	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0007		
CHANGE IN WATER STORAGE	2.155	7823.477	4.57
SOIL WATER AT START OF YEAR	50.077	181779.641	

SOIL WATER AT END OF YEAR	52.232	189603.109	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0097	35.275	0.02

****

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	46.93	170355.922	100.00
RUNOFF	3.452	12530.854	7.36
EVAPOTRANSPIRATION	33.674	122237.586	71.75
DRAINAGE COLLECTED FROM LAYER 4	10.9622	39792.621	23.36
PERC./LEAKAGE THROUGH LAYER 6	0.000003	0.011	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0010		
CHANGE IN WATER STORAGE	-1.158	-4205.191	-2.47
SOIL WATER AT START OF YEAR	52.232	189603.109	
SOIL WATER AT END OF YEAR	51.074	185397.922	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.033	0.00

****

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC

```
PRECIPITATION
-------------
  TOTALS                  3.76     3.07     4.93     3.07     3.87     6.42
                          6.67     8.13     4.06     3.91     2.85     3.20

  STD. DEVIATIONS         3.40     1.03     1.47     2.21     2.89     2.35
                          3.34     7.69     2.46     2.80     1.88     1.41

RUNOFF
------
  TOTALS                  0.360    0.153    0.339    0.124    0.260    0.524
                          0.713    1.280    0.619    0.339    0.201    0.287

  STD. DEVIATIONS         0.546    0.105    0.233    0.200    0.529    0.341
                          0.579    2.090    0.729    0.432    0.206    0.185

EVAPOTRANSPIRATION
------------------
  TOTALS                  1.479    1.914    2.910    3.429    3.687    4.325
                          5.130    3.823    2.363    2.860    1.300    1.054

  STD. DEVIATIONS         0.227    0.182    0.070    0.839    1.554    1.287
                          1.672    1.212    0.827    0.393    0.540    0.190

LATERAL DRAINAGE COLLECTED FROM LAYER  4
----------------------------------------
  TOTALS                  1.8553   1.8908   1.3673   0.9030   0.6366   0.5916
                          0.7168   1.6717   2.2856   0.9645   0.9333   0.8319

  STD. DEVIATIONS         0.8598   2.3780   0.7316   0.3213   0.4831   0.9817
                          0.8468   2.4984   3.4998   0.2481   0.6791   0.4312

PERCOLATION/LEAKAGE THROUGH LAYER  6
-------------------------------------
  TOTALS                  0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                          0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

  STD. DEVIATIONS         0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                          0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

-------------------------------------------------------------------------------
              AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)
-------------------------------------------------------------------------------

DAILY AVERAGE HEAD ON TOP OF LAYER  5
-------------------------------------
  AVERAGES                0.0020   0.0022   0.0015   0.0010   0.0007   0.0006
                          0.0008   0.0018   0.0025   0.0010   0.0010   0.0009

  STD. DEVIATIONS         0.0009   0.0028   0.0008   0.0004   0.0005   0.0011
                          0.0009   0.0027   0.0039   0.0003   0.0007   0.0005

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     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS     1 THROUGH     5
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     53.95    (  12.766)     195831.3     100.00

 RUNOFF                             5.199   (  3.7381)      18871.65      9.637

 EVAPOTRANSPIRATION                34.274   (  0.3993)     124413.12     63.531

 LATERAL DRAINAGE COLLECTED        14.64837 (  9.00175)     53173.570   27.15275
   FROM LAYER  4

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.012     0.00001
   LAYER  6

 AVERAGE HEAD ON TOP                0.001 (     0.001)
   OF LAYER  5

 CHANGE IN WATER STORAGE           -0.175   (  1.6251)       -634.18     -0.324

*******************************************************************************
```

```
*******************************************************************************

              PEAK DAILY VALUES FOR YEARS    1 THROUGH    5
  ------------------------------------------------------------------------------
                                             (INCHES)      (CU. FT.)
                                            ----------    -------------
     PRECIPITATION                            6.78         24611.400

     RUNOFF                                   2.592         9409.1426

     DRAINAGE COLLECTED FROM LAYER  4         0.64909       2356.20142

     PERCOLATION/LEAKAGE THROUGH LAYER  6     0.000000         0.00033

     AVERAGE HEAD ON TOP OF LAYER  5          0.022

     MAXIMUM HEAD ON TOP OF LAYER  5          0.456

     SNOW WATER                               1.65          5989.4712

     MAXIMUM VEG. SOIL WATER (VOL/VOL)                0.2728

     MINIMUM VEG. SOIL WATER (VOL/VOL)                0.1232

       ***  MAXIMUM HEADS ARE COMPUTED USING THE MOUND EQUATION.  ***

*******************************************************************************
```

```
*****************************************************************************

                    FINAL WATER STORAGE AT END OF YEAR     5
    ---------------------------------------------------------------------
                     LAYER         (INCHES)        (VOL/VOL)
                     -----         --------        ---------
                       1             3.8180          0.3182

                       2            22.8162          0.0761

                       3            14.1874          0.3941

                       4             0.0043          0.0172

                       5             0.0000          0.0000

                       6            10.2480          0.4270

                  SNOW WATER         0.000

*****************************************************************************
*****************************************************************************
```

INSERT FINAL HELP MODEL
STANDARD LINER SYSTEM (Alt. 1)
PHASE 3 CLOSED

```
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.04   (13 MARCH 1995)                 **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:     C:\HELP3\WAYNE1.D4
TEMPERATURE DATA FILE:       C:\HELP3\WAYNE1.D7
SOLAR RADIATION DATA FILE:   C:\HELP3\WAYNE1.D13
EVAPOTRANSPIRATION DATA:     C:\HELP3\WAYNE1.D11
SOIL AND DESIGN DATA FILE:   C:\HELP3\WAYNEC.D10
OUTPUT DATA FILE:            C:\HELP3\WayneC.OUT
```

TIME: 15:43 DATE: 10/01/2009

```
*******************************************************************************************

   TITLE:  Wayne Co. Phase 3  Closed  (Alt. 1)

*******************************************************************************************


     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                  LAYER  1
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER  12
          THICKNESS                    =     24.00   INCHES
          POROSITY                     =      0.4710 VOL/VOL
          FIELD CAPACITY               =      0.3420 VOL/VOL
          WILTING POINT                =      0.2100 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3501 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.419999997000E-04 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  4.20
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
```

```
                    LAYER  2
                    --------

          TYPE 2 - LATERAL DRAINAGE LAYER
            MATERIAL TEXTURE NUMBER  20
THICKNESS                    =      0.20   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0281 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   10.0000000000     CM/SEC
SLOPE                        =      5.00   PERCENT
DRAINAGE LENGTH              =    300.0    FEET


                    LAYER  3
                    --------

          TYPE 4 - FLEXIBLE MEMBRANE LINER
            MATERIAL TEXTURE NUMBER  35
THICKNESS                    =      0.04   INCHES
POROSITY                     =      0.0000 VOL/VOL
FIELD CAPACITY               =      0.0000 VOL/VOL
WILTING POINT                =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY          =      4.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      4.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  3 - GOOD


                    LAYER  4
                    --------

          TYPE 3 - BARRIER SOIL LINER
          MATERIAL TEXTURE NUMBER  23
THICKNESS                    =     18.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.4610 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.900000032000E-05 CM/SEC


                    LAYER  5
                    --------
```

```
          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  12
THICKNESS                    =     12.00   INCHES
POROSITY                     =      0.4710 VOL/VOL
FIELD CAPACITY               =      0.3420 VOL/VOL
WILTING POINT                =      0.2100 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3420 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.419999997000E-04 CM/SEC


                        LAYER  6
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  19
THICKNESS                    =    360.00   INCHES
POROSITY                     =      0.1680 VOL/VOL
FIELD CAPACITY               =      0.0730 VOL/VOL
WILTING POINT                =      0.0190 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0730 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  7
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  14
THICKNESS                    =     36.00   INCHES
POROSITY                     =      0.4790 VOL/VOL
FIELD CAPACITY               =      0.3710 VOL/VOL
WILTING POINT                =      0.2510 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3710 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.249999994000E-04 CM/SEC


                        LAYER  8
                        --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      0.25   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   33.0000000000     CM/SEC
SLOPE                        =      2.00   PERCENT
DRAINAGE LENGTH              =    100.0    FEET
```

LAYER 9

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	4.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	4.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 16

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4270	VOL/VOL
FIELD CAPACITY	=	0.4180	VOL/VOL
WILTING POINT	=	0.3670	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4270	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000001000E-06	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #12 WITH A POOR STAND OF GRASS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 200. FEET.

SCS RUNOFF CURVE NUMBER	=	91.70	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	7.638	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	10.362	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	4.620	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	70.697	INCHES
TOTAL INITIAL WATER	=	70.697	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
RALEIGH NORTH CAROLINA

STATION LATITUDE	=	35.87	DEGREES
MAXIMUM LEAF AREA INDEX	=	3.00	
START OF GROWING SEASON (JULIAN DATE)	=	86	
END OF GROWING SEASON (JULIAN DATE)	=	310	
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	7.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	66.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	70.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	72.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.07	3.73	4.15	3.40	4.01	4.34
6.40	5.77	4.77	2.84	3.25	3.46

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
41.50	43.50	51.50	61.50	69.30	75.90
79.70	78.80	73.20	61.80	52.40	43.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA
AND STATION LATITUDE = 35.35 DEGREES

****

ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT

PRECIPITATION	47.17	171227.125	100.00
RUNOFF	6.125	22234.236	12.99
EVAPOTRANSPIRATION	36.551	132681.469	77.49
DRAINAGE COLLECTED FROM LAYER 2	4.4931	16310.127	9.53
PERC./LEAKAGE THROUGH LAYER 4	0.000080	0.290	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0013		
DRAINAGE COLLECTED FROM LAYER 8	0.0001	0.290	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	0.000	0.969	0.00
SOIL WATER AT START OF YEAR	70.697	256629.609	
SOIL WATER AT END OF YEAR	70.697	256630.578	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.030	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	51.97	188651.125	100.00
RUNOFF	9.594	34826.180	18.46
EVAPOTRANSPIRATION	36.439	132272.812	70.12
DRAINAGE COLLECTED FROM LAYER 2	6.4017	23238.273	12.32
PERC./LEAKAGE THROUGH LAYER 4	0.000118	0.427	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0018		
DRAINAGE COLLECTED FROM LAYER 8	0.0001	0.427	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00

AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	-0.465	-1686.524	-0.89
SOIL WATER AT START OF YEAR	70.697	256630.578	
SOIL WATER AT END OF YEAR	70.233	254944.047	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.027	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	76.47	277586.125	100.00
RUNOFF	24.813	90072.242	32.45
EVAPOTRANSPIRATION	34.733	126080.547	45.42
DRAINAGE COLLECTED FROM LAYER 2	16.9111	61387.254	22.11
PERC./LEAKAGE THROUGH LAYER 4	0.000281	1.019	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0049		
DRAINAGE COLLECTED FROM LAYER 8	0.0003	1.018	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.001	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	0.012	45.115	0.02
SOIL WATER AT START OF YEAR	70.233	254944.047	
SOIL WATER AT END OF YEAR	70.245	254989.172	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.043	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.20	171335.984	100.00
RUNOFF	6.647	24127.512	14.08
EVAPOTRANSPIRATION	35.544	129022.984	75.30
DRAINAGE COLLECTED FROM LAYER 2	4.6390	16839.553	9.83
PERC./LEAKAGE THROUGH LAYER 4	0.000082	0.299	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0014		
DRAINAGE COLLECTED FROM LAYER 8	0.0001	0.298	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	0.361	1310.486	0.76
SOIL WATER AT START OF YEAR	70.245	254989.172	
SOIL WATER AT END OF YEAR	70.606	256299.656	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0097	35.156	0.02

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	46.93	170355.922	100.00
RUNOFF	7.110	25810.369	15.15
EVAPOTRANSPIRATION	35.046	127218.562	74.68

DRAINAGE COLLECTED FROM LAYER 2	4.1297	14990.926	8.80
PERC./LEAKAGE THROUGH LAYER 4	0.000078	0.285	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0012		
DRAINAGE COLLECTED FROM LAYER 8	0.0001	0.285	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	0.643	2335.716	1.37
SOIL WATER AT START OF YEAR	70.606	256299.656	
SOIL WATER AT END OF YEAR	71.249	258635.375	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.056	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	3.76	3.07	4.93	3.07	3.87	6.42
	6.67	8.13	4.06	3.91	2.85	3.20
STD. DEVIATIONS	3.40	1.03	1.47	2.21	2.89	2.35
	3.34	7.69	2.46	2.80	1.88	1.41
RUNOFF						
TOTALS	0.814	0.356	0.742	0.279	0.534	1.018
	1.400	2.649	1.302	0.706	0.423	0.635
STD. DEVIATIONS	1.230	0.243	0.501	0.453	1.078	0.644
	1.129	4.383	1.531	0.860	0.421	0.396
EVAPOTRANSPIRATION						
TOTALS	1.466	1.903	2.909	3.495	4.562	4.291

	5.374	3.752	2.260	3.116	1.511	1.025
STD. DEVIATIONS	0.213	0.183	0.079	0.773	1.132	1.381
	1.286	1.192	0.758	0.225	0.124	0.176

LATERAL DRAINAGE COLLECTED FROM LAYER 2

TOTALS	1.2263	0.9087	1.0667	0.5196	0.3049	0.0239
	0.0877	0.7803	0.6148	0.4160	0.4762	0.8897
STD. DEVIATIONS	1.3626	0.9416	0.5818	0.6168	0.4691	0.0518
	0.1635	1.7413	1.1397	0.4136	0.5671	0.4968

PERCOLATION/LEAKAGE THROUGH LAYER 4

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

LATERAL DRAINAGE COLLECTED FROM LAYER 8

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 10

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 3

AVERAGES	0.0042	0.0034	0.0037	0.0018	0.0010	0.0001
	0.0003	0.0027	0.0022	0.0014	0.0017	0.0030
STD. DEVIATIONS	0.0047	0.0036	0.0020	0.0022	0.0016	0.0002
	0.0006	0.0060	0.0040	0.0014	0.0020	0.0017

DAILY AVERAGE HEAD ON TOP OF LAYER 9

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

```
                                0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
*******************************************************************************


*******************************************************************************
     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH    5
-------------------------------------------------------------------------------
                                    INCHES            CU. FEET       PERCENT
                                --------------------  -------------  ---------
 PRECIPITATION                   53.95    (  12.766)    195831.3     100.00

 RUNOFF                          10.858   (  7.9140)     39414.11     20.127

 EVAPOTRANSPIRATION              35.663   (  0.8140)    129455.27     66.106

 LATERAL DRAINAGE COLLECTED       7.31494 (  5.43573)    26553.227   13.55924
   FROM LAYER  2

 PERCOLATION/LEAKAGE THROUGH      0.00013 (  0.00009)        0.464     0.00024
   LAYER  4

 AVERAGE HEAD ON TOP              0.002 (    0.002)
   OF LAYER  3

 LATERAL DRAINAGE COLLECTED       0.00013 (  0.00009)        0.464     0.00024
   FROM LAYER  8

 PERCOLATION/LEAKAGE THROUGH      0.00000 (  0.00000)        0.000     0.00000
   LAYER 10

 AVERAGE HEAD ON TOP              0.000 (    0.000)
   OF LAYER  9

 CHANGE IN WATER STORAGE          0.111    (  0.4181)      401.15      0.205
*******************************************************************************
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*******************************************************************************

              PEAK DAILY VALUES FOR YEARS    1 THROUGH    5
  ------------------------------------------------------------------------
                                             (INCHES)      (CU. FT.)
                                            ----------    -------------
     PRECIPITATION                            6.78         24611.400

     RUNOFF                                   5.257        19083.2070

     DRAINAGE COLLECTED FROM LAYER  2         0.63696       2312.15381

     PERCOLATION/LEAKAGE THROUGH LAYER  4     0.000009         0.03203

     AVERAGE HEAD ON TOP OF LAYER  3          0.068

     MAXIMUM HEAD ON TOP OF LAYER  3          2.464

     DRAINAGE COLLECTED FROM LAYER  8         0.00001          0.03202

     PERCOLATION/LEAKAGE THROUGH LAYER 10     0.000000         0.00000

     AVERAGE HEAD ON TOP OF LAYER  9          0.000

     MAXIMUM HEAD ON TOP OF LAYER  9         -0.003

     SNOW WATER                               1.65          5989.4712

     MAXIMUM VEG. SOIL WATER (VOL/VOL)                 0.4265

     MINIMUM VEG. SOIL WATER (VOL/VOL)                 0.2100

       ***  MAXIMUM HEADS ARE COMPUTED USING THE MOUND EQUATION.  ***

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****

FINAL WATER STORAGE AT END OF YEAR 5

LAYER	(INCHES)	(VOL/VOL)
1	8.9439	0.3727
2	0.0170	0.0849
3	0.0000	0.0000
4	8.2980	0.4610
5	4.1040	0.3420
6	26.2800	0.0730
7	13.3560	0.3710
8	0.0025	0.0100
9	0.0000	0.0000
10	10.2480	0.4270
SNOW WATER	0.000	

****
****

INSERT FIRST HELP MODEL
ALTERNATE LINER SYSTEM (Alt. 2)
PHASE 3 OPEN 1st YEAR

```
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.04   (13 MARCH 1995)                 **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:     C:\HELP3\WAYNE1.D4
TEMPERATURE DATA FILE:       C:\HELP3\WAYNE1.D7
SOLAR RADIATION DATA FILE:   C:\HELP3\WAYNE1.D13
EVAPOTRANSPIRATION DATA:     C:\HELP3\WAYNE1.D11
SOIL AND DESIGN DATA FILE:   C:\HELP3\WAYNEA.D10
OUTPUT DATA FILE:            C:\HELP3\WayneA.OUT


TIME:  15:47            DATE:  10/01/2009


*******************************************************************************************

   TITLE:  Wayne Co. Phase 3  Open 1st  Year  (Alt. 2)

*******************************************************************************************


     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                  LAYER  1
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER  12
          THICKNESS                  =     12.00   INCHES
          POROSITY                   =      0.4710 VOL/VOL
          FIELD CAPACITY             =      0.3420 VOL/VOL
          WILTING POINT              =      0.2100 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.3113 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.419999997000E-04 CM/SEC
       NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  4.20
                FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
```

```
                    LAYER  2
                    --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  19
THICKNESS                    =     96.00   INCHES
POROSITY                     =      0.1680 VOL/VOL
FIELD CAPACITY               =      0.0730 VOL/VOL
WILTING POINT                =      0.0190 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0726 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                    LAYER  3
                    --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  14
THICKNESS                    =     36.00   INCHES
POROSITY                     =      0.4790 VOL/VOL
FIELD CAPACITY               =      0.3710 VOL/VOL
WILTING POINT                =      0.2510 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.4314 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.249999994000E-04 CM/SEC


                    LAYER  4
                    --------

           TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      0.25   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   33.0000000000     CM/SEC
SLOPE                        =      2.00   PERCENT
DRAINAGE LENGTH              =    100.0    FEET


                    LAYER  5
                    --------

           TYPE 4 - FLEXIBLE MEMBRANE LINER
              MATERIAL TEXTURE NUMBER  35
THICKNESS                    =      0.06   INCHES
```

```
POROSITY                      =      0.0000 VOL/VOL
FIELD CAPACITY                =      0.0000 VOL/VOL
WILTING POINT                 =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY           =      4.00   HOLES/ACRE
FML INSTALLATION DEFECTS      =      4.00   HOLES/ACRE
FML PLACEMENT QUALITY         =  3 - GOOD


                        LAYER  6
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  17
THICKNESS                     =      0.24   INCHES
POROSITY                      =      0.7500 VOL/VOL
FIELD CAPACITY                =      0.7470 VOL/VOL
WILTING POINT                 =      0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.7470 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  0.300000003000E-08 CM/SEC


                        LAYER  7
                        --------

              TYPE 3 - BARRIER SOIL LINER
              MATERIAL TEXTURE NUMBER  23
THICKNESS                     =     18.00   INCHES
POROSITY                      =      0.4610 VOL/VOL
FIELD CAPACITY                =      0.3600 VOL/VOL
WILTING POINT                 =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.4610 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  0.900000032000E-05 CM/SEC


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
         SOIL DATA BASE USING SOIL TEXTURE #12 WITH A
         POOR STAND OF GRASS, A SURFACE SLOPE OF  2.%
         AND A SLOPE LENGTH OF  200. FEET.

SCS RUNOFF CURVE NUMBER                =     91.70
FRACTION OF AREA ALLOWING RUNOFF       =      0.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE     =      1.000  ACRES
EVAPORATIVE ZONE DEPTH                 =     22.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE      =      4.430  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE     =      7.332  INCHES
```

LOWER LIMIT OF EVAPORATIVE STORAGE	=	2.710	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	34.716	INCHES
TOTAL INITIAL WATER	=	34.716	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
RALEIGH NORTH CAROLINA

STATION LATITUDE	=	35.87	DEGREES
MAXIMUM LEAF AREA INDEX	=	3.00	
START OF GROWING SEASON (JULIAN DATE)	=	86	
END OF GROWING SEASON (JULIAN DATE)	=	310	
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	7.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	66.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	70.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	72.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.07	3.73	4.15	3.40	4.01	4.34
6.40	5.77	4.77	2.84	3.25	3.46

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
41.50	43.50	51.50	61.50	69.30	75.90
79.70	78.80	73.20	61.80	52.40	43.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA
AND STATION LATITUDE = 35.35 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.17	171227.125	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	35.134	127536.766	74.48
DRAINAGE COLLECTED FROM LAYER 4	12.0350	43686.902	25.51
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0011		
PERC./LEAKAGE THROUGH LAYER 7	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 7	0.0000		
CHANGE IN WATER STORAGE	0.001	3.365	0.00
SOIL WATER AT START OF YEAR	34.896	126671.383	
SOIL WATER AT END OF YEAR	34.897	126674.750	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.090	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.69	4.49	3.27	1.63	1.94	6.85
	7.43	7.75	2.56	3.57	0.80	5.19
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00

```
RUNOFF
------
  TOTALS                  0.000    0.000    0.000    0.000    0.000    0.000
                          0.000    0.000    0.000    0.000    0.000    0.000

  STD. DEVIATIONS         0.000    0.000    0.000    0.000    0.000    0.000
                          0.000    0.000    0.000    0.000    0.000    0.000

EVAPOTRANSPIRATION
------------------
  TOTALS                  1.436    1.926    3.002    2.474    2.867    5.357
                          6.192    4.364    2.866    3.385    0.395    0.870

  STD. DEVIATIONS         0.000    0.000    0.000    0.000    0.000    0.000
                          0.000    0.000    0.000    0.000    0.000    0.000

LATERAL DRAINAGE COLLECTED FROM LAYER  4
----------------------------------------
  TOTALS                  1.6545   0.4259   2.1411   0.6815   0.3048   0.0001
                          0.0013   1.8489   1.5869   1.3420   0.6555   1.3924

  STD. DEVIATIONS         0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                          0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

PERCOLATION/LEAKAGE THROUGH LAYER  5
-------------------------------------
  TOTALS                  0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                          0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

  STD. DEVIATIONS         0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                          0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

PERCOLATION/LEAKAGE THROUGH LAYER  7
-------------------------------------
  TOTALS                  0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                          0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

  STD. DEVIATIONS         0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                          0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

-------------------------------------------------------------------------------
              AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)
-------------------------------------------------------------------------------

DAILY AVERAGE HEAD ON TOP OF LAYER  5
-------------------------------------
  AVERAGES                0.0018   0.0005   0.0023   0.0007   0.0003   0.0000
                          0.0000   0.0020   0.0017   0.0014   0.0007   0.0015

  STD. DEVIATIONS         0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                          0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

DAILY AVERAGE HEAD ON TOP OF LAYER  7
-------------------------------------
```

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 1

	INCHES		CU. FEET	PERCENT
PRECIPITATION	47.17	(0.000)	171227.1	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	35.134	(0.0000)	127536.77	74.484
LATERAL DRAINAGE COLLECTED FROM LAYER 4	12.03496	(0.00000)	43686.902	25.51401
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.00000	(0.00000)	0.004	0.00000
AVERAGE HEAD ON TOP OF LAYER 5	0.001	(0.000)		
PERCOLATION/LEAKAGE THROUGH LAYER 7	0.00000	(0.00000)	0.004	0.00000
AVERAGE HEAD ON TOP OF LAYER 7	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.001	(0.0000)	3.36	0.002

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******************************************************************************

              PEAK DAILY VALUES FOR YEARS    1 THROUGH    1
  ------------------------------------------------------------------------------
                                             (INCHES)       (CU. FT.)
                                            ----------    -------------
     PRECIPITATION                            2.94          10672.200

     RUNOFF                                   0.000             0.0000

     DRAINAGE COLLECTED FROM LAYER  4         0.30165        1094.97546

     PERCOLATION/LEAKAGE THROUGH LAYER  5     0.000000          0.00003

     AVERAGE HEAD ON TOP OF LAYER  5          0.010

     MAXIMUM HEAD ON TOP OF LAYER  5          0.311

     PERCOLATION/LEAKAGE THROUGH LAYER  7     0.000000          0.00003

     AVERAGE HEAD ON TOP OF LAYER  7          0.000

     SNOW WATER                               1.65           5989.4712

     MAXIMUM VEG. SOIL WATER (VOL/VOL)                 0.2708

     MINIMUM VEG. SOIL WATER (VOL/VOL)                 0.1232

       ***  MAXIMUM HEADS ARE COMPUTED USING THE MOUND EQUATION.  ***

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	3.7283	0.3107
2	6.9688	0.0726
3	15.5405	0.4317
4	0.0025	0.0100
5	0.0000	0.0000
6	0.1793	0.7470
7	8.2980	0.4610
SNOW WATER	0.000	

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INSERT SECOND HELP MODEL
ALTERNATE LINER SYSTEM (Alt. 2)
PHASE 3 OPEN 5 YEARS w/25 FT. OF SOLID WASTE

```
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.04   (13 MARCH 1995)                 **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:      C:\HELP3\WAYNE1.D4
TEMPERATURE DATA FILE:        C:\HELP3\WAYNE1.D7
SOLAR RADIATION DATA FILE:    C:\HELP3\WAYNE1.D13
EVAPOTRANSPIRATION DATA:      C:\HELP3\WAYNE1.D11
SOIL AND DESIGN DATA FILE:    C:\HELP3\WAYNE2A.D10
OUTPUT DATA FILE:             C:\HELP3\Wayne2A.OUT


TIME:  15:48            DATE:  10/01/2009


*******************************************************************************************

   TITLE:  Wayne Co. Phase 3  Open  5 Years  w/25 ft. of Solid Waste (Alt. 2)

*******************************************************************************************


     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                  LAYER  1
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER  12
          THICKNESS                  =     12.00   INCHES
          POROSITY                   =      0.4710 VOL/VOL
          FIELD CAPACITY             =      0.3420 VOL/VOL
          WILTING POINT              =      0.2100 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.3109 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.419999997000E-04 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  4.20
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
```

```
                    LAYER  2
                    --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  19
THICKNESS                    =    300.00   INCHES
POROSITY                     =      0.1680 VOL/VOL
FIELD CAPACITY               =      0.0730 VOL/VOL
WILTING POINT                =      0.0190 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0729 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                    LAYER  3
                    --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  14
THICKNESS                    =     36.00   INCHES
POROSITY                     =      0.4790 VOL/VOL
FIELD CAPACITY               =      0.3710 VOL/VOL
WILTING POINT                =      0.2510 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.4471 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.249999994000E-04 CM/SEC


                    LAYER  4
                    --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      0.25   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   33.0000000000     CM/SEC
SLOPE                        =      2.00   PERCENT
DRAINAGE LENGTH              =    100.0    FEET


                    LAYER  5
                    --------

            TYPE 4 - FLEXIBLE MEMBRANE LINER
              MATERIAL TEXTURE NUMBER  35
THICKNESS                    =      0.06   INCHES
```

```
POROSITY                      =      0.0000 VOL/VOL
FIELD CAPACITY                =      0.0000 VOL/VOL
WILTING POINT                 =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY           =      4.00   HOLES/ACRE
FML INSTALLATION DEFECTS      =      4.00   HOLES/ACRE
FML PLACEMENT QUALITY         =  3 - GOOD


                        LAYER  6
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  17
THICKNESS                     =      0.24   INCHES
POROSITY                      =      0.7500 VOL/VOL
FIELD CAPACITY                =      0.7470 VOL/VOL
WILTING POINT                 =      0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.7470 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  0.300000003000E-08 CM/SEC


                        LAYER  7
                        --------

              TYPE 3 - BARRIER SOIL LINER
              MATERIAL TEXTURE NUMBER  23
THICKNESS                     =     18.00   INCHES
POROSITY                      =      0.4610 VOL/VOL
FIELD CAPACITY                =      0.3600 VOL/VOL
WILTING POINT                 =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.4610 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  0.900000032000E-05 CM/SEC


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
         SOIL DATA BASE USING SOIL TEXTURE #12 WITH A
         POOR STAND OF GRASS, A SURFACE SLOPE OF  2.%
         AND A SLOPE LENGTH OF  200. FEET.

SCS RUNOFF CURVE NUMBER               =     91.70
FRACTION OF AREA ALLOWING RUNOFF      =     50.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE    =      1.000  ACRES
EVAPORATIVE ZONE DEPTH                =     22.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE     =      4.426  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE    =      7.332  INCHES
```

LOWER LIMIT OF EVAPORATIVE STORAGE	=	2.710	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	50.177	INCHES
TOTAL INITIAL WATER	=	50.177	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
RALEIGH NORTH CAROLINA

STATION LATITUDE	=	35.87	DEGREES
MAXIMUM LEAF AREA INDEX	=	3.00	
START OF GROWING SEASON (JULIAN DATE)	=	86	
END OF GROWING SEASON (JULIAN DATE)	=	310	
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	7.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	66.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	70.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	72.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.07	3.73	4.15	3.40	4.01	4.34
6.40	5.77	4.77	2.84	3.25	3.46

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
41.50	43.50	51.50	61.50	69.30	75.90
79.70	78.80	73.20	61.80	52.40	43.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA
AND STATION LATITUDE = 35.35 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.17	171227.125	100.00
RUNOFF	2.922	10606.174	6.19
EVAPOTRANSPIRATION	34.737	126096.398	73.64
DRAINAGE COLLECTED FROM LAYER 4	9.5142	34536.723	20.17
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0009		
PERC./LEAKAGE THROUGH LAYER 7	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 7	0.0000		
CHANGE IN WATER STORAGE	-0.003	-12.213	-0.01
SOIL WATER AT START OF YEAR	50.356	182791.906	
SOIL WATER AT END OF YEAR	50.353	182779.687	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.032	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	51.97	188651.125	100.00
RUNOFF	4.642	16851.811	8.93
EVAPOTRANSPIRATION	34.147	123952.344	65.70
DRAINAGE COLLECTED FROM LAYER 4	15.3364	55671.250	29.51
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.004	0.00

AVG. HEAD ON TOP OF LAYER 5	0.0014		
PERC./LEAKAGE THROUGH LAYER 7	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 7	0.0000		
CHANGE IN WATER STORAGE	-2.155	-7824.280	-4.15
SOIL WATER AT START OF YEAR	50.353	182779.687	
SOIL WATER AT END OF YEAR	48.197	174955.406	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.001	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	76.47	277586.125	100.00
RUNOFF	11.782	42767.832	15.41
EVAPOTRANSPIRATION	34.491	125200.812	45.10
DRAINAGE COLLECTED FROM LAYER 4	29.9091	108570.094	39.11
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.005	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0028		
PERC./LEAKAGE THROUGH LAYER 7	0.000001	0.005	0.00
AVG. HEAD ON TOP OF LAYER 7	0.0000		
CHANGE IN WATER STORAGE	0.289	1047.289	0.38
SOIL WATER AT START OF YEAR	48.197	174955.406	
SOIL WATER AT END OF YEAR	48.486	176002.703	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.103	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.20	171335.984	100.00
RUNOFF	3.196	11601.604	6.77
EVAPOTRANSPIRATION	34.319	124578.398	72.71
DRAINAGE COLLECTED FROM LAYER 4	7.5199	27297.229	15.93
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.003	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0007		
PERC./LEAKAGE THROUGH LAYER 7	0.000001	0.003	0.00
AVG. HEAD ON TOP OF LAYER 7	0.0000		
CHANGE IN WATER STORAGE	2.155	7823.477	4.57
SOIL WATER AT START OF YEAR	48.486	176002.703	
SOIL WATER AT END OF YEAR	50.641	183826.172	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0097	35.277	0.02

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	46.93	170355.922	100.00
RUNOFF	3.452	12530.854	7.36
EVAPOTRANSPIRATION	33.674	122237.586	71.75
DRAINAGE COLLECTED FROM LAYER 4	10.9622	39792.625	23.36

PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0010		
PERC./LEAKAGE THROUGH LAYER 7	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 7	0.0000		
CHANGE IN WATER STORAGE	-1.158	-4205.177	-2.47
SOIL WATER AT START OF YEAR	50.641	183826.172	
SOIL WATER AT END OF YEAR	49.482	179621.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.023	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	3.76	3.07	4.93	3.07	3.87	6.42
	6.67	8.13	4.06	3.91	2.85	3.20
STD. DEVIATIONS	3.40	1.03	1.47	2.21	2.89	2.35
	3.34	7.69	2.46	2.80	1.88	1.41
RUNOFF						
TOTALS	0.360	0.153	0.339	0.124	0.260	0.524
	0.713	1.280	0.619	0.339	0.201	0.287
STD. DEVIATIONS	0.546	0.105	0.233	0.200	0.529	0.341
	0.579	2.090	0.729	0.432	0.206	0.185
EVAPOTRANSPIRATION						
TOTALS	1.479	1.914	2.910	3.429	3.687	4.325
	5.130	3.823	2.363	2.860	1.300	1.054
STD. DEVIATIONS	0.227	0.182	0.070	0.839	1.554	1.287

	1.672	1.212	0.827	0.393	0.540	0.190

LATERAL DRAINAGE COLLECTED FROM LAYER 4

TOTALS	1.8553	1.8908	1.3673	0.9030	0.6366	0.5916
	0.7168	1.6717	2.2856	0.9645	0.9333	0.8319
STD. DEVIATIONS	0.8598	2.3780	0.7316	0.3213	0.4831	0.9817
	0.8468	2.4984	3.4998	0.2481	0.6791	0.4312

PERCOLATION/LEAKAGE THROUGH LAYER 5

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 7

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 5

AVERAGES	0.0020	0.0022	0.0015	0.0010	0.0007	0.0006
	0.0008	0.0018	0.0025	0.0010	0.0010	0.0009
STD. DEVIATIONS	0.0009	0.0028	0.0008	0.0004	0.0005	0.0011
	0.0009	0.0027	0.0039	0.0003	0.0007	0.0005

DAILY AVERAGE HEAD ON TOP OF LAYER 7

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 5

	INCHES	CU. FEET	PERCENT

PRECIPITATION	53.95	(12.766)	195831.3	100.00
RUNOFF	5.199	(3.7381)	18871.65	9.637
EVAPOTRANSPIRATION	34.274	(0.3993)	124413.12	63.531
LATERAL DRAINAGE COLLECTED FROM LAYER 4	14.64837	(9.00175)	53173.586	27.15276
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.00000	(0.00000)	0.004	0.00000
AVERAGE HEAD ON TOP OF LAYER 5	0.001	(0.001)		
PERCOLATION/LEAKAGE THROUGH LAYER 7	0.00000	(0.00000)	0.004	0.00000
AVERAGE HEAD ON TOP OF LAYER 7	0.000	(0.000)		
CHANGE IN WATER STORAGE	-0.175	(1.6251)	-634.18	-0.324

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              PEAK DAILY VALUES FOR YEARS    1 THROUGH    5
  ------------------------------------------------------------------------
                                            (INCHES)      (CU. FT.)
                                            ----------   -------------
     PRECIPITATION                            6.78         24611.400

     RUNOFF                                   2.592         9409.1426

     DRAINAGE COLLECTED FROM LAYER  4         0.64909       2356.20166

     PERCOLATION/LEAKAGE THROUGH LAYER  5     0.000000         0.00004

     AVERAGE HEAD ON TOP OF LAYER  5          0.022

     MAXIMUM HEAD ON TOP OF LAYER  5          0.456

     PERCOLATION/LEAKAGE THROUGH LAYER  7     0.000000         0.00004

     AVERAGE HEAD ON TOP OF LAYER  7          0.000

     SNOW WATER                               1.65          5989.4712

     MAXIMUM VEG. SOIL WATER (VOL/VOL)                0.2728

     MINIMUM VEG. SOIL WATER (VOL/VOL)                0.1232

       ***  MAXIMUM HEADS ARE COMPUTED USING THE MOUND EQUATION.  ***

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FINAL WATER STORAGE AT END OF YEAR 5

LAYER	(INCHES)	(VOL/VOL)
1	3.8180	0.3182
2	22.8162	0.0761
3	14.1874	0.3941
4	0.0043	0.0172
5	0.0000	0.0000
6	0.1793	0.7470
7	8.2980	0.4610
SNOW WATER	0.000	

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INSERT FINAL HELP MODEL
ALTERNATE LINER SYSTEM (Alt. 2)
PHASE 3 CLOSED

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******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.04    (13 MARCH 1995)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:      C:\HELP3\WAYNE1.D4
TEMPERATURE DATA FILE:        C:\HELP3\WAYNE1.D7
SOLAR RADIATION DATA FILE:    C:\HELP3\WAYNE1.D13
EVAPOTRANSPIRATION DATA:      C:\HELP3\WAYNE1.D11
SOIL AND DESIGN DATA FILE:    C:\HELP3\WAYNECA.D10
OUTPUT DATA FILE:             C:\HELP3\WayneCA.OUT


TIME:  15:50              DATE:  10/01/2009


******************************************************************************************

    TITLE:  Wayne Co. Phase 3  Closed  (Alt. 2)

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      NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
               COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                   LAYER  1
                                   --------

                      TYPE 1 - VERTICAL PERCOLATION LAYER
                          MATERIAL TEXTURE NUMBER  12
          THICKNESS                  =     24.00   INCHES
          POROSITY                   =      0.4710 VOL/VOL
          FIELD CAPACITY             =      0.3420 VOL/VOL
          WILTING POINT              =      0.2100 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.3501 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.419999997000E-04 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  4.20
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
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                    LAYER  2
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          TYPE 2 - LATERAL DRAINAGE LAYER
            MATERIAL TEXTURE NUMBER  20
THICKNESS                    =      0.20    INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0281 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   10.0000000000      CM/SEC
SLOPE                        =      5.00    PERCENT
DRAINAGE LENGTH              =    300.0     FEET


                    LAYER  3
                    --------

          TYPE 4 - FLEXIBLE MEMBRANE LINER
            MATERIAL TEXTURE NUMBER  35
THICKNESS                    =      0.04    INCHES
POROSITY                     =      0.0000 VOL/VOL
FIELD CAPACITY               =      0.0000 VOL/VOL
WILTING POINT                =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY          =      4.00    HOLES/ACRE
FML INSTALLATION DEFECTS     =      4.00    HOLES/ACRE
FML PLACEMENT QUALITY        =  3 - GOOD


                    LAYER  4
                    --------

          TYPE 3 - BARRIER SOIL LINER
            MATERIAL TEXTURE NUMBER  23
THICKNESS                    =     18.00    INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.4610 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.900000032000E-05 CM/SEC


                    LAYER  5
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        TYPE 1 - VERTICAL PERCOLATION LAYER
            MATERIAL TEXTURE NUMBER  12
THICKNESS                    =     12.00   INCHES
POROSITY                     =      0.4710 VOL/VOL
FIELD CAPACITY               =      0.3420 VOL/VOL
WILTING POINT                =      0.2100 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3420 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.419999997000E-04 CM/SEC
```

LAYER 6

```
        TYPE 1 - VERTICAL PERCOLATION LAYER
            MATERIAL TEXTURE NUMBER  19
THICKNESS                    =    360.00   INCHES
POROSITY                     =      0.1680 VOL/VOL
FIELD CAPACITY               =      0.0730 VOL/VOL
WILTING POINT                =      0.0190 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0730 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC
```

LAYER 7

```
        TYPE 1 - VERTICAL PERCOLATION LAYER
            MATERIAL TEXTURE NUMBER  14
THICKNESS                    =     36.00   INCHES
POROSITY                     =      0.4790 VOL/VOL
FIELD CAPACITY               =      0.3710 VOL/VOL
WILTING POINT                =      0.2510 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3710 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.249999994000E-04 CM/SEC
```

LAYER 8

```
        TYPE 2 - LATERAL DRAINAGE LAYER
            MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      0.25   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   33.0000000000     CM/SEC
SLOPE                        =      2.00   PERCENT
DRAINAGE LENGTH              =    100.0    FEET
```

LAYER 9

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	4.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	4.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 10

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.24	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7470	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

LAYER 11

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 23

THICKNESS	=	18.00	INCHES
POROSITY	=	0.4610	VOL/VOL
FIELD CAPACITY	=	0.3600	VOL/VOL
WILTING POINT	=	0.2030	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4610	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.900000032000E-05	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #12 WITH A POOR STAND OF GRASS, A SURFACE SLOPE OF 2.%

AND A SLOPE LENGTH OF 200. FEET.

SCS RUNOFF CURVE NUMBER	=	91.70	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	7.638	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	10.362	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	4.620	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	68.926	INCHES
TOTAL INITIAL WATER	=	68.926	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
RALEIGH NORTH CAROLINA

STATION LATITUDE	=	35.87	DEGREES
MAXIMUM LEAF AREA INDEX	=	3.00	
START OF GROWING SEASON (JULIAN DATE)	=	86	
END OF GROWING SEASON (JULIAN DATE)	=	310	
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	7.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	66.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	70.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	72.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.07	3.73	4.15	3.40	4.01	4.34
6.40	5.77	4.77	2.84	3.25	3.46

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
41.50	43.50	51.50	61.50	69.30	75.90
79.70	78.80	73.20	61.80	52.40	43.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA
AND STATION LATITUDE = 35.35 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.17	171227.125	100.00
RUNOFF	6.125	22234.236	12.99
EVAPOTRANSPIRATION	36.551	132681.469	77.49
DRAINAGE COLLECTED FROM LAYER 2	4.4931	16310.127	9.53
PERC./LEAKAGE THROUGH LAYER 4	0.000080	0.290	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0013		
DRAINAGE COLLECTED FROM LAYER 8	0.0001	0.290	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
PERC./LEAKAGE THROUGH LAYER 11	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 11	0.0000		
CHANGE IN WATER STORAGE	0.000	0.942	0.00
SOIL WATER AT START OF YEAR	69.105	250852.687	
SOIL WATER AT END OF YEAR	69.106	250853.625	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.058	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	51.97	188651.125	100.00
RUNOFF	9.594	34826.180	18.46
EVAPOTRANSPIRATION	36.439	132272.812	70.12
DRAINAGE COLLECTED FROM LAYER 2	6.4017	23238.273	12.32
PERC./LEAKAGE THROUGH LAYER 4	0.000118	0.427	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0018		
DRAINAGE COLLECTED FROM LAYER 8	0.0001	0.427	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
PERC./LEAKAGE THROUGH LAYER 11	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 11	0.0000		
CHANGE IN WATER STORAGE	-0.465	-1686.497	-0.89
SOIL WATER AT START OF YEAR	69.106	250853.625	
SOIL WATER AT END OF YEAR	68.641	249167.125	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.055	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	76.47	277586.125	100.00
RUNOFF	24.813	90072.242	32.45
EVAPOTRANSPIRATION	34.733	126080.547	45.42
DRAINAGE COLLECTED FROM LAYER 2	16.9111	61387.254	22.11

PERC./LEAKAGE THROUGH LAYER 4	0.000281	1.019	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0049		
DRAINAGE COLLECTED FROM LAYER 8	0.0003	1.018	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000000	0.001	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
PERC./LEAKAGE THROUGH LAYER 11	0.000000	0.001	0.00
AVG. HEAD ON TOP OF LAYER 11	0.0000		
CHANGE IN WATER STORAGE	0.012	45.087	0.02
SOIL WATER AT START OF YEAR	68.641	249167.125	
SOIL WATER AT END OF YEAR	68.654	249212.219	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.015	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.20	171335.984	100.00
RUNOFF	6.647	24127.512	14.08
EVAPOTRANSPIRATION	35.544	129022.984	75.30
DRAINAGE COLLECTED FROM LAYER 2	4.6390	16839.553	9.83
PERC./LEAKAGE THROUGH LAYER 4	0.000082	0.299	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0014		
DRAINAGE COLLECTED FROM LAYER 8	0.0001	0.298	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
PERC./LEAKAGE THROUGH LAYER 11	0.000000	0.000	0.00

AVG. HEAD ON TOP OF LAYER 11	0.0000		
CHANGE IN WATER STORAGE	0.361	1310.513	0.76
SOIL WATER AT START OF YEAR	68.654	249212.219	
SOIL WATER AT END OF YEAR	69.015	250522.734	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0097	35.128	0.02

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	46.93	170355.922	100.00
RUNOFF	7.110	25810.369	15.15
EVAPOTRANSPIRATION	35.046	127218.562	74.68
DRAINAGE COLLECTED FROM LAYER 2	4.1297	14990.926	8.80
PERC./LEAKAGE THROUGH LAYER 4	0.000078	0.285	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0012		
DRAINAGE COLLECTED FROM LAYER 8	0.0001	0.285	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
PERC./LEAKAGE THROUGH LAYER 11	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 11	0.0000		
CHANGE IN WATER STORAGE	0.643	2335.716	1.37
SOIL WATER AT START OF YEAR	69.015	250522.734	
SOIL WATER AT END OF YEAR	69.658	252858.453	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00

ANNUAL WATER BUDGET BALANCE 0.0000 0.056 0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	3.76	3.07	4.93	3.07	3.87	6.42
	6.67	8.13	4.06	3.91	2.85	3.20
STD. DEVIATIONS	3.40	1.03	1.47	2.21	2.89	2.35
	3.34	7.69	2.46	2.80	1.88	1.41
RUNOFF						
TOTALS	0.814	0.356	0.742	0.279	0.534	1.018
	1.400	2.649	1.302	0.706	0.423	0.635
STD. DEVIATIONS	1.230	0.243	0.501	0.453	1.078	0.644
	1.129	4.383	1.531	0.860	0.421	0.396
EVAPOTRANSPIRATION						
TOTALS	1.466	1.903	2.909	3.495	4.562	4.291
	5.374	3.752	2.260	3.116	1.511	1.025
STD. DEVIATIONS	0.213	0.183	0.079	0.773	1.132	1.381
	1.286	1.192	0.758	0.225	0.124	0.176
LATERAL DRAINAGE COLLECTED FROM LAYER 2						
TOTALS	1.2263	0.9087	1.0667	0.5196	0.3049	0.0239
	0.0877	0.7803	0.6148	0.4160	0.4762	0.8897
STD. DEVIATIONS	1.3626	0.9416	0.5818	0.6168	0.4691	0.0518
	0.1635	1.7413	1.1397	0.4136	0.5671	0.4968
PERCOLATION/LEAKAGE THROUGH LAYER 4						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LATERAL DRAINAGE COLLECTED FROM LAYER 8						

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 9

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 11

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 3

AVERAGES	0.0042	0.0034	0.0037	0.0018	0.0010	0.0001
	0.0003	0.0027	0.0022	0.0014	0.0017	0.0030
STD. DEVIATIONS	0.0047	0.0036	0.0020	0.0022	0.0016	0.0002
	0.0006	0.0060	0.0040	0.0014	0.0020	0.0017

DAILY AVERAGE HEAD ON TOP OF LAYER 9

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

DAILY AVERAGE HEAD ON TOP OF LAYER 11

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

****

****

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 5

	INCHES		CU. FEET	PERCENT
PRECIPITATION	53.95	(12.766)	195831.3	100.00
RUNOFF	10.858	(7.9140)	39414.11	20.127
EVAPOTRANSPIRATION	35.663	(0.8140)	129455.27	66.106
LATERAL DRAINAGE COLLECTED FROM LAYER 2	7.31494	(5.43573)	26553.227	13.55924
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.00013	(0.00009)	0.464	0.00024
AVERAGE HEAD ON TOP OF LAYER 3	0.002	(0.002)		
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00013	(0.00009)	0.464	0.00024
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)		
PERCOLATION/LEAKAGE THROUGH LAYER 11	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 11	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.111	(0.4181)	401.15	0.205

****

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*******************************************************************************

              PEAK DAILY VALUES FOR YEARS    1 THROUGH    5
  ---------------------------------------------------------------------------
                                              (INCHES)      (CU. FT.)
                                             ----------    -------------
     PRECIPITATION                             6.78         24611.400

     RUNOFF                                    5.257        19083.2070

     DRAINAGE COLLECTED FROM LAYER  2          0.63696       2312.15381

     PERCOLATION/LEAKAGE THROUGH LAYER  4      0.000009         0.03203

     AVERAGE HEAD ON TOP OF LAYER  3           0.068

     MAXIMUM HEAD ON TOP OF LAYER  3           2.464

     DRAINAGE COLLECTED FROM LAYER  8          0.00001          0.03202

     PERCOLATION/LEAKAGE THROUGH LAYER  9      0.000000         0.00000

     AVERAGE HEAD ON TOP OF LAYER  9           0.000

     MAXIMUM HEAD ON TOP OF LAYER  9           0.009

     PERCOLATION/LEAKAGE THROUGH LAYER 11      0.000000         0.00000

     AVERAGE HEAD ON TOP OF LAYER 11           0.000

     SNOW WATER                                1.65          5989.4712

     MAXIMUM VEG. SOIL WATER (VOL/VOL)                 0.4265

     MINIMUM VEG. SOIL WATER (VOL/VOL)                 0.2100

       ***  MAXIMUM HEADS ARE COMPUTED USING THE MOUND EQUATION.  ***

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FINAL WATER STORAGE AT END OF YEAR 5

LAYER	(INCHES)	(VOL/VOL)
1	8.9439	0.3727
2	0.0170	0.0849
3	0.0000	0.0000
4	8.2980	0.4610
5	4.1040	0.3420
6	26.2800	0.0730
7	13.3560	0.3710
8	0.0025	0.0100
9	0.0000	0.0000
10	0.1793	0.7470
11	8.2980	0.4610
SNOW WATER	0.000	

****
****

License No. C-0281

CIVIL/SANITARY/ENVIRONMENTAL ENGINEERS

SOLID WASTE MANAGEMENT

Municipal Services

Engineering Company, P.A.

SITE PLANNING/SUBDIVISIONS

SUBSURFACE UTILITY ENGINEERING (SUE)

June 24, 2013

Ms. Christine Ritter
Solid Waste Section
Division of Waste Management
North Carolina Department of Environment and Natural Resources
217 West Jones Street
Raleigh, NC 27603

Re: ***Notification of Background Well MW-1 Abandonment and Replacement by MW-1R***
Wayne County Active C&D and Closed MSWLF (Dudley)
Permit No. 96-01
MESCO Project No. G12016.0

Dear Ms. Ritter:

On behalf of Wayne County, Municipal Engineering Services Company, P.A. (MESCO) is notifying the Solid Waste Section (SWS) that upgradient background well MW-1 was abandoned and replaced by MW-1R on June 4, 2013. MW-1 abandonment and MW-1R replacement was pre-authorized by Ms. Christine Ritter of the SWS via email on May 30, 2013 (DIN:19050).

MW-1 was completely sealed with grout in accordance with 15A NCAC 2C.0113 (d) entitled "Abandonment of Wells" and the well abandonment record (GW-30) and corresponding well construction record is attached.

MW-1R was installed per the requirements of 15A NCAC 02C at the planned location as shown on **Figure 1**. MW-1R well construction record (GW-1) is attached.

Location of MW-1R location is planned to be surveyed as required.. Once MW-1R is surveyed the water quality sampling and analysis plan (SAP) will be updated reflecting the well replacement prior to the next semi-annual monitoring event scheduled for August 2013.

If you need any additional information please contact us at (919) 772-5393 or by email at jpfohl@mesco.com.

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

Jonathan Pfohl
Environmental Specialist

NORTH CAROLINA LICENSED SEAL 0975 GEOLOGIST D. MARK DURWAY

D. Mark Durway
Geologist

Enclosures

WELL ABANDONMENT RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Gerald R. Eister

Well Contractor Name (or well owner personally abandoning well on his/her property)

2394-A

NC Well Contractor Certification Number

Bridger Drilling Entrp., Inc. dba Carolina

Company Name

2. Well Construction Permit #: _____

List all applicable well construction permits (i.e. County, State, Variance, etc.) if known

3. Well use (check well use):

Water Supply Well:

- ☐ Agricultural
- ☐ Municipal/Public
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Residential Water Supply (single)
- ☐ Industrial/Commercial
- ☐ Residential Water Supply (shared)
- ☐ Irrigation

Non-Water Supply Well:

- ☑ Monitoring
- ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge
- ☐ Groundwater Remediation
- ☐ Aquifer Storage and Recovery
- ☐ Salinity Barrier
- ☐ Aquifer Test
- ☐ Stormwater Drainage
- ☐ Experimental Technology
- ☐ Subsidence Control
- ☐ Geothermal (Closed Loop)
- ☐ Tracer
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Other (explain under 7g)

4. Date well(s) abandoned: 6/4/13

5a. Well location:

Wayne County Landfill

Facility/Owner Name

Facility ID# (if applicable)

460 B South Landfill Rd - Dudley, NC 28333

Physical Address, City, and Zip

Wayne

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35.29629 N 78.06757 W

CONSTRUCTION DETAILS OF WELL(S) BEING ABANDONED

*Attach well construction record(s) if available. For multiple injection or non-water supply wells **ONLY** with the same construction/abandonment, you can submit one form.*

6a. Well ID#: MW-1

6b. Total well depth: 25 **(ft.)**

6c. Borehole diameter: n/a **(in.)**

6d. Water level below ground surface: 18.84 **(ft.)**

6e. Outer casing length (if known): none **(ft.)**

6f. Inner casing/tubing length (if known): 20 **(ft.)**

6g. Screen length (if known): 5 **(ft.)**

For Internal Use ONLY:

WELL ABANDONMENT DETAILS

7a. Number of wells being abandoned: 1

*For multiple injection or non-water supply wells **ONLY** with the same construction/abandonment, you can submit one form.*

7b. Approximate volume of water remaining in well(s): 0 **(gal.)**

FOR WATER SUPPLY WELLS ONLY:

7c. Type of disinfectant used: n/a

7d. Amount of disinfectant used: n/a

7e. Sealing materials used (check all that apply):

- ☑ Neat Cement Grout
- ☐ Bentonite Chips or Pellets
- ☐ Sand Cement Grout
- ☐ Dry Clay
- ☐ Concrete Grout
- ☐ Drill Cuttings
- ☐ Specialty Grout
- ☐ Gravel
- ☐ Bentonite Slurry
- ☐ Other (explain under 7g)

7f. For each material selected above, provide amount of materials used:

94 lb portland cement, 6 gal water, 8 lb benonite

7g. Provide a brief description of the abandonment procedure:

pressure tremie grout

8. Certification:

Gerald R. Eister

Signature of Certified Well Contractor or Well Owner

6/10/13

Date

By signing this form, I hereby certify that the well(s) was (were) abandoned in accordance with 15A NCAC 02C .0100 or 2C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

9. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well abandonment details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

10a. For All Wells: Submit this form within 30 days of completion of well abandonment to the following:

Division of Water Quality, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

10b. For Injection Wells: In addition to sending the form to the address in 10a above, also submit one copy of this form within 30 days of completion of well abandonment to the following:

Division of Water Quality, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

10c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well abandonment to the county health department of the county where abandoned.

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
DIVISION OF ENVIRONMENTAL MANAGEMENT – GROUNDWATER SECTION
P.O. BOX 27687 – RALEIGH, N.C. 27611, PHONE (919)733-3221

FOR OFFICE USE ONLY	
Quad. No.	Serial No.
Lat.	Long. / Pc
Minor Basin	
Basin Code	
Header Ent.	GW-1 Ent.

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Ralph Lawson

DRILLER REGISTRATION NUMBER: 720

STATE WELL CONSTRUCTION PERMIT NUMBER:

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Dudley
   (Road, Community, or Subdivision and Lot No.)
   County: Wayne
2. OWNER: Wayne Co Landfill
   ADDRESS: Rt #1 Box 200 (Street or Route No.)
   Dudley (City or Town) NC (State) 28333 (Zip Code)
3. DATE DRILLED: 8-28-90 USE OF WELL: Monitor
4. TOTAL DEPTH: 25' CUTTINGS COLLECTED: ☐ Yes ☑ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☑ No
6. STATIC WATER LEVEL: 15' FT. ☐ above ☑ below TOP OF CASING.
   TOP OF CASING IS 2' FT. ABOVE LAND SURFACE.
7. YIELD (gpm): 2 METHOD OF TEST: air
   WATER ZONES (depth): 10'
9. CHLORINATION: Type 0 Amount 0
10. CASING:

	Depth From	Depth To	Diameter	Wall Thickness or Weight/Ft.	Material
	0	20'	2"	.40	PVC

11. GROUT:

	Depth From	Depth To	Material	Method
	0	19'	cuttings	Pouring

12. SCREEN:

	Depth From	Depth To	Diameter	Slot Size	Material
	20	25	2"	.16 in.	PVC

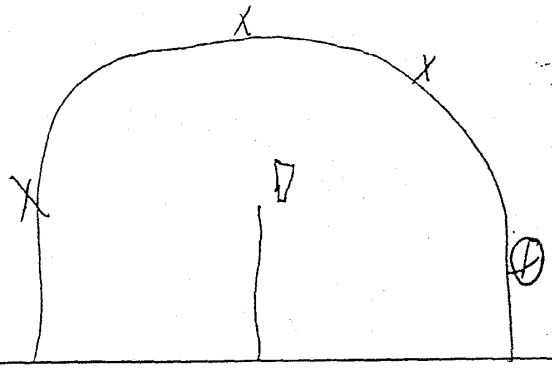
13. GRAVEL PACK:

	Depth From	Depth To	Size	Material
	19	25	sand	

Depth From	Depth To	DRILLING LOG Formation Description
0	5	sand
5	12	clay
15'	25'	sand & water

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)



REMARKS:

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Ralph Lawson Jr. 9-10-90
SIGNATURE OF CONTRACTOR OR AGENT DATE

Submit original to Division of Environmental Management and copy to well owner.

GW-1 Revised 6/88

WELL CONSTRUCTION RECORD

This form can be used for single or multiple wells

1. Well Contractor Information:

Gerald R. Eister

Well Contractor Name

2394-A

NC Well Contractor Certification Number

Bridger Drilling Entrp., Inc. dba Carolina Drilling

Company Name

2. Well Construction Permit #: _____

List all applicable well construction permits (i.e. County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural
- ☐ Municipal/Public
- ☐ Geothermal (Heating/Cooling Supply)
- ☐ Residential Water Supply (single)
- ☐ Industrial/Commercial
- ☐ Residential Water Supply (shared)
- ☐ Irrigation

Non-Water Supply Well:

- ☑ Monitoring
- ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge
- ☐ Groundwater Remediation
- ☐ Aquifer Storage and Recovery
- ☐ Salinity Barrier
- ☐ Aquifer Test
- ☐ Stormwater Drainage
- ☐ Experimental Technology
- ☐ Subsidence Control
- ☐ Geothermal (Closed Loop)
- ☐ Tracer
- ☐ Geothermal (Heating/Cooling Return)
- ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 6/4/13 Well #MW-1R

5. Well Location:

Wayne County Landfill

Facility/Owner Name

Facility ID# (if applicable)

460 B South Landfill Rd - Dudley, NC 28333

Physical Address, City, and Zip

Wayne

County

Parcel Identification No. (PIN)

5b. Latitude and Longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35.292302 N 78.064366 W

6. Is (are) the well(s): ☑ **Permanent** or ☐ **Temporary**

7. Is this a repair to an existing well: ☐ **Yes** or ☑ **No**

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. Number of wells constructed: 1

*For multiple injection or non-water supply wells **ONLY** with the **same construction**, you can submit one form.*

9. Total well depth below land surface: 27.32 **(ft.)**

For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 23.38 **(ft.)**

If water level is above casing, use "+"

11. Borehole diameter: 8.5 **(in.)**

12. Well construction method: auger

(i.e. auger, rotary, cable, direct push, etc.)

13. FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ **Method of test:** _____

13b. Disinfection type: _____ **Amount:** _____

For Internal Use ONLY:

14. WATER ZONES

FROM	TO	DESCRIPTION
15.65 ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
12.32 ft.	27.32 ft.	2 in.	.010	sch40	pvc
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0 ft.	9 ft.	neat	pressure tremie
9 ft.	11 ft.	bentonite	gravity
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
11 ft.	28 ft.	sand	in place
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0 ft.	8 ft.	tan sand
8 ft.	12 ft.	tan clay
12 ft.	17 ft.	sandy clay
17 ft.	28 ft.	white sand
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

replaces MW-1

22. Certification:

Gerald R. Eister

Signature of Certified Well Contractor

6/10/13

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well site details or well construction details. You may also attach additional pages if necessary.

24. Submittal Instructions:

24a. For All Wells: Submit this form within 30 days of completion of well construction to the following:

Division of Water Quality, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

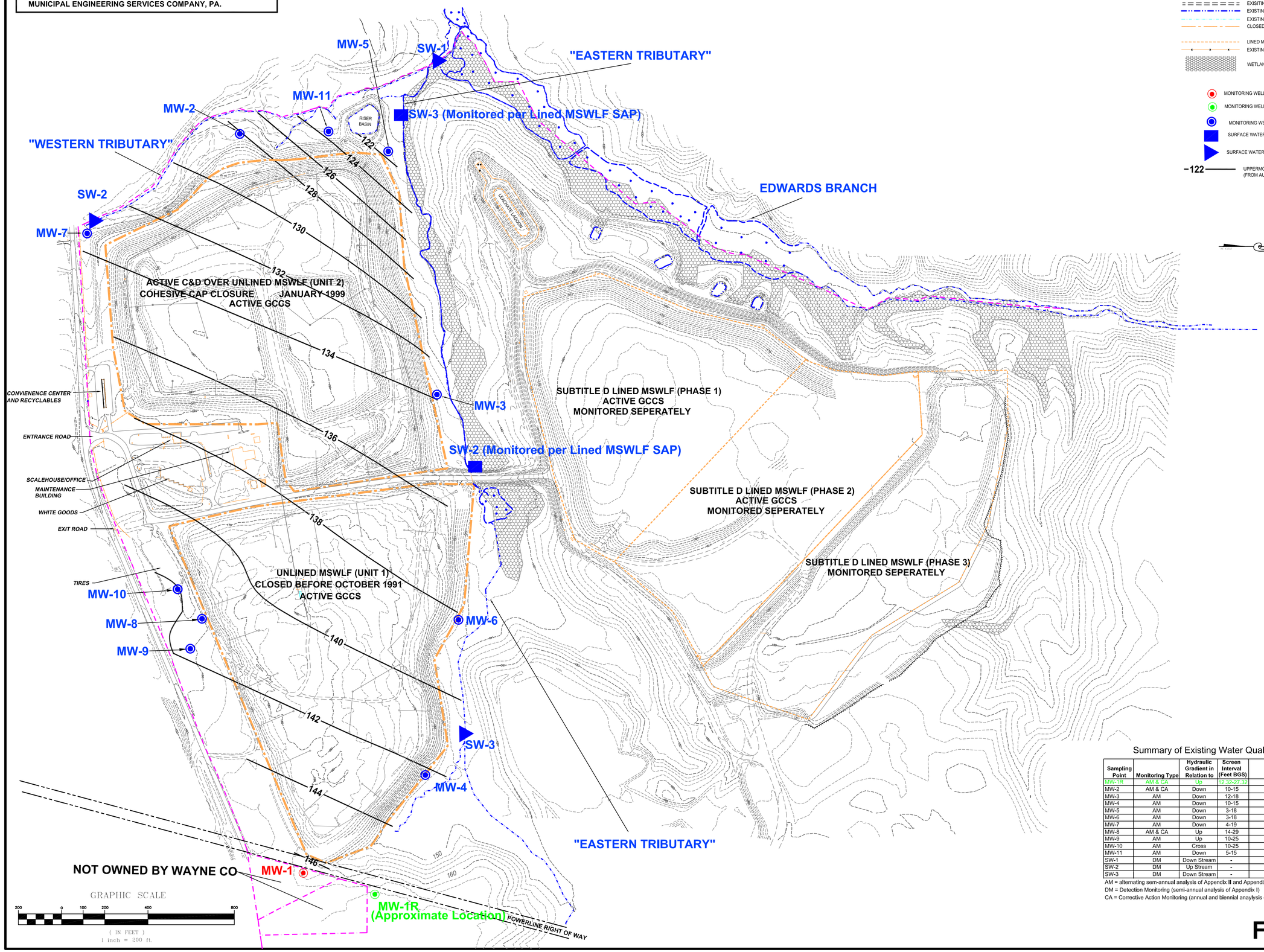
24b. For Injection Wells: In addition to sending the form to the address in 24a above, also submit a copy of this form within 30 days of completion of well construction to the following:

Division of Water Quality, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

24c. For Water Supply & Geothermal Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well construction to the county health department of the county where constructed.

TOPOGRAPHY IS FROM AERIAL PHOTOGRAPHY FLOWN AND A TOP0GRAPHIC MAP WAS PROVIDED BY DARREL S. MILLER, PLS ON 8/17/2007 AND SUPPLEMENTED WITH FIELD SURVEYS BY MUNICIPAL ENGINEERING SERVICES COMPANY, PA.

BACKGROUND WELL MW-1 ABANDONED & REPLACED BY MW-1R ON JUNE 4, 2013



LEGEND

- EXISTING TOPOGRAPHIC CONTOURS
- PROPERTY LINE
- EXISITING UNPAVED ROAD
- EXISTING CREEK, STREAM, ETC.
- EXISTING DIVERSION DITCHES
- CLOSED MSWLF ESTIMATED EXTENT OF WASTE
- LINED MSWLF PHASE LIMITS
- EXISTING CHAINLINK FENCE
- WETLANDS
- MONITORING WELL MW-1 (ABANONDED) LOCATION
- MONITORING WELL MW-1R APPROXIMATE (NON-SURVEYED) LOCATION
- MONITORING WELL (EXISTING)
- SURFACE WATER MONITOIRNG POINT (LINED MSWLF)
- SURFACE WATER MONITOIRNG POINT (CLOSED MSWLF)
- −122 UPPERMOST POTENIOMETRIC GROUNDWATER CONTOUR (FROM AUGUST 16, 2011 GROUNDWATER ELEVEVATIONS)

Summary of Existing Water Quality Monitoring Points

Sampling Point	Monitoring Type	Hydraulic Gradient in Relation to	Screen Interval (Feet BGS)	Monitored Unit
MW-1R	AM & CA	Up	12.32-27.32	Both (Units 1 & 2)
MW-2	AM & CA	Down	10-15	Active C&D and Closed MSWLF (Unit 2)
MW-3	AM	Down	12-18	Active C&D and Closed MSWLF (Unit 2)
MW-4	AM	Down	10-15	Closed MSWLF (Unit 1)
MW-5	AM	Down	3-18	Active C&D and Closed MSWLF (Unit 2)
MW-6	AM	Down	3-18	Closed MSWLF (Unit 1)
MW-7	AM	Down	4-19	Active C&D and Closed MSWLF (Unit 2)
MW-8	AM & CA	Up	14-29	Closed MSWLF (Unit 1)
MW-9	AM	Up	10-25	Closed MSWLF (Unit 1)
MW-10	AM	Cross	10-25	Closed MSWLF (Unit 1)
MW-11	AM	Down	5-15	Active C&D and Closed MSWLF (Unit 2)
SW-1	DM	Down Stream	-	Eastern & Western Tributary Confluence
SW-2	DM	Up Stream	-	Western Tributary
SW-3	DM	Down Stream	-	Eastern Tributary

AM = alternating sem-annual analysis of Appendix II and Appendix I plus Appendix II detections
DM = Detection Monitoring (semi-annual analysis of Appendix I)
CA = Corrective Action Monitoring (annual and biennial anaylysis of select MNA paramateres)

FIGURE 1

Municipal Engineering Services Company, P.A.
P.O. BOX 97 GARNER, N.C. 27529 (919) 772-5393
P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1767
LICENSE NUMBER: C-0281

ACTIVE C&D AND CLOSED MSW LANDFILL FACILIITY (DUDLEY)
WAYNE COUNTY
NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

SITE MAP WITH MONITORING LOCATIONS
BACKGROUND WELL MW-1 REPLACEMENT

SCALE: 1" = 200'
DATE: 6/15/13
DRWN. BY: J. PFOHL
CHKD. BY: M. DURWAY
PROJECT NUMBER G12016.0
DRAWING NO. FIGURE 1
SHEET NO. 1 OF 1

Subject: RE: wayne co lf wells
From: "Ritter, Christine" <christine.ritter@ncdenr.gov>
Date: 5/30/2013 3:15 PM
To: "jpfohl@mesco.com" <jpfohl@mesco.com>
CC: Mark Durway <mdurway@mesco.com>

DIN 19050

Jonathan and Mark-

The proposed well replacement location of MW-1R to replace background well MW-1 at the Wayne County Subtitle D landfill is approved as requested. Please submit the appropriate well construction record form for MW-1R and appropriate well abandonment record for MW-1 in accordance with NCAC 2C Well Construction Standards and after surveying the location of the replacement well, please modify the Ground and Surface Water Sampling and Analysis Plan for the Wayne County Subtitle D landfill with new groundwater monitoring well MW-1R located on figures.

The proposed well replacement of MW-16R to replace existing monitoring well MW-16 at the Wayne county Active C&D and Closed MSWLF is approved as requested. In accordance with 15A NCAC 13B .0538 (b) (2) (J), all piezometers within the footprint area must be overdrilled to the full depth of the boring, prior to cement or bentonite grout placement, and the level of the grout within the boring must not exceed the elevation of the proposed base grade. Please submit the appropriate well construction record form for MW-16R and appropriate well abandonment record for MW-16 in accordance with NCAC 2C Well Construction Standards and after surveying in the location of the replacement well, please modify the Water Quality Sampling and Analysis Plan for the Wayne County Closed Unlined MSWLF and Active C&DLD over closed MSWLF with new groundwater monitoring well MW-16R located on figures.

If you have any questions, please do not hesitate to call me.

Thank you,
Christine Ritter

From: Mark Durway [mailto:mdurway@mesco.com]
Sent: Friday, May 24, 2013 1:01 PM
To: Ritter, Christine
Subject: RE: wayne co lf wells

Not trying to rush you. Thanks.

From: Ritter, Christine [mailto:christine.ritter@ncdenr.gov]
Sent: Friday, May 24, 2013 11:03 AM
To: Mark Durway
Subject: RE: wayne co lf wells

I will try and start reviewing it today…hopefully by early next week I will be finished.

From: Mark Durway [mailto:mdurway@mesco.com]
Sent: Friday, May 24, 2013 10:52 AM
To: Ritter, Christine

Subject: wayne co lf wells

Christine,
To give you an idea of timeframe, JP hopes to drill the first week of June. Thank you.

D. Mark Durway, P.G.
Municipal Engineering Services Company, P.A.
PO Box 97
Garner, NC 27529
Tel (919) 772-5393, ext. 127
Fax (919) 772-1176
Mob (919) 924-6400
mdurway@mesco.com

PART 1 (MSWLF):

SECTION 1.0

ENGINEERING PLAN

1.1 Analysis of the Facility Design and Landfill Capacity

The Wayne County Municipal Solid Waste Landfill Facility (MSWLF), Permit number 96-06, was originally permitted in 1998. The county currently has three Municipal Solid Waste(MSW) phases of operation permitted: Phase 1, Phase 2 and Phase 3. The County also has two phases of Construction and Demolition Landfill (C&DLF) permitted. The County is proposing a vertical expansion, Phase 4, on the existing permitted area of the MSWLF and a vertical expansion, Phase 3, of the existing permitted C&DLF.

The MSW Facility consists of approximately 168.5 acres. This facility was originally designed and approved in 1998 (Phase 1), 2004 (Phase 2) and 2013 (Phase 3).

The facility consists of the Municipal Solid Waste Landfill (MSWLF) and a Construction and Demolition Landfill (C&D). In addition to these elements several things are processed at the facility. Processing includes storage, separation and/or grinding but not disposal of the materials processed. The processing facilities consist of Public Drop-off Area, Scrap Tire Storage, White Goods/Appliance Storage, Recycling Facility and Yard Waste.

The MSWLF unit is located a minimum of 300' from the property lines, 500' from existing wells, and 100' from any stream, river or lake, and the post settlement subbase elevation was prepared a minimum of four feet above the seasonal high groundwater table and bedrock. The liner system consists of a 60 mil HDPE geomembrane liner which was installed above and in direct uniform contact with a geosynthetic clay liner and compacted clay liner.

The County will cap their landfill within 180 days after the final receipt of solid waste. The cap system will consist of 12 inches bridging material (temporary cover), 1.50 feet of soil liner with a permeability no greater than 1.0×10^{-5} cm/sec, 40 mil Linear Low Density Polyethylene (LLDPE), drainage layer, 24 inches of protective/erosive layer. All depths shall be measured perpendicular to the slope surface. The cap contains gas venting system consisting of a series of washed stone trenches below the soil liner that will be vented through pipes with membrane boots that penetrate the cap. The cap system will also include the proper seeding and mulching of the erosive layer and other erosion control devices.

Landfill Capacity

The Life Expectancy calculations were calculated for Phase 4 of development (vertical expansion on Phases 2 and 3). Existing Phases 1, 2 and 3 combined are approximately 65 acres in size. Each successive phase will vary in size due to the vertical expansion above the previously filled areas. The current footprint (65 acres) has a permitted gross capacity of 5,365,695 cubic yards.

LIFE EXPECTANCY CALCULATIONS PHASE 4

Given:

Life expectancy is based on actual air space used from FY 2014-2015, which was 101,959 cubic yards.

Therefore using 101,959 cubic yards the first year and the waste stream growing at a 0.83% rate which is the same annual rate the population had grown between 1990 and 2000.

Phase 4 = 561,630 cubic yards available = 5.51 years

Soil requirements for daily cover and final cap for Phase 4
(on top of Existing Phase 2 and Phase 3)

Soil needed for Daily Cover (8:1, trash:soil) = 62,403 cubic yards
Soil needed for Closure (65 acres) = 471,900 cubic yards

Soil requirements for daily cover and final cap for Phases 1-8 (proposed 5,365,695 cubic yards of waste)

Soil needed for Daily Cover (8:1,trash:soil) = 596,188 cubic yards
Soil needed for Closure (65 acres) = 471,900 cubic yards

Overall Soil Requirements = 1,068,088 cubic yards (soil needed for closure, and daily cover)

The County's property consists of approximately 168.5 acres, of which, 143.5 acres is used for landfilling (active and closed). As the need arises the County will construct additional borrow sites utilizing the remaining property.

Note: All air space and soil calculation were determined by Autodesk Land Development computer program.

MSW - ACTIVE/INACTIVE PHASING TABLE

PHASE	**WASTE FOOTPRINT** (ACRE)	**GROSS CAPACITY** (CUBIC YARDS)	**STATUS**
1, 2 and 3	65	2,133,006	ACTIVE
4	VERTICAL EXPANSION	561,630	NEW PTO REQUESTED
5	VERTICAL EXPANSION	677,195	TO BE DEVELOPED
6	VERTICAL EXPANSION	645,215	TO BE DEVELOPED
7	VERTICAL EXPANSION	667,765	TO BE DEVELOPED
8	VERTICAL EXPANSION	680,884	TO BE DEVELOPED
TOTAL	**65**	***5,365,695**	

* Total Capacity defined as the volume measured between the bottom of waste (or the top of protective cover of landfill base system) and the top of the final cover of the landfill unit including the volume of daily cover and final cover system.

The estimate of maximum inventory of MSW wastes on-site over the life to date of the landfill facility is 2,133,006 cubic yards.

Estimated schedule of closure will be approximately 26 years.

1.1.1 Base Liner System Standards

The base liner system consists of a geomembrane liner which is installed above and in direct uniform contact with a compacted clay liner.

1. The site has met the following design requirements for Landfill subgrade.

   The landfill subgrade was adequately free of organic material and consist of *in situ* soils.

2. The site has met the following material requirements for the Standard/Alternate Liner Systems.

   The soil materials used in construction of the compacted clay liner may consist of on-site sources and possessed adequate native properties. The soil was free of particles greater than ¾ inch in dimension.

   The compacted standard clay liner (Phases 1 and 2) are 2.0 feet thick (measured perpendicular to slope) with a permeability not to exceed 1.0×10^{-7} cm/sec.

   The compacted alternate clay liner (Phase 3) is 1.50 feet thick (measured perpendicular to slope), with a permeability not to exceed 1.0×10^{-5} cm/sec. and is overlain by a Geosynthetic Clay Liner (GCL) and a geomembrane liner.

   The geomembrane liner material is high density polyethylene geomembrane with a thickness of 60 mils., which has a demonstrated water vapor transmission rate of not more than 0.03 gm/m^2-day. The liner and seaming materials have chemical and physical resistance not adversely affected by environmental exposure, waste placement and leachate generation.

3. The site has met the following design requirements for the Leachate Collection System.

   The Leachate Collection System is designed with stone filled trenches, collection pipes and 0.6 cm double bonded drainage net that allows less than one foot of head on the liner.

   The impingement rate on the drainage layer is at least equal to the peak monthly precipitation rate.

   The geometry of the landfill controls and contains the volume of leachate generated by the 24-hour, 25-year storm.

   The Leachate Collection System includes a pipe network with clean-outs, geotextile and filter fabrics.

   The Leachate Collection Piping has a minimum nominal diameter of six inches.

   The chemical properties of the pipe and all materials used in installation shall not be adversely affected by waste placement or leachate generated by the landfill.

   The pipe provides adequate structural strength to support the maximum static and dynamic loads and stresses imposed by the overlying materials and any equipment used in construction and operation of the landfill.

Strength of Pipe Calculations:

Rinker Materials PolyPipe Division Design and Engineering Guide for Polyethylene Piping

PolyPipe®

C Earthloading Critical Buckling

$$P_t = P_b + P_L + P_s$$

$$P_{CB} = \frac{1}{SF}\sqrt{\frac{2.67 \times B \times RW \times \Sigma_s \times \Sigma}{SDR^3}}$$

$$P_{CB} \geq P_t$$

See Page C-5 Thru C-8

09/17/2009

Rho	60	lbs/ft³
H	200	ft
PL	21	psi
PS	0	psi
HW	5	ft
SF	2	
DR	17	
E	30000	psi
Es	3000	psi
Pt	104.33	psi
Pcb	110.12	

Variable descriptions

Note: If Pcb is less than Pt, critical buckling of the pipe may occur.
DR = standard dimension ratio
Pcb = critical buckling stress
SF = safety factor (recommend SF = 2)
Rw = water buoyancy factor
' Rw = (1-(0.33*hw/h))
' Note: hw must be less than h
H = height of soil cover above pipe
Hw = height of water table above pipe
B = empirical coefficient of elastic support
e = 2.718
Es = soil modulus (see table C-4)
E = pipe modulus of elasticity
Ps = surface load exerted by a permanent structure in close proximity to buried pipe. See page C-6 for value calculation
PL = live load exerted by heavy equipment on surface above the pipe. See page C-7 for table of values. If depth of bury is greater than 4ft. then H20 load is 3psi and E80 load is 21psi. For depth of bury greater than 10ft. E80 load is 9psi.
Rho = Density of backfill meterial

Using this CD for Design Purposes

Due to wide variations in service conditions, quality of installation, etc., no warranty or guarantee, expressed or implied, is given in conjunction with the use of the calculations and analytical solutions

Select the appropriate soil modulus Es (psi). For crushed rock bedding use 3000 psi.

PolyPipe®

C Earthloading % Deflection

$$\% \text{ Deflection} = \frac{\Delta x}{D} \times 100$$

$$\text{where } \Delta x = \frac{DI \times K \times W}{\frac{2E}{3 \times SDR^3} + 0.61 \times E_s}$$

$$\text{where } W = \frac{C_d \times \rho \times B_d \times D}{144}$$

See Page C-4

09/17/2009

CD	3.0	
Rho	60	lbs/ft³
Bd	2	ft
D	6.625	in
DR	17	
H	200	ft
DI	1.50	
K	0.1	
E	30000	psi
Es	3000	psi
W	16.563	psi
delta X	0.013546	
% deflection	0.20446	

Variable descriptions

W = earthload
Cd = trench coefficient (See figure 15)
Rho = soil density
D = outside diameter of pipe
DR = Standard Dimension Ratio
Bd = trench width at top of pipe
H = height of backfill above top of pipe
delta x = vertical defection of pipe
DI = deflection lag factor (1.50)
K = bending constant (0.10)
E = modulus of pipe elasticity
Es = soil modulus

Using this CD for Design Purposes

Due to wide variations in service conditions, quality of installation, etc., no warranty or guarantee, expressed or implied, is given in conjunction with the use of the calculations and analytical solutions. PolyPipe® has checked the calculations in this CD and to the best of our knowledge these calculations are accurate. However, users of this CD assume all responsibility for the accuracy of the analytical solutions. In all cases, third party verification or a licensed professional engineer should be consulted prior to any actual selection of product or material specification or use.

Contact our Technical Services Group at (800) 433-5632 for further assistance.

Maximum allowable safe deflection for flexible polyethylene pipe w/DR 17 is 5%.

PolyPipe®

C Earthloading % Deflection

$$\% \text{ Deflection} = \frac{\Delta x}{D} \times 100$$

$$\text{where } \Delta x = \frac{Dl \times K \times W}{\frac{2E}{3 \times 6DR^3} + 0.61 \times E_s}$$

$$\text{where } W = \frac{C_d \times \rho \times B_d \times D}{144}$$

See Page C-4

09/17/2009

CD	3.0	
Rho	60	lbs/ft³
Bd	2	ft
D	8.625	in
DR	17	
H	200	ft
Dl	1.50	
K	0.1	
E	30000	psi
Es	3000	psi
W	21.563	psi
delta X	0.017635	
% deflection	0.20446	

Variable descriptions

W = earthload
Cd = trench coefficient (See figure 15)
Rho = soil density
D = outside diameter of pipe
DR = Standard Dimension Ratio
Bd = trench width at top of pipe
H = height of backfill above top of pipe
delta x = vertical defection of pipe
Dl = deflection lag factor (1.50)
K = bending constant (0.10)
E = modulus of pipe elasticity
Es = soil modulus

Using this CD for Design Purposes

Due to wide variations in service conditions, quality of installation, etc., no warranty or guarantee, expressed or implied, is given in conjunction with the use of the calculations and analytical solutions. PolyPipe® has checked the calculations in this CD and to the best of our knowledge these calculations are accurate. However, users of this CD assume all responsibility for the accuracy of the analytical solutions. In all cases, third party verification or a licensed professional engineer should be consulted prior to any actual selection of product or material specification or use.

Contact our Technical Services Group at (800) 433-5632 for further assistance.

Maximum allowable safe deflection for flexible polyethylene pipe w/DR 17 is 5%.

PolyPipe®

C Earthloading % Deflection

$$\% \text{ Deflection} = \frac{\Delta x}{D} \times 100$$

$$\text{where } \Delta x = \frac{DI \times K \times W}{\frac{2E}{3 \times SDR^3} + 0.61 \times E_s}$$

$$\text{where } W = \frac{C_d \times \rho \times B_d \times D}{144}$$

See Page C-4

09/17/2009

CD	3.0	
Rho	60	lbs/ft³
Bd	2	ft
D	10.75	in
DR	17	
H	200	ft
DI	1.50	
K	0.1	
E	30000	psi
Es	3000	psi
W	26.875	psi
delta X	0.02198	
% deflection	0.20446	

Variable descriptions

W = earthload
Cd = trench coefficient (See figure 15)
Rho = soil density
D = outside diameter of pipe
DR = Standard Dimension Ratio
Bd = trench width at top of pipe
H = height of backfill above top of pipe
delta x = vertical defection of pipe
DI = deflection lag factor (1.50)
K = bending constant (0.10)
E = modulus of pipe elasticity
Es = soil modulus

Using this CD for Design Purposes

Due to wide variations in service conditions, quality of installation, etc., no warranty or guarantee, expressed or implied, is given in conjunction with the use of the calculations and analytical solutions. PolyPipe® has checked the calculations in this CD and to the best of our knowledge these calculations are accurate. However, users of this CD assume all responsibility for the accuracy of the analytical solutions. In all cases, third party verification or a licensed professional engineer should be consulted prior to any actual selection of product or material specification or use.

Contact our Technical Services Group at (800) 433-5632 for further assistance.

Maximum allowable safe deflection for flexible polyethylene pipe w/DR 17 is 5%.

The Geosynthetic filter materials have adequate permeability and soil particle retention, and chemical and physical resistance which is not adversely affected by waste placement, and overlying material or leachate generated by the landfill.

All calculations for Sliding Block Stability Analysis, Foundation Settlement Calculations were provided by ECS Carolinas, LLP, in Phases 1, 2 and 3 Permit Applications.

1.1.2 Horizontal Separation Requirements

1. The MSWLF units are located a minimum of 300' from the property lines.
2. The MSWLF units are located a minimum of 500' from existing residences/wells.
3. The MSWLF units are located a minimum of 100' from any stream, river, or lake.

1.1.3 Vertical Separation Requirements

The MSWLF units were constructed so that post settlement bottom elevation of the base liner system is a minimum of four feet above the seasonal high ground-water table and bedrock.

1.1.4 Location Coordinates and Survey Control

Survey control coordinates are shown on the drawings and any additional information will be furnished upon request. Any location surveys will be performed by North Carolina Professional Land Surveyor.

1.1.5 Sedimentation and Erosion Control Plan

The Sedimentation and Erosion control plan was completed for the 24-hour, 25-year storm and submitted with Phases 1, 2 and 3 Permit Applications.

1.1.6 Cap System Standards

The County will cap their landfill within 180 days after the final receipt of solid waste. The cap system will consist of 12 inches bridging material (temporary cover), 1.50 feet of soil liner with a permeability no greater than 1.0×10^{-5} cm/sec, 40 mil Linear Low Density Polyethylene (LLDPE), drainage layer, 24 inches of protective/erosive layer. All depths shall be measured perpendicular to the slope surface. The cap contains a gas venting system that consists of a series of washed stone trenches below the soil liner that will be vented through pipes with membrane boots that penetrate the cap. The cap system will also include the proper seeding and mulching of the erosive layer and other erosion control devices.

Prior to beginning closure, the County will notify the Division of Waste Management that a notice of the intent to close the unit has been placed in the operating record. The County will begin closure activities no later than thirty (30) days after the date on which the landfill receives the final wastes or if the landfill has remaining capacity and there is a reasonable likelihood that the landfill will receive additional wastes, no later than one year after the most recent receipt of wastes. Extensions beyond the one-year deadline for beginning closure may be granted by the Division of Waste Management if the County demonstrates that the landfill has the capacity to receive additional waste and the County has taken and will continue to take all steps necessary to prevent threats to human health and the environment from the closed landfill.

The County will complete closure activities in accordance with the closure plan within 180 days following the final receipt of waste. Extensions of the closure period may be granted by the Division of Waste Management if the County demonstrates that closure will, of necessity, take longer than one hundred eighty (180) days and the County has taken and will continue to take all steps to prevent threats of human health and environment from the enclosed landfill.

Following closure of the landfill, the County will record a notation on the deed to the landfill property and notify the Division of Waste Management that the notation has been recorded and a copy has been placed in the operating record. The notation on the deed will in perpetuity notify any potential purchaser

of the property that the land has been used as a landfill and its use is restricted under the closure plan approved by the Division of Waste Management. The County may request permission from the Division to remove the notation from the deed if all waste is removed from the landfill.

1.1.7 Leachate Storage Requirements

The County's existing leachate lagoon was designed and built with a minimum of two feet of freeboard. Odor and vector controls are practiced when necessary. A groundwater monitoring system has been installed. The lagoon is protected from external damage by an 8' high chain link fence.

The management of leachate is a major daily operational task. The generation of leachate should always be kept to a minimum. The leachate that is generated will be pumped to the City of Goldsboro Wastewater Treatment Plant. The leachate is treated according to the pre-treatment agreement with the City of Goldsboro. The reason for this testing is to assure the City that the leachate will not harm the biological processes in their treatment facility. The County also records rainfall events as they occur and leachate generation to track the effect rainfall amounts have on the amount of leachate that is generated.

The leachate will be collected in the existing double lined lagoon, which will hold approximately 1,012,029 gallons at 8 feet deep. The Lagoon is 10 feet deep which allows for 2 feet of free board. In the event that the lagoon fills up faster than it can be pumped by forcemain to the City of Goldsboro WWTP, the control valves on the leachate lines can be turned off which will allow the lagoon to be drawn down. Once the leachate levels have been lowered, the valves can be opened. Leachate will be a management problem from the time the garbage is placed in the landfill until long after closure has taken place. Consequently, it is imperative that stormwater be diverted away from any solid waste and managed properly.

All stormwater falling outside of the existing lined areas will be diverted away from the lined section through the use of diversion berms and ditches. Stormwater that falls within the lined area but does not come in contact with solid waste can be diverted to the perimeter areas of the landfill.

The County will close the leachate lagoon within 180 days after liquid collection has ceased.

All solid waste will be removed from the leachate lagoon, connecting sewer lines, and manholes. All solid waste removed will be properly handled and disposed of according to Federal and State requirements. All connecting lines will be disconnected and securely capped or plugged.

All waste residues, contaminated system components (composite liner system), contaminated subsoils, structures and equipment contaminated with waste will be removed and appropriately disposed. If the groundwater surrounding the impoundment is contaminated, other corrective actions to remediate a contaminant plume will be performed if required by the Division. If the groundwater, surrounding the lagoon is found not to be contaminated, the liner system may remain in place if drained and cleaned to remove all traces of waste, and both liners punctured so that drainage is allowed. The lagoon is to be backfilled and re-graded to the surrounding topography.

1.1.8 Existing Landfill Leachate Permit and Flow Data

The County has pumped 8,654,072 gallons of leachate from July 2014 thru June 2015 to the City of Goldsboro Waste Water Treatment Plant.

The existing Utility Agreement between The County of Wayne and the City of Goldsboro is set to expire on March 3, 2020. The County must submit to the Solid Waste Section a copy of the renewal agreement on or before March 3, 2020 to retain the life of site permit of the MSWLF unit.

March 3, 2000

Utility Agreement between the County of Wayne and City of Goldsboro to Treat Wastewater

County Attorney E. B. Borden Parker stated the State of North Carolina would not renew the permit for the Genoa wastewater treatment plant without improvements being made and placing it on another site. The City of Goldsboro has agreed to treat the wastewater and monitor the wastewater, but not take over the system. The County of Wayne is responsible for the new line to the City of Goldsboro wastewater treatment plant and from the Genoa wastewater treatment plant to the users. The City of Goldsboro will treat the County of Wayne as an outside user. The County shall pay the City two times the City's prevailing rate for an outside user who has not purchased reserved capacity for the volume of exceedance multiplied by the number of days in the billing cycle for any 30 days the County exceeds 10,000 gallons over 400,000 gallons per day. The rate for exceeding 25,000 gallons per day is equal to three times the City's prevailing rate for an outside user. The County of Wayne is responsible for any damage it causes the City of Goldsboro wastewater treatment plant. Satellite annexation users and Brogden Middle School are not counted in the County's gallons per day allocation. The County will need to install a sampling station at the landfill due to the leachate. Inflow and infiltration must be stopped so the County does not have to pay for it. If the manhole has unacceptable odors, the county will need to install a device to filter out odors. The County is not getting out of sewer business; we are only getting out of the sewer treatment business. The City will be the entity to give permits for significant industrial users and the County will be one with the landfill. The County of Wayne will have to adopt Goldsboro's sewer ordinance. The State of North Carolina is requiring all municipalities and counties to adopt storm water ordinances and programs. Wayne County's will have to be the same as Goldsboro's.

Al Hodge with the Division of Water Quality of the North Carolina Department of Environment and Natural Resources urged the Board of Commissioners to approve the agreement with the City of Goldsboro. The Division of Water Quality supports centralized wastewater treatment systems. Centralized systems tend to do a better job of treating wastewater. If the County does not approve the agreement, the Genoa wastewater treatment plant would have to be built on another site. The agreement is best for the environment and best for the County of Wayne. He recommended the County remove leaking ground water and water running into the manhole covers. Mr. Hodge expected the permit for the City of Goldsboro to increase its effluent to be approved by the end of the year. Wastewater treatment has become very expensive. He stressed the need to search for alternate methods of using wastewater; such as irrigation uses, outside uses and for toilets.

County Manager Will R. Sullivan stated the effluent for the County of Wayne will remain at 400,000 gallons per day. There is no automatic increase for the County of Wayne even if the City of Goldsboro receives an increase in its effluent.

Upon motion of Commissioner Wilbur E. Anderson, the Board of Commissioners unanimously approved and authorized an utility agreement between the County of Wayne and City of Goldsboro to treat wastewater, attached hereto as Attachment D.

Chairman Atlas Price, Jr. thanked the City of Goldsboro, County Manager Will R. Sullivan, County Attorney E. B. Borden Parker and Buildings and Grounds Superintendent Brant Brown for their cooperation in bringing the agreement to fruition.

STATE OF NORTH CAROLINA

COUNTY OF WAYNE

UTILITY AGREEMENT-CITY AND COUNTY

THIS AGREEMENT, made and entered into this 3rd day of March, 2000 by and between THE CITY OF GOLDSBORO, a municipal corporation existing under the laws of the State of North Carolina (hereinafter called "the City"), and WAYNE COUNTY, a body politic existing under the laws of the State of North Carolina (hereinafter called "the COUNTY".

W I T N E S S E T H:

WHEREAS, the City is the owner and operator of a wastewater treatment plant, which is being expanded to at least 14.2 MGD of treated capacity; and

WHEREAS, the County has reviewed and analyzed many different options relative treatment of it's wastewater at the Genoa Wastewater Treatment Plant; and

WHEREAS, the most cost effective, environmentally sound, and best long term method of wastewater disposal for the County is achieved by abandoning the County's existing wastewater treatment facility and conveying wastewater to the City's wastewater treatment plant.

NOW, THEREFORE, for and in consideration of the respective rights, powers, duties and obligations hereinafter set forth to be performed by the City and the County, the parties mutually agree as follows:

F:\wp7\OB\COG\GSNOAAG.WPD

1. Definitions

a.	County -	County of Wayne
b.	City -	City of Goldsboro
c.	MGD -	Million Gallons Per Day
d.	GPD -	Gallons Per Day
e.	GPM -	Gallons Per Minute
f.	IU -	An industrial user that does not fall under the criteria for a SIU
g.	IUP -	Industrial User Permit
h.	SIU -	Significant Industrial User (See definition in current Sewer Use Ordinance)
i.	NPDES -	National Pollutant Discharge Elimination System
j.	SUO -	Sewer Use Ordinance
k.	EPA -	Environmental Protection Agency
l.	CERCLA -	Comprehensive Environmental Response, Compensation and Liability Act
m.	DENR -	Department of Environment, and Natural Resources
n.	RU -	Residential User - A single-family or multi-family residential user
o.	NRU -	Non-Residential User - A wastewater contributor that is not a single-family or multi-family residential user.

2. Users to be Served: Since the sewer capacity of the City and its waste treatment plant is limited, the ability of the City to serve its users within the City must have a first priority. However, under the terms of this Agreement, the City and County have agreed upon a priority for providing sewer service to certain areas outside the City of Goldsboro in the following order:

(a) Those users in the area of Wayne County which are currently being provided sewer service by the Genoa WasteWater Treatment Plant as shown on Exhibit "A";

(b) Those users to which the County has obligated itself to provide sewer service as shown on Exhibit "B";

(c) Those potential users who are experiencing sewer problems on existing septic tanks or improper soil conditions so

septic tanks cannot be installed and are located so that they can connect with the Genoa WasteWater Treatment Plant;

(d) Those users in (a) and (b) above who have requested additional sewer service; and

(e) Additional users who desire sewer service through the Genoa WasteWater Treatment Plant.

Except for the users referred to in (a) and (b) above, the County shall obtain the City's concurrence and approval before the addition of any non-residential user or increased flow on existing non-residential users. Additionally, the extension of sewer service to any other governmental entity shall require the City's approval and/or a separate agreement.

Even though the City has agreed to extend sewer service to the current users set forth on Exhibit "A" and to fulfill the commitment of the County to the users set forth on Exhibit "B", it is understood and agreed that the total monthly flow from all county users (excluding Brogden Middle School), shall not exceed 400,000 GPD. Users annexed into the City shall not be included in computing the total monthly flow allowed the County. Further, the County shall adopt a fee schedule of flow exceedences for the users shown on Exhibits "A" and "B" that have a permitted daily flow and any additional users assigned a permitted daily flow hereinafter served by the City to insure that the aggregate monthly flow of its customers shall not exceed 400,000 GPD. Finally, County acknowledges and has agreed that City's Sewer Use

Ordinance allows City to regulate significant industrial users, industrial users, residential users and non-residential users.

3. Construction of Line, Meter and Maintenance, by County: The County shall be responsible for the design and construction of the wastewater conveyance system from it's Genoa plant to the City's wastewater treatment plant culminating at the influent structure. In order to limit flows to those specified in this Agreement, capacity of the wastewater conveyance system from the County's system shall be limited to 1.5 of the maximum daily flow allowable under this Agreement. This limitation on capacity shall be designed into the proposed system and approved by the City. The methods of flow constraints shall include, but shall not be limited to, one or more of the following:

a. Pump station design; the pump station will be designed to not exceed 417 GPM maximum pumping capacity. (417 GPM = 400,000 gal. x 1.5)

b. Force main design;

c. Restricting valves;

d. or A semi-permanent flow constriction designed into the system.

At the time the City's wastewater treatment expansion is completed to at least 14.2 MGD, the aforementioned flow constraint may be adjusted to accommodate additional flows provided the City has additional capacity. The system to be designed and constructed by the County shall consist of the following elements:

a. One (1) 0.60 MGD(peak day) pumping station to be located as determined by the County's Engineer.

b. A twelve inch (12") force main from the Genoa plant to the City's wastewater treatment plant.

c. A flow meter to be located as determined by the City's Engineer between the County's force main and the City's wastewater treatment plant.

d. All wastewater shall flow through a bar screen before entering a force main. The screen shall have not more than 3/8 inch spaces between the bars before entering a force main.

e. The City reserves the right to require the County to install such odor control/reaeration facilities as the City deems necessary from time to time to prevent odors or septic conditions.

f. County shall be responsible for the operation and maintenance of its collection system, the pumping station, force main, and odor control/re-aeration facilities.

4. Metering Facility - Maintenance: The point of flow measurement shall be installed at a location to be approved by the City so as to provide accurate measurements. It shall be designed by the County's engineer and approved by the City Public Utilities Director and installed at the County's expense. A vault shall be constructed with a magnetic flow measuring device which will measure, display and transmit flow information to the City's SCADA system. The metering device shall be capable of instantaneous measurement to a prescribed accuracy with continuous readout of

flow rate and totalized flow. The in-line meter shall be recalibrated every 6 months or sooner, if needed, by an independent contractor employed by the City. The maintenance of the metering facility shall be performed by the City. The County shall reimburse the City for the actual cost of said maintenance and re-calibration and the replacement and/or repair thereof which shall be billed by the City on a monthly basis. The City shall have access to the meter at all times.

5. Sampling Stations:

(a) The County shall construct a suitable wastewater sampling station for use by the City at the County's expense. This facility shall be integrated with the metering facility as previously described under Section 4 above and approved by the City. This wastewater sampling station shall include a refrigerated sampler with the capabilities of timed volume/flow proportional, sequential sampling device, housed in a locked compartment. The maintenance of this sampling station shall be performed by the City. The County shall reimburse the City for the cost of the maintenance, replacement and/or repair thereof, including utility cost, which shall be billed by the City on a monthly basis.

(b) The County shall also construct a sampling station for use by the City at the County's expense to accept the County's landfill Leachate. This sampling station shall be located at the County landfill with a twenty-four hour composite sampling station and flow meter acceptable to the City. In addition, the County

shall be treated by the City as an SIU for its landfill Leachate with its permit allowing up to 15,000 gallons per day. In the event the County's Leachate causes a toxicity or other problem for the City and its wastewater plant, then the County, after written notice from the City, shall immediately cease to discharge its Leachate into the City's collection system until the County can provide adequate pretreatment to resolve the problem. The mainenance of this sampling station shall be performed by the City. The County shall reimburse the City for the cost of the maintenance, replacement and/or repair thereof which shall be billed by the City on a monthly basis.

6. City Review:

a. The City shall receive a copy of the State-approved engineering drawings for the County's forced main from the Genoa plant to the City's wastewater treatment plant prior to the construction of these facilities, along with a copy of notice to proceed and a copy of the certificate of completion submitted by the County to DENR along with a copy of DENR's final approval.

b. The County shall provide the City with a list of all current non-residential users who discharge into the County's existing system. Each non-residential user shall be required to obtain written permission from the City to continue to discharge into the County's existing system. The City reserves the right to require a new discharge permit for all of the County's existing non-residential users in accordance with the City's current policies and procedures. Further, all new non-residential users,

or expanding existing non-residential users, who discharge industrial and/or domestic wastewater into the County's system shall obtain written permission from the City or, in the City's discretion, a discharge permit from the City before connecting to the County's wastewater conveyance system.

c. The County shall provide the City with copies of all proposed applications to be forwarded to DENR for non-discharge permits for all sewer main extensions for the City's approval. The City's approval shall be based upon the subsequent approval by DENR, and the City's ability to accept additional customers.

7. Limitations on Acceptance of County Flows and Effluent Limits: Due to limitations of its current NPDES permit, the City is unable to accept additional flows and effluent from the County's system. Therefore, it is necessary for the City's wastewater treatment plant to be expanded to at least 14.2 MGD or have the City's permit re-rated to 700,000 GPD.

Before the County can connect to the City's wastewater treatment plant, the City must have its permit re-rated or its plant expanded to 14.2 MGD, and the acceptance of the County's wastewater by the City approved by DENR. Further, the County agrees to transfer all of its nitrogen poundage and all other additional effluent rights or privileges under its current Genoa NPDES permit without cost to the City.

8. City's Rates: On a monthly basis, the County shall pay to the City an amount equal to the City's prevailing rate for an outside the City user who has not purchased reserve capacity. In

the event there are sewer users served by the County who have been annexed into the City, then and in that event these users will be charged for sewer as inside the City users based upon the user's monthly metered water flow. Any credit due a user located in an annexed area who is billed by the County shall receive a refund from the City on a semi-annual and not monthly basis. The County shall be responsible for the payment of all bills to the City for any and all users (including other governmental entities) who are served on the County's wastewater conveyance system. In the event there are surcharges, these surcharges (see Exhibit C, Resolution No. 1995-64, paragraph 3) shall be paid monthly to the City by the County in an amount equal to the City's prevailing rate charged other similar users.

All bills received by the County under this Agreement, are due and payable within fifteen (15) days after receipt thereof. The City shall provide the County forty-five (45) days written notice of any rate changes enacted by the City.

9. Monitoring Charges: In addition to the rates set forth in Section 8 above, the County shall be required to pay to the City monitoring charges.

For the purpose of determining these monitoring charges, the City shall collect at the sampling station flow proportional composite samples, and shall analyze these samples at a minimum of not less than one time per week. The results of the analysis of said samples shall be utilized in determining the sampling criteria as shown in Exhibit D (Sewer Regulations, Chapter 51 of

the City of Goldsboro Code of Ordinances). Upon request, the City shall provide the County equal split portions of the samples which have been taken for analysis by the City. The analysis reports shall be submitted monthly in writing to the County. The discovery by the City of violations of the discharge limitations by the County as shown on Exhibit D shall be verbally reported to the County within 24 hours of becoming aware of the violation. A written report shall be issued within thirty (30) days. The County shall reimburse the City quarterly for its cost in collecting samples and preparing these analysis (See Exhibit C).

10. Monthly Flow Limitations - Exceedences: As set forth in Section 7, this Agreement is subject to the re-rating of the City's current permit or to a new expanded permit being issued to the City for 14.2 MGD and approval by DENR.

The County's average monthly flow shall not exceed 400,000 GPD. When the County's average monthly flow reaches 320,000 GPD, the City and County shall immediately meet for the purpose of addressing the County's average monthly flow and its customers and potential flow problems. In the event the County's average monthly flow reaches 360,000 GPD, the County shall issue a moratorium on any additional customers or increases in flow from existing customers and shall again meet with the City to address its average monthly flow and potential flow problems. In the event the County's average monthly flow exceeds 400,000 GPD, the County shall immediately take steps to reduce the monthly flow of

its customers and shall present to the City its plan for said reduction in that regard.

In the event the County's average monthly flow exceeds 400,000 GPD for a period of thirty (30) days, the County shall pay to the City the following:

(a) For any 30 days that the County's monthly exceedance is 10,000 GPD, the County shall pay to the City an amount equal to two times the City's prevailing rate for an outside the City user who has not purchased reserved capacity for the volume of the exceedence multiplied by the number of days in the billing cycle;

(b) For any 30 days that the County's monthly exceedance is 25,000 GPD or greater, the County shall pay to the City an amount equal to three times the City's prevailing rate for an outside the City user who has not purchased reserved capacity for the volume of the exceedence multiplied by the number of days in the billing cycle; and

(c) In the event the exceedence over 400,000 GPD is not corrected by the County within 120 days, after its first monthly flow exceedence, this exceedence shall constitute a breach of this Agreement and cause for the City to terminate this agreement as provided for under Section 22.

11. <u>County's User Charge System</u>: The County shall establish and maintain a User Charge system which shall generate sufficient revenue to provide for the complete and adequate operation of its sewerage system and its maintenance. The County shall also maintain, at all times during the term of this agreement,

sufficient funds to finance the cost of any capital improvements that may be necessary to maintain its sewerage system. Such user charges shall be updated from time to time to remain in compliance with all federal and State laws and regulations, including an ongoing effort and commitment to resolve the County's inflow and infiltration problems, it may be necessary to maintain its sewer system.

12. County's Rates: The County shall charge and collect sewer connection fees in an amount not less than those charged by the City. In addition, the County shall not charge wastewater sewer service to any user within the service area unless such charge is at a rate equal or greater than City's charges to supply wastewater sewer service to the County.

13. County's Sewer Use Ordinance and Storm Water Management Plan:

a. The County shall adopt the City's Sewer Use Ordinance (including all amendments and additions thereto). In the event the County contracts with another governmental entity to perform its duties and obligations under this Agreement, the contract shall be subjected to the City's approval. The sewer use ordinance adopted by the County shall comply with all current State and/or EPA regulations and shall be updated from time to time to meet all future federal and State requirements. The sewer use ordinance adopted by the County shall be forwarded to the City.

(b) The County shall adopt a Storm Water Management Plan which shall be no less stringent than the City's Storm Water Management Plan. Further, any additional governmental entity which shall become a user of the County shall likewise adopt a similar Storm Water Management Plan. Any Storm Water Management Plan adopted by the County or any other governmental entity shall comply with all current State and/or EPA regulations which shall be updated from time to time to meet all future Federal and State requirements. Any Storm Water Management Plan shall be approved by the City prior to its adoption by the County or any other governmental entity.

14. Industrial Pre-Treatment Program: The City shall administer and issue all permits for the industrial pre-treatment program for the County or any other governmental entity which conveys wastewater to the City. If any enforcement action is needed, the City shall follow its enforcement policy and, when necessary, the County shall terminate the non-residential user's water and/or sewer service after written notification to such user from the City. It shall be the City's responsibility to collect any and all fines and penalties from any SIU. The City shall notify the County of any civil penalty to be assessed against a non-residential user. The City shall assess and collect civil penalties of the County's non-residential users in accordance with the City's policies and procedures. The failure by the County to terminate a non-residential user's water and/or sewer service

shall constitute a breach of this Agreement and cause for the City to terminate this Agreement as provided for under Section 22.

15. Emergency Condition: In the event an emergency condition arises at the City's wastewater treatment facility, the County, after notice, shall immediately take such remedial action in order to assist the City in the elimination of the emergency condition. The County shall and does hereby assume and agree to indemnify and hold harmless the City, its successors and assigns, from and against any and all losses, fines, costs, and expenses, including attorney fees, from damage to the City's system or other property caused by, or in any way resulting from an emergency event caused by the County. Finally, the City shall and does hereby assume and agree to indemnify and hold harmless the County, its successors and assigns, from and against any and all losses, fines, costs, and expenses, including attorney fees, from damage to the County's system or other property caused by, or in any way resulting from an emergency event caused by the City, provided the County has utilized a proper remedial action in resolving the emergency conditions.

16. Interference, Pass-Through Biological Upset: The County shall and does hereby assume and agree to hold harmless the City, its successors and assigns, from harm and against any and all losses, fines, costs, and expenses, including attorney fees, from damage caused by or in any way resulting from a biological upset of the City's treatment facility as a result of the levels of

metals or toxic contaminants contained in the wastewater being discharged by the County to City's wastewater treatment plant.

17. Environmental Liability: The County shall and does hereby assume and agree to hold harmless the City, its successors and assigns, from and against all losses, costs, expenses, including attorney fees, fines and penalties caused by, or in any way resulting from, any claim resulting from wastewater being discharged by the County to the City's wastewater treatment plant, or as a result of any other discharges, including a spill, from the County or any of its users.

18. Force Majeure: In the event either the City or the County is unable, in whole or in part, by reason of force majeure to carry out its obligations, other than to make payments for wastewater treatment services received, it is agreed that on giving notice of such force majeure as soon as possible after the occurrence of the cause relied upon, then the obligation of the City or the County, so far as each may be affected by such force majeure, shall be suspended from performance hereunder during the continuance of any inability to obtain permit, but for no longer period and such cause shall be, as far as possible, be remedied with all due speed. The term "force majeure" shall mean acts of God, strikes, lockouts or other industrial disturbances, acts of public enemy, war, blockades, riots, landslides, droughts, storms, floods or washouts, arrest and restraints of governments and people, civil disturbances, explosions, unavoidable breakage, accident to machinery and equipment and sanitary sewer lines,

inability to obtain permits or materials and equipment and supplies, and any other cause not within the control of the City or the County, which by the exercise of reasonable diligence by the City of the County, is not preventable.

19. Term: This Agreement shall be effective after the date of its approval by the County and the City. It shall continue for a period of twenty (20) years from the date upon which wastewater sewer service is first treated for the County, pursuant to the terms of this Agreement. The City shall, prior to the beginning of the seventeenth year of the term of this Agreement, give notice to the County of its desire to renew this Agreement. Upon giving such notice, the City and the County shall negotiate in good faith with reference to a renewal agreement based upon the same rate format contained in this Agreement. However, without cause, the County may terminate this Agreement at any time upon one year's written notice.

20. Arbitration: Any dispute concerning this Agreement shall, at the request of either the City or the County, be submitted to and determined by an arbitration panel of three (3) arbitrators, pursuant to the terms of this section and the Uniform Arbitration Act (hereafter "the Act") as adopted by the State of North Carolina, and its general statutes in Section 1-567.1 through 1-567.29, as amended. The City and the County shall each appoint one (1) qualified member to the arbitration panel, and these appointees shall select a third member. A majority vote of the arbitration panel shall control and be binding on the City and

the County without recourse, except as otherwise provided in the Act. If the two (2) arbitrators first chosen can not agree on the selection of a third arbitrator, then, upon application by the City or the County, such third arbitrator shall be appointed by the Court having jurisdiction over such matters as provided in the Act. To be qualified, such third arbitrator shall be a professional engineer with experience in production and delivery of sanitary sewer service, a certified public accountant, or a practicing attorney with experience in municipal utility matters. Pursuant to the Act, the cost to be paid by the City and the County associated with arbitration shall be determined by the arbitration panel. The City and the County shall each continue to perform all other obligations under the terms of this Agreement pending final resolution of any dispute arising out of or relating to this Agreement which has been submitted to arbitration. Neither the City nor the County may violate any federal, state, or local law or regulation regarding the wastewater sewer service being provided herein during the course of pursuing its rights under this section, or shall the user be denied the wastewater sewer service necessary to reasonably maintain the public health and safety.

21. Discrimination: It is specifically agreed by both parties hereto, as part of consideration of the signing of this Agreement, that neither the County nor the City, its agents, officials, employees, or servants shall discriminate in any manner on the basis of race, color, creed, sexual orientation, or

national origin with reference to the subject matter of this Agreement.

22. Nonpayment and/Default: The City may terminate this Agreement and terminate the County's right to discharge wastewater to the City's wastewater treatment plant one hundred and twenty (120) days after written notification to the County by the City for the non-payment of fees, cost, charges or fines as set forth in this Agreement, or for the breach by the County of any other condition contained in this Agreement.

23. Waivers: Neither the failure nor the delay on the part of the City or County hereto to exercise any right, power, or privilege hereunder shall operate as a waiver hereof, nor shall any single or partial exercise of any other right, power, or privilege, nor shall any custom or practice at variance with the terms of this Agreement constitute a waiver of the right of either party to demand exact compliance with such terms.

24. Invalid Terms: Should any one or more of the provisions contained in this Agreement be held invalid, illegal, or unenforceable in any respect, the validity, legality and enforceability of the remaining provisions contained in this Agreement shall not in any way be affected or impaired thereby, and this Agreement shall otherwise remain in full force and effect.

25. Controlling Law: This Agreement and the rights and obligations of the parties hereunder shall be construed and interpreted in accordance with laws of the State of North

Carolina, and shall be binding upon and inure to the benefit of their successors and, with consent of the other party, the assigns of either party hereto.

26. Notices: Any notices required or permitted under this Agreement, including address changes, shall be made in writing either by mailing registered or certified mail, return receipt requested, and postage prepaid, to the other party at the address shown herein for that party, or at such different address for that party, notice of which has been properly given hereunder, or by personally delivering such a notice to an officer of the other party. The notice, if mailed as provided for herein, shall be deemed given on the day of receipt or refusal to accept receipt, and if personally delivered, on the date of delivery. The addresses are as follows:

To the City: City Manager
City of Goldsboro
P. O. Drawer A
Goldsboro, NC 27533

To the County: County Manager
County of Wayne
P.O. Box 227
Goldsboro, NC 27533-0227

27. Entire Agreement: This Agreement reflects and contains the entire and only agreement between the parties related to the subject matter herein, and, as such, supersedes all negotiations, commitments and agreements, whether oral or otherwise.

28. Amendments: This Agreement may be amended only by an instrument in writing executed by both parties hereto.

IN WITNESS WHEREOF, The City and the County have caused this Agreement to be executed its Mayor and Chairman respectively, their corporate seals to be affixed and attested by their respective Clerks, all by the authority of their respective governmental bodies the day and year first written.

CITY OF GOLDSBORO

BY: _____
Mayor

ATTEST:

_____
City Clerk

APPROVED (as to form only)

W. Harrell Freeman Jr.
City Attorney

County of Wayne
Wayne County Board of Commissioners

BY: _____
Chairman

ATTEST:

Marcia R. Wilson
County Clerk

APPROVED (as to form only)

_____
County Attorney

NORTH CAROLINA
WAYNE COUNTY

This the _____ day of _____, 2000, personally came before me _____, a Notary Public in and for said State and County, SANDRA JUSTICE, who by me duly sworn, says that she knows the common seal of the CITY OF GOLDSBORO and is acquainted with _____, who is the Mayor _____ of said municipal corporation; that she, the said SANDRA JUSTICE, is its Clerk; and that she saw the Mayor sign the foregoing instrument; and that she, the said Clerk, saw the said common seal of said corporation affixed thereto, and that she, the said Clerk, signed her name in attestation of said instrument in the presence of said Mayor of said municipal corporation.

Witness my hand and seal this the _____ day of _____, 2000.

_____
Notary Public

My Commission Expires:
_____

NORTH CAROLINA
WAYNE COUNTY

This the 13th day of March, 2000, personally came before me Cynthia B. Furcron, a Notary Public in and for said State and County, MARCIA WILSON, who by me duly sworn, says that she knows the common seal of the WAYNE COUNTY BOARD OF COMMISSIONERS and is acquainted with ATLAS PRICE, who is the Chairman of said body politic; that she, the said MARCIA WILSON is its Clerk; and that she saw the Mayor sign the foregoing instrument; and that she, the said Clerk, saw the said common seal of said body politic affixed thereto, and that she, the said Clerk, signed her name in attestation of said instrument in the presence of said Chairman of the Wayne County Board of Commissioners.

Witness my hand and seal this the 13th day of March, 2000.

Notary Public

My Commission Expires:
April 20, 2003

1.1.9 Foundation Settlement, and Slope Stability Analysis

All calculations for Sliding Block Stability Analysis, Foundation Settlement Calculations were provided by ECS Carolinas, LLP, in Phases 1, 2 and 3 Permit Applications.

1.1.10 Applicable Location Restriction Demonstrations

All location restrictions were handled in the site study.

SECTION 2.0

OPERATION PLAN

2.1 Introduction

The County Landfill will only accept Municipal Solid Wastes (MSW) from the County. The County will perform the proposed Phase 4 vertical expansion on the existing 65 acre Municipal Solid Waste Landfill (Phases 1, 2 and 3) according to Subtitle D requirements.

The perimeter of the lined area is marked off by 2 inch PVC pipe at 100' intervals that are placed in the anchor trenches. Solid waste will not be placed within four (4) feet of this boundary to assure that it is being placed directly above the liner system so that no leachate can flow outside of this area.

All stormwater that comes in contact with solid waste will be handled as leachate. The leachate is collected in the sump area, where it is pumped by force main to the lagoon.

Storm water that has not come in contact with waste can be removed from the landfill by pumping thru a sump pump over the berm prior to waste being placed in the sump basin. A mobile pump can also be used to pump storm water over the berm.

Leachate will be pumped and treated at the Goldsboro Wastewater Treatment Plant. The leachate will have to be tested according to the pretreatment conditions outlined in the pre-treatment agreement.

The leachate lagoon will be inspected on a monthly basis and a report generated and placed in the landfill records. The report will include the date the liner was inspected, the inspector, general observations since the last inspection, visible abrasions, possible stress cracks, or obvious punctures. Stress cracks can occur in wrinkles that are generated from heat expansion or contraction due to freezing. Also, the HDPE liner may deteriorate due to ultra violet light and this can appear as an abrasion where material can be scraped away with a hard object. If any damage or possible weak spots due to ultra violet exposure has been detected, a qualified HDPE installation company shall be notified immediately so that a repair patch can be installed. The leachate level shall not be allowed to exceed the depth of the damaged liner until it has been repaired and tested by the liner installation company. Once this has been accomplished all testing documentation shall be placed in the operating records.

Daily cover is the combination of soil and/or approved Alternate Cover Material (ACM). (See Section 2.2 for cover requirements, see Section 2.4 for approved ACM's).

The County will monitor all areas of MSW filling for possible leachate break-outs. The County will implement a program for corrective actions for leachate break-outs (See Section 2.8 Appendix VI). The County's Environmental Technician is responsible for weekly inspections of the landfill for leachate breakouts and/or eroded areas. The entire landfill operational staff is on the lookout daily for any type of breakout. If one is spotted either by the Technician or other operational staff, they are to flag the location and contact the Assistant Sold Waste Director and/or the Field Supervisor so that immediate corrective measures can be taken. The inspection dates, findings and time are recorded and are part of the operating record.

The County will continue a program at the landfill for detecting and preventing the disposal of hazardous and liquid wastes. The program consists of random inspection of incoming loads at a minimum of 1% of the weekly traffic. Landfill personnel will be trained to recognize hazardous and liquid wastes. Records will be kept on the training and the inspections. (See Section 2.3)

The County will monitor for explosive gases at landfill structures and the perimeter of the landfill. There are two (2) existing methane monitoring probes at the MSWLF and three(3) existing methane probes at the C&DLF. (see 2.5 for Explosive Gas Control Plan).

The concentration of methane and hydrogen sulfide (H_2S) gases generated by the landfill cannot exceed 25 percent of the lower explosive limit for methane and hydrogen sulfide (H_2S) in the structures, and it cannot exceed 100 percent of the lower explosive limit for methane and hydrogen sulfide (H_2S) at the landfill property boundary. (See Section 2.5) If methane and/or hydrogen sulfide (H_2S) gas is found to exceed the acceptable limits at either the property boundary or landfill structures, it is the County's responsibility to do the following:

1. Immediately take all necessary steps to ensure protection of human health, i.e. no smoking, temporarily abandon the structure and notify the Division of Waste Management.

2. Within seven days of detection, place in the operating record the methane gas levels detected and a description of the steps taken to protect human health; and

3. Within 60 days of detection, implement a remediation plan for the methane and/or hydrogen sulfide (H_2S) gas releases, place a copy of the plan in the operating record, and notify the Division of Waste Management that the plan has been implemented. The plan will describe the nature and extent of the problem and the proposed remedy.

Off and on site erosion will be controlled through erosion control structures and devices. Provisions for a vegetative ground cover sufficient to restrain erosion will be accomplished within 30 working days or 120 calendar days upon completion of any phase of landfill development.

The County will record and retain at the landfill an operating record of the following information:

(1) Inspection records, waste determination records, and training procedures;
(2) Amounts by weight of solid waste received at the landfill;
(3) Waste determination, Leachate sampling data and analytical data, leachate levels, meteorological data ;
(4) Gas monitoring results and any remediation plans;
(5) Any demonstration, certification, findings, monitoring, testing or analytical data required for surface and groundwater monitoring;
(6) Any monitoring, testing or analytical data required for closure or post-closure;
(7) Any cost estimates and financial assurance documentation.

All information contained in the operating record will be furnished upon request to the Division of Waste Management or be made available at all reasonable times for inspection by the Division.

Ground and surface water will be sampled and analyzed according to Subtitle D Appendix I detection monitoring requirements. The monitoring frequency for all Subtitle D Appendix I detection monitoring constituents will be at least semi-annually during the life of the facility (including closure) and the post-closure period. A minimum of four independent samples from each well (background and downgradient) will be collected and analyzed for the Subtitle D Appendix I constituents during the first semi-annual sampling event. At least one sample from each well (background and downgradient) will be collected and analyzed during subsequent semiannual sampling events. (see Section 2.7 for Monitoring Plan)

If the County determines that there is a statistically significant increase over background for one or more of the constituents listed in Subtitle D Appendix I at any monitoring well at the relevant point of compliance, the County will, within 14 days of the finding, report to the Division of Waste Management and place a notice in the operating record indicating which constituents have shown statistically significant changes from background levels. The County will establish an assessment monitoring program within 90 days. The County may demonstrate that a source other than the landfill caused the contamination or that the statistically significant increase resulted from an error in sampling, analysis, statistical evaluation, or natural variation in ground-water quality. A report documenting these demonstrations will be certified by a Licensed Geologist or Professional Engineer and approved by the Division of Waste Management. A copy of this report will be placed in the operating record. If a successful demonstration is made, documented, and approved by the Division, the County may continue detection monitoring. If after 90 days, a successful demonstration is not made, the County will initiate an assessment monitoring program.

2.2 Operational Requirements

1. Waste Acceptance and Disposal Requirements

   a. The Municipal Solid Waste Landfill (MSWLF) will only accept those solid wastes which it is permitted to receive. The County will notify the Division within 24 hours of attempted disposal of any waste the landfill is not permitted to receive. Signs are placed at the entrance to the Landfill stating that Hazardous and Liquid wastes are not accepted and that random waste screening is performed.

   b. The following wastes are prohibited from disposal at the MSWLF:

      i. Hazardous waste as defined within 15A NCAC 13A, to also include hazardous waste from conditionally exempt small quantity generators.

      ii. Polychlorinated biphenyls (PCB) wastes as defined in 40 CFR 761.

      iii. Bulk or non-containerized liquid waste will not be placed in the landfill unless:

         (i) The waste is household waste other than septic waste and waste oil,
         (ii) The waste is leachate or gas condensate derived from the landfill.

      iv. White Goods, Yard Waste, Tires.

      v. Containers holding liquid wastes will not be placed in the landfill unless:

         (i) The container is a small container similar in size to that normally found in household waste;
         (ii) The container is designed to hold liquids for use other than storage; or
         (iii) The waste is household waste.

      vi. For the purpose of this paragraph:

         (i) Liquid waste means any waste material that is determined to contain "free liquids" as defined by Method 9095 (Paint Filter Liquids Test), S. W. 846.

   c. Spoiled foods, animal carcasses, abattoir waste, hatchery waste, and other animal waste delivered to the disposal site will be covered immediately.

   d. The following are items that are banned from the landfill:

      i. Beverage containers that are required to be recycled under G.S. 18B-1006.1

      ii. Recyclable rigid plastic containers that are required to be labeled as provided BELOW that have a neck smaller than the body of the container and that accept a screw top, snap cap, or other closure. The prohibition on disposal of recyclable rigid plastic containers in landfills does not apply to rigid plastic containers that are intended for use in the sale or distribution or motor oil.

         (a) For polyethylene terephthalate, the letters “PETE” and the number 1.
         (b) For high density polyethylene, the letters “HDPE” and the number 2.
         (c) For vinyl, the letter “V” and the number 3.
         (d) For low density polyethylene, the letters “LDPE” and the number 4.
         (e) For polypropylene, the letters “PP” and the number 6.
         (f) For polystyrene, the letters “PS” and the number 7.

(g) For any other, the letters “OTHER” and the number 7.

iii. Motor vehicle oil filters.

iv. Wooden pallets, except that wooden pallets maybe disposed of in a landfill that is permitted to only accept construction and demolition debris.

v. Discarded computer equipment (effective April 1, 2011).

e. Asbestos waste will be accepted and managed in accordance with 40 CFR 61. The waste will be covered immediately with soil in a manner that will not cause airborne conditions and must be disposed of separate and apart from other solid wastes:

i. At the bottom of the working face or;
ii. In an area not contiguous with other disposal areas. Separate areas will be clearly designated so that asbestos is not exposed by future land disturbing activities.

f. Wastewater treatment sludges may be accepted either as a soil conditioner incorporated into or applied onto vegetative growth layer but in no case greater than six inches in depth. Or wastewater treatment sludges may be co-disposed in the lined area.

g. The County will continue a program at the Landfill for detecting and preventing the disposal of hazardous and liquid wastes. (Section 2.3) This program will include, at a minimum:

i. Random inspections of incoming loads or other comparable procedures;
ii. Records of any inspections;
iii. Training of facility personnel to recognize hazardous and liquid wastes.
iv. If hazardous wastes are identified by facility personnel, Emergency Management or personnel trained, shall be notified to identify the waste and address removal, storage and final deposition of the waste.

h. Waste placement will be within the areal limits of the base liner system and in a manner consistent with the effective permit.

i. Special Wastes

The Landfill has handling capabilities and recycling/disposal options in place for all non-hazardous and non-regulated special wastes currently banned from landfill disposal by the State. These materials include whole tires, white goods, used oil, oil filters and lead-acid batteries. These materials are stored under canopies, covered shelters, buildings and/or tractor trailers.

i. Whole tires are accepted at the landfill and stored in two tractor trailers until they are transported out of the county. They are either recycled or place in a monofil so they can easily be reclaimed when reuse and recycling alternatives are in place.
ii. White goods and other scrap metals are collected at the landfill and are managed in a building adjacent to office. Freon is removed weekly by landfill staff, and materials are then transported to a metals recycler.
iii. Used oil is collected at the landfill, at the household trash and recycling convenience center in 250 gallon tanks with secondary containment. All oil collected is recycled either as refined lubrication oil or as fuel.
iv. Oil filters also have a designated collection area at the convenience center. These are collected and recycled by a contracted oil recycler.
v. Lead-acid batteries are accepted for recycling at the household trash and recycling convenience center at the landfill.
vi. Antifreeze has a designated collection container for recycling. This material is handled by the contracted oil recycler.

vii. Electronic waste is deposited by homeowners in the electronic waste recycling area at the convenience center at the landfill. The material is recycled by a certified e-recycler.

j. Recovered/Recyclable Wastes

Recovered material is not regulated as solid waste under GS 130A-309.5(c). Materials must meet the following requirements to be qualified as recovered material:

i. A majority of the recovered material at the facility will be sold, used, or reused within one year;
ii. The recovered material or the products or the by-products of operations that process recovered material shall not be discharged, deposited, injected, dumped, spilled, leaked, or placed into or upon any land or water so that the products or by-products or any constituent thereof may enter other lands or be emitted into the air or discharged into any waters including groundwater, or otherwise enter the environment or pose a threat to public health and safety; and
iii. The recovered material shall not be a hazardous waste or have been recovered from a hazardous waste.
iv. For the purpose of this paragraph:

(i) "Recovered Material" means a material that has known recycling potential, can be feasibly recycled, and has been diverted or removed from the solid waste stream for sale, use, or reuse.
(ii) "Recyclable Material" means those materials which are capable of being recycled and which would otherwise be processed or disposed of as solid waste.

v. Documentation of all contractors who are transporting, treating, processing, or disposing of the recyclables or recovered materials at an off-site facility, shall be place in the operating record.

k. Destruction of Abandoned Manufactured Homes

The county will accept Manufactured Homes for destruction, provided the following criteria are met:

i. Only mobile homes originating in Wayne County will be accepted for deconstruction.
ii. The landfill will require 24 hour notice prior to accepting the mobile home for deconstruction.
iii. The established disposal/processing fee will be collected upon arrival at the Landfill.
iv. The mobile home will be transported to the MSW or the C&D landfill and placed adjacent to the working face for deconstruction.
v. The mobile home will be secured by the hauler to prevent spillage during transport.
vi. Prior to deconstruction, white goods shall be removed from the mobile home unit if the mobile home is safe to enter. The white goods shall be taken to a white goods collection site. Should the mobile home be severely damaged, or if there are inherent health risks to entering the unit, the white goods may be disposed along with the mobile home.
vii. All removed appliances shall be placed in the white goods area and the Freon removed by the County or certified contractor.

viii. Appliances and all other metals shall be loaded into a container for recycling.

ix. Efforts shall be made to remove any putrescible waste prior to deconstruction of the mobile home.

x. Household Hazardous Waste (HHW) should be removed for separate disposal. If the mobile home is not safe to enter, incidental quantities may be disposed along with the mobile home.

xi. The metal frame, tires, and axles shall be removed by the transporter to be salvaged or recycled before disposal of the mobile home.

xii. As asbestos may be present in building materials of mobile homes constructed prior to 1983, all mobile homes built prior to 1983 shall be thoroughly sprayed with water (interior and exterior) to minimize dust.

xiii. The mobile home shall be deconstructed within 45 days of receipt.

xiv. A permit from NCDOT and approval from the Division of Motor Vehicles must be obtained before moving a mobile home on a state highway.

2. Cover material requirements.

a. Except as in Part (b), the County must cover disposed solid waste with six inches of earthen material at the end of each operating day, or at more frequent intervals if necessary, to control disease vectors, fires, odors blowing litter, and scavenging.

b. Alternative cover materials may be used as daily cover on the working face or until it is necessary to cover with earthen material. The alternative cover material must be approved by the Division of Waste Management and applied according to manufacturers recommendations. At a minimum soil cover will be used once every seven (7) days. (See Section 2.4)

c. Areas which will not have additional wastes placed on them for 12 months or more, but where final termination of disposal operations has not occurred, will be covered with a minimum of one foot of intermediate cover.

3. Disease vector control

a. The County will prevent or control on-site populations of disease vectors using techniques appropriate for protection of human health and the environment. At the end of every day, waste will be covered either by synthetic cover or 6” of soil cover. At a minimum soil will be used once a week. Any waste that requires immediate cover, will be covered immediately with soil.

b. "Disease vectors" means any rodents, flies, mosquitoes, or other animals, including insects, capable of transmitting disease to humans.

4. Explosive gases control

a. The County must ensure that:

i. The concentration of methane and hydrogen sulfide (H_2S) gases generated by the landfill does not exceed 25 percent of the lower explosive limit for methane and hydrogen sulfide (H_2S) in landfill structures (excluding gas control or recovery system components); and

ii. The concentration of methane and hydrogen sulfide (H_2S) gas does not exceed 100 percent of the lower explosive limit for methane and hydrogen sulfide (H_2S) at the landfill property boundary.

b. The County will continue a routine gas monitoring program to ensure that the standards of 4 (a) are met. (Section 2.5-Appendix III-Explosive Gas Monitoring Plan)

i. The type and frequency of monitoring must be determined based on the following factors:

(i) Soil conditions;
(ii) The hydrogeologic conditions surrounding the facility;
(iii) The hydraulic conditions surrounding the facility;
(iv) The location of facility structures and property boundaries.

ii. The minimum frequency of monitoring will be quarterly.

c. If methane and hydrogen sulfide (H_2S) gas levels exceeding the limits specified in 4 (a) are detected, the owner or operator will:

i. Immediately take all necessary steps to ensure protection of human health, i.e. no smoking, temporarily abandon the structure and notify the Division of Waste Management.

ii. Within seven days of detection, place in the operating record the methane gas levels detected and a description of the steps taken to protect human health; and

iii. Within 60 days of detection, implement a remediation plan for the methane gas releases, place a copy of the plan in the operating record, and notify the Division of Waste Management that the plan has been implemented. The plan will describe the nature and extent of the problem and the proposed remedy.

d. "Lower explosive limit" means the lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at 25°C and atmospheric pressure.

5. Air Criteria

a. The County will ensure that the landfill does not violate any applicable requirements developed under a State Implementation Plan (SIP) approved or promulgated by the US EPA Administrator pursuant to Section 110 of the Clean Air Act, as amended.

b. Open burning of solid waste, except for the infrequent burning of land clearing debris generated on site or debris from emergency clean-up operations, is prohibited. Any such infrequent burning will be approved by the Division of Waste Management, NC Division of Air Quality and the local fire department or fire marshal.

c. In the event of an emergency the operator(s) will call 911. Earth moving equipment will be provided to control accidental fires. Arrangements have been made with the local fire department to provide actual fire protection. The site will be served by the Thoroughfare Volunteer Fire Department. This Fire Department is located within 2 miles of the landfill. Should the need arise Grantham Volunteer Fire Department and Arrington Volunteer Fire Department are also located with 7 miles of the landfill. This Fire department has access at all times to the landfill to provide fire fighting services when needed. Fire extinguishers are located in all buildings and on all equipment. Dirt piles are also on site to use in emergency situations. Landfill personnel can use soil to isolate the fire so it will not spread any further but actual fighting of the fire should be the responsibility of the trained fire department.

d. Fires that occur at the landfill will be reported to the Division of Waste Management within 24 hours and written notification will be submitted within 15 days. Written Notification may be submitted by using NCDEQ - Fire Occurrence Form.(Section 2.9-Appendix VII)

6. Access and safety requirements

a. The landfill will be adequately secured by means of gates, chains, beams, fences and other security measures approved by the Division of Waste Management to prevent unauthorized entry.

b. An attendant will be on duty at the site at all times while it is open for public use to ensure compliance with operational requirements.

c. The access road to the site will be of all-weather construction and maintained in good condition.

d. Dust control measures will be implemented when necessary. If dust problems should arise, the county will use any reasonable means necessary to reduce it. At a minimum the county will spray water on necessary areas.

e. Signs providing information on tipping or disposal procedures, the hours during which the site is open for pubic use, the permit number and other pertinent information will be posted at the site entrance.

f. Signs will be posted stating that no hazardous or liquid waste can be received.

g. Traffic signs or markers will be provided as necessary to promote an orderly traffic pattern to and from the discharge area and to maintain efficient operating conditions.

h. The removal of solid waste from the landfill will be prohibited unless the County approves and the removal is not performed on the working face.

i. Barrels and drums will not be disposed of unless they are empty and perforated sufficiently to ensure that no liquid or hazardous waste is contained therein, except fiber drums containing asbestos.

7. Erosion and Sedimentation Control Requirements

a. Adequate sediment control measures (structures or devices), will be utilized to prevent silt from leaving the landfill.

b. Adequate sediment control measures (structures or devices), will be utilized to prevent excessive on-site erosion.

c. Provisions for a vegetative ground cover sufficient to restrain erosion will be accomplished within 15 working days or 90 calendar days upon completion of any phase of landfill development.

8. Drainage Control and Water Protection Requirements

a. Surface water will be diverted from the operational area and will not be impounded over waste.

b. Solid waste will not be disposed of in water.

c. Leachate will be contained on site and properly treated prior to discharge.

d. The landfill will not:

(i) Cause a discharge of pollutants into waters of the United States, including wetlands, that violates any requirements of the Clean Water Act, including, but not limited to, the National Pollutant Discharge Elimination System (NPDES) requirements pursuant to Section 402.

(ii) Cause the discharge of a nonpoint source of pollution to waters of the United States, including wetlands, that violates any requirements of an area-wide or state-wide water quality management plan that has been approved under Section 208 or 319 of the Clean Water Act, as amended.

9. Liquids Restriction

a. Bulk or non-containerized liquid waste will not be placed in the landfill unless:

(i) The waste is household waste other than septic waste and waste oil,

(ii) The waste is leachate or gas condensate derived from the landfill.

b. Containers holding liquid wastes will not be placed in the landfill unless:

(i) The container is a small container similar in size to that normally found in household waste;

(ii) The container is designed to hold liquids for use other than storage; or

(iii) The waste is household waste.

c. For the purpose of this paragraph:

(i) Liquid waste means any waste material that is determined to contain "free liquids" as defined by Paint Filter Free Liquid Testing Method SW-846 Method 9095B(2004).

d. Test for free liquids:

Sludges or other wastes may be tested for free liquids after previous screening tests have shown that the waste is not hazardous and does not contain PCB's. The specified test to determine whether or not a material is considered to be a liquid is the Paint Filter Free Liquid Testing Method SW-846 Method 9095B (2004). The procedure for conducting this test is as follows:

(i) Obtain standard 400- micron paint filter;

(ii) Place a properly-sized, clean, dry funnel in a ring stand or similar device;

(iii) Fold the filter and line the funnel with it;

(iv) Place a 100 ml sample of waste into the funnel;

(v) Place a clean, dry container under the funnel; and,

(vi) Check in exactly 5 minutes to see if any liquid is in the container.

(vii) If any liquid passes through the filter in 5 minutes or less, the waste is considered to be a liquid. The filtrate can be water, oil or any combination of any non-hazardous liquids.

10. Record keeping Requirements

a. The County MSWLF will record and retain at the facility, or an alternative location near the facility approved by the Division of Waste Management, in an operating record the following information as it becomes available.

(i) Inspection records, waste determination records, and training procedures;
(ii) Amounts by weight of solid waste received at the landfill to include source of generation.
(iii) Waste determination, Leachate sampling data, leachate levels, meteorological data;

(iv) Gas monitoring results and any remediation plans;
(v) Any demonstration, certification, findings, monitoring, testing or analytical data required for surface and groundwater monitoring;

(vi) Any monitoring, testing or analytical data required for closure or post-closure; and,
(vii) Any cost estimates and financial assurance documentation.

b. All information contained in the operating record will be furnished upon request to the Division of Waste Management or be made available at all reasonable times for inspection by the Division.

c. The County will maintain a copy of the operation plan at the landfill.

11. Spreading and Compacting Requirements

a. The landfill will restrict solid waste into the smallest area feasible, typically 60' x 75' area.

b. Solid waste will be compacted as densely as practical into cells. The compactor should run over an area of solid waste a minimum of 6 times.

c. Appropriate methods such as fencing and diking will be provided within the area to confine solid waste subject to be blown by the wind. At the conclusion of each day of operation, all windblown material resulting from the operation will be collected and returned to the area.

12. Leachate Management Plan

a. The County will record the flows weekly from the sump pumps to the lagoon and the volume pumped from the lagoon to the Waste Water Treatment Plant. Monthly visually inspect the lagoon liner for damage. Utilizing the Leachate Collection System Inspection Log (Section 2.6 - Appendix IV) the County will:

(i) Record the rainfall after every occurrence;
(ii) Record pump readings weekly; and
(iii) Inspect Leachate Lagoon monthly

b. The County will maintain records for the amount of leachate pumped to the lagoon from the sumps and the amount pumped to the Waste Water Treatment Plant. Records of the visual inspections and any repairs made will also become part of the operating record.

c. The County will quality sample their leachate bi-annually for Subtitle D Appendix I constituents, pH, BOD, COD, TDS, phosphate, nitrate, and sulfate. The sample will be obtained from the lagoon and sampled the same time as the monitoring wells. The results will be part of the operating record and submitted with the semiannual groundwater sampling events.

d. The leachate is being treated by Goldsboro Wastewater Treatment Plant. Leachate will not be recirculated.

e. Under extreme operational conditions, the County has the option of shutting down the flow of leachate to the lagoon by shutting off the pump. The leachate will be temporarily stored within the MSWLF units until such a time the flow of leachate can continue to the lagoon. If any rain or other event requires storage of leachate or storm water in the cell, the Division of Waste Management will be notified immediately followed by written communication.

f. The leachate lines shall be flushed at least once per year. This can be done by using a tanker full of either leachate or plain water. The liquid can either be pumped or gravity flow into the cleanouts provided at the ends of the lines. Once the water is unloaded into the collection system, there needs to be a visual inspection at the leachate storage lagoon to assure that the water unloaded into the system appears at the leachate storage lagoon in a short period of

time. This is observed as an increase in the flow that is observed prior to unloading the water into the system.

In the event that it cannot be visually determined whether or not the flow in the leachate line at the leachate storage lagoon has not increased, a flow measuring device shall be used at the end of the leachate line flowing into the leachate storage lagoon. The measurements need to be done prior to dumping water into the collection system and after.

If it is determined that a blockage is in the line, the line shall be pressure cleaned and videoed to assure that the blockage has been removed.

Records of all flushing either by gravity or pressurized shall become part of the operating record (Section 2.6-Appendix IV). Any videos that have been taken shall also become part of the operating record.

g. The video camera accessible leachate lines shall be videoed annually, by the County to assure that no blockages have occurred. If a blockage is encountered, the line will be pressured washed until the blockage is removed and re-videoed. The sediment or other material that has been washed to the sump shall be vacuumed from the sump utilizing a vacuum truck. The lines will be videoed annually and cleaned if necessary until the waste in the landfill has reached the height of the surrounding exterior berms. Once the waste has reached the berm height, the videoing and necessary cleaning shall be done every three years.

   Records of all videoing and pressurized washing shall become part of the operating record.

h. The County will inspect the exterior slopes of the landfill at least weekly and after major storm events and/or drenched raining season to determine if there are any breakouts of leachate in the slopes. If any are discovered, they will be contained immediately to assure that they will not leave the site. (See Section 2.8-Appendix VI-Corrective Action for Leachate Break-outs) The containment can consist but not be limited to an earthen berm, sand bags, erosion control logs and/or anything that will contain the leachate on the slope.

   The repair of the breakout will require excavating into the cover soil on the slope down to the waste and into the waste to determine what is causing the leachate to come to the surface. Normally it is another layer of soil that has been used as cover and the leachate is flowing along that layer to the slope and surfacing on the slope. The lower layer of cover needs to be removed at the breakout so that the leachate that is flowing along this cover has a point where it will go vertically into the landfill instead of flowing along the soil boundary that was once either daily cover or an intermediate cover.

   Once this soil layer has been breached, the excavation can be filed back with stone, clean waste or any material, other than soil, that will allow the leachate to flow vertically instead of horizontally. Once the excavation has been filled with this material, the surface can be cover with soil so that surface water does not intrude into the excavation. Vegetative cover will be reestablished over the excavated area.

   Records of all inspections and break-outs shall become part of the operating record.

13. Landfill Gas Collection System

All maintenance, conversion, pumping and daily operation of the landfill gas collection system is provided by the gas developer/contractor. All records of actions taken shall be placed in the operating record. Other operational requirements are as follows:

a. Site Security: The Generator/Flare site has security fence around it so that only authorized people have access to the electrical generation and flaring equipment. Access to the landfill is during normal working hours for the general public. It is secured after hours by gates and fencing.

b. Contingency and Emergency Response: The system has built safety devices that stop the gas flow if excessive heat is detected. If a fire is detected, the local fire department will be called to extinguish it. The gas will not burn without oxygen; therefore, the fires would be restricted to openings exposed to the atmosphere.

c. Operations: During the active life of the landfill, all wells, sumps and infrastructure will be modified when required by landfill operations by the gas developer. The modification will include but not limited to the raising of well heads so that the landfill can be filled vertically.

d. Methane Monitoring Plan: The County will continue to monitor for migrating methane, according to landfill permits, at the boundaries and inside buildings. They will also be responsible for monitoring according to Air Quality Permits and EPA requirements for Green House Gases.

e. Training and Safety: The operation of the system is the responsibility of the gas developer; consequently, the training and safety of their personnel will be the developer's responsibility. The County is responsible for the training and safety of their personnel in the monitoring of methane gas for the various permits and EPA requirements.

f. Condensate Management: The condensate is collect in sumps that are placed around the collection system. Each sump has a pneumatic pump that pumps the condensate to the lagoon. The condensate along with the leachate from the landfill is then pump into Goldsboro's sewerage collection system.

g. Inspection and Maintenance Plan: The County inspects the collection system to satisfy the air quality permit requirements twice a month. The developer is monitoring the system on site and remotely 24 hours a day 7 days a week as long as the system is operating. The maintenance of the system will be the developer's responsibility until the system is decommissioned.

h. Decommissioning Plan: The extraction wells will be converted to passive vents once the system is no longer required for air quality permits and/or electrical generation. Piping that is on the surface will be removed. All other piping will be left in placed so that not to disturb the capping system. Equipment used for the generation of electricity and the flare will also be removed from the site.

i. Revised Closure and/or post-closure cost estimates: The cost of removal of the system other than converting the extraction wells to passive methane vents is the responsibility of the gas developer.

2.3 Appendix I Waste Screening Plan

A. INTRODUCTION

The municipal solid waste stream is made up of wastes from all sectors of society. The waste is often categorized by its source or its characteristics. Terms used include commercial, industrial, residential, biomedical, hazardous, household, solid, liquid, demolition/construction, sludge, etc. Regardless of how one classifies wastes, the bottom line is that wastes are delivered to the landfill and a management decision must be made to either reject or accept them. This responsibility rests with the manager of the landfill. Wastes which are not authorized to be accepted at the landfill create a number of potential problems including: (1) liability due to future releases of contaminants; (2) bad publicity if media learns of unacceptable waste entering the landfill; (3) potential for worker injury; (4) exposure to civil or criminal penalties; (5) damage to landfill environmental control systems.

B. HAZARDOUS WASTE REGULATIONS AND MANAGEMENT

In the United States, hazardous waste is regulated under RCRA, Subtitle C. A waste is hazardous if it is listed as a hazardous waste by the Administrator of the Environmental Protection Agency (EPA) in the Code of Federal Regulations, Title 40, Part 261, or if it meets one or more of the hazardous waste criteria as defined by EPA. These criteria are:

- Ignitability
- Corrosivity
- Reactivity
- Toxicity

1. Ignitability

Ignitable waste is a waste that burns readily, causes a fire by friction under normal circumstances, or is an oxidizer. Any waste having a flash point of <140F falls in this category. Flash point is that temperature at which a liquid gives off vapors that will ignite when an open flame is applied. Under Department of Transportation (DOT) definitions, a flammable liquid has a flash point of >100 F. A combustible liquid has a flash point between 100 and 200 F. Therefore, a flammable liquid is always hazardous while a combustible liquid may or may not be hazardous depending upon its flash point.

2. Corrosivity

A corrosive waste is one having a very high or a very low pH. The pH of a liquid is a measure of how acidic or basic (alkaline) the material is. The pH scale ranges from 0 to 14. High numbers are basic and low numbers are acidic. A substance having a pH $\leq$2.0 or $\geq$12.5 is defined as hazardous under RCRA.

3. Reactivity

A waste is reactive if it is normally unstable: reacts violently with water; forms an explosive mixture with water; contains quantities of cyanide or sulfur that could be released to the air; or can easily be detonated or exploded. These wastes may fall into any one of several DOT categories.

4. Toxicity Characteristic Leaching Procedure (TCLP)

A waste is TCLP toxic if the concentration of any constituent in Table 1 exceeds the standard assigned to that substance. The TCLP is a methodology which attempts to simulate the conditions within a landfill. An acidic solution is passed through a sample of waste and the resultant "leachate" is analyzed

for contaminants. The TCLP is designed to detect heavy metals, pesticides and a few other organic and inorganic compounds. The purpose of the test is to prevent groundwater contamination by highly toxic materials. TCLP tests the mobility of 40 different elements and compounds.

Except in certain specified circumstances, regulated quantities of hazardous waste must be disposed of at a permitted hazardous waste disposal facility. In accordance with 40 CFR Part 261.3, **any material contaminated by a hazardous waste is also deemed to be a hazardous waste and must be managed as such.** Hazardous waste from conditionally exempt small quantity generators are to be disposed of in a Hazardous waste disposal facility. RCRA permits are also required to store, transport, and treat hazardous waste.

C. POLYCHLORINATED BIPHENYL'S (PCBs)

1. Introduction

PCBs are nonflammable and conduct heat without conducting electricity. These compounds were most frequently used as an additive to oil or other liquids in situations where heat was involved. The PCBs enhance the heat conducting properties of the liquid and thereby increase the heat dissipation or cooling effect obtained. They have also been used in lubricants and paint. In the United States one of the most common applications was in electric transformers. The only effective method for destroying PCBs is high Temperature incineration which is relatively expensive due to a shortage of PCB incineration capacity.

TABLE 1

T.C.L.P. CONSTITUENTS & REGULATORY LEVELS (mg/L)			
CONSTITUENT	REG LEVEL	CONSTITUENT	REG LEVEL
Arsenic	5.0	Hexachlorobenzene	0.13
Barium	100	Hexachloro-1,3-butadiene	0.5
Benzene	0.5	Hexachloroethane	3.0
Cadmium	1.0	Lead	5.0
Carbon Tetrachloride	0.5	Lindane	0.4
Chlordane	0.03	Mercury	0.2
Chlorobenzene	100	Methoxychlor	10.0
Chloroform	6.0	Methyl ethyl ketone	200
Chromium	5.0	Nitrobenzene	2.0
m-Cresol	200	Pentachlorophenol	100
o-Cresol	200	Pyridine	5.0
p-Cresol	200	Selenium	1.0
Cresol	200	Silver	5.0
1,4-Dichlorobenzene	10.0	Tetrachloroethylene	0.7
1,2-Dichloroethane	0.7	Toxaphene	0.5
1,1-Dichloroethylene	0.5	Trichloroethylene	0.5
2,4-Dichlorophenoxyacetic acid	0.7	2,4,5-Trichlorophenol	400
2,4-Dinitrotoluene	0.13	2,4,6-Trichlorophenol	2.0
Endrin	0.02	2,4,5-TP (Silvex)	1.0
Heptachlor (and its hydroxide)	0.008	Vinyl Chloride	0.2

By law PCB's are no longer used as dielectrics in transformers and capacitors manufactured after 1979. There are many millions of pounds of PCBs still in use or in storage. One example is the ballasts used in fluorescent light fixtures. It has been estimated that there are between 0.5 million and 1.5 billion ballasts currently in use in this country. Due to the long life of these units, about half of these may be of pre-1979 manufacture and contain PCBs. Since each ballast contains about one ounce of nearly pure PCB fluid, there are about **20 to 30 million pounds** of PCBs in existing lighting fixtures.

These items are not subject to RCRA Subtitle D Waste Screening!

Commercial or industrial sources of PCB wastes that should be addressed by the program include:

- Mineral oil and dielectric fluids containing PCBs;
- Contaminated soil, dredged material, sewage sludge, rags, and other debris from a release of PCBs;
- Transformers and other electrical equipment containing dielectric fluids; and
- Hydraulic machines.

2. PCB Regulatory Requirements

As contrasted to hazardous wastes, the Toxic Substance Control Act regulates PCBs based on the concentration of PCBs in the waste rather than the source or characteristic of the waste. The regulations concerning PCB disposal are spelled out in 40 CFR Part 761. Subtitle D of RCRA merely requires that PCB waste not be disposed in a MSW landfill. PCB management requirements include:

Waste containing more than 500 ppm of PCBs must be incinerated. Waste containing from 50 to 500 ppm must be disposed of by incineration, approved burning, or in chemical waste landfill permitted to receive such wastes. The regulations are silent concerning wastes containing less than 50 ppm of PCBs; however, the regulations cannot be circumvented by diluting stronger wastes.

D. FUNDAMENTALS OF WASTE SCREENING

1. Know Your Generators and Haulers

Since the level of sophistication of your waste screening program will be a reflection of the likelihood of hazardous waste and PCB waste being in your incoming waste, **knowledge of the commercial industrial base of your service area is critical.** Some examples are the automotive industry, which generates solvents, paint wastes, lead acid batteries, grease and oil; the dry cleaning industry, which may generate filters containing dry cleaning solvents; metal platers which generate heavy metal wastes; and other industries which generate a variety of undesirable wastes; e.g. chemical and related products, petroleum refining, primary metals, electrical and electronic machinery, etc.

Landfill managers should also know the haulers and trucks serving the businesses in their community which are likely to carry unacceptable wastes.

Some local governments and solid waste management agencies have enacted legislation requiring haulers to provide a manifest showing the customers whose wastes make up that particular load. Such a manifest is an extremely useful tool when a load is found to contain prohibited wastes. It is unwise to accept wastes from unknown, unlicensed, or otherwise questionable haulers.

2. Inspections

An inspection is typically a visual observation of the incoming waste loads by an individual who is trained to identify regulated hazardous or PCB wastes that would not be acceptable for disposal at the MSWLF unit. The training of landfill personnel will be conducted by a local EMS official or a SWANA certification. An inspection is considered satisfactory if the inspector knows the nature of all materials received in the load and is able to discern whether the materials are potentially regulated hazardous wastes or PCB wastes.

Ideally, all loads should be screened; however, it is generally not practical to inspect in detail all incoming loads. Random inspections, therefore, can be used to provide a reasonable means to adequately control the receipt of inappropriate wastes. Random inspections are simply inspections made on less than every load. At a minimum the inspection frequency will not be less than one percent of the waste stream.
The frequency of random inspections may be based on the type and quantity of wastes received daily, and the accuracy and confidence desired in conclusions drawn from inspection observations. Because statistical parameters are not provided in the regulation, a reasoned, knowledge-based approach may be taken. A random inspection program may take many forms such as inspecting every incoming load one day out of every month or inspecting one or more loads from transporters of wastes of unidentifiable nature each day. If these inspections indicate that unauthorized wastes are being brought to the MSWLF site, the random inspection program should be modified to increase the frequency of inspections.

Inspection priority also can be given to haulers with unknown service areas, to loads brought to the facility in vehicles not typically used for disposal of municipal solid waste, and to loads transported by previous would-be offenders. For wastes of unidentifiable nature received from sources other than households (e.g., industrial or commercial establishments), the inspector should question the transporter about the source/composition of the materials.

Loads will be inspected on the working face of the landfill.

An inspection flow chart to identify, accept, or refuse solid waste is provided as Figure 1.

Inspections of materials may be accomplished by discharging the vehicle load in an area designed to contain potentially hazardous wastes that may arrive at the facility. The waste should be carefully spread for observation using a front end loader or other piece of equipment. The Division of Waste Management recommends that waste should be hand raked to spread the load. Personnel should be trained to identify suspicious wastes. Some indications of suspicious wastes are:

- Hazardous placards or markings;
- Liquids;
- Powders or dusts;
- Sludges;
- Bright or unusual colors;
- Drums or commercial size containers; or
- Chemical odors.

The County will follow these procedures when suspicious wastes are discovered.

- Segregate the wastes;
- Question the driver;
- Review the manifest (if applicable);
- Contact possible source;
- Call the State Solid Waste Management Department;
- Use appropriate protective equipment;
- Contact laboratory support if required; and
- Notify the local Hazardous Material Response Team.

Containers with contents that are not easily identifiable, such as unmarked 55-gallon drums, should be opened only by properly trained personnel. Because these drums could contain hazardous waste, they should be refused whenever possible. Upon verifying that the solid waste is acceptable, it may then be transferred to the working face for disposal.

Testing typically would include the Toxicity Characteristic Leaching Procedure (TCLP) and other tests for characteristics of hazardous wastes including corrositivity, ignitability, and reactivity. Wastes that are suspected of being hazardous should be handled and stored as a hazardous waste until a determination is made.

If the wastes temporarily stored at the site are determined to be hazardous, The County is responsible for the management of the waste. If the wastes are to be transported from the facility, the waste must be: (1) stored at the MSWLF facility in accordance with requirements of a hazardous waste generator, (2) manifested, (3) transported by a licensed Treatment, Storage, or Disposal (TSD) facility for disposal.

E. RECORD KEEPING AND NOTIFICATION REQUIREMENTS

Records must be kept pursuant to an incident where regulated hazardous waste or prohibited waste is found at the landfill. It is also recommended that records be kept of all screening activities and incidents, whether or not, regulated or prohibited wastes are found. This will help prove that the landfill owner/operator has acted in a prudent and reasonable manner.

The best way to prove compliance with this requirement is to document each inspection including:

Date and time of waste detection
Hauler name (company and driver)
Waste(s) detected
Waste generator(s) if able to identify
Action(s) taken to manage or return material(s)
Efforts taken if extreme toxicity or hazard was discovered
Landfill employee in responsible charge

40 CFR Part 258 requires that records should be maintained at or near the landfill site during its active life and as long after as may be required by the appropriate state or local regulations.

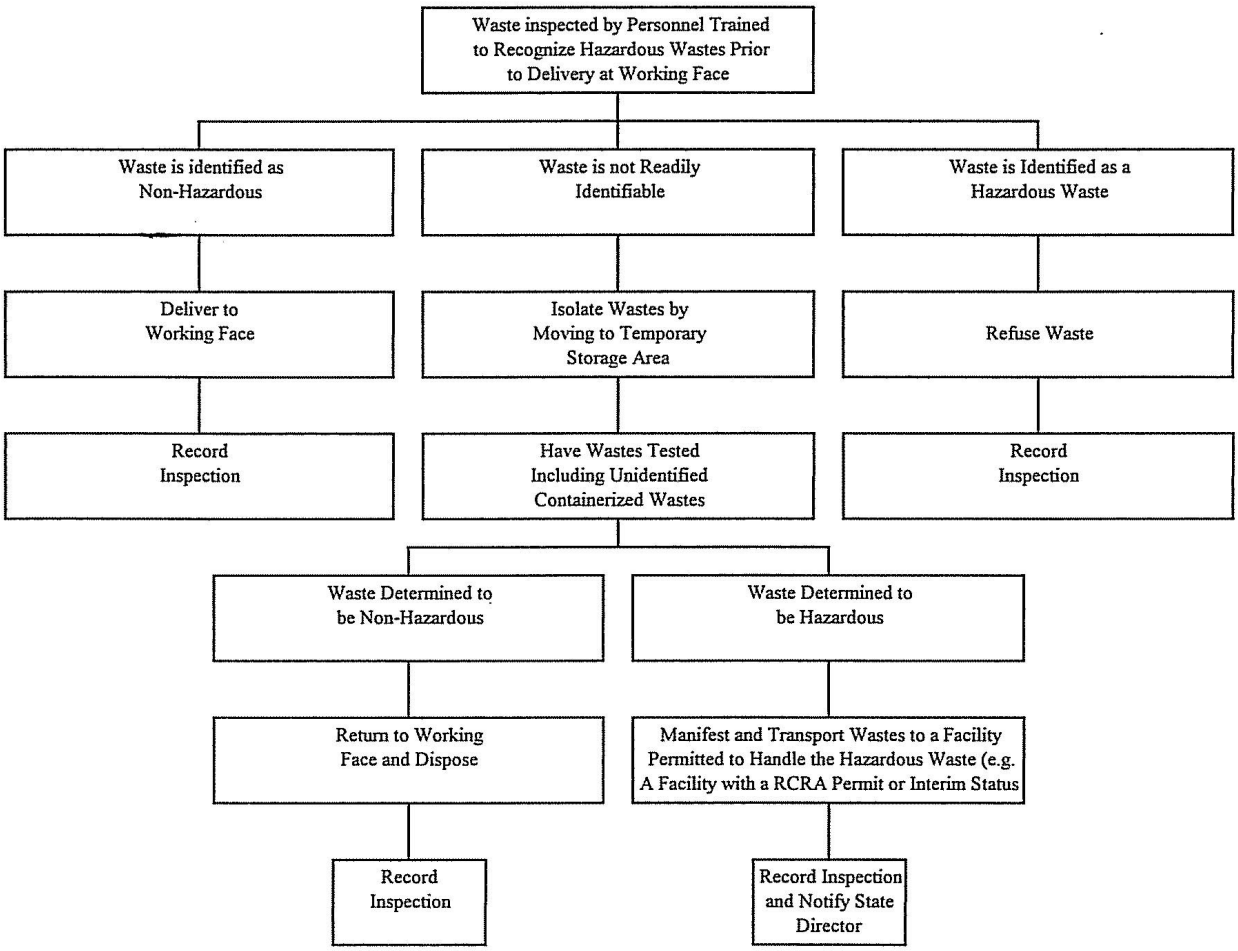


FIGURE 1
Hazardous Waste Inspection Decision Tree
Inspection Prior to Working Face

WASTE SCREENING CHECK LIST
(CHECK ALL THAT APPLY)

CONTAINERS	**YES**	**NO**
FULL……..	_____	_____
PARTIALLY FULL……..	_____	_____
EMPTY……..	_____	_____
CRUSHED…….	_____	_____
PUNCTURED……	_____	_____
POWDERS/DUSTS		
IDENTIFIED……	_____	_____
UNKNOWN……	_____	_____
SATURATION……	_____	_____
LABEL/HAZARDOUS……	_____	_____
ODOR/FUMES		
STRONG…….	_____	_____
FAINT…….	_____	_____
HEAT……..	_____	_____
ITEMS FOUND		
BATTERIES……	_____	_____
OIL……..	_____	_____
BIOMEDICAL……	_____	_____
RADIOACTIVE……..	_____	_____
ASHES/RESIDUE……	_____	_____
SOD/SOIL……	_____	_____
LIQUID……	_____	_____
HAZARDOUS…….	_____	_____
PCB'S……..	_____	_____

Action Taken:

DETAILED SCREENING REPORT

WASTE SOURCE_____
ADDRESS_____
_____
_____

PROBABLE [ ] SUSPECTED [ ] CONFIRMED [ ]

WASTE HAULER_____
ADDRESS_____
_____
_____

DRIVER'S NAME_____
DETAIL_____
_____
_____

NOTIFIED:

WASTE SOURCE [ ] HAULING MANAGEMENT [ ] SITE MANAGEMENT [ ]

STATE [ ] FEDERAL [ ]

NAME_____
WITNESS (IF ANY)_____
DATE_____TIME_____ AM PM

ACTION REQUIRED:

2.4 Appendix II - Alternate Cover Materials (ACM)

ACM: Automotive Shredder Residuals (ASR)

Approved Landfill Use: MSWLF and C&DLF (lined)

Material Characteristics: Automotive shredder residuals are the fines remaining after scrap cars have passed through a shredder and all recoverable materials have been removed. ASR can consist of glass, synthetic fibers, rubber, plastics, automobile liquids residue, metal fines and dirt. It is possible for the ASR to contain substances considered hazardous such as lead, cadmium and PCB.

Usage Criteria:

1. ASR can be applied, in lieu of soil, to a depth of six inches given calm site (weather) conditions.
2. If site (weather) conditions are, or are forecast to be , windy the ASR must either be:
   a). Mixed with soil at a ration of 50% soil with 50% ASR prior to application on the working face, or
   b) Placed on the working face to a minimum depth of 3" and then covered with soil a minimum depth of 3".
3. During use of ASR as an ACM, soil cover to a full depth of six inches shall be applied once per week.
4 ASR shall not be used on any exterior/outside slopes and may not be used for intermediate cover.
5. The ASR must be sourced from within the approved service are of the landfill facility.

* **A CDLF equipped with a liner system may use the ASR as alternate daily cover only. Use of more than six inches equates to disposal. ASR is not a C&D waste. To dispose of ASR in a lined CDLF, contact the Permitting Branch of the solid Waste Section for further clarification.**

ACM: Combustion Residuals (CR)/Ash

Approved Landfill Use: MSWLF and C&DLF (lined)*, IndLF (lined)*

Material Characteristics: Construction Combustion Residuals or Ash are, generally, the residuals remaining from the combustion of coal or the incineration of waste materials. The CR/Ash generally consists of fine particles such as fly-ash as well as larger particles similar to sand, gravel or stone.

Usage Criteria:

1. CR/Ash can be applied, in lieu of soil, to a full depth of six inches given calm site (weather) conditions.
2. If site (weather) conditions are, or are forecast to be , windy the CR/Ash must either be:
   a). Mixed with soil at a ration of 50% soil with 50% CR/Ash prior to application on the working face if it can become airborne or exhibits dust like properties, or
   b) Placed on the working face to a minimum depth of 3" and then covered with soil a minimum depth of 3".
3. During use of CR/Ash as an ACM, soil cover to a full depth of six inches shall be applied once per week, unless otherwise approved by the Section*.
4 CR/Ash may not be used for intermediate cover, if it can become airborne or exhibits dust like properties.
5. The CR/Ash must be sourced from within the approved service area of the landfill facility..

Warning: Some materials, such as flue gas desulfurization residue, are destined for recycle and cannot be contaminated with soil. Site Specific handling practices should be discussed with the Solid Waste Section prior to implementation.

* **A CDLF equipped with a liner system may use the CR as alternate daily cover only. Use of more than six inches equates to disposal. CR is not a C&D waste. To dispose of CR in a lined CDLF, or a non-CCB industrial landfill, contact the Permitting Branch of the solid Waste Section for further clarification.**

ACM: Construction and Demolition Debris (C&D) Fines

Approved Landfill Use: MSWLF and C&DLF (lined)

Material Characteristics: Construction and Demolition Debris Fines are, generally, the residuals and fine particles remaining in the bottom of dumpsters, roll-off containers and trucks used in the transportation or processing of C&D debris.

Usage Criteria:

1. C&D Fines can be applied, in lieu of soil, to a full depth of six inches given calm site (weather) conditions.
2. If site (weather) conditions are, or are forecast to be , windy the ASR must either be:
   a). Mixed with soil at a ration of 50% soil with 50% C&D Fines prior to application on the working face, or
   b) Placed on the working face to a minimum depth of 3" and then covered with soil a minimum depth of 3".
3. During use of C&D Fines as an ACM, soil cover to a full depth of six inches shall be applied once per week.
4 C&D Fines shall not be used on any exterior/outside slopes and may not be used for intermediate cover.
5. The C&D Fines must be sourced from within the approved service are of the landfill facility.

* **Warning: C&D fines can contain large percentages of drywall dust or gypsum. These materials may produce significant amounts of hydrogen sulfide, an obnoxious smelling compound. If odor problems develop, the use of the fines should be suspended immediately and the offending area covered with soil.**

ACM: Petroleum Contaminated Soils (PCS)

Approved Landfill Use: MSWLF and C&DLF (lined)*, IndLF (lined)*

Material Characteristics: Petroleum Contaminated Soils are, generally, native soils contaminated with some petroleum liquid. Generally, these soils are to be sourced from environmental cleanup sites, spill sites or sites associated with above ground or underground storage tank (AST or UST) removal. In the case of ACM usage, petroleum is narrowly defined as low to medium boiling point petroleum derived fuels such as gasoline, kerosene, diesel, motor oil, mineral spirits and fuel oils #11 through #6. All other petroleum derived liquids such as solvents, acids, tars and asphalts are excluded. In all cases, the concentration of Total Petroleum Hydrocarbons (TPH) in the PCS cannot exceed 3,000 parts per million (PPM) regardless of type or test method. The material may not contain chlorinated solvents or other hazardous materials or exhibit the hazardous characteristic of flammable.

Usage Criteria:

1. PCS can be applied, in lieu of soil, to a full depth of six inches.
2. The PCS must be stockpiled within the disposal area and shall be managed and applied in such a way that runoff cannot leave the lined landfill area.
3. The PCS shall be managed in such a way to prevent run-off and fugitive emissions (i.e. use of tarps, berms and/or wetting to prevent blowing).
4. PCS is prohibited from disposal. Therefore, the facility may not accept more PCS than can be used in a 45 day period. The amount of PCS accepted should not exceed 20% of the permitted facility average monthly waste stream.

5. PCS shall not be used on any exterior/outside slopes and may not be used for intermediate cover.
6. The PCS must be sourced from within the approved service area of the landfill facility.
7. PCS can only be used at lined landfill facilities.
8. Records must be maintained in the facility operating record indicating the volume of PCS accepted and applied at the facility on a daily basis.

* **A CDLF or IndLF equipped with a liner system may use the PCS as alternate daily cover only. Use of more than six inches equates to disposal. PCS is neither a C&D nor an Industrial waste. To dispose of PCS in a lined CDLF, or an non-CCB industrial landfill, contact the Permitting Branch of the Solid Waste Section for further clarification.**

ACM: Spray-applied Mortar Coating (SMC)

Approved Landfill Use: MSWLF, C&DLF and IndLF

Material Characteristics: SMC is, generally, a commercially sourced non-flammable, non-toxic product containing proprietary components including mix setting agents, reinforcing materials and cement. Other components, such as latex paint, may also be added to the mixture. All of the components are mixed on site with water and/or leachate to produce a slurry that is then spray applied to the working face.

Usage Criteria:

1. SMC can be applied, in lieu of soil, given appropriate site (weather) conditions.
2. SMC must be applied in accordance with the manufacturer's application guidelines.
3. SMC must be applied in two directions to ensure adequate coverage.
4. During the use of SMC as an ACM, soil cover to a full depth of six inches shall be applied once per week unless otherwise approved by the Section.
5. The use of non-hazardous latex or water based paint in the mixture is approved provided that the paint has been collected for recycling.

ACM: Foam Coating (Foam)

Approved Landfill Use: MSWLF, C&DLF and IndLF

Material Characteristics: Foam Coating is, generally, a commercially sourced non-flammable, non-toxic, non-hardening water based product. The proprietary liquid concentrate is delivered to the site and diluted with water prior to application with proprietary equipment.

Usage Criteria:

1. Foam can be applied, in lieu of soil, given appropriate site (weather) conditions.
2. Foam must be applied in accordance with the manufacturer's application guidelines.
3. During the use of Foam as an ACM, soil cover to a full depth of six inches shall be applied once per week.
4. The use of non-hazardous latex or water based paint in the mixture is approved provided that the paint has been collected for recycling.
5. Foam shall not be used on any exterior/outside slopes and may not be used for intermediate cover.

ACM: Foundry Sand (Sand)

Approved Landfill Use: MSWLF, C&DLF (lined)* and IndLF (lined)*

Material Characteristics: Foundry Sand is , generally, a by-product of the smelting and forging processes for metals fabrication. Metal pieces and particulate may also be found in the sand. Prior to use, a Toxicity Characteristic Leaching Procedure (TCLP) analysis must be performed to ensure no hazardous constituents are found in the sand at the source. The TCLP analysis results must be submitted with the Operation Plan revision.

Usage Criteria:

1. Sand can be applied, in lieu of soil, to a full depth of six inches.
2. The Sand must be stockpiled within the disposal area and shall be managed and applied in such a way that runoff cannot leave the lined landfill area.
3. The Sand shall be managed in such a way to prevent runoff and fugitive emissions (i.e. use of tarps, berms and/or wetting to prevent blowing).
4. Sand is prohibited from disposal. Therefore, the facility may not accept more Sand than can be used in a 45 day period. The amount of Sand accepted should not exceed 20% of the permitted facility average monthly waste stream.
5. Sand shall not be used on any exterior/outside slopes and may not be used for intermediate cover.
6. The Sand must be sourced from within the approved service area of the landfill facility.
7. Sand can only be used at lined landfill facilities.
8. Records must be maintained in the facility operating record indicating the volume of Sand accepted and applied at the facility on a daily basis.

* **A CDLF or IndLF equipped with a liner system may use the Sand as alternate daily cover only. Use of more than six inches equates to disposal. Sand is not a C&D waste. To dispose of Sand in a lined CDLF, a lined landfill not previously permitted to accept it or a or an non-CCB industrial landfill, contact the Permitting Branch of the Solid Waste Section for further clarification.**

ACM: Soil/Mulch Mixture (S&M)

Approved Landfill Use: MSWLF, C&DLF and IndLF

Material Characteristics: Soil/Mulch Mixture is, generally, a mixture of native soils and wood mulch generated from grinding of yard trash, land clearing debris and pallets constructed of unpainted and untreated natural wood. Additionally, shredded tire chips may be used in addition to, or in lieu of, wood mulch.

Usage Criteria:

1. S&M can be applied, in lieu of soil, to a full depth of six inches.
2. S&M can be mixed at a ratio from 80% soil to 20% mulch up to 50% soil to 50% mulch by volume.
3. During the use of S&M as an ACM, soil cover to a full depth of six inches shall be applied once per week.
4. S&M may not be used for intermediate cover.

ACM: Synthetic Tarps (Tarps)

Approved Landfill Use: MSWLF, C&DLF and IndLF

Material Characteristics: Synthetic Tarps are, generally, a commercially sourced non-flammable, non-toxic, sheet product constructed of an impermeable synthetic polymer typically reinforced with fibers. Acceptable sheet products include, but are not limited to, geotextiles, polyethylene membranes, plastic film, tarps and composite geotextile/plastic membranes. Tarps may be applied by hand, using landfill equipment and/or and Automatic Tarping Machine (ATM).

Usage Criteria:

1. Tarps can be applied, in lieu of soil, given appropriate site (weather) conditions.
2. Tarps must cover the entire working face. Any waste not covered by tarps must be covered by soil.
3. Tarps must be secured in place with the use of soils or other ballast system such as tires or sand bags.
4. During the use of Tarps as an ACM, soil cover to a full depth of six inches shall be applied once per week.
5. Tarps shall not be used on any exterior/outside slopes and may not be used for intermediate cover.

2.5 Appendix III - Explosive Gas Control Plan (MSW and C&D)

North Carolina Solid Waste Management Rules 15A NCAC 13B require quarterly monitoring of methane gas (at MSW landfills) and quarterly monitoring of methane and other explosive landfill gases (LFG) (at C&D and other landfills) to ensure that methane does not exceed the lower explosive limit (LEL) in the soil at the facility property boundary or 25 percent of the lower explosive limit within facility structures. If the concentration exceeds the specified limits, steps must be taken to ensure the protection of public health and a remediation plan must be implemented immediately.

Per the SWS Guidance Document (November 2010), subsurface gas typically migrates above the groundwater table and is restricted laterally by streams. On-site perennial tributaries and adjoining wetlands namely Jacob's Branch and Yellow Marsh Branch comprise portions of the Thoroughfare Swamp. Almost the entire area surrounding the waste units are isolated by these perennial hydraulic barriers which significantly decreases the potential for LFG migration beyond Wayne County's property boundaries.

The uppermost aquifer across the entire site has been identified to be within the unconsolidated regolith. The vertical LFG migration potential extent is the water table which ranges from approximately 0 to 20 feet below ground.

In accordance with Rule 15A NCAC 13B LFG readings will be recorded quarterly and results will be kept in the facility operating records. Wayne County will follow all operational requirements for MSWLF facilities; ensuring the measured concentrations of methane gas does not exceed the lower explosive limit (100% LEL or 5% by volume) at the facility boundary and (25% LEL or 1.25% by volume) in structures. Hydrogen sulfide gas should not exceed the lower explosive limit (100% LEL or 4% by volume) at the facility boundary and (25% LEL or 1% by volume) in structures. LFG records will be submitted to the SWS in the event that stabilized methane or hydrogen sulfide levels exceed these limits or upon SWS request.

Wayne County Landfill facility located in Dudley, NC consists of three discrete waste units. An active Subtitle D Lined MSWLF, an active construction and demolition (C&D) landfill vertical expansion atop an unlined landfill and a closed sanitary landfill. The locations of monitoring points were chosen following careful consideration of spatial relationship between property boundaries, hydraulic barriers and both on and off-site structures. The LFG monitoring locations are shown in the facility drawings.

The contiguous lined landfill shall be monitored at existing probes MP-29 and MP-30. LFG migration through soil originating from lined landfill is effectively bound by perennial streams on all sides except for a small portion in a northeastern direction. No probes are located within any future planned landfill development areas however in the unlikely event their location inhibits any site development they will be properly abandoned per 15A NCAC2C.0113(d). No additional monitoring locations are currently proposed around the lined landfill.

Active CDLF and closed unlined landfill units shall be monitored by five existing LFG probes (MP-4, MP-10, MP-11, MP-12 and MP-13). Monitoring probes (MP-4, MP-12 and MP-13) are located adjacent to two small properties that are not owned by Wayne County. Monitoring probes (MP-10 and MP-11) are located along the north side of Landfill Road in which both sides are owned by Wayne County. These probes are not located within any future planned landfill development areas; however in the unlikely event their location inhibits any site development they will be properly abandoned per 15A NCAC 2C .0113(d). No additional monitoring locations are currently proposed around the unlined landfills.

New probes are not proposed to be installed. In the event unrepairable damage occurs to existing probes or migration investigations are initiated new probes will be installed per specifications outlined in SWS Guidance Document with the exception the probes may be constructed of 1" PVC and the outer protective case may be constructed out of non-sparkable aluminum. All probes will be equipped with a stopcock ball valve bushed to the well casing, quick connect coupling threaded into the well cap or an equivalent device that allows air flow to be controlled at the wellhead.

The inside of eight on-site structures (CONV_BLG, SCALES_1, SHOP_BRM, SHOP_GRG, GARAGE_1, HUT_WTGS, SCALES_2 and CH4_BLDG) will be monitored quarterly for LFG accumulation in accordance with the Guidance Document. If new on-site structures are erected in the future they will be monitored along with the existing ones. All on-site habitable structures are shown on the facility drawings.

2.6 Appendix IV - Leachate Collection System Inspection Log

Leachate Collection System Inspection Log

Rainfall

_____ inches *(measured after each occurrence)*

Pump Readings

Pump #_____:

_____ Date

_____ Hrs. Run (total weekly)*

_____ Gallons Pumps (total weekly)**

Manually Operate Pump_____ Date (monthly)

Pump #_____:

_____ Date

_____ Hrs. Run (total weekly)*

_____ Gallons Pumps (total weekly)**

Manually Operate Pump_____ Date (monthly)

Leachate Lagoon(s)

Inspection of Storage Lagoon _____ Date (Monthly)

Repairs to Storage Lagoon(s) _____ Date

Leachate Lines

Date Videoed _____

Date Flushed _____

Comments

_____
_____
_____
_____

**Hours Run/Week* = *Previous Week's Hours – This Weeks Hours*
***Gallons Pumped/Week* = *Previous week's gallons – This week's gallons*

2.7 Appendix V - Surface and Groundwater Monitoring Plan

Introduction

The objective of the Ground and Surface water Sampling and Analysis Plan is to provide clear guidelines and procedures for field and laboratory personnel when obtaining and testing ground and surface water samples. This plan is an update, and supersedes the November 1995 SAP for the Wayne County C&D Landfill on top of Closed MSW landfill. The sampling procedures outlined in this analysis plan are guidelines by which sampling will be performed. Deviation from the procedures may be warranted depending on facility conditions or unforeseen sampling variables. Alternative sampling procedures must conform to the N.C. Water Quality Monitoring Guidance Document for Solid Waste Facilities (Guidance Document).

All groundwater and surface water monitoring points shall be sampled semi-annually for the constituents listed in Appendix I and Appendix II. In addition to the Appendix I and Appendix II constituents monitoring wells MW-1, MW-2 and MW-8 will be sampled for the following suite of Monitored Natural Attenuation (MNA) parameters.

MNA Performance Parameters		
Parameter	**Analysis Type**	**Analytical Method**
Dissolved Oxygen (DO)	Field Reading	Multi-parameter Field Instrument w/ flow-through cell
pH	Field Reading	
Oxidation-Reduction Potential (ORP)	Field Reading	
Turbidity	Field Reading	
Conductivity	Field Reading	
Temperature	Field Reading	
Dissolved CO_2	Field Reading	Field Instrument / Hach Kit
Alkalinity (Total as $CaCO_3$)*	Laboratory/Field*	EPA 310.2
Chloride*	Laboratory/Field*	SM 4500-CLB
Iron	Laboratory	SM3111B
Nitrate*	Laboratory/Field*	EPA 353.2 / SM 2320B
Sulfate*	Laboratory/Field*	EPA 375.4 / SM 4500-SO4E
Sulfide*	Laboratory/Field*	EPA 376.1 or SM 4500SE
TOC/BOD/COD	Laboratory	EPA 415.1 / EPA 405.1 / EPA 410.1
Methane	Laboratory	RSK 175
Ethane, Ethene	Laboratory	RSK 175
Hydrogen	Laboratory	AM19GA
Volatile Fatty Acids	Laboratory	AM23G
*For budgetary considerations these analyses may be performed in the field using Hach® brand color wheel test kits.		

Water Quality Monitoring Summary

The nature of the groundwater flow, geology, location of Edwards Branch, and close proximity of several drainage features will require extensive monitoring for early detection of a landfill release. The monitoring plan consists of eleven (11) monitoring wells numbered MW-1R through MW-11 and three (3) surface monitoring points numbered SW-1, SW-2 and SW-3.

Monitoring well MW-1R is the background well located up gradient of the landfill. MW-2 is a downgradient monitoring well for the western portion; designed to intersect groundwater flow from the eastern portion prior to reaching the western tributary of Edwards Branch. MW-3 is a downgradient monitoring well in the northeastern portion of the western landfill. MW-4 is installed on the eastern half of the landfill to detect a potential release from the southeastern area via advection. MW-5 is a downgradient well utilized for the detection of a release from the middle of the landfill. MW-6 is a downgradient monitoring well located on the northeastern side of the landfill, positioned to detect a release from the landfill center. MW-7 is a downgradient monitoring well for the southernmost route of contamination. MW-8 is a downgradient monitoring well for the eastern unit. MW-9 is used as a background well for statistical analysis, and MW-11 serves as a sentinel well for the plume area near MW-2.

Surface water sampling point SW-1 is located downstream of the landfill below the confluence of the two forks of Edwards Branch. Surface water sampling points SW-2 and SW-3 are located upstream of the landfill on the two separate forks of Edwards Branch.

Assessment Monitoring

Assessment Monitoring will be performed on MW-1R through MW-11. Assessment monitoring will consist of collection of groundwater for analysis for the complete list of Appendix I constituents, as well as Appendix II constituents as determined by the Solid Waste Section. Additionally, field parameters including dissolved oxygen (DO), oxidation reduction potential (ORP), pH, temperature, turbidity, and conductivity will also be collected.

As indicated in the *Corrective Action Plan*, MNA monitoring will be performed on monitoring wells MW-1R, MW-2, and MW-8.

Sampling Equipment

Groundwater purging and sampling will be performed using a submersible pump and disposable polyethylene bailers. A new bailer will be used to sample each individual well. *Under no circumstance will a disposable bailer used to sample a given well be used to sample any remaining well.* The following procedure will be used to decontaminate the submersible pump:

1. Phosphate-free detergent & de-ionized or distilled water rinse.
2. De-ionized or distilled water rinse.
3. Isopropyl alcohol (isopropanol) rinse.
4. De-ionized or distilled water rinse.

At least one (1) equipment blank will be collected during pump decontamination procedures to ensure that cross-contamination has not occurred as a result of the decontamination process. The standard equipment necessary to conduct sampling for each well consists of sample containers (including trip blanks and equipment blanks), one wide-mouth container, at least one 100-ft spool of nylon twine, at least one box of disposable latex/nitrile gloves, temperature/pH/ORP/conductivity indicator, water level indicator, storage coolers, and ice. All equipment subject to damage and contamination will be transported in sealed, plastic bags or storage containers. The water level indicator will be decontaminated in accordance with Steps 2 and 3 described above prior to placement in a clean plastic bag or storage container.

Sampling Containers

Ground and surface water monitoring will include organic (volatile organic compounds- VOCs) and inorganic (metals) analyses. Samples will be collected for the various analyses in laboratory-supplied containers.

1. Each sample container will be clearly labeled providing the following information: site name, county location, sample identification number, parameters to be analyzed, preservative added, date and time of sampling, and initials of the sampler.
2. Samples to be analyzed for VOC concentrations will be collected first, using three 40-ml glass vials with Teflon septa caps. The sample vials will be completely filled to create zero headspace in the vials.
3. Samples to be analyzed for inorganic contamination will be collected second, using a quart/1-liter polyethylene container.

All sample containers will be obtained from an independent laboratory in a sterilized condition and with the appropriate, method-specific preservative. Care will be taken by the field technician to not allow the preservative to wash out of the sample containers during sampling.

MNA Sampling Containers

Groundwater samples to be analyzed for MNA performance parameters will be collected into the container types listed in the table below.

MNA Parameter	Volume	Bottle Type	Preservative
Alkalinity	250 mL	Plastic	none; cool to 4°C
Chloride	125 mL	Plastic	none; cool to 4°C
TOC/COD	250 mL	Glass	Sulfuric acid (H_2SO_4)
BOD	500 mL	Polyethylene	none; cool to 4°C
Iron	125 mL	Plastic	Nitric acid (HNO_3)
Nitrate	125 mL	Plastic	Sulfuric acid (H_2SO_4)
Sulfate	125 mL	Plastic	none; cool to 4°C
Sulfide	250 mL	Glass	Sodium hydroxide (NaOH)
Methane/Ethane/Ethene	125 mL	Plastic	none; cool to 4°C
Hydrogen	-	-	proprietary lab sampler
Volatile Fatty Acids	40 mL	Glass	Hydrochloric Acid (HC1)

Sampling

Wells will be sampled from upgradient to downgradient locations; or when previous analytical data is available, from least to greatest contamination. This procedure is required to limit potential cross contamination between sampling points.

A clean sheet of plastic will be placed around the well to provide a clean surface for sampling equipment. The total well depth read from the well tag and the measured depth to water, determined using the water level indicator, will be used to compute the depth of water in the well. The total well depth will be measured and compared to the depth indicated on the well tag as a check for silt buildup or blockage at depth.

All meters used to monitor purge parameters will be calibrated immediately prior to purging and sampling, and those readings recorded in a field logbook. Entries will always include pre- and post- calibration readings as well as the model and serial number of the equipment and the date, time, and person performing the calibration(s). Two standards, which bracket the average or suspected measurements for pH and specific conductance, will be used at the site. Since natural waters (including those impacted by environmental contaminants) tend to have pH values less than 7.0, pH buffers of 4.0 and 7.0 will typically be used for instrument calibration.

Disposable nitrile gloves will be worn by the field technician during sampling to minimize the risk of personal exposure to potentially harmful chemical substances and to minimize the risk of sample cross-contamination. Fresh pairs of nitrile gloves will be worn during each purge and sampling event. The groundwater samples will be transferred from the bailers into method-specific and appropriately preserved containers and placed into a clean cooler containing ice to chill the samples to a temperature of approximately 4°C.

Indicator parameters such as pH, temperature and specific conductance will be measured during purging as an indication that groundwater representative of the formation surrounding a given well is being sampled. Purging is considered complete when at least three well volumes have been purged and indicator parameters have stabilized such that three successive readings vary by no more than 10%. Purging may need to be continued beyond five well volumes if indicator parameters have not stabilized. All information will be recorded on a field data sheet or in a field logbook with copies submitted to the Division of Waste Management with the analytical results.

Purging

Each well will be purged of approximately three (3) to five (5) volumes of standing water and allowed to settle prior to collection of groundwater samples. If the well should go dry and not recharge before the requisite well volumes are removed, the well will be allowed to recharge and a sample will be collected within 24 hours of the initial purging. The amount of standing water will be calculated by first subtracting the depth-to-water from total well depth.

After determination of the amount of water to be purged from a given well, the equipment necessary for purging will be assembled at the well. The disposable bailer will be maintained in a stable, upright position while the upper portion of the plastic wrapping will be pulled away to expose only the eyelet used for securing twine to the bailer. After the twine has been secured to the bailer with gloved hands, the bailer will be suspended as the remaining plastic is removed. The bailer will be lowered slowly into the well until the bailer contacts groundwater. The bailer twine will then be cut to an adequate length and secured to prevent loss of the bailer in the well. At no time during purging will the bailer twine be allowed to touch the ground. In order to not allow the twine to touch the ground during purging, the twine will be collected when raising the bailer either by loops gathered in one hand or by alternating hand-to-hand as the bailer is pulled from the well. When purging deep wells (in excess of 40 feet), the ground and the well head may be covered with a clean plastic bag or sheet of plastic with a slit cut to allow the plastic to slide over the well head. This will be a separate sheet of plastic from the one used for the sampling equipment.

Groundwater Sample Collection

The bailer will be lowered slowly into the well to avoid volatilization of any dissolved-phase compounds that may be present in the groundwater. Once full, the bailer will be retrieved and containers filled by emptying the water through the hole at the bottom of the bailer. Glass 40-mL vials for VOC analyses will be filled in such a manner as to produce zero headspace in the vials. Polyethylene containers for metals analyses will be filled and sealed with the cap, leaving about ½-inch of airspace at the top. In addition to collecting the samples, water will be collected in the wide-mouth container for pH, temperature, and conductivity measurements. Upon completion of sampling, all groundwater samples, including equipment and trip blanks, will be placed in labeled and sealed plastic bags and stored in ice-filled coolers to chill the samples to 4°C pending transport to a NCDEQ-certified analytical laboratory. Contaminated nitrile gloves and twine will be discarded.

Surface water Sample Collection

Surface water sampling will be taken with given consideration to minimize turbulence and aeration. As during groundwater sampling, surface water samples will be collected by a field technician wearing disposable gloves. Containers will be dipped at sampling location points by gently dipping the sample container into surface water and allowing surface water to flow over the mouth of container so as not to displace any preservative within the sample container. If there is little current movement, the container will be moved slowly through the water laterally. During times of low water, if the water is not deep enough to allow filling of sample containers, an appropriately decontaminated sampling cup will be used to retrieve the sample. All containers will be treated in the same manner as the groundwater samples. The samples will be sealed in labeled, plastic bags, and stored in an ice-filled cooler to chill the samples to 4°C pending transport to a NCDEQ-certified analytical laboratory.

Chain of Custody

Chain-of-custody forms will be used to document the handling of all samples collected and listing all individuals who have taken possession of a given set of samples, including field personnel, laboratory couriers, and laboratory personnel. Trip blanks, equipment blanks, and sample containers will all travel and be stored together. Trip blanks will remain in the condition they are received from the laboratory and will not be opened or tampered with during the sampling. A chain-of-custody record will be completed for each day's samples, indicating the date and time, sample location, sample matrix (soil, water, etc.), and laboratory analyses to be conducted.

Analysis

When the water samples reach the laboratory, they will be transferred to a sample custodian who will sign the chain of custody documentation as receipt of the samples. Internal control of the water samples in the laboratory will be in accordance with QA/QC procedures for the laboratory. Copies of QA/QC manuals for approved laboratories are on file at the Division.

Groundwater and surface water will be analyzed for the Appendix I list of constituents. QA/QC procedures utilized during the testing will be in conformance with laboratory QA/QC manual. Monitoring wells MW-1, MW-2 and MW-8 will be sampled for the Appendix I list and the aforementioned MNA parameters.

ATTACHMENT 1

BASELINE DATA

TO BE ADDED IN THE FUTURE

ATTACHMENT 2

VISUAL MONITORING LOG

DATE	INDIVIDUAL MONITORING	OBSERVATIONS

ATTACHMENT 3

RAINFALL LOG

DATE	RAINFALL (INCHES)

2.8 Appendix VI – Corrective Action For Leachate Break-Outs

CORRECTIVE ACTION FOR LEACHATE BREAK-OUTS

Leachate breakouts can be prevalent during and after any wet weather period. These breakouts are created by standing water on a landfill that drains through the cover into the waste. Once the water is in the waste, it moves through it both vertically and horizontally until it reaches a less permeable layer. Once it reaches this layer, it will move horizontally along it until it pools up or finds a less permeable area to flow vertically through that layer. If it pools up, it will eventually work through the layer to also flow vertically. If the less permeable layer is on a slope, the leachate will never pool up but flow horizontally along this slope until it "breaks out" the side of the landfill.

The best solution to breakouts is to avoid any standing water on top of the landfill. If waste is placed down a slope, provide trench excavations perpendicular to the flow direction into the intermediate cover so that the leachate flow is directed downward instead of along the plane between the waste and the intermediate cover.

If a breakout occurs, first and foremost contain it on the landfill foot print. In the case of the lined landfill, it needs to be within the lined area. Containment on the surface cannot be the only solution. The breakout must be repaired so that the flow of the leachate is downward and does not continue along the plane between any cover and the waste. Containment of leachate breakouts by berming along the edge is not a permanent fix for two reasons. First, storm water is being impounded behind the berms and impoundment of storm water over waste is a violation of the NC Solid Waste Rules. Second, if storm water continues to be impounded behind the berms, it has the potential eventually to pond up higher than the berm and erode the berm releasing all contained leachate with the storm water. The storm water cannot flow downward into the waste as fast as it is flows down the slopes; consequently, a pond will form and all of the above can and will happen.

The liquid that is impounded behind any berm has to be removed by pumping into a tank and hauling it either to the leachate lagoon or the waste water treatment plant. It cannot be allowed accumulate because it will break through the containment berm.

All leachate breakouts need to be repaired immediately. The repair consists of vertically excavating above (uphill) of the actual breakout. The leachate is flowing down hill from the ponding on top of the landfill; consequently, it needs to be intercepted by the excavation. Vertically excavate down through the waste until the intermediate or cover soils have been penetrated so waste below these layers of soil has been exposed. Immediately remove all excavated waste to the working face of the landfill.

Place a more permeable material in the excavation. The best material is rock because it is the most permeable material. The rock can be either on site or purchased from a quarry. The only criteria is that it be relatively free of soil. The excavation needs to be filled with this material up to and including the soil layers where the leachate is flowing. This allows the leachate to move vertically instead of horizontally. Once the material has been filled above the soil layers, re-cover the area with soil cover material.

If the outbreak is at the edge of the landfill (MSW or C&D), do not excavate at his point. Step into the landfill at least 20 feet to excavate. In the lined landfill, do this with extreme caution. In the lined landfill, the excavation should be no deeper than 6 feet. Within 6 feet, the intermediate soil layers should have been penetrated. Do not excavate into the initial waste placement.

In the C&D landfill, the vertical excavation may have to penetrate the final cap of the MSWLF. The cap was supposed to be two feet but may be thicker. Whatever the thickness, the excavation needs to penetrate this cap until the MSW is exposed. Fill the excavation with the more permeable material up to the top of the excavation and place the methane vent pipe in the material and re-cover with intermediate cover. However, unlike the MSWLF, place at least two feet of intermediate soil cover over the surface at the breakout. Also, unlike the MSWLF, the leachate may be following the final cap of the closed MSW landfill and a considerable amount of leachate may be seeking the low point along the landfill cap. If the low point happens to be at the edge of the landfill, the excavation into the landfill may have to be considerable in order to allow the amount of

leachate to flow vertically. The additional soil cover will have a damming effect so that the water is forced vertically into the trench that has been excavated and filled with rock, preferably.

Also, the top of the C&D landfill needs to be graded so that there is very little standing water. The water that is accumulating on the top is the source of the breakouts. The less there is on top, the less the potential of a breakout.

If leachate has been impounded behind a berm, immediately obtain a water sample for laboratory testing for Appendix I constituents. If leachate from a breakout has left the foot print of the landfill, obtain a water sample from a sediment basin or other areas that the leachate may have been ponding. Once the sample has been obtained, remove the ponding water by pumping it into a tank and disposing of it in either the leachate lagoon or the waste water treatment plant. Once the water has been removed, remove the top one foot of soil in the pond and dispose of it in the lined MSW landfill. Once the top one foot of soil has been removed, test the remaining soil to assure that there are no Appendix I constituents in the surface of the soil that is in the pond area.

2.9 Appendix VII - Solid Waste Management Facility Fire Occurrence Notification Form

SOLID WASTE MANAGEMENT FACILITY
FIRE OCCURRENCE NOTIFICATION
NC DENR Division of Waste Management
Solid Waste Section

Notify the Section verbally within 24 hours and submit written notification within 15 days of the occurrence.
(If additional space is needed, use back of this form.)

NAME OF FACILITY: _____ PERMIT # _____

DATE AND TIME OF FIRE: _____ @ _____

HOW WAS THE FIRE REPORTED AND BY WHOM:

LIST ACTIONS TAKEN:

WHAT WAS THE CAUSE OF THE FIRE:

DESCRIBE AREA, TYPE, AND AMOUNT OF WASTE INVOLVED:

WHAT COULD HAVE BEEN DONE TO PREVENT THIS FIRE:

DESCRIBE PLAN OF ACTIONS TO PREVENT FUTURE INCIDENTS:

NAME: _____ TITLE: _____ DATE: _____

****

THIS SECTION TO BE COMPLETED BY SOLID WASTE SECTION REGIONAL STAFF

DATE RECEIVED _____

List any factors not listed that might have contributed to the fire or that might prevent occurrence of future fires:

FOLLOW-UP REQUIRED:

☐ NO ☐ PHONE CALL ☐ SUBMITTAL ☐ MEETING ☐ RETURN VISIT BY:_____ (DATE)

ACTIONS TAKEN OR REQUIRED:

Revised 6/8/09

2.10 Engineering/Operation Drawings

2.10.1 Title Sheet
2.10.2 Index Sheet
2.10.3 Existing Conditions (MSW)
2.10.4 5 Year Fill Plan (MSW)
2.10.5 5 Year Fill with Gas Collection Wells (MSW)
2.10.6 Operation Details
2.10.7 Existing Conditions (C&D)
2.10.8 5 Year Fill Plan (C&D)
2.10.9 5 Year Fill with Gas Collection Wells (C&D)
2.10.10 Baseline Profiles and Cross Sections (MSW/C&D)

WAYNE COUNTY MUNICIPAL SOLID WASTE LANDFILL FACILITY

ENGINEERING/OPERATION PLAN

Permit Number: 9606-MSWLF-1998 and 9601-CDLF-1997

Site Location: 460 B South Landfill Road
Dudley, NC 28333

Applicant: Wayne County

Applicant's Address: 224 E. Walnut St., 3rd Floor
Goldsboro, NC 27530

BOARD OF COMMISSIONERS

Joe Daughtery - Chairman
Bill Pate - Vice-Chairman
George Wayne Aycock
Edward Cromartie
John M. Bell
E. Ray Mayo
A. Joe Gurley. III

COUNTY MANAGER

George Wood

SOLID WASTE DIRECTOR

Tim Rogers

Engineer
Municipal Engineering Services Company, P.A.
Garner, NC - Boone, NC

NORTH CAROLINA PROFESSIONAL SEAL 9108 ENGINEER STEVEN R. GANDY

by _____ 4/14/16
Professional Engineer
(Garner Office)

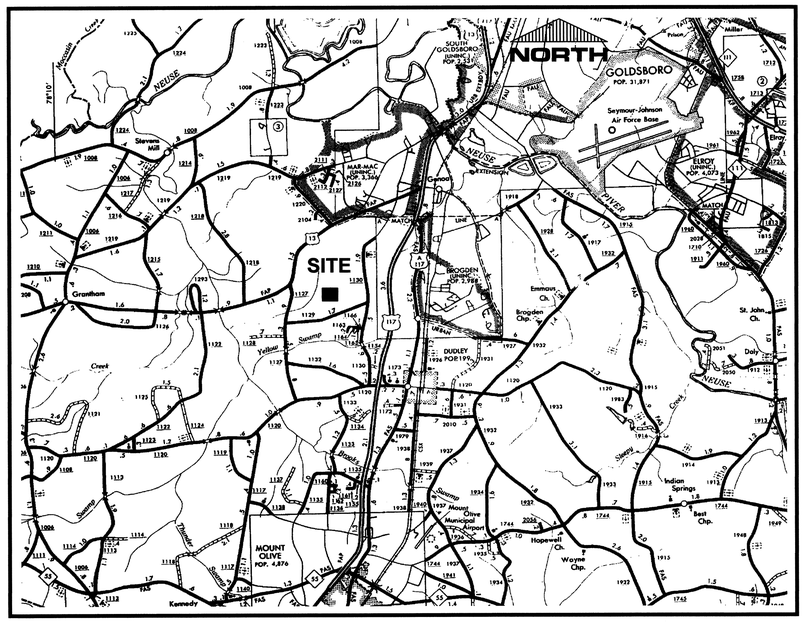
Municipal Engineering Services Company, P.A.
P.O. BOX 97, GARNER, N.C. 27529 (919) 772-5393
P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1767
LICENSE NUMBER: C-0281

DATE	BY	REV.	DESCRIPTION
3/25/2016	LHC	1	NO REVISIONS THIS SHEET.

SCALE:	1:1
DATE:	12/10/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	S. GANDY
PROJECT NUMBER	G15124
DRAWING NO.	T1
SHEET NO.	1 OF 10

INDEX

SHEET NO.	DRAWING NO.	DESCRIPTION
1	T1	TITLE SHEET
2	T2	INDEX AND VICINITY MAP
3	E1	EXISTING CONDITIONS
4	E2	5 YEAR FILL PLAN (MSW)
5	E3	5 YEAR FILL PLAN WITH GAS COLLECTION SYSTEM (MSW)
6	E4	OPERATION DETAILS
7	E5	EXISTING CONDITIONS (C&D)
8	E6	5 YEAR FILL PLAN (C&D)
9	E7	5 YEAR FILL PLAN WITH GAS COLLECTION SYSTEM (C&D)
10	E8	BASELINE PROFILE AND CROSS SECTIONS (MSW AND C&D)



VICINITY MAP

Municipal Engineering Services Company, P.A.
P.O. BOX 97, GARNER, N.C. 27529 (919) 772-5393
P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1767
LICENSE NUMBER: C-0281

MUNICIPAL SOLID WASTE LANDFILL FACILITY
WAYNE COUNTY
NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION
3/25/2016	LHC	1	NO REVISIONS THIS SHEET.

INDEX AND VICINITY MAP

SCALE:	1:1
DATE:	12/23/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	S. GANDY
PROJECT NUMBER	G15124
DRAWING NO.	T2
SHEET NO.	2 OF 10

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22120 STEVEN R. GANDY
4/4/16

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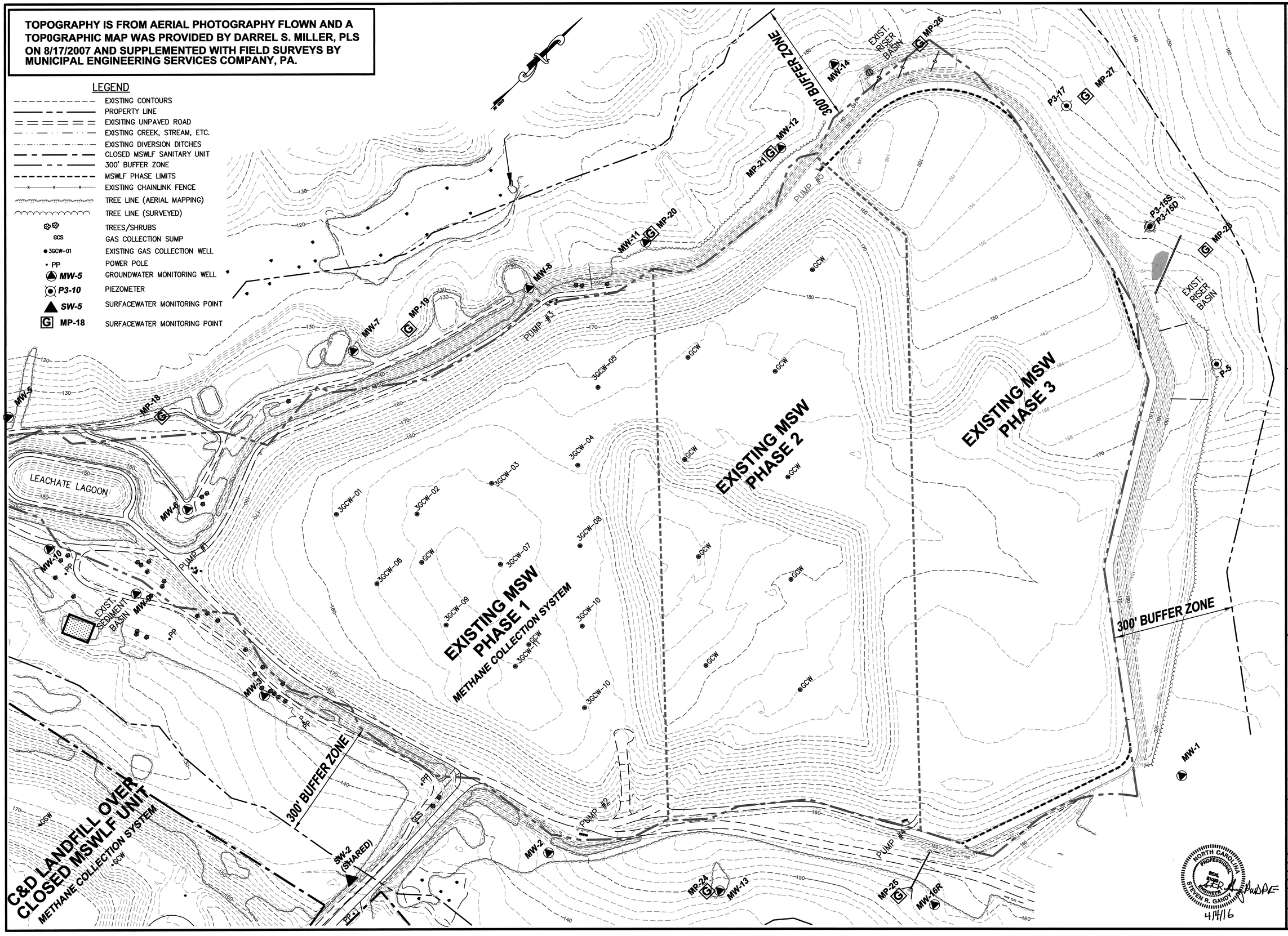

Municipal Engineering Services Company, P.A.
P.O. BOX 97 GARNER, N.C. 27529 (919) 772-5393
P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1767
LICENSE NUMBER: C-0281

MUNICIPAL SOLID WASTE LANDFILL FACILITY
WAYNE COUNTY NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION
3/25/2016	LHC	1	ADDED MP'S, SW'S AND MP'S PER SWS REVIEW LETTER DATED 3/18/2016

ENGINEERING/OPERATION PLAN – MSW AND C&D
EXISTING CONDITIONS PHASE 4 (MSW)

SCALE:	1" = 100'
DATE:	12/29/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	S. GANDY
PROJECT NUMBER	G15124
DRAWING NO.	E1
SHEET NO.	3 OF 10

NORTH CAROLINA PROFESSIONAL SEAL 21168 ENGINEER SHERWIN R. GANDY
4/4/16

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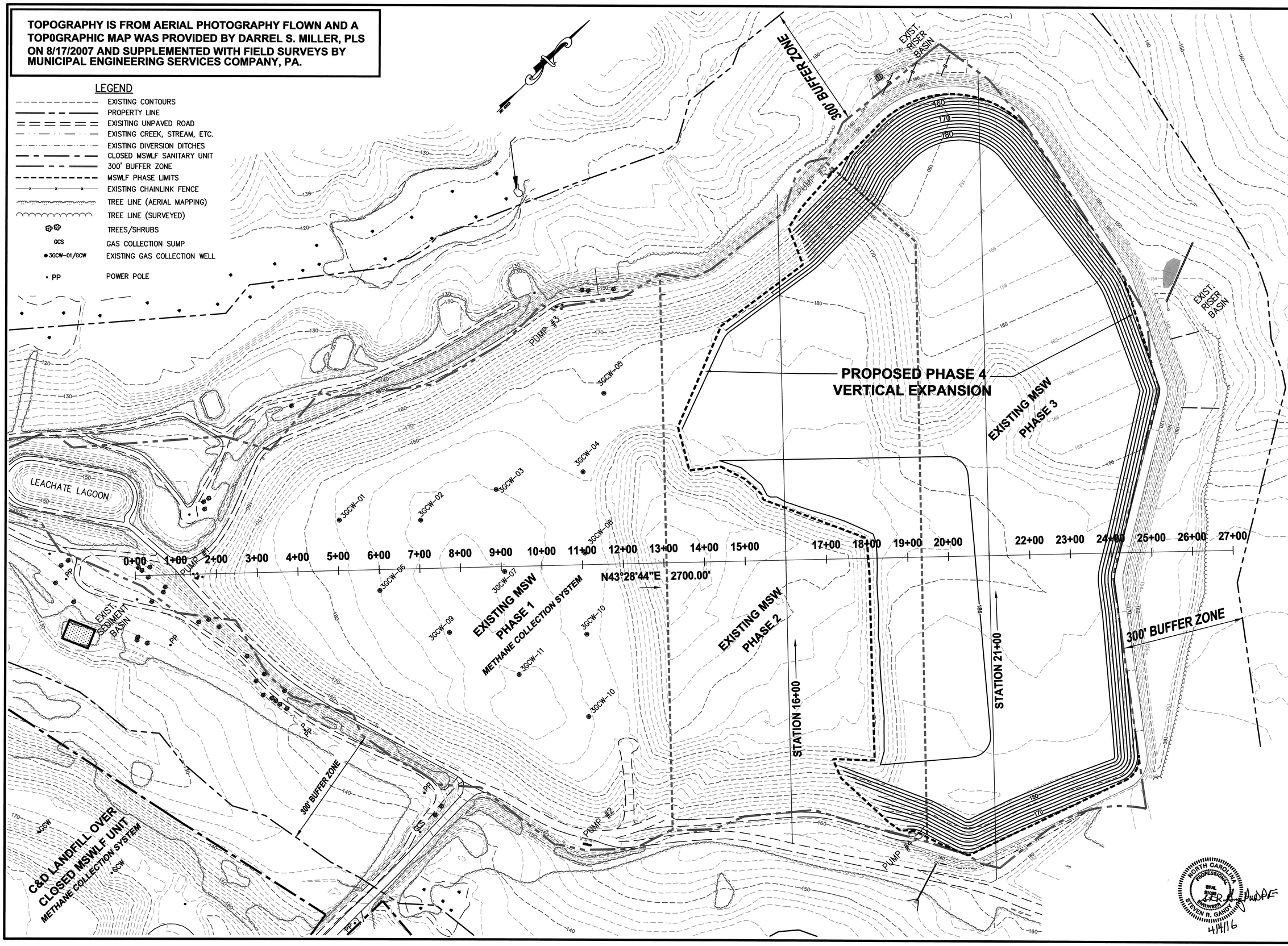
TOPOGRAPHY IS FROM AERIAL PHOTOGRAPHY FLOWN AND A TOPOGRAPHIC MAP WAS PROVIDED BY DARREL S. MILLER, PLS ON 8/17/2007 AND SUPPLEMENTED WITH FIELD SURVEYS BY MUNICIPAL ENGINEERING SERVICES COMPANY, PA.



Municipal Engineering Services Company, P.A.
P.O. BOX 97, GARNER, N.C. 27529 (919) 772-5393
P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1767
LICENSE NUMBER: C-0281

MUNICIPAL SOLID WASTE LANDFILL FACILITY
WAYNE COUNTY NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION
3/25/2016	LHC	1	ADDED PHASE 4 DELINEATION PER SWS LETTER DATED 3/16/2016

ENGINEERING/OPERATION PLAN – MSW AND C&D
5 YEAR FILL PLAN – PHASE 4 (MSW)

SCALE:	1" = 100'
DATE:	12/29/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	S. GANDY
PROJECT NUMBER	G15124
DRAWING NO.	E2
SHEET NO.	4 OF 10

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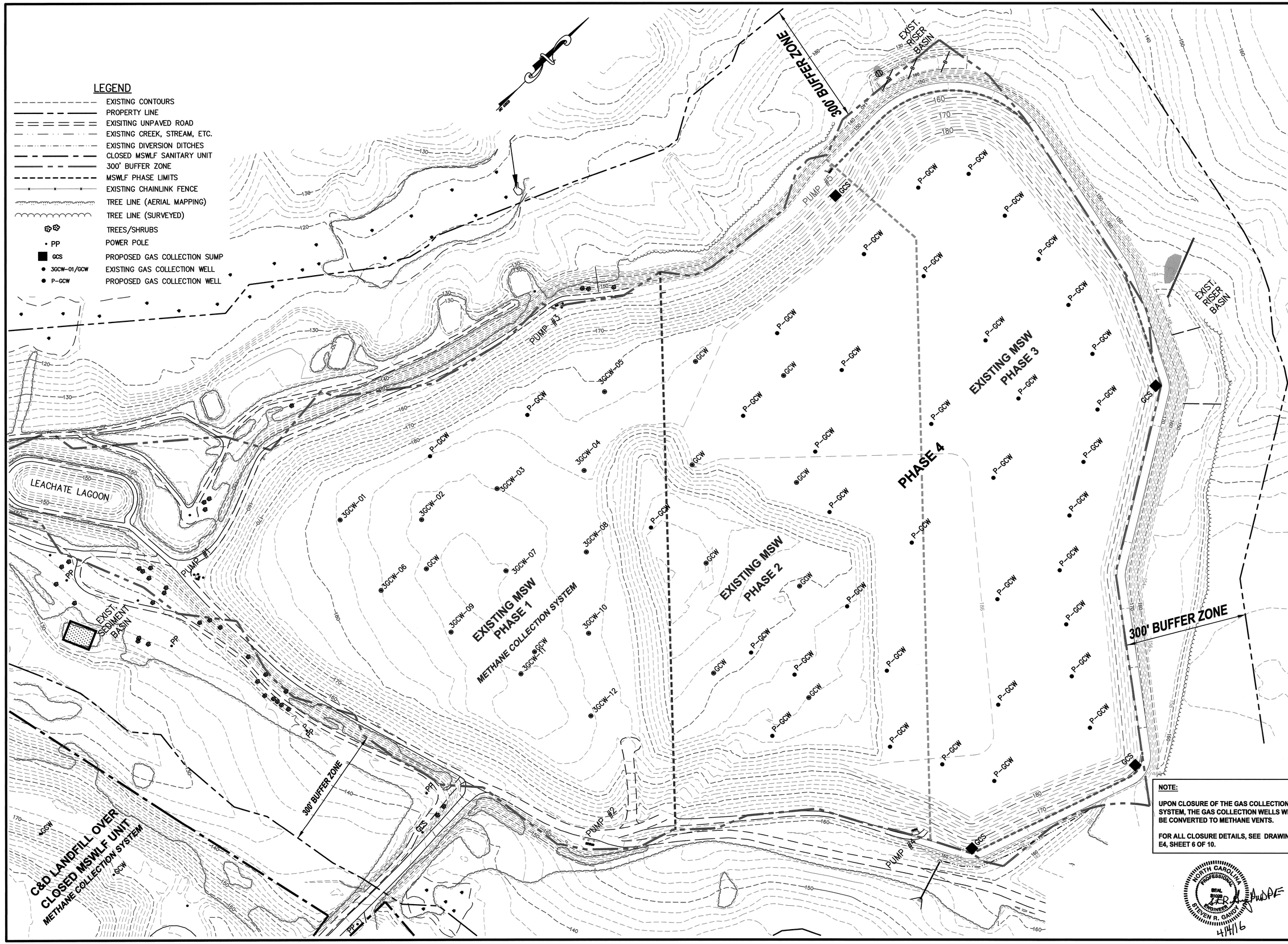

NOTE:

UPON CLOSURE OF THE GAS COLLECTION SYSTEM, THE GAS COLLECTION WELLS WILL BE CONVERTED TO METHANE VENTS.

FOR ALL CLOSURE DETAILS, SEE DRAWING E4, SHEET 6 OF 10.

NORTH CAROLINA PROFESSIONAL SEAL 019281 ENGINEER STEVEN R. GANDY

4/4/16

Municipal Services Engineering Company, P.A.
P.O. BOX 97 GARNER, N.C. 27529 (919) 772-5393
P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1767
LICENSE NUMBER: C-0281

MUNICIPAL SOLID WASTE LANDFILL FACILITY
WAYNE COUNTY NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION
3/25/2016	LHC	1	ADDED NOTE ABOUT DETAILS PER SWS LETTER DATED 3/18/2016

ENGINEERING/OPERATION PLAN – MSW AND C&D
5 YEAR FILL PLAN – PHASE 4 (MSW)
WITH GAS COLLECTION WELLS

SCALE:	1" = 100'
DATE:	12/29/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	S. GANDY
PROJECT NUMBER	G15124
DRAWING NO.	E3
SHEET NO.	5 OF 10

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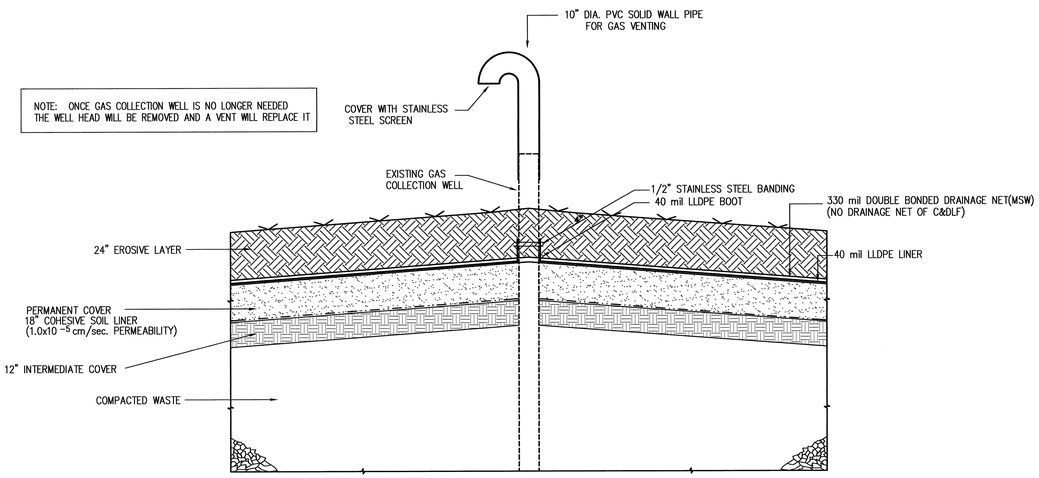
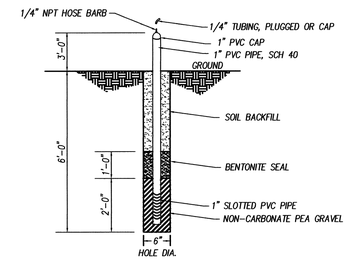


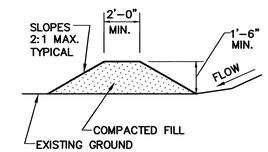
TYPICAL METHANE GAS COLLECTION WELL TO VENT CONVERSION DETAIL

N.T.S.



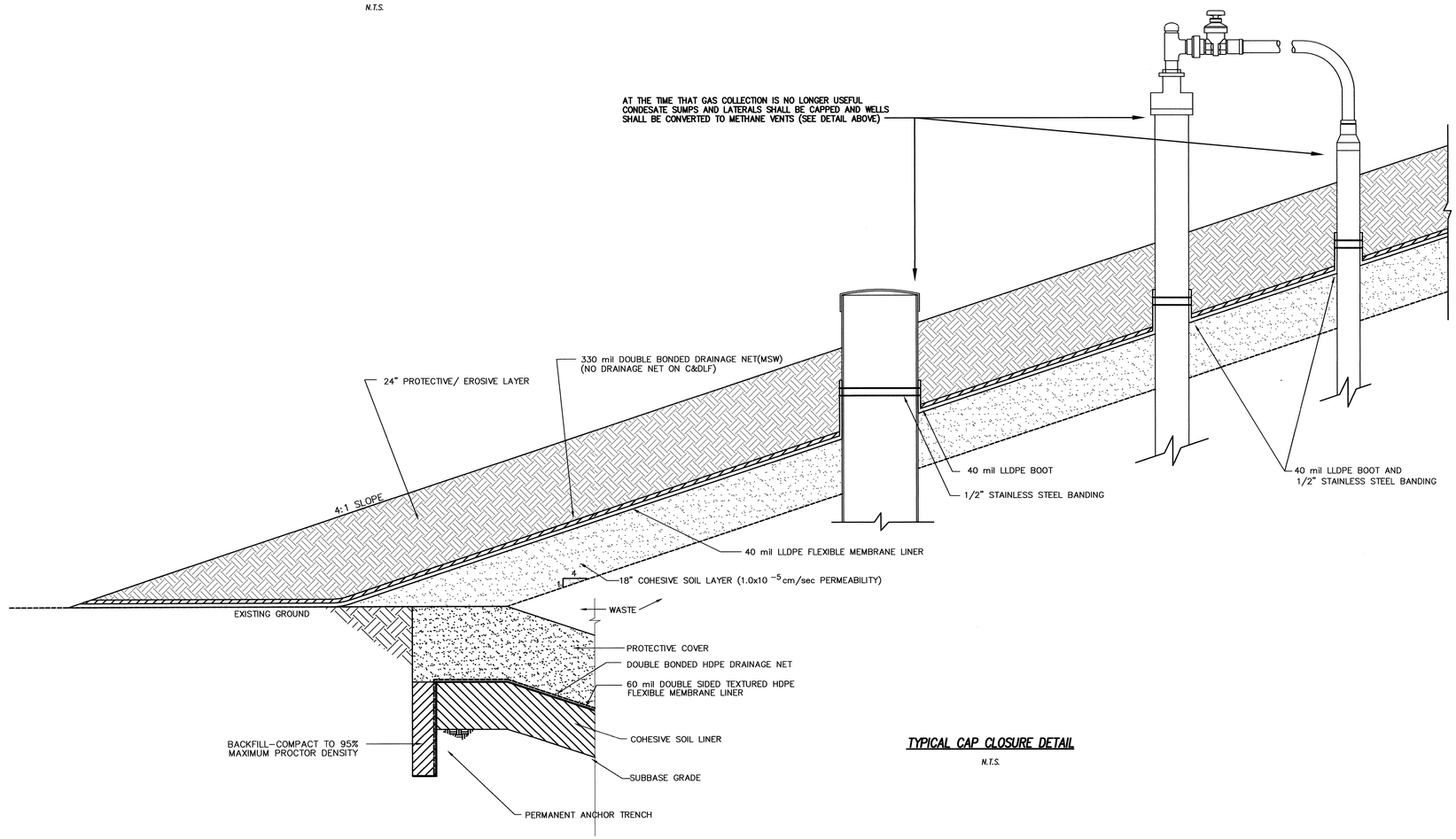
METHANE GAS MONITORING PROBE

N.T.S.



STORMWATER DIVERSION BERM DETAIL

NOT TO SCALE



TYPICAL CAP CLOSURE DETAIL

N.T.S.

NORTH CAROLINA PROFESSIONAL SEAL 019320 ENGINEER STEVEN R. GANDY
4/4/16

Municipal Services Engineering Company, P.A.
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P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1767
LICENSE NUMBER: C-0281

MUNICIPAL SOLID WASTE LANDFILL FACILITY
WAYNE COUNTY NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION
3/25/2016	LHC	1	REVISED DRAINAGE NET NOTES PER SWS LETTER DATED 3/14/2016

ENGINEERING/OPERATION PLAN – MSW AND C&D OPERATION DETAILS

SCALE:	1:1
DATE:	12/23/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	S. GANDY
PROJECT NUMBER	G15124
DRAWING NO.	E4
SHEET NO.	6 OF 10

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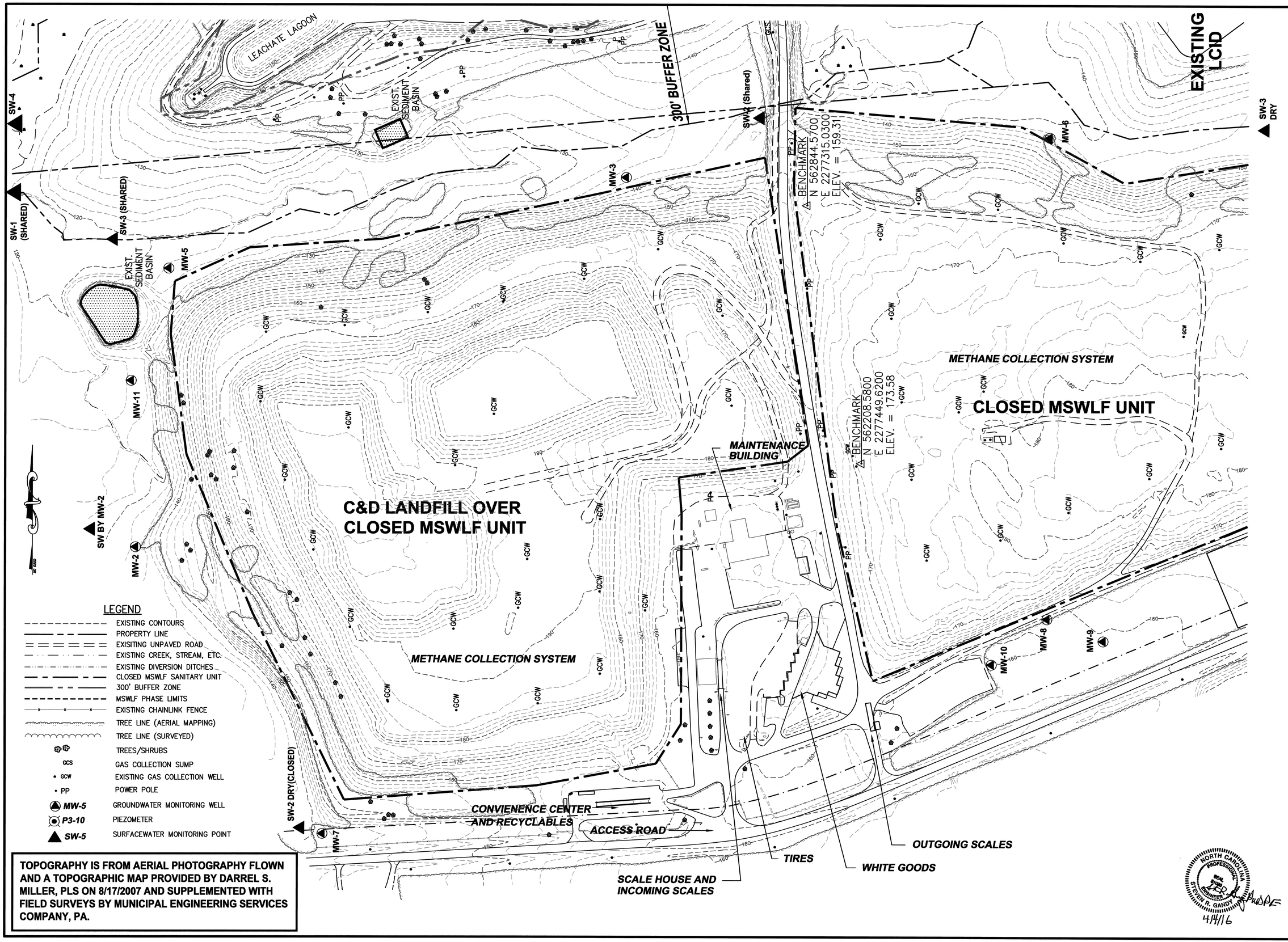

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 17420 STEVEN R. GANDY
4/4/16

Municipal Services Engineering Company, P.A.
P.O. BOX 97, GARNER, N.C. 27529 (919) 772-5393
P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1767
LICENSE NUMBER: C-0281

MUNICIPAL SOLID WASTE LANDFILL FACILITY
WAYNE COUNTY NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION
3/25/2016	LMC	1	ADDED MW'S, SW'S AND MP'S PER SWS REVIEW LETTER DATED 3/18/2016

ENGINEERING/OPERATION PLAN – MSW AND C&D
EXISTING CONDITIONS PHASE 3 (C&D)

SCALE:	1" = 100'
DATE:	12/29/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	S. GANDY
PROJECT NUMBER	G15124
DRAWING NO.	E5
SHEET NO.	7 OF 10

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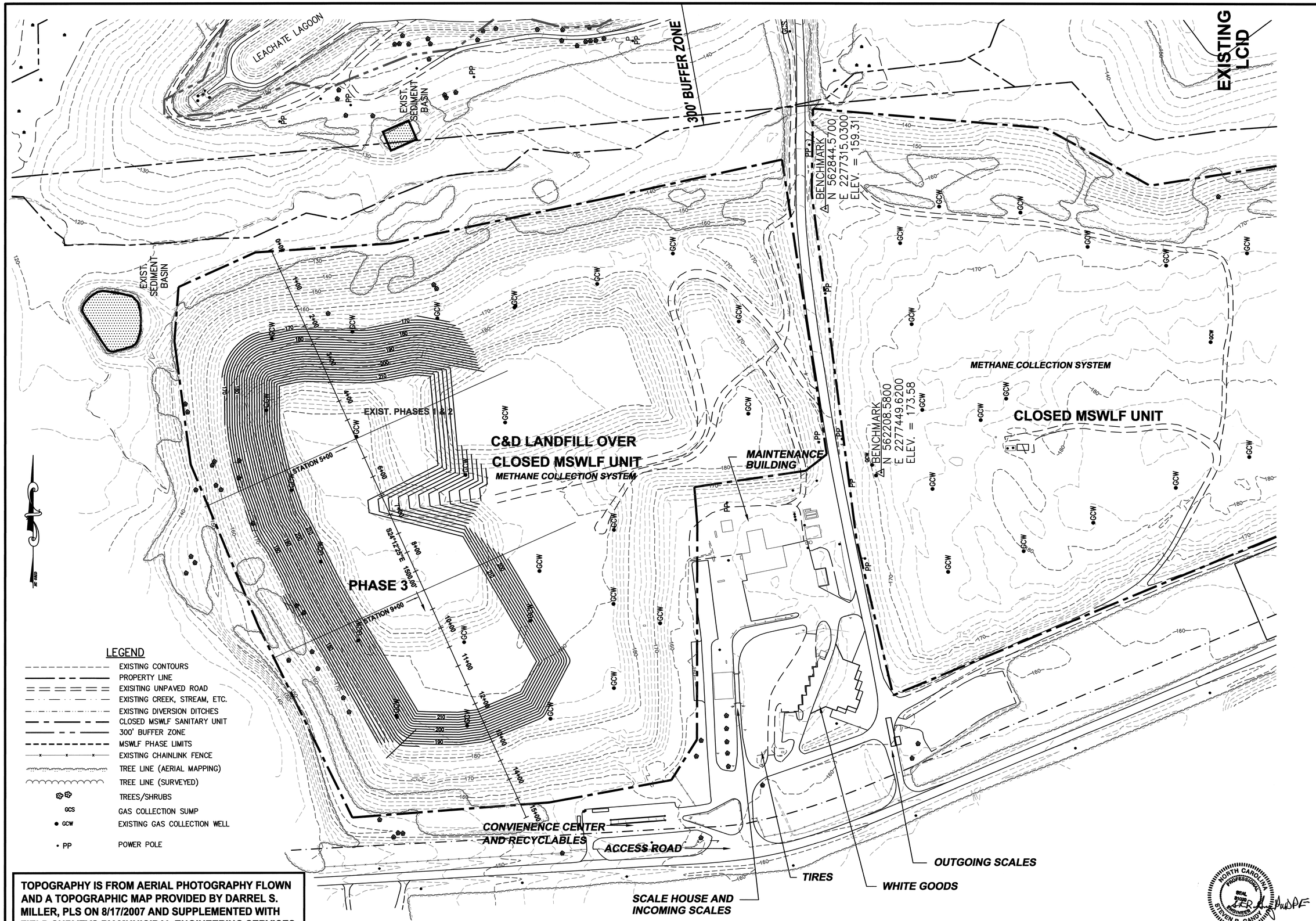

TOPOGRAPHY IS FROM AERIAL PHOTOGRAPHY FLOWN AND A TOPOGRAPHIC MAP PROVIDED BY DARREL S. MILLER, PLS ON 8/17/2007 AND SUPPLEMENTED WITH FIELD SURVEYS BY MUNICIPAL ENGINEERING SERVICES COMPANY, PA.

Municipal Services Engineering Company, P.A.
P.O. BOX 97 GARNER, N.C. 27529 (919) 772-5393
P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1767
LICENSE NUMBER: C-0281

MUNICIPAL SOLID WASTE LANDFILL FACILITY
WAYNE COUNTY NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION
3/25/2015	LJC	1	ADDED GAS WELL PER SWS LETTER DATED 3/18/2016

ENGINEERING/OPERATION PLAN – MSW AND C&D
5 YEAR FILL PLAN (C&D)

NORTH CAROLINA PROFESSIONAL SEAL 21102 ENGINEER STEVEN R. GANDY
4/4/16

SCALE:	1" = 100'
DATE:	12/29/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	S. GANDY
PROJECT NUMBER	G15124
DRAWING NO.	E6
SHEET NO.	8 OF 10

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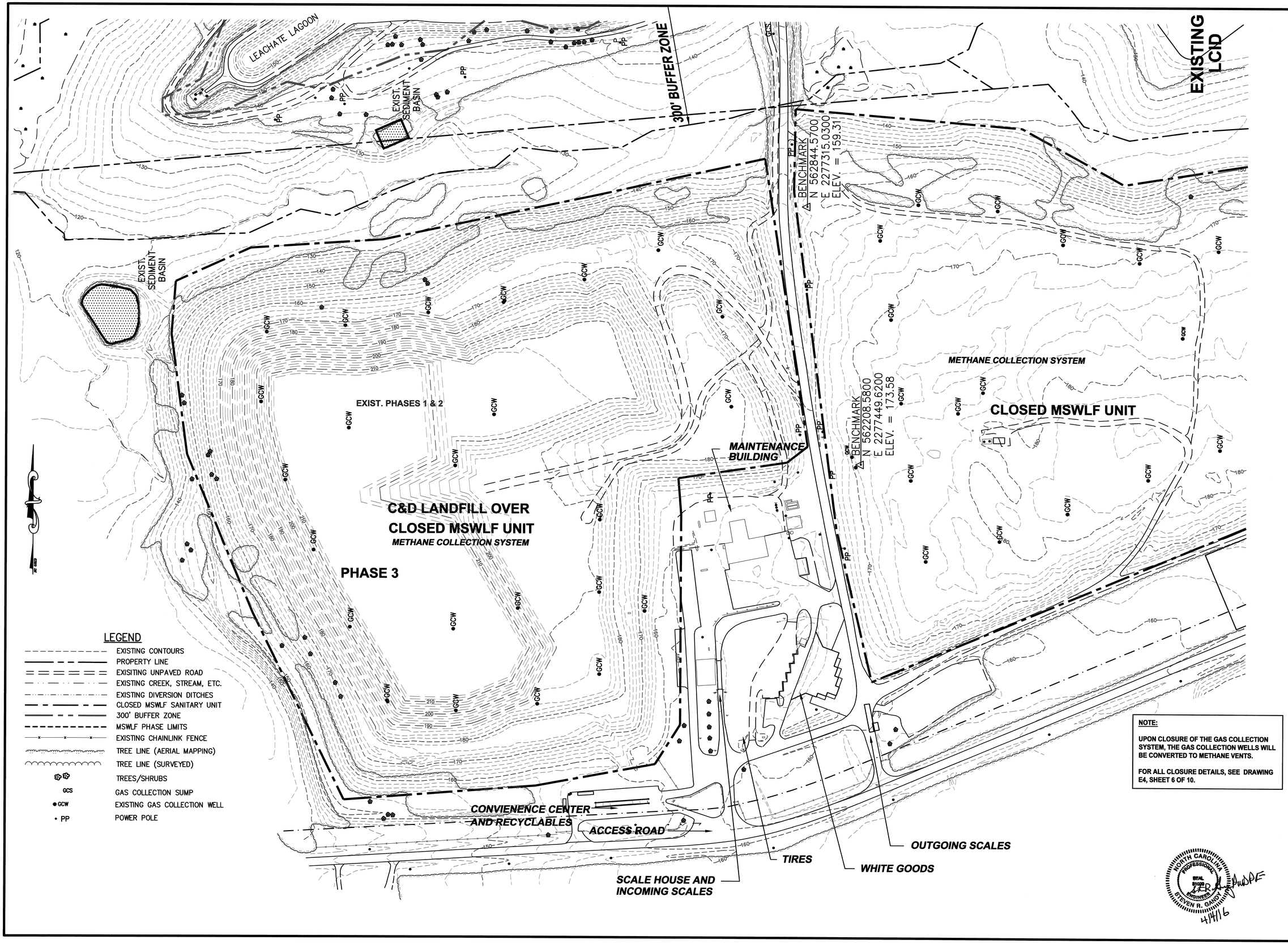


NOTE:

UPON CLOSURE OF THE GAS COLLECTION SYSTEM, THE GAS COLLECTION WELLS WILL BE CONVERTED TO METHANE VENTS.

FOR ALL CLOSURE DETAILS, SEE DRAWING E4, SHEET 6 OF 10.

NORTH CAROLINA PROFESSIONAL SEAL 21021 ENGINEER STEVEN R. GANDY
4/4/16

Municipal Services
P.O. BOX 97 GARNER, N.C. 27529
(919) 772-5393

Engineering Company, P.A.
P.O. BOX 349 BOONE, N.C. 28607
(828) 262-1767
LICENSE NUMBER: C-0281

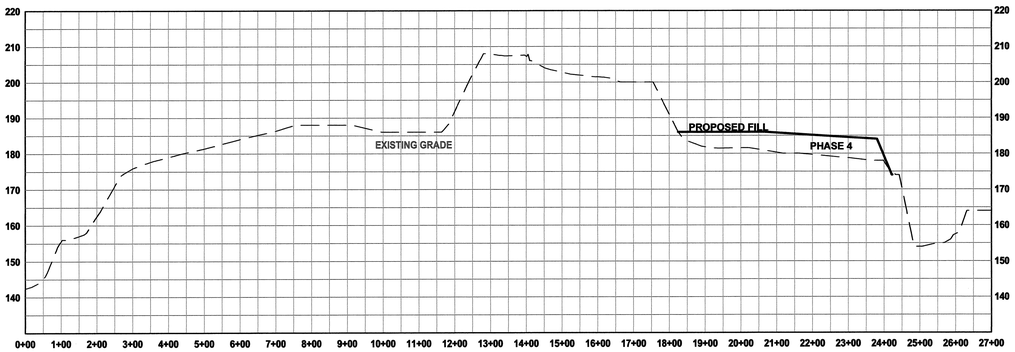
MUNICIPAL SOLID WASTE LANDFILL FACILITY
WAYNE COUNTY NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION
3/25/2016	LHC	1	ADDED NOTE ABOUT DETAILS PER SWS LETTER DATED 3/18/2016

ENGINEERING/OPERATION PLAN – MSW AND C&D
5 YEAR FILL PLAN WITH GAS COLLECTION (C&D)

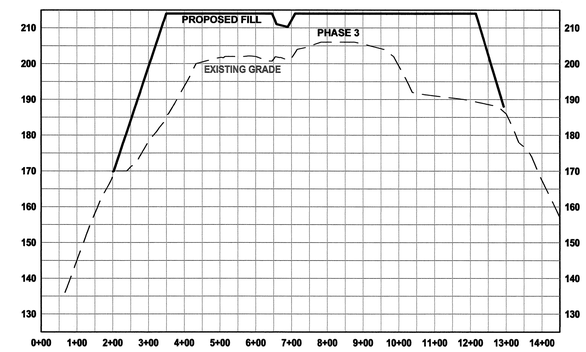
SCALE:	1" = 100'
DATE:	12/29/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	S. GANDY
PROJECT NUMBER	G15124
DRAWING NO.	E7
SHEET NO.	9 OF 10

P:\SolidWaste\G15124-Wayne Co. MSW & CD Permit Renewal\dwg\Eng-Op\G15124-09-E7.dwg, 4/4/2016 3:38:58 PM, lhc,lhc



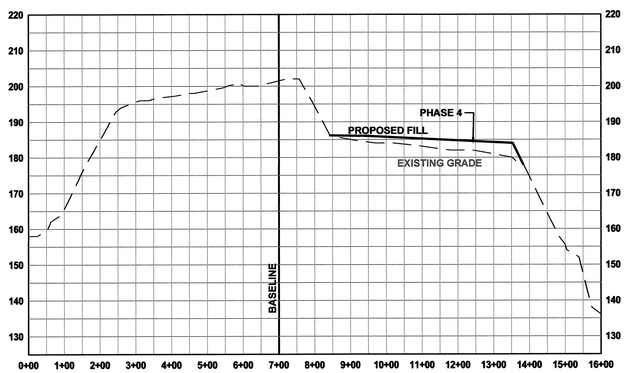
BASELINE PROFILE (MSW)

SCALE: HORIZ.: 1" = 200'
VERT.: 1" = 20'



BASELINE PROFILE (C&D)

SCALE: HORIZ.: 1" = 200'
VERT.: 1" = 20'



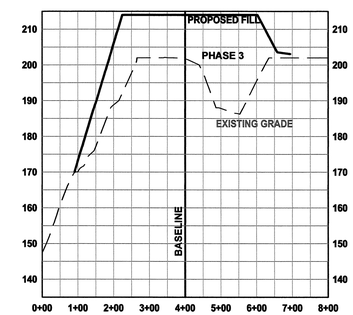
STATION 16+00 (MSW)

SCALE: HORIZ.: 1" = 200'
VERT.: 1" = 20'

NOTE

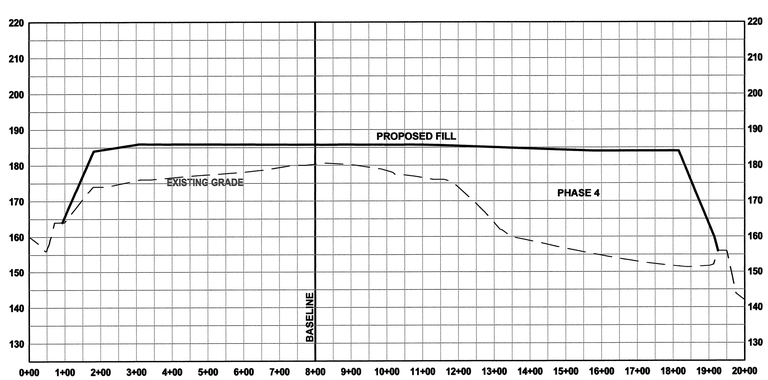
THESE CROSS SECTIONS ARE INTENDED TO SHOW THE CROSS SECTIONS AT SPECIFIC POINTS AS DEFINED BY THE BASELINE GRID ON DRAWINGS E2 AND E6.

EXISTING GRADES ARE CURRENT AS 5/12/2015 SURVEY



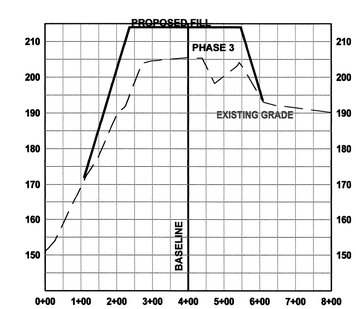
STATION 5+00 (C&D)

SCALE: HORIZ.: 1" = 200'
VERT.: 1" = 20'



STATION 21+00 (MSW)

SCALE: HORIZ.: 1" = 200'
VERT.: 1" = 20'



STATION 9+00 (C&D)

SCALE: HORIZ.: 1" = 200'
VERT.: 1" = 20'

NORTH CAROLINA PROFESSIONAL SEAL 21025 ENGINEER STEVEN R. GANDY
4/4/16

Municipal Engineering Services Company, P.A.
P.O. BOX 97 GARNER, N.C. 27529 (919) 772-5393 LICENSE NUMBER: C-0281
P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1767 LICENSE NUMBER: C-0281

MUNICIPAL SOLID WASTE LANDFILL FACILITY
WAYNE COUNTY NORTH CAROLINA

REV.	DATE	BY	DESCRIPTION
1	3/25/2016	LHC	REVISED PROFILES PER SWS LETTER DATED 3/18/2016

ENGINEERING/OPERATION PLAN – MSW AND C&D
BASELINE PROFILES AND CROSS SECTIONS

SCALE:	1" = 200'
DATE:	12/17/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	J. WOODIE
PROJECT NUMBER	G15124
DRAWING NO.	E8
SHEET NO.	10 OF 10

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SECTION 3.0

CLOSURE PLAN

3.1 Introduction

The County will cap their landfill within 180 days after the final receipt of solid waste. The cap system will consist of 12 inches bridging material (temporary cover), 18 inches of cohesive soil liner with a permeability no greater than 1.0 x 10^{-5} cm/sec, 40 mil Linear Low Density Polyethylene (LLDPE), drainage layer, 24 inches of protective/erosive layer. All depths shall be measured perpendicular to the slope surface. The cap contains gas venting system consisting of a series of washed stone trenches below the soil liner that will be vented through 10" diameter PVC pipes with membrane boots that penetrate the cap. The cap system will also include the proper seeding and mulching of the erosive layer and other erosion control devices.

The largest area to be closed within the permitted life will be 65 acres. Upon closure, the slopes of the side and deck portions of the final cover system shall be a minimum of 5 percent and a maximum of 25 percent.

The Division requires that the Engineer certifies that the constructed cap is built according to approved plans and specifications. The Engineer that will accomplish this task is the one who did the planning and has written the Closure Plan specifications.

Before construction can begin, a pre-construction meeting will be held and the responsibilities and duties of each party will be discussed.

The parties involved in the construction of the landfill are the Owner, Contractor and Engineer. The Contractor is contractually responsible to the Owner. The Engineer is the Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of the Engineer as the Owner's representative are set forth in the Contract Document and will not be changed without written consent of the Owner and Engineer.

The Contactor will purchase and supply all materials that are part of the landfill construction. They will employ subcontractors who will install and non-destructively test all flexible membrane liners. They will also employ a North Carolina licensed geotechnical engineer and professional land surveyor. The geotechnical engineer will test, report and certify the results for all structural and cohesive soils that are incorporated in the landfill. The surveyor will report and certify elevations of the as-built existing grade, top of cohesive soil liner and top of vegetative/protective cover.

The Contractor is responsible for following and meeting the requirements set forth in the contract documents. The Contractors will provide to the Owner of the landfill and the Engineer a completed landfill constructed by Division's approved plans and specifications. The Contractor will give the Engineer a schedule for completion of the landfill including dates for expected construction of the cohesive soil test pad, cohesive soil cap, erosive layer, and estimated time for project completion. The Contractor is responsible for providing a foreman to remain on site at all times during construction, provide qualified personnel to conduct quality control, scheduling and coordinating the subcontractors, provide progress reports and as-built drawings, and coordinating construction activities with the Engineer. The foreman is responsible for supervising and coordinating with his crew, subcontractors, quality control personnel, attending all meetings and notifying the Engineer's Construction Observer when any discrepancies occur. The Contractor will meet with the Construction Observer on a daily basis to discuss the days construction activities. The results of all tests and any change in schedule shall be given to the Construction Observer as soon they are known by the Contractor. The Contractor must be registered in the State of North Carolina.

As the owner's representative, the Engineer will employ the onsite construction observer. The Engineer will also employ all third party laboratories for conformance testing of the geosynthetics, destructive flexible membrane liner tests and random cohesive soil permeability tests.

The Engineer is responsible for providing the engineering design, drawings and specifications, contract documents and Construction Quality Assurance (CQA) needed for construction of the landfill. The Engineer is responsible for conducting the pre-construction meeting, which will lay out the foundation for the project. The Engineer will approve any design changes and certify to the Division that the cap was constructed according to the requirements of Rule .1621 Construction Quality Assurance Plan and .1624 Construction requirements for MSWLF Facilities, and Division approved plans and specifications. This will be accomplished by on-site

observation and independent laboratory soil testing to test site-specific soil properties including permeability. The Engineer will provide Quality Assurance by spot testing along side the Contractor, who will be providing the Quality Control. The Engineer will certify that the construction was completed in accordance with the CQA manual. The Engineer must be a professional engineer registered in North Carolina.

The Construction Observer (CO) is the Engineer's representative on-site. It is the CO's responsibility to know and interpret the plans and specifications of the project. On a daily basis the CO will coordinate with the Foreman to help ensure a quality product for the Owner. The CO will keep a daily log on the activities of the Contractor, keep notes on all meetings, and handle all quality assurance activities indicated in this document. The CO will keep a log of all material delivered on site and ensure the materials meets or exceeds the specifications indicated in this report. If the need arises, additional meetings will be scheduled as determined by the CO.

The estimate of the maximum inventory of MSW wastes ever on-site over the active life to date of the landfill facility is 2,133,006 cubic yards.

Prior to beginning closure, the County shall notify the Division of Waste Management that a notice of the intent to close the unit has been placed in the operating record. The County shall begin closure activities no later than thirty (30) days after the date on which the landfill receives the final wastes or if the landfill has remaining capacity and there is a reasonable likelihood that the landfill will receive additional wastes, no later than one year after the most recent receipt of wastes. Extensions beyond the one-year deadline for beginning closure may be granted by the Division of Waste Management if the County demonstrates that the landfill has the capacity to receive additional waste and the County has taken and will continue to take all steps necessary to prevent threats to human health and the environment from the closed landfill.

The County shall complete closure activities in accordance with the closure plan within 180 days following the final receipt of waste. Extensions of the closure period may be granted by the Division of Waste Management if the County demonstrates that closure will, of necessity, take longer than one hundred eighty (180) days and the County has taken and will continue to take all steps to prevent threats of human health and environment from the enclosed landfill.

Estimated schedule of closure will be approximately 26 years.

Following closure of the landfill, the County shall notify the Division that a certification, signed by the project engineer, verifying that closure has been completed in accordance with the closure plan, and has been placed in the operating record. The County shall record a notation on the deed to the landfill property and notify the Division of Waste Management that the notation has been recorded and a copy has been placed in the operating record. The notation on the deed shall in perpetuity notify any potential purchaser of the property that the land has been used as a landfill and its use is restricted under the closure plan approved by the Division of Waste Management. The County may request permission from the Division to remove the notation from the deed if all waste are removed from the landfill.

3.2 Closure Cap System

All materials and equipment shall be furnished by an established and reputable manufacturer or supplier. All materials and equipment shall be new and shall be of first class ingredients and construction, designed and guaranteed to perform the service required and shall conform with the following standard specifications or shall be the product of the listed manufacturers or similar and equal thereto as approved by the Engineer.

3.2.1 Conformance Testing for Interface Friction Angles of Capping Materials

Conformance testing for Interface Friction Angles, for every 200,000 square feet of capping materials is as follows:

1. Minimum Friction Angle for soil to textured LLDPE liner is 26 degrees and the test method is ASTM 5321.

2. Minimum Friction Angle for textured LLDPE liner to 330 mil double bonded geocomposite drainage net is 26 degrees and the test method is ASTM 5321.

3. Minimum Friction Angle for 330 mil double bonded geocomposite drainage net to soil is 26 degrees and the test method is ASTM 5321.

3.3 Closure Cohesive Soil Cap

All materials and equipment shall be furnished by an established and reputable manufacturer or supplier. All materials and equipment shall be new and shall be of first class ingredients and construction, designed and guaranteed to perform the service required and shall conform with the following standard specifications or shall be the product of the listed manufacturers or similar and equal thereto as approved by the Engineer.

Cohesive Soil Cap Borrow Material

Test Name	Test Method	Contractor/Engineer Frequency
Moisture/Density	ASTM D698/D1557	1 per 5000 c.y.
Remolded Permeability	ASTM D5084	1 per 5000 c.y.
Atterberg Limits	ASTM D4318	1 per 5000 c.y.
Visual Classification	ASTM D2488	1 per 5000 c.y.
Grain Size Distribution	ASTM D422	1 per 5000 c.y.

Cohesive Soil Cap Test Pad

Test Name	Test Method	Contractor/Engineer Frequency
Field Moisture/Density	ASTM D1556 (sand cone) ASTM D2922/D3017 (nuclear gauge) ASTM D2937 (drive cylinder)	3 per lift
Permeability	ASTM D5084	1 per lift
Remolded Permeability	ASTM D5084	1 per lift
Atterberg Limits	ASTM D4318	1 per lift
Visual Classification	ASTM D2488	1 per lift
Grain Size Distribution	ASTM D422	1 per lift

In-Place Cohesive Soil Cap

Test Name	Test Method	Contractor/Engineer Frequency
Field Moisture/Density	ASTM D1556 (sand cone) ASTM D2922/D3017 (nuclear gauge) ASTM D2937 (drive cylinder)	1 per lift per acre
Permeability	ASTM D5084	1 per lift per acre
Atterberg Limits	ASTM D4318	1 per lift per acre
Visual Classification	ASTM D2488	1 per lift per acre
Grain Size Distribution	ASTM D422	1 per lift per acre

(a) Suitable on-site and/or off-site soils may be used as cohesive soil cap if it can achieve an in-place permeability of 1.0 x 10^{-5} cm/sec or less and meets all testing requirements indicated in the material testing paragraph in this section. Wyoming bentonite or an approved equivalent may be blended with the soil to lower the soil's permeability.

(b) A permeability “window” shall be developed for each type of soil from the borrow material that will be used for construction of the cohesive soil cap. The window shall be plotted on a semi-log plot with moisture content versus density. Laboratory testing to develop the window shall include a series of remolded samples compacted to various dry densities and moisture contents utilizing the same compactive effort (ASTM D 698 or D 1557). The remolded samples shall be tested for permeability to determine whether or not the particular soil type will provide the maximum permeability (1.0 x 10^{-5} cm/sec) at various dry densities and moisture contents. The window is then developed from the accepted

remolded samples and moisture contents from the semi-log plot. A straight line is typically drawn between the acceptable points on the moisture-density curve to indicate a range of probable acceptable permeability results. The window will be used in the construction of the test strip to verify the laboratory remolded permeability results.

(c) Atterberg limits and grain size distribution shall also be conducted on the bulk samples used to prepare the permeability window ASTM D2487, D4318, D422. These tests can be used as indices on random samples collected from the borrow site during construction to verify the soil type is the same as was used to develop the "window". As a minimum, sufficient visual classifications and Atterberg limits shall be conducted in association with each permeability test to verify that the construction materials meet specifications.

(d) A test strip of compacted cohesive soil cap shall be prepared to verify the permeability "window" prior to general installation of the cohesive soil cap. The test strip will be used to verify the results from the remolded permeabilities from the borrow site utilizing the permeability window(s) for each soil type that is going to be used for construction of the cohesive soil cap. At a minimum, the verification will consist of three moisture density tests, one Atterberg limits test, one grain size distribution test (ASTM D2487, D4318, and D422), and one Shelby Tube sample for each lift constructed in the test pad. Laboratory permeability tests shall be performed on tube (Shelby or drive tubes) samples of the cohesive soil cap after placement and compaction. The permeability must be a maximum of 1.0×10^{-5}cm/sec. Tests shall be performed in accordance with the ASTM D5084. The test strip shall be approximately 2,500 sq. ft. in surface area and constructed to conform geometrically to the site topography with a minimum lateral dimension in any direction of 25 ft. The test strip shall consist of at least three compacted 6 inch lifts of cohesive soil cap. Placement and testing of the test strip shall be in conformance with the construction specifications and requirements for general installation of the cohesive soil cap. Test results from the test strip shall be used to guide placement and achievement of the required maximum permeability of 1.0×10^{-5} cm/sec of the cohesive soil cap. The test strip may be used as an integral part of the overall cohesive soil cap if it meets the required specification for the cap. All results shall be given to the Construction Observer.

(e) The soils shall be placed to the total thickness shown on the plans in maximum 8-inch thick loose lifts with a maximum 6" compacted lift compacted preferably at a moisture content between 0 to 3% above optimum moisture content to 95% standard Proctor maximum dry density (ASTM Test Designation D698). A sheepsfoot roller or approved alternative may be used to compact the soil cap provided the compaction and permeability requirements can be achieved. Each lift shall be tested for permeability, moisture content, particle size distribution analysis, Atterberg limits, moisture-density-permeability relation, and if needed percent bentonite admixed with soil, prior to the placement of the succeeding lift and visually inspected to confirm that all soil clods have been broken and that the surface is sufficiently scarified so that adequate bonding can be achieved. Soils for cohesive soil cap shall be screened, disced, or prepared using any other approved method as necessary to obtain a homogeneous cohesive soil with clod sizes in a soil matrix no larger than about 1.5 inches in maximum diameter. After each lift, the surface shall be scarified prior to the placement of the next lift to provide good bonding from one lift to the next.

(f) The cohesive soil cap shall be tested to evaluate the coefficient of permeability. The coefficient of permeability of the soil cap shall be equal to or less than 1.0×10^{-5} cm/sec after placement and compaction. The soil cap must be a minimum of 1.5 feet thick (measured perpendicular to slope).

(g) Laboratory falling head permeability tests shall be performed on tube (Shelby or drive tubes) samples of the cohesive soil cap after placement and compaction. The permeability must be a maximum of 1.0×10^{-5}cm/sec. Tests shall be performed in accordance with ASTM D5084. All laboratory permeability tests shall be performed at a confining pressure of 10 psi and at a hydraulic gradient of 20.

(h) The soil cap shall be tested a minimum of one soil sample per lift per acre for laboratory permeability. All permeability testing will be on random samples judged by the Engineer to be representative of the most permeable soil conditions for the area being tested. The project engineer shall certify that the

materials used in construction were tested according to the Division approved plans. If after placement of the soil cap it fails the required tests, the material will either be reworked or replaced and retested. The soil cap must remain moist at all times, if any section becomes dry, rework the dry area and moisten.

(i) A minimum of two (2) inches of soil shall be removed prior to securing each sample for permeability testing. The sampling tube shall be advanced vertically into the soil with as little soil disturbance as possible and should be pushed using a uniform pressure. The sampling tube (Shelby tube), when extracted, shall be free of dents, and the ends shall not be distorted. A backhoe or approved alternative should be used to advance the sampling tube (Shelby tube) as long as disturbance is minimized. Drive tube samples of the cap may be obtained for permeability testings. If the Engineer judges the sample to be too disturbed, another sample shall be taken. Once an acceptable sample has been secured and properly prepared, all sample excavations or other holes created by survey stakes, etc. shall be backfilled to grade with a 50% mixture of bentonite and similar soils in maximum 3-inch loose lifts and hand tamped with a blunt tool to achieve a tight seal equivalent to the original density.

(j) No additional construction shall proceed on the soil layers at the area being tested until the Engineer has reviewed the results of the tests and judged the desired permeability is being achieved.

(k) As a minimum, sufficient visual classifications (ASTM Test Designation D2487), analyses (ASTM Test Designation D422) and Atterberg limits (ASTM Test Designation D4318) shall be conducted in association with each permeability test to verify that the construction materials meet specifications. The minimum number of tests will be 1 per lift per acre.

(l) If the soil for the cohesive soil cap is incapable of achieving the required permeability when compacted, bentonite or approved alternative may be mixed with the soils to decrease the permeability. The amount of additive required must be determined in the laboratory and mixed in the field using either a pug mill or a soil stabilizer. Where additives are required, the soil shall be placed in maximum 8-inch thick loose lifts and compacted preferably between 0 to +3% optimum moisture content to 95% standard proctor maximum dry density (ASTM Test Designation D698) for the soil-additive mixture. All other compaction procedures for the soil apply.

(m) Surfaces to be lined shall be smooth and free of debris, roots, and angular or sharp rocks larger than three-eight (3/8) inches in diameter to a depth of six (6) inches. The cohesive soil cap shall have no sudden sharp or abrupt changes in grade.

(n) The Contractor shall protect the cohesive soil cap from desiccation, flooding and freezing. Protection, if required, may consists of a thin plastic protective cover, (or other material as approved by the engineer) installed over the completed cohesive soil cap until such time as the placement of flexible membrane liner begins. Areas found to have any desiccation cracks or which exhibit swelling, heaving or other similar conditions shall be replaced or reworked and retested by the contractor to remove these defects.

(o) The thickness and grade of the soil cap will be verified by the surveyor before placement of the geomembrane liner. The soil cap will be surveyed at 50 foot grid points and any grade changes (top of slopes, bottom of slopes, breaks in slopes, etc.) where the elevations of the top of landfill will be checked with the top of soil cap to verify 1.5 feet (measured perpendicular to slope) of soil cap. The grade will then be verified with the surveyed information. The survey will be performed by NC professional land surveyor.

(p) Surface Acceptance. Upon request, the Flexible Membrane Liner manufacturer installer shall provide the Engineer with a written acceptance of the surface prior to commencing installation. Subsequent repairs to the cohesive soil cap and the surface shall remain the responsibility of the contractor.

3.4 Closure Flexible Membrane Liner Method of Deployment

All materials and equipment shall be furnished by an established and reputable manufacturer or supplier. All materials and equipment shall be new and shall be of first class ingredients and construction, designed and guaranteed to perform the service required and shall conform with the following standard specifications or shall be the product of the listed manufacturers or similar and equal thereto as approved by the Engineer.

Delivery, Storage and Handling of all materials and equipment shall adhere to the following:

A. Manufacturer labels must be on all rolls delivered to the project.
B. A firmly affixed label attached to the selvage edge, shall clearly state the manufacturer's name, product identification, material thickness, roll number, roll type, roll dimensions and roll weight.
C. The manufacturer protects the geomembrane from mud, dirt, dust, puncture, cutting or any other damaging deleterious conditions.
D. Continuously and uniformly supported, rolls are stored away from high traffic areas on a smooth, level surface. Chocks keep the rolls secure when necessary.

Material Warranty shall adhere to the following:

Material manufacturer shall guarantee material against defects and premature aging from environmental conditions on a pro rata basis for a specified period of time acceptable to owner and manufacturer.

Flexible Membrane Liner Tests

Test Name	Description	Test Method	Frequency
Air Test	Air Test Seams		Every Seam
Vacuum Test	Every welded area		Where air test impossible
Destructive Tests	Seam Strength	ASTM D4437	Every 500' of seam

Qualified liner installers, seamers, and the liner foreman shall meet a minimum requirement of 1,000,000 square feet of geomembrane installation. There are no other minimum qualifications needed by other parties.

The 40 mil Linear Low Density Polyethylene (LLDPE) is to be placed in direct contact with moist cohesive soil cap. The extrusion rods and/or brads used in seaming the rolls together shall be derived from the same base resin as the liner and shall meet the following minimum properties:

English Units

Table 2(a) – Linear Low Density Polyethylene (LLDPE) Geomembrane (TEXTURED)

Properties	Test Method	Test Value								Testing Frequency (minimum)
		20 mils	30 mils	40 mils	50 mils	60 mils	80 mils	100 mils	120 mils	
Thickness mils (min. ave.) • lowest individual for 8 out of 10 values • lowest individual for any of the 10 values	D 5994	nom. (-5%) -10% -15%	nom. (-5%) -10% -15%	nom. (-5%) -10% -15%	nom. (-5%) -10% -15%	nom. (-5%) -10% -15%	nom. (-5%) -10% -15%	nom. (-5%) -10% -15%	nom. (-5%) -10% -15%	per roll
Asperity Height mils (min. ave.) *(1)*	D 7466	16	16	16	16	16	16	16	16	Every 2nd roll *(2)*
Density g/ml (max.)	D 1505/D 792	0.939	0.939	0.939	0.939	0.939	0.939	0.939	0.939	200,000 lb
Tensile Properties *(3)* (min. ave.) • break strength – lb/in. • break elongation - %	D 6693 Type IV	30 250	45 250	60 250	75 250	90 250	120 250	150 250	180 250	20,000 lb
2% Modulus – lb/in. (max.)	D 5323	1200	1800	2400	3000	3600	4800	6000	7200	per formulation
Tear Resistance – lb (min. ave.)	D 1004	11	16	22	27	33	44	55	66	45,000 lb
Puncture Resistance – lb (min. ave.)	D 4833	22	33	44	55	66	88	110	132	45,000 lb
Axi-Symmetric Break Resistance Strain - % (min.)	D 5617	30	30	30	30	30	30	30	30	per formulation
Carbon Black Content - %	D 4218 *(4)*	2.0-3.0	2.0-3.0	2.0-3.0	2.0-3.0	2.0-3.0	2.0-3.0	2.0-3.0	2.0-3.0	45,000 lb
Carbon Black Dispersion	D 5596	note *(5)*	note *(5)*	note *(5)*	note *(5)*	note *(5)*	note *(5)*	note *(5)*	note *(5)*	45,000 lb
Oxidative Induction Time (OIT) *(6)* (e) Standard OIT (min. ave.) — or — (f) High Pressure OIT (min. ave.)	 D 3895 D 5885	 100 400	 100 400	 100 400	 100 400	 100 400	 100 400	 100 400	 100 400	200,000 lb
Oven Aging at 85°C *(7)* (a) Standard OIT (min. ave.) - % retained after 90 days — or — (b) High Pressure OIT (min. ave.) - % retained after 90 days	D 5721 D 3895 D 5885	 35 60	 35 60	 35 60	 35 60	 35 60	 35 60	 35 60	 35 60	per formulation
UV Resistance *(8)* (a) Standard OIT (min. ave.) — or — (b) High Pressure OIT (min. ave.) - % retained after 1600 hrs *(10)*	D 7238 D 3895 D 5885	 N. R. *(9)* 35	 N.R. *(9)* 35	 N.R. *(9)* 35	 N.R. *(9)* 35	 N.R. *(9)* 35	 N.R. *(9)* 35	 N.R. *(9)* 35	 N.R. *(9)* 35	per formulation

(1) Of 10 readings; 8 out of 10 must be ≥ 14 mils, and lowest individual reading must be ≥ 12 mils; also see Note 9.
(2) Alternate the measurement side for double sided textured sheet
(3) Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction.
- Break elongation is calculated using a gage length of 2.0 in. at 2.0 in./min.

(4) Other methods such as D 1603 (tube furnace) or D 6370 (TGA) are acceptable if an appropriate correlation to D 4218 (muffle furnace) can be established.
(5) Carbon black dispersion (only near spherical agglomerates) for 10 different views:
- 9 in Categories 1 or 2 and 1 in Category 3

(6) The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.
(7) It is also recommended to evaluate samples at 30 and 60 days to compare with the 90 day response.
(8) The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C.
(9) Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.
(10) UV resistance is based on percent retained value regardless of the original HP-OIT value.

(1) Preparation for Geomembrane Deployment

(a) Panel Layout

Prior to commencement of liner deployment, layout drawings shall be produced to indicate the panel configuration and location of seams for the project.

(b) Identification

Each panel used for the installation shall be given a numeric or alpha-numeric identification number consistent with the layout drawing. This identification number shall be related to manufacturing roll number that identifies the resin type, batch number and date of manufacture.

(c) Verification

The manufacturers certification will be reviewed by the Engineer. If the certification does not meet the requirements of GRI-GM17, the corresponding liner rolls will be rejected.

The Engineer will remove a sample from 1 out of 4 rolls delivered to the site and have a third party lab test for thickness, density, carbon black content, carbon black dispersion and tensile properties. The geomembrane will have been accredited by the Geosynthetic Accreditation Institute (GAI).

(2) Field Panel Placement

(a) Location

The Flexible Membrane Liner Manufacturer/Installer shall install field panels at the location indicated on the layout drawing. If the panels are deployed in a location other than that indicated on the layout drawings, the revised location shall be noted in the field on a layout drawing which will be modified at the completion of the project to reflect actual panel locations.

(b) Weather Conditions

Geomembrane deployment shall not be carried out during any precipitation, nor in the presence of excessive moisture (i.e. fog, dew), in an area of standing water, or during high winds.

(c) Method of Deployment shall follow the manufacturer's recommendations and sound, accepted engineering practices.

(1) The method and equipment used to deploy the panels must not damage the geomembrane or the supporting subgrade surface.

(2) No personnel working on the geomembrane will smoke, wear shoes that can damage the geomembrane, or engage in actions which could result in damage to the geomembrane.

(3) Adequate temporary loading and/or anchoring, (i.e. sandbags, tires), which will not damage the geomembrane, will be placed to prevent uplift of the geomembrane by wind. If uplift occurs, additional sandbags will be placed in necessary areas.

(4) The geomembrane will be deployed in a manner to minimize wrinkles. The geomembrane will have no fold overs.

(5) Any damage to a panel of the geomembrane will be repaired. Any area of a panel seriously damaged (torn, twisted, or crimped) will be marked, cut out and removed from the work area with resulting seaming and/or repairs performed.

(3) Field Seaming

(a) Layout

In general, seams shall be oriented parallel to the slope, i.e., oriented along, not across the slope. Whenever possible, horizontal seams should be located not less than five (5) feet from the toe of the slope. Each seam made in the field shall be numbered in a manner that is compatible with the panel layout drawing for documentation of seam testing results.

(b) Personnel

All personnel performing seaming operations shall be trained in the operation of the specific seaming equipment being used and will qualify by successfully welding a test seam. The project foreman will provide direct supervision of all personnel seaming to verify proper welding procedures are followed. Qualified liner installers, seamers, and the liner foreman shall meet a minimum requirement of 1,000,000 square feet of geomembrane installation. There are no other minimum qualifications needed by other parties.

(c) Equipment

(1) Fusion Welding

Fusion Welding consists of placing a heated wedge, mounted on a self propelled vehicular unit, between two (2) overlapped sheets such that the surface of both sheets are heated above the polyethylene's melting point. After being heated by the wedge, the overlapped panels pass through a set of preset pressure wheels which compress the two (2) panels together so that a continuous homogeneous fusion weld is formed. The fusion welder is equipped with a temperature readout device which continuously monitors the temperature of the wedge.

(2) Extrusion Fillet Welding

Extrusion fillet welding consists of introducing a ribbon of molten resin along the edge of the seam overlap of the two (2) sheets to be welded. The molten polymer causes some of the material of each sheet to be liquefied resulting in a homogeneous bond between the molten weld bead and the surfaces of the sheets. The extrusion welder is equipped with gauges giving the temperature in the apparatus and the preheat temperature at the nozzle.

(d) Weather Conditions

The Flexible Membrane Liner Manufacturer/Installer will rely on the experience of the Flexible Membrane Liner Project Superintendent and the results of test seams to determine seaming restrictions by weather. Many factors, such as ambient temperature, humidity, wind, sunshine, etc., can effect the integrity of field seams and must be taken into account when deciding whether or not seaming should proceed. Responsibility for monitoring these conditions shall lie with the Flexible Membrane Liner Project Superintendent; however, the Engineer may suspend any seaming operation which is, in his opinion, at the risk of providing the Owner with a quality product. Test seams are required prior to daily production seaming to determine if the weather conditions will effect the Flexible Membrane Liner System's ability to produce quality seams. Additional non-destructive and destructive testing of production seams substantiate the decision made by the Flexible Membrane Liner Project Superintendent to seam on any given day.

(4) Seam Preparation

(a) Fusion Welding

(1) Overlap the panels of geomembrane approximately four (4) inches.

(2) Clean the seam area prior to seaming to assure the area is clean and free of moisture, dust, dirt, debris of any kind. No grinding is required for fusion welding.

(3) Adjust the panels so that seams are aligned with the fewest possible number of wrinkles and "fishmouths".

(4) A movable protective layer may be used, at the discretion of the Flexible Membrane Liner Project Superintendent, directly below the overlap of geomembrane that is to be seamed to prevent build-up of moisture between the panels.

(b) Extrusion Welding

(1) Overlap the panels of geomembrane a minimum of three (3) inches.

(2) Temporarily bond the panels of geomembrane to be welded taking care not to damage the geomembrane.

(3) Grind seam overlap prior to welding within one (1) hour of welding operation In a manner that does not damage the geomembrane. Limit grinding to ¼" outside of the extrusion weld area.

(4) Clean the seam area prior to seaming to assure the area is clean and free of moisture, dust, dirt, and debris of any kind.

(5) Purge the extruder prior to beginning the seam to remove all heat-degraded extrudate from the barrel.

(6) Keep welding rod clean and off the ground.

(5) Test Seams

Test seams shall be performed at the beginning of each seaming period and at least once each four (4) hours for each seaming apparatus used that day. Test seams shall be made on fragment pieces of the geomembrane liner and under the same conditions as actual seams.

(a) Test Seam Length

The test seam shall be at least three (3) feet long and should be made by joining two (2) pieces of geomembrane at least 9" in width.

(b) Sample Procedure

(1) Visually inspect the seam for squeeze out, footprint, pressure and general appearance.

(2) Two random samples one (1) inch wide shall be cut from the test seam.

(3) The two (2), one (1) inch wide samples shall be tested in the field in a tensiometer that has a constant separation of 2.0 in/min for peel and shear. The passing destructive test requirements for a 40-mil liner seam is: minimum peel adhesion of 44 ppi for hot wedge and 50 ppi for extrusion fillet seams, minimum shear strength of

60 ppi or hot wedge and extrusion fillet seams, and a maximum of 25% peel separation of the seam. If a specimen fails, the entire procedure shall be repeated.

(4) If any of the second set of specimens fail, the seaming apparatus shall not be accepted and shall not be used for seaming until the deficiencies are corrected and a passing test seam is achieved.

(5) After completion of these tests, the remaining portion of test seam can be discarded. Documentation of the test seams will be maintained, listing seam identification number, welder's name, temperature control setting, and test results.

(6) Passing test results records shall be maintained.

(6) General Seaming Procedures

(a) Seaming shall extend to the outside edge of panels to be anchored. While welding a seam, monitor and maintain the proper overlap.

(b) Inspect seam area to assure area is clean and free of moisture, dust, dirt, debris of any kind.

(c) While welding a seam, monitor temperature gauges to assure proper settings are maintained and that the seaming apparatus is operating properly.

(d) Align wrinkles at the seam overlap to allow welding through the wrinkle.

(e) Fishmouths or wrinkles at seam and overlaps that cannot be welded through shall be cut along the ridge in order to achieve a flat overlap. The cut fishmouth or wrinkle shall be seamed. Any portion where the overlap is inadequate shall be patched with an oval or round patch of the same geomembrane extending a minimum of six (6) inches beyond the cut in all directions.

(f) All cross/butt seams between two (2) rows of seamed panels shall be welded during the coolest time of the day to allow for contraction of the geomembrane.

(g) All "T" joints shall have the overlap from the wedge welder seam trimmed back to allow an extrusion fillet weld. Then grind ¼ of an inch minimum on either side of the wedge seam, then extrusion weld all of the area prepared by grinding.

3.5 Closure Flexible Membrane Liner Tests

The installation crews will non-destructively test all field seams over their full length using air pressure testing, vacuum testing or other approved methods, to verify the continuity and integrity of the seams.

(a) Air Pressure Testing

The welded seam created by double hot-wedge fusion welding process is composed of two distinct welded seams separated by an unwelded channel approximately 3/8 of an inch between the two welded seams permits the double hot-wedge fusion seams to be tested by inflating the sealed channel with air to a predetermined pressure, and observing the stability of the pressurized channel over time.

(1) Equipment for Air Testing

An air pump (manual or motor driven) capable of generating and sustaining a pressure between 25 to 30 psi.

A rubber hose with fittings and connections.

A sharp hollow needle, or other approved pressure feed device with a pressure gauge capable of reading and sustaining a pressure between 25 to 30 psi.

(2) Procedure for Air Testing

Seal both ends of the seam to be tested.

Insert needle or other approved pressure feed device into the sealed channel created by the fusion weld.

Inflate the test channel to a pressure between 25 to 30 psi, in accordance with the following schedule, close valve, and observe initial pressure after approximately 2 minutes.

INITIAL PRESSURE SCHEDULE *

Material (Mil)	Min. Psi	Max. Psi
40	25	30
60	27	30
80	30	30
100	30	30

* Initial pressure settings are read after a two minute "relaxing period". The purpose of this "relaxing period" is to permit the air temperature and pressure to stabilize.

Observe and record the air pressure five (5) minutes after "relaxing period" ends and when initial pressure setting is used. If loss of pressure exceeds the following or if the pressure does not stabilize, locate faulty area and repair.

MAXIMUM PERMISSIBLE PRESSURE DIFFERENTIAL AFTER 5 MINUTES - LLDPE

Material (Mil)	Pressure Diff.
40	4 psi
60	3 psi
80	3 psi
100	3 psi

At the conclusion of the pressure test the end of the seam opposite the pressure gauge is cut. A decrease in gauge pressure must be observed or the air channel will be considered "blocked" and the test will have to be repeated after the blockage is corrected.

Remove needle or other approved pressure feed device and seal resulting hole by extrusion welding.

(3) In the event of a Non-Complying Air Pressure Test, the following procedure shall be followed:

Check seam end seals and retest seams.

If non-compliance with specified maximum pressure differential re-occurs, repair the seam. Capping or removal/re-seam of the non-complying seam are the only two (2) acceptable methods for repairing failed seams. Non-destruct test the entire length of the repaired seam.

Perform destructive peel tests on the samples using the field tensiometer.

If all samples pass destructive testing, remove the overlap left by the wedge welder and vacuum test the entire length of seam.

If a leak is located by the vacuum test, repair by extrusion welding. Test the repair by vacuum testing.
If no leak is discovered by vacuum testing, the seam will pass non-destructive testing.

If one or more samples fail the peel tests, additional samples will be taken.

When two (2) passing samples are located, the seam between these two (2) locations will be considered non-complying. Capping or removal of the non-complying seam, are the only two (2) acceptable methods for repairing failed seams. Non-destruct test the entire length of the repaired seam.

(b) Vacuum Testing

This test is used when the geometry of the weld makes air pressure testing impossible or impractical or when attempting to locate the precise location of a defect believed to exist after air pressure testing. The penetration will be tested using this method.

(1) Equipment for Vacuum Testing

Vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, port hole or valve assembly, and a vacuum gauge.

Vacuum pump assembly equipped with a pressure controller and pipe connection.

A rubber pressure/vacuum hose with fittings and connections.

A bucket and means to apply a soapy solution.

A soapy solution.

(2) Procedure for Vacuum Testing

Trim excess overlap from seam, if any.

Turn on the vacuum pump to reduce the vacuum box to approximately 5 inch of mercury, i.e., 5 psi gauge.

Apply a generous amount of a solution of strong liquid detergent and water to the area to be tested.

Place the vacuum box over the area to be tested and apply sufficient downward pressure to "seat" the seal strip against the liner.

Close the bleed valve and open the vacuum valve.

Apply a minimum of 5 in. Hg vacuum to the area as indicated by the gauge on the vacuum box.

Ensure that a leak tight seal is created.

For a period of not less than 30 seconds, examine the geomembrane through the viewing window for the presence of soap bubbles.

If no bubbles appear after 30 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 in. overlap, and repeat the process.

(3) Procedure for Non-Complying Test

Mark all areas where soap bubbles appear and repair the marked areas.

Retest repaired areas.

(c) Destructive Testing

(1) Concept

The purpose of destructive testing is to determine and evaluate seam strength. These tests require direct sampling and thus subsequent patching. Therefore destructive testing should be held to a minimum to reduce the amount of repairs to the geomembrane.

(2) Procedure for Destructive Testing

All Destructive tests will be done according to GRI test method GM19. Destructive test samples shall be marked and cut out randomly at a minimum average frequency of one test location every 500 feet of seam length.

Additional destructive tests may be taken in areas of contamination, offset welds, visible crystallinity or other potential cause of faulty welds at the descretion of the Flexible Membrane Liner Project Superintendent and Engineer.

Sample Size

The sample should be twelve (12) inches wide with a seam fourteen (14) inches long centered lengthwise in the sample. The sample may be increased in size to accommodate independent laboratory testing by the owner at the owner's request or by specific project specifications.

A one (1) inch sample shall be cut from each end of the test seam for field testing.

The two (2), one (1) inch wide samples shall be tested in the field in a tensiometer that has a constant separation of 2.0 in/min. for peel and shear. The passing destructive test requirements for a 40-mil LLDPE liner seam is: minimum peel strength of 50 ppi for hot wedge and 44 ppi for extrusion fillet seams, minimum shear strength of 60 ppi for hot wedge and extrusion fillet seams, and a maximum of 25% peel separation of the seam.

(3) Procedure in the event of Destructive Test Failure

Cut additional field samples for testing. In the case of a field production seam, the samples must lie a minimum of ten (10) feet in each direction from the location of the failed sample. Perform a field test for peel strength. If these field samples pass, then laboratory samples can be cut and forwarded to the laboratory for full testing.

If the laboratory samples pass then reconstruct the seam between the two (2) passing samples locations.

Heat tack the overlap along the length of the seam to be reconstructed and extrusion weld.

Vacuum test the extrusion weld.

If either of the samples fail, then additional samples are taken in accordance with the above procedure until two (2) passing samples are found to establish the zone in which the seam should be reconstructed.
All passing seams must be bounded by two (2) locations from which samples passing laboratory destructive tests have been taken.

In cases of reconstructed seams exceeding 150 feet, a destructive sample must be taken and pass destructive testing from within the zone in which the seam has been reconstructed.

All destructive seam samples sent to the independent laboratory chosen by the Engineer, shall be numbered.

(d) Quality Assurance Laboratory Testing

(1) Destructive samples sent to the laboratory will be tested for shear/peel strength, elongation, and peel separation according to table 2(a) of GRI Test Method GM19. Five (5) specimens shall be tested for each test method with data recorded. Four (4) out of the five (5) specimens must pass and the fifth specimen must be 80% of the passing test values. The passing test values are as follows:

Hot Wedge Seams
- Shear Strength-60 ppi
- Shear elongation at break – 50%
- Peel Strength- 50 ppi
- Peel separation-25%

Extrusion Fillet Seams
- Shear Strength-60 ppi
- Shear Elongation at break-50%
- Peel Strength- 44 ppi
- Peel separation-25%

(2) Defects and Repairs

(a) The Flexible Membrane Liner Project Superintendent shall conduct a detailed walk through and visually check all seams and non-seam areas of the geomembrane for defects, holes, blisters and signs of damage during installation.

(b) All other installation personnel shall, at all times, be on the lookout for any damaged areas. Damaged areas shall be marked and repaired.

(c) Repair Procedures

Any portion of the geomembrane showing a flaw or failing a destructive or non-destructive test shall be repaired. Several procedures exist for repair and the decision as to the appropriate repair procedure shall be made by the Flexible Membrane Liner Project Superintendent. Repairs need to be made in a timely manner to protect the moist cohesive soil liner and flexible membrane liner. If inclement weather is approaching, steps need to be made to protect the cohesive soil cap such as a temporary cover. If cohesive soil cap is damaged, it must be reworked. Procedures available for liner repair:

Patching - used to repair large holes, tears and destructive sample locations. All patches shall extend at least six (6) inches beyond the edges of the defect and all corners of patches shall be rounded.

Reconstruction - used to repair seams bounded by passing destruct samples.

Grinding and welding - used to repair sections of extruded seams.

Spot welding or seaming - used to repair small tears, pinholes or other minor localized flaws.

Capping - used to repair lengths of failed extruded seams.

Removal of a bad seam and replacement with a strip of new material seamed into place.

(d) Verification of Repairs

Every repair shall be non-destructively tested. Repairs which pass the non-destructive test shall be deemed adequate. Large repairs may require a destructive test. Repair test results shall be logged. The repair location shall be recorded on an as-built drawing.

(e) Liner Acceptance

The constructed liner will be accepted when all non-destruct and destruct tests have passed their respective tests and the results have been verified by the Engineer.

3.6 Closure Protective Cover

(1) HPDE Geocomposite Drainage Netting manufactured by SKAPS Industries 330 mil, or approved equal. Q/C testing information/certification for each property on geocomposite will be provided by the contractor/manufacturer for the rolls delivered. The thickness, transmissivity and ply adhesion will be tested by the Engineer's third party laboratory for quality assurance. One roll from every 200,000 $ft.^2$ of material delivered to the site will be tested.

Otherwise, the deployed geonet is visually inspected to assure that the geotextile fabric has not been torn and is over lapping onto adjacent rolls so that it can and has been heat seamed. Damaged spots are repaired accordingly to assure that soil cannot get into the drainage net.

Transmissivity of Geocomposite Drainage Net

Skaps Transnet 330 with 8 oz. geotextile has a transmissivity of 9×10^{-4} m^2/sec

$$1\ m^2/sec = 10.7639\ ft^2$$

$$\therefore\ 0.0009\ m^2/sec = 0.010\ ft^2/sec = T$$

Transmissivity (T) = Permeability (K) x thickness (b)

$$b = 0.33\ inch = 0.0275\ feet$$

$$K = T \div b = 0.010\ ft^2/sec \div 0.0275\ ft = 0.363\ ft/sec$$

$$1\ acre = 43{,}560\ ft^2$$

1 acre of Transnet 330 discharges:

$$43{,}560\ ft^2 \times 0.363\ ft/sec = 15{,}838\ ft^3/sec$$

Based on HELP model from the Phases 1-3 Permit Applications the average annual discharge from top liner cap is 12 inches/acre which is:

$$43{,}560\ ft^3/year = 43{,}560\ ft^3 \div (60)(60)(24)(365) = 0.00138\ ft^3/sec.$$

The cap will have a drainage net that will flow 15,838 ft^3/sec/acre and the expected discharge is 0.00138 ft^3/sec.

∴ The Transnet 330 is more than adequate to handle the flow from the vegetative layer onto the LLDPE Liner.

GEOCOMPOSITE PROPERTIES (SKAPS 330 mil)

Property	Test Method	Unit	Required Value		Qualifier
			with 6 oz.	with 8 oz.	
Geonet					
Thickness	ASTM D 5199	mil	330±30	330±30	Range
Carbon Black	ASTM D 4218	%	2 to 3	2 to 3	Range
Tensile Strength	ASTM D 7179	lb/in	95	95	Minimum
Melt Flow	ASTM D 1238[3]	g/10 min	1	1	Maximum
Density	ASTM D 1505	g/cm^3	0.94	0.94	Minimum
Transmissivity[1]	ASTM D 4716	m^2/sec	$8x10^{-3}$	$8x10^{-3}$	MARV[2]
Composite					
Ply Adhesion (Minimum)	ASTM D 7005	lb/in	0.5	0.5	MARV
Ply Adhesion (Average)	ASTM D 7005	lb/in	1	1	MARV
Transmissivity[1]	ASTM D 4716	m2/sec	$9x10^{-4}$	$9x10^{-4}$	MARV
GeoTextile					
Fabric Weight	ASTM D 5261	oz/yd^2	6	8	MARV
Grab Strength	ASTM D 4632	lbs	160	225	MARV
Grab Elongation	ASTM D 4632	%	50	50	MARV
Tear Strength	ASTM D 4533	lbs	65	90	MARV
Puncture Resistance	ASTM D 4833	gpm/ft^2	95	130	MARV
CBR Puncture	ASTM D 6241	lbs	475	650	MARV
Water Flow Rate	ASTM D 4491	gpm/ft^2	125	100	MARV
Permittivity	ASTM D 4491	sec^{-1}	1.63	1.26	MARV
Permeability	ASTM D 4491	cm/sec	0.3	0.3	MARV
AOS	ASTM D 4751	US Sieve	70	80	MARV

Notes:
1. Transmissivity measured using water at 21 ± 2°C (70 ± 4°F) with a gradient of 0.1 and a confining pressure of 10000 psf between steel plates after 15 minutes. Values may vary between individual labs.
2. MARV is statistically defined as mean minus two standard deviations and it is the value which is exceeded by 97.5% of all the test data.
3. Condition 190/2.16

Delivery, Storage and Handling of all materials and equipment shall adhere to the following:

A. Manufacturer labels must be on all rolls delivered to the project.
B. A firmly affixed label attached to the selvage edge, shall clearly state the manufacturer's name, product identification, material thickness, roll type, roll dimensions and roll weight.
C. The manufacturer protects the geocomposite from mud, dirt, dust, puncture, cutting or any other damaging deleterious conditions.
D. Continuously and uniformly supported, rolls are stored away from high traffic areas on a smooth, level surface. Chocks keep the rolls secure when necessary.

Material Warranty shall adhere to the following:

Material manufacturer shall guarantee material against defects and premature aging from environmental conditions on a pro rata basis for a specified period of time acceptable to owner and manufacturer.

The geocomposite will be handled in such a manner as to ensure the geocomposite are not damaged in any way. On slopes, the geocomposite will be secured in the anchor trench and then rolled down the slope in such a manner as to continually keep the geocomposite sheet in tension. If necessary, the geocomposite will be positioned by hand after being unrolled to minimize wrinkles. Geocomposite can be placed in the horizontal direction (i.e., across the slope) in some special locations (e.g., where extra layers are required or where slope is less than 10:1).

Geocomposite will not be welded to the geomembrane. Geocomposite will be cut using approved cutters,(i.e., hook blade, scissors, etc.) Care should be taken to prevent damage to underlying layers. Care must be taken not to entrap dirt in the geocomposite that could cause clogging of the drainage system, and or stones that could damage the adjacent geomembrane.
Adjacent rolls of geocomposite will be overlapped by at least four inches and securely tied. Tying can be achieved by plastic fasteners. Tying devices will be white or yellow for easy inspection. Metallic devices are not allowed. Tying will be five to ten feet along the bottom of the slope. Tying will be every five feet along the slope, every two feet across the slope and at the top of the berm. Tying in the anchor trench will be done in one foot intervals. In the corners of the side slopes where overlaps between perpendicular geocomposite strips are required, an extra layer of geocomposite will be unrolled along the slope, on top of the previously installed geocomposite, from the top to bottom of the slope.

Any holes or tears in the geocomposite will be repaired by placing a patch, utilizing the same geocomposite material, extending two feet beyond edges of the hole or tear. The patch will be secured to the original geocomposite by tying every twelve inches. If the hole or tear width across the roll is more than 50% the width of the roll, the damaged area will be cut out and the two portions of the geocomposite will be joined.

The engineer will visually inspect the drainage layer before placement of the erosive layer, if any defects are detected they will be repaired before placement of erosive layer.

(2) Erosive Layer

The soil for the erosive layers shall consist of suitable site soil free of debris, roots, rocks and organics. The soil shall contain no particles or objects greater than 3/4 inch in largest dimension, which has been screened, with fines passing the 200 sieve less than 50%, but no greater than 12%. There will not be soils used in the erosive layer that has fines greater than 50%. A sieve analysis, according to ASTM D-422 will be done on every 3500 cubic yards of soil used for the erosive layer. No other tests will be done because the erosive layer is not compacted.

Installation of the protective cover shall be the responsibility of the contractor. Before proceeding with placement of the protective cover over the liner, the Contractor shall furnish to the Engineer with the manufacturer's certification that the lining has been satisfactorily installed in accordance with the manufacturer's recommendations.

The erosive layer shall be composed of 24” of select backfill. The cover shall be installed using low ground pressure equipment such as a Caterpillar D6H LGP, or approved equal, with ground pressure not exceeding 4.71 psi until the depth of cover exceeds three feet.

The depth of the erosive layer will be verified based on the 50 ft. grid and the difference in elevation from the top of the cohesive soil to the top of the erosive layer.

(a) A minimum of twelve inches (12") of cover between low ground pressure equipment and the liner is required at all times. Roadways for entering and for transporting material over slopes and capped/lined areas shall have a minimum depth of four feet (4').

(b) Avoid undue stress on the liner at all times. Cover material must be pushed up slopes, never down to help minimize wrinkles. Material must be placed to minimize wrinkles, wrinkles in excess of two feet in height are unacceptable. If a wrinkle is more than two feet in height, soil will be placed on top of the wrinkle to decrease the height. Fold over of the liner will not be allowed. A worker must walk along side earth moving equipment and remove all rocks, stones, roots or other debris that could cause damage to the liner. Equipment operators must avoid sharp turns or quick stops that could pinch and tear the liner.

(c) If damage does occur, report it to the Project Manager immediately so that repairs can be performed without needless delay. All repairs to any component of the liner system will be done and tested according to the required repairs and testing for that component.

(d) Do not work wet cover material that cannot support equipment.

(e) Equipment operators and all other personnel must be qualified and must exercise good judgment and common sense at all times.

(3) Vegetative Layer

Native vegetation will be used as approved by the Erosion Control Plan.

3.7 Closure Gas Venting System

The existing gas collection system and any future expansions of the system, shall remain in service until collection of gas is no longer functional. The wells will then be converted to methane vents and the gas collection laterals shall remain in place and be capped.

The well heads shall be removed and replaced with a methane vent turndown and the opening shall be covered with a stainless steel screen.

3.8 Closure Construction Quality Assurance (CQA)

At the completion of the closure, it is the Engineer's responsibility to provide to the Owner and eventually to the Division of Waste Management the following:

1. All parties involved in the landfill construction including name and contact information and responsibilities'.
2. As-built drawings of the existing surface, the top of cohesive soil liner, and the top of the vegetative /protective cover, gas vents, etc. provided by NC Professional Land Surveyor.
3. Documentation of all cohesive soil liner standard Proctor tests.
4. Documentation of all cohesive soil liner tests including test pads, permeability, standard Proctor and Atterberg limits.
5. Documentation of all destructive and non-destructive tests, methods and results and repairs.
6. Geomembrane panel layout with test locations and repairs illustrated.
7. Completed and signed meeting minutes including pre-construction, progress and any trouble shooting.
8. Summary of all construction activities from the Engineer.
9. Provide color photographs of major construction features.
10. Any other pertinent documentation.

The CQA report shall be sealed by the Engineer and a certification that construction was completed in accordance with the CQA plan, Conditions of the permit to construct, the requirements of rule .1624 Construction Requirements for MSWLF Facilities, and acceptable engineering practices.

Shop Drawings

Contractor is required to submit to the Engineer a descriptive detail and any shop and setting drawings. On composite liner system, such submission shall include the following:

(1) Flexible Membrane Liner Panel Layout Drawings,
(2) Flexible Membrane Liner Penetration Details,
(3) Flexible Membrane Liner Anchoring Detail,
(4) Flexible Membrane Liner Seaming Detail,
(5) Single Flexible Membrane Liner Anchoring to Structure Detail,
(6) Flexible Membrane Liner Extension Detail, and
(7) Certified experience records for manufacturer, fabricator and installer, listing installations of Flexible Membrane Liners.

3.9 Closure Costs

The largest area to be closed within the permitted life will be Phase 1, 2, and 3 (65 Ac.). The estimated costs shown below are only for Phase 1, 2 and 3. 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 $1x10^{-5}$ cm/sec. soil cover
2. 40 Mil LLDPE Liner and Drainage net
3. Erosion Control Devices
4. 24" Erosive layer
5. Seeding and Mulching
6. Mobilization/Demobilization
7. Labor Costs
8. Stone for gas venting
9. Geotextile for gas venting
10. Vent pipes for gas venting
11. Engineering Costs and QA/QC of the Composite liner and certification of closure

Estimate of Probable Costs:

1. 18" of $1x10^{-5}$ cm/sec. soil cover for 65 acres:

   Total yardage + 15% = 180,895 yd^3 @ a cost of $9.00/$yd^3$
   ∴ Cost = $1,628,055

2. 40 Mil LLDPE Liner and Drainage net for 65 acres

   Total Footage + 15% = 3,256,110 ft^2 @ a cost of $0.85/$ft^2$
   ∴ Cost = $2,767,694

3. Erosion Control devices

   Estimated costs @ $75,000
   ∴ Cost = $75,000

4. 24" Erosive soil layer for 65 acres.

   Total yardage + 15% = 241,194 yd^3 @ a cost of $4.38/$yd^3$
   ∴ Cost = $1,056,430

5. Seeding and Mulching for 65 acres.

   Estimated cost of $2,000/acre
   ∴ Cost = $130,000

6. Mobilization/Demobilization.

   Estimated cost of $200,000

7. Labor Costs.

   Estimated cost of $700,000

8. Vent pipes for methane gas collection.

Estimated cost @ $600.00 each (62).
∴ Cost = $37,200

9. Engineering Costs and QA/QC of the Composite liner and certification of closure.

Estimated cost = $700,000

Total of Estimated Phase 1, 2 and 3 Closure Costs:

1.	$ 1,628,055
2.	$ 2,767,694
3.	$ 75,000
4.	$ 1,056,430
5.	$ 130,000
6.	$ 200,000
7.	$ 700,000
8.	$ 37,200
9.	$ 700,000
Total:	$ 7,294,379

SECTION 4.0

POST-CLOSURE PLAN

4.1 Introduction

CONTACTS:	Name:	Tim Rogers
	Title:	Solid Waste Director
	Phone No.:	(919) 689-2994
	Address:	460 B. S. Landfill Rd. Dudley, NC 28333

DESCRIPTION OF USE:

The County has no future use planned for their landfill at this time. However, should the County decide to use the site for any other purpose, the owner or operator shall submit such request to the Division of Waste Management for approval. Post-Closure use of the property will not disturb the integrity of the cap system, base liner system or any other components of the containment system, or the function of the monitoring systems unless necessary to comply with the requirements of the section

DESCRIPTION OF MAINTENANCE ACTIVITIES:

The landfill will be monitored quarterly for evidence of settlement, subsidence, ponding in the cap system, leachate seepages, and any erosion. The quarterly inspection will also include observation and necessary repair of the security fence, entrance sign, access roads to the methane and groundwater monitoring points, the actual ground water monitoring wells and methane probes, accumulated silt in the sediment basins, all inspection, operation & maintenance of the leachate storage lagoon, pumps and edge of waste markers. Annually in the spring, the vegetative cover will be monitored to assure a good stand of vegetation, and where needed, it will be reseeded. Semi-annually the cap vegetation will be mowed and any saplings removed. These maintenance activities will take place over the entire post closure period of thirty years.

The pumps in the sumps will be monitored quarterly to assure that they are operating properly by manually operating each pump. The flow pumped from each sump for the quarter will be documented. The pumps at the lagoon will also be manually operated to assure that they are working properly and the flow to the Waste Water Treatment Plant documented for the quarter. If for any reason a pump is not operating, it will be repaired or replaced within two weeks of the inspection.

Any repairs to the cap system will be done according to the approved closure plan and documented according to the approved quality assurance plan. Damages that require repairs shall be reported to the NC Solid Waste Section within 3 days of inspection/observation.

The leachate collection system will be videoed every five years and power washed if necessary. The pump risers will be vacuum cleaned every five years. Leachate will be collected and treated until the generation of leachate has stopped due to capping.

All quarterly inspections/observations will be documented and become part of the landfill's operating record. All repairs/maintenance will be documented and also become part of the landfill's operating record. Data collected from all pumps will also become part of the operating record.

DESCRIPTION OF MONITORING ACTIVITIES:

The County will monitor and analyze ground and surface water semi-annually according to the approved monitoring plan for a period of thirty years. The County will also monitor methane gas at landfill structures and the boundary quarterly according to the approved methane monitoring plan for the thirty-year period. All reports and records required by the approved monitoring plans will become part of the landfill's operating record.

COMPLETION OF POST-CLOSURE CARE

Following completion of the post-closure care period for each MSWLF unit, the owner or operator will notify the Division of Waste Management that a certification, signed by a registered professional engineer, verifying that post-closure care has been completed in accordance with the post-closure plan, has been placed in the operating record.

CLOSURE OF LEACHATE STORAGE FACILITIES

The County will close the leachate lagoon within 180 days after liquid collection has ceased. The plan for closure of the lagoon shall be approved by the Division of Waste Management prior to commencing closure activities.

At closure, all solid waste will be removed from the leachate lagoon, connecting sewer lines, and manholes. All solid waste removed will be properly handled and disposed of according to federal and State requirements. All connecting lines will be disconnected and securely capped or plugged.

All waste residues, contaminated system components (composite liner system), contaminated subsoils, structures and equipment contaminated with waste will be removed and appropriately disposed. If the groundwater surrounding the impoundment is contaminated, other corrective actions to remediate a contaminant plume may be required by the Department. If the groundwater surrounding the lagoon is found not to be contaminated, the liner system may remain in place if drained, cleaned to remove all traces of waste, and both liners punctured so that drainage is allowed. The lagoon is to be backfilled and regraded to the surrounding topography.

All waste residues, contaminated system components (composite liner system), contaminated subsoils, structures and equipment contaminated with waste will be removed and appropriately disposed.

4.2 Post Closure Costs

The largest closed area to be monitored within the post closure life will be Phase 1, 2 and 3 (65 Ac.).

Post Closure Costs:

Methane and/or hydrogen sulfide (H_2S) gas, ground water and surface water will be monitored for 30 years after closure. The cap will also have to be monitored for the 30 year period. All costs include reports, data analysis, and certifications.

1. Ground and Surface Water monitoring semi-annually for 30 years for Subtitle D Appendix I constituents and statistical analysis.
   Estimated cost/sample = $840.00/sample
   Total annual samples = 2(16 wells + 4 surface) = 40 samples/year
   Estimated cost = 30 years x 40 samples/year x $840.00/sample

   ∴ Cost = $1,008,000

2. Methane Gas monitoring quarterly for 30 years.
   Estimate $600.00/quarter = $2,400.00/year
   Estimated cost = 30 year x $2,400.00

   ∴ Cost = $72,000.00

3. Closure of sedimentation and erosion control devices.
   Estimate $24,000 for closure

   ∴ Cost = $24,000

4. Leachate Management including pumping data.
   Estimate $400,000 for the 30 years.

   ∴ Cost = $400,000

5. Closure of leachate lagoon.
   Estimate $30,000

6. Maintenance of gas vents, monitoring wells, pumps, access roads, fencing, signage, EOW markers, vegetation and mowing, etc.
   Estimate $520,000

7. Decommissioning of LGCCS System.
   Estimated cost/well head = $500.00
   62 well heads x 500.00 = $31,000

   ∴ Cost = $31,000

8. Cap Monitoring and repairing any problems.
   Estimate $100,000 for the 30 years.

   ∴ Cost = $100,000

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Total of Estimated Phase 1, 2 and 3 Post Closure Costs:

1.	$1,008,000
2.	$ 72,000
3.	$ 24,000
4.	$ 400,000
5.	$ 30,000
6.	$ 520,000
7.	$ 31,000
8.	$ 100,000
Total:	$2,185,000

4.3 Potential Assessment and Corrective Action (PACA) Estimate

Approved PACA Cost Estimate = **$2,000,000**

SECTION 5.0

FINANCIAL ASSURANCES

(TO BE SUBMITTED AT A LATER DATE)

PART 2 (C&DLF and LCID):

SECTION 1.0

ENGINEERING PLAN

1.1 Analysis of the Facility Design and Landfill Capacity (C&DLF)

Introduction

Wayne County will continue to operate a Construction and Demolition (C&D) landfill on the 112 acre property owned by the County (Deed Book 832, Page 161). Prior to operating as a C&D landfill, the site operated as a Municipal Solid Waste (MSW) unlined sanitary landfill that consisted of two units. The first unit was closed prior to October 1991, with a 24-inch final soil cover. The second unit was closed by December 31, 1998, with an 18-inch thick cohesive soil cap with a permeability of 1×10^{-5} cm/sec, and 18 inches of erosive layer. The C&D landfill is operating on top of the second MSW unit.

General

The existing C&DLF unit is located a minimum of 50' from the property lines, 500' from existing wells, and 50' from any stream, river or lake, and the post settlement subbase elevation was prepared a minimum of four feet above the seasonal high groundwater table and bedrock.

The County will cap their landfill within 180 days after the final receipt of solid waste. The cap system will consist of 12 inches bridging material (temporary cover), 1.50 feet of soil liner with permeability no greater than 1×10^{-5} cm/sec, and 18 inches of protective/erosive layer. All depths shall be measured perpendicular to the slope surface.

The cap contains gas venting system consisting of a series of washed stone trenches below the soil liner that will be vented through pipes that penetrate the cap. The cap system will also include the proper seeding and mulching of the erosive layer and other erosion control devices.

The C&D facility has a permitted gross capacity of 2,736,883 cubic yards. The existing closed MSW footprint is approximately 40 acres in size.

Landfill Capacity

The Life Expectancy calculations were calculated for Phases 2-7 of development with a vertical expansion being included when a Phase is constructed adjacent to the previous Phase. Each successive phase will vary in size due to being able to expand onto the previously filled areas. The Operation Plan of the Engineering Report will delineate this more clearly. The airspace is a net volume excluding the capping requirements.

LIFE EXPECTANCY CALCULATIONS PHASES 2-7

Given: Life expectancy is based on annual tonnage reported to the Division of Waste Management for FY 2007-2008, the county received 36,067 tons (55,488 cy/yr). We used this number for the first year and an annual increase of 0.83% for each year thereafter.

$$\frac{[36{,}067\text{tons}(2000\text{ lbs./ton})]}{1300\text{ lbs/cy compaction}} = 55{,}488\text{ cy/yr}$$

Phases	Airspace Available	Years of Life
Phase 3	= 284,019 cubic yards	= 5.12 years
Phase 4	= 307,651 cubic yards	= 5.00 years
Phase 5	= 323,518 cubic yards	= 4.74 years
Phase 6	= 329,624 cubic yards	= 4.73 years
Phase 7	= 299,067 cubic yards	= 4.20 years
	1,543,879 cubic yards	23.78 years

Soil requirements for construction, daily cover and final caps for Phases 2-7
(Assume 10:1 trash to soil ratio)

Soil needed for Daily Cover	= 140,262 cubic yards
Soil needed for Closure	= 258,134 cubic yards
Overall Soil Requirements	= 398,396 cubic yards (soil needed for closure and daily cover)

The County also owns property which it will utilize for borrow material as needed. There should be enough borrow material available to complete the landfill. If the need arises the County will purchase additional land to borrow from.

C & D - ACTIVE/INACTIVE PHASING TABLE

C&D PHASE	WASTE FOOTPRINT (ACRE)	GROSS CAPACITY (CUBIC YARDS)	STATUS
1 & 2	40	1,193,004	ACTIVE AND PERMITTED
3	VERTICAL EXPANSION	284,019	NEW PTO REQUESTED
4	VERTICAL EXPANSION	307,651	TO BE DEVELOPED
5	VERTICAL EXPANSION	323,518	TO BE DEVELOPED
6	VERTICAL EXPANSION	329,624	TO BE DEVELOPED
7	VERTICAL EXPANSION	299,067	TO BE DEVELOPED
TOTAL	**40**	**2,736,883**	

Note: All air space and soil calculation were determined by Autodesk Land Development computer program.

The estimate of maximum inventory of C&D wastes on-site over the life to date of the landfill facility is 1,193,004 cubic yards.

Estimated schedule of closure will be approximately 24 years (Phases 1-7).

1.1.1 Location Coordinates and Survey Control

Survey control coordinates are shown on the drawings and any additional information will be furnished upon request.

The thickness and grade of the soil liner and the erosive layer will be verified by the surveyor. The soil liner and the erosive soil layer will be surveyed at 100 foot grid points. All depths shall be measured perpendicular to the slope surface. The grade will then be verified with the surveyed information. The survey will be performed by North Carolina Professional Land Surveyor.

1.1.2 Sedimentation and Erosion Control Plan

The Sedimentation and Erosion control plan has been completed for the 24-hour, 25-year storm.

1.1.3 Cap System Standards

The County will cap their landfill within 180 days after the final receipt of solid waste The cap system will consist of 12 inches of intermediate cover, 1.50 feet of cohesive soil with a permeability no greater than 1.0×10^{-5} cm/sec, and 18 inches of erosive layer. All depths shall be measured perpendicular to the slope surface. The cap contains a gas venting system that consists of a series of washed stone trenches below the soil liner that will be vented through pipes (1 per acre) that penetrate the cap. The cap system will also include the proper seeding and mulching of the erosive layer and other erosion control devices.

Prior to beginning closure, the County will notify the Division of Waste Management that a notice of the intent to close the unit has been placed in the operating record. The County will begin closure activities no later than thirty (30) days after the date on which the landfill receives the final wastes or if the landfill has remaining capacity and there is a reasonable likelihood that the landfill will receive additional wastes, no later than one year after the most recent receipt of wastes. Extensions beyond the one-year deadline for beginning closure may be granted by the Division of Waste Management if the County demonstrates that the landfill has the capacity to receive additional waste and the County has taken and will continue to take all steps necessary to prevent threats to human health and the environment from the closed landfill.

The County will complete closure activities in accordance with the closure plan within 180 days following the final receipt of waste. Extensions of the closure period may be granted by the Division of Waste Management if the County demonstrates that closure will, of necessity, take longer than one hundred

eighty (180) days and the County has taken and will continue to take all steps to prevent threats of human health and environment from the enclosed landfill.

Following closure of the landfill, the County will record a notation on the deed to the landfill property and notify the Division of Waste Management that the notation has been recorded and a copy has been placed in the operating record. The notation on the deed will in perpetuity notify any potential purchaser of the property that the land has been used as a landfill and its use is restricted under the closure plan approved by the Division of Waste Management. The County may request permission from the Division to remove the notation from the deed if all waste is removed from the landfill.

1.2 Analysis of the Facility Design and Landfill Capacity (LCID)

Introduction

Wayne County will operate a Land Clearing and Inert Debris (LCID) landfill, less than 2 acres in size, on the 28.40 acre property owned by the County (Deed Book 1927, Page 382).

General

The existing LCID Landfill unit is located northeast of the Closed MSW Landfill, within the existing landfill facility. The LCID was constructed on top of the existing grade, where test pits were dug to a depth of 5 feet and no groundwater was observed within a 48 hour period. (See Evaluation Report for LCID in the Permit to Operate Phase 1 and 2 C&DLF Document). The County will cap their landfill within 180 days after the final receipt of solid waste. The cap system will consist of a 24 inch erosive layer. Upon closure, the slopes of the side and deck portions of the final cover system shall not exceed 3 to 1.

The LCID facility has a permitted gross capacity of 41,716 cubic yards, which consists of air space of 35,263 cubic yards and a final cover system of 6,453 cubic yards. Phase 1 has used 5,866 cubic yards of airspace, leaving 29,397 cubic yards of air space available.

Life Expectancy

The Life Expectancy calculations were calculated for Phases 1-6 of development with a vertical expansion being included when a phase is constructed adjacent to the previous phase. Each successive phase will vary in size due to being able to expand onto the previously filled areas. The airspace is a net volume excluding the capping requirements.

LIFE EXPECTANCY CALCULATIONS PHASES 2-6

Given: Life expectancy based on an approximate tonnage of 2 tons per day. The facility is open 5days per week, therefore approximately 520 tons per year. We used 1,040 cy/yr for the first year and an annual increase of 0.83% for each year thereafter.

$$\frac{[520\text{tons}(2000\text{ lbs./ton})]}{1000\text{ lbs/cy compaction}} = 1{,}040\text{ cy/yr}$$

Phases	Airspace Available	Years of Life
Phase 2	= 6,550 cubic yards	= 6.30 years
Phase 3	= 5,973 cubic yards	= 5.51 years
Phase 4	= 5,120 cubic yards	= 4.53 years
Phase 5	= 5,630 cubic yards	= 4.78 years
Phase 6	= 6,124 cubic yards	= 4.99 years
	29,397 cubic yards	26.11 years

Soil requirements for construction, daily cover and final cap for Phases 1-6:(Assume 20:1 Trash to soil ratio)

Soil needed for Daily Cover	=	1,470 cubic yards
Soil needed for Closure	=	6,453 cubic yards (2 acres)
Overall Soil Requirements	=	7,923cubic yards (soil needed for closure and daily cover)

SECTION 2.0

OPERATION PLANS

2.1 Construction and Demolition Landfill Facility (C&DLF)

Introduction

The Wayne County landfill is located at 460 S. Landfill Road (SR 1129), Dudley, Wayne County, North Carolina. The Wayne County Construction and Demolition (C&D) landfill operates under permit #96-01. Prior to operating as a C&D landfill, the site operated as a Municipal Solid Waste (MSW) unlined sanitary landfill that consisted of two units. The first unit was closed prior to October 1991, with a 24-inch final soil cover. The second unit was closed by December 31, 1998, with an 18-inch thick cohesive soil cap with a permeability of 1×10^{-5} cm/sec, and 18 inches of erosive layer. The C&D landfill was constructed and is operating on top of the second MSW unit. Adjacent to the C&D landfill is the existing Subtitle D MSW landfill, which operates under permit #96-06.

The County Landfill will only accept Construction and Demolition(C&D) wastes from Wayne County. Phase 3 will be a lateral expansion.

The County will implement a program at the landfill for detecting and preventing the disposal of hazardous and liquid wastes. The program consists of random inspection of incoming loads at a minimum of 1% of the weekly traffic. Landfill personnel will be trained to recognize hazardous and liquid wastes. Records will be kept on the training and the inspections. [See Part 1 (MSWLF): Section 2.3].

The County will monitor all areas of C&D filling for possible leachate break-outs. The County will implement a program for corrective actions for leachate break-outs. [See Part 1 (MSWLF): Section 2.8].

The County will monitor for explosive gases at landfill structures and the perimeter of the landfill. There are two (2) existing methane monitoring probes at the MSWLF and three (3) existing methane probes at the C&DLF. [See Part 1(MSWLF): Section 2.5].

The concentration of methane gases generated by the landfill cannot exceed 25 percent of the lower explosive limit for methane in the structures, and it cannot exceed 100 percent of the lower explosive limit for methane of the landfill property boundary. If methane gas is found to exceed the acceptable limits at either the property boundary or landfill structures, it is the County's responsibility to do the following:

1. Immediately take all necessary steps to ensure protection of human health, (i.e. no smoking, etc.), temporarily abandon the structure and notify the Division of Waste Management (Division).

2. Within seven days of detection, place in the operating record the methane gas levels detected and a description of the steps taken to protect human health; and

3. Within 60 days of detection, implement a remediation plan for the methane gas releases, place a copy of the plan in the operating record, and notify the Division that the plan has been implemented. The plan will describe the nature and extent of the problem and the proposed remedy.

Off-site and on-site erosion will be controlled through erosion control structures and devices. Provisions for a vegetative ground cover sufficient to restrain erosion will be accomplished within 30 working days or 120 calendar days upon completion of any phase of landfill development.

The County will record and retain at the landfill an operating record of the following information:

(1) Inspection records, waste determination records, and training procedures;
(2) Amounts by weight of solid waste received at the landfill;
(3) Gas monitoring results and any remediation plans;
(4) Any demonstration, certification, findings, monitoring, testing or analytical data required for surface and groundwater monitoring;
(5) Any monitoring, testing or analytical data required for closure or post-closure;
(6) Any cost estimates and financial assurance documentation.

All information contained in the operating record will be furnished upon request to the Division or be made available at all reasonable times for inspection by the Division.

Ground and surface water will be sampled and analyzed according to 40 CFR, Part 258, Appendix I detection monitoring requirements. The monitoring frequency for all Appendix I detection monitoring constituents will be at least semiannual during the life of the facility (including closure) and the post-closure period. A minimum of four independent samples from each well (background and downgradient) will be collected and analyzed for the Appendix I constituents during the first semiannual sampling event. At least one sample from each well (background and downgradient) will be collected and analyzed during subsequent semiannual sampling events. [See Part 1 (MSWLF): Section 2.7]

If the County determines that there is a statistically significant increase over background for one or more of the constituents listed in Appendix I at any monitoring well at the relevant point of compliance, the County will, within 14 days of the finding, report to the Division of Waste Management and place a notice in the operating record indicating which constituents have shown statistically significant changes from background levels. The County will establish an assessment monitoring program within 90 days. The County may demonstrate that a source other than the landfill caused the contamination or that the statistically significant increase resulted from an error in sampling, analysis, statistical evaluation, or natural variation in ground-water quality. A report documenting these demonstrations will be certified by a Licensed Geologist or Professional Engineer and approved by the Division. A copy of this report will be placed in the operating record. If a successful demonstration is made, documented, and approved by the Division, the County may continue detection monitoring. If after 90 days, a successful demonstration is not made, the County will initiate an assessment monitoring program.

2.2 Operational Requirements

1. Waste Acceptance and Disposal Requirements

   a. The C&DLF will only accept those solid wastes which it is permitted to receive. The County will notify the Division within 24 hours of attempted disposal of any waste the landfill is not permitted to receive.

   b. Asbestos waste will be managed in accordance with 40 CFR 61. The regulated asbestos waste will be covered immediately with soil in a manner that will not cause airborne conditions and will be disposed of separate and apart from other solid waste, as:

      i. in a defined isolated area within the foot print of the landfill, or

      ii. in an area not contiguous with other disposal areas. Separate areas will be designated so that asbestos will not be exposed by future land-disturbing activities.

   c. Wastewater treatment sludges may be accepted, with the approval of the Division, either as a soil conditioner incorporated into or applied onto vegetative growth layer. The wastewater treatment sludge will neither be applied at greater than agronomic rates nor to a depth greater than six inches.

   d. Asphalt in accordance with G.S. 130-294(m) will be accepted;

   e. Inert debris from any source that is defined as solid waste which consists solely of material that is virtually inert, such as brick, concrete, rock and clean soil will be accepted;

   f. Construction materials, that could or would be part of any construction, remodeling, repair or demolition of pavement, buildings or other structures, from solid waste that is generated by mobile or modular home manufacturers and asphalt shingle manufacturers in Wayne County. The waste must be source separated at the manufacturing site and must exclude municipal solid waste, hazardous wastes, and other wastes prohibited from disposal in a C&DLF. It must be transported to Wayne County C&DLF in a shipment or container that consists solely of the

separated waste to be disposed of. Wayne County C&DLF will not except this waste if it has not been separated or transported as specified.

g. Wooden pallets generated only from C&D activities.

h. The following wastes are prohibited from disposal at the C&DLF:

   i. Containers such as tubes, drums, barrels, tanks, cans, and bottles unless they are empty and perforated to ensure that no liquid, hazardous or municipal solid waste is contained therein.

   ii. Garbage as defined in G.S. 130A-290(a)(7).

   iii. Hazardous waste as defined in G.S. 130A-290(a)(8), to also include hazardous waste from conditionally exempt small quantity generators.

   iv. Industrial solid waste unless a demonstration has been made and approved by the Division that the landfill meets the requirements of Rule .0503(2)(d)(ii)(A).

   v. Liquid wastes.

   vi. Medical waste as defined in G.S. 130A-290(a)(18)

   vii. Municipal solid waste as defined in G.S. 130A-290(a)(18a)

   viii. Polychlorinated biphenyls (PCB) wastes as defined in 40 CFR 761

   ix. Radioactive waste as defined in G.S. 104E-5(14)

   x. Septage as defined in G.S. 130A-290(a)(32)

   xi. Sludge as defined in G.S. 130A-290(a)(34)

   xii. Special waste as defined in G.S. 130A-290(a)(40)

   xiii. White goods as defined in G.S. 130A-290(a)(44)

   xiv. Yard trash as defined in G.S. 130A-290(a)(45)

   xv. Wooden Pallets generated by means other than C&D activities

i. The following waste will not be received if separate from C&DLF waste: lamps or light bulbs including but not limited to halogen, incandescent, neon or fluorescent; lighting ballast or fixtures: thermostats and light switches; batteries including but not limited to those from exit and emergency lights and smoke detectors; lead pipes; lead roof flashing; transformers; capacitors; and copper chrome arsenate (CCA) and creosote treated woods.

j. Waste accepted for disposal in the C&DLF unit shall be readily identifiable as C&D waste and must not have been shredded, pulverized, or processed to such an extent that the composition of the original waste cannot be readily ascertained except in the case where the waste has come from a permitted recycling and reuse facility.

k. The County will not knowingly dispose any type or form of C&D waste that is generated within the boundaries of a unit of local government that by ordinance:

   i. Prohibits generators or collectors of C&D waste from disposing that type or form of C&D waste.

   ii. Requires generators or collectors of C&D waste to recycle that type or form of C&D waste.

l. Any recyclables received on site including yard wastes, white goods, used tires, and etc., shall be segregated and stockpiled in designated areas within the permitted landfill property.

m. Tear-off Asphalt Shingle Recycling

The County will continue a program at the Landfill for recycling Tear-off Asphalt Shingles. [See Part 2(C&DLF and LCID) Section 2.6] This program will include, at a minimum:

i. All materials shall be source separated at the job site by the roofers;
ii. Training of suppliers to recognize acceptable and unacceptable materials;
iii. Visually inspect loads when entering the facility;
iv. Records of all inspections, shingle waste entering the facility, sorted shingles leaving the facility for recycling and waste that is disposed or sent to disposal, and all supplier certification forms and any other supporting documents are to be kept for use in the facility's monthly and annual reports.

n. Passive Composting

The County will continue a program at the Landfill for Passive Composting. [See Part 2(C&DLF and LCID) Section 2.6] The composting area is located outside of the disposal limits of the C&D Landfill. All waste placement and management of activities will be conducted by landfill employees only. The general public will not have access to this area. Material generated will only be used by the County as a soil amendment in daily and intermediate cover. Material will not be given or sold to the general public. Only material from within the County will be accepted. This program will include, at a minimum:

i. All materials shall be weighed. Customers will deposit material in a roll-off located at the facility's Recycling Collection Center;
ii. Employees will remove roll-off, weighed, and deposited in the appropriate area;
iii. Material will be sorted, any unacceptable material will sorted according to the Waste Screening Plan [See Part 1 (MSWLF) Section 2.7 Appendix I-Waste Screening Plan];
iv. Records are to be kept for all material placed in the passive composting area and of the amount of material used for cover. These documents are to be kept in the operating record for use in the facility's monthly and annual reports.

2. Cover material requirements.

a. Except as in Subparagraph (c), the County must cover the solid waste with six inches of earthen material when the waste disposal area exceeds one-half acre and at least once weekly. Cover must be placed at more frequent intervals if necessary to control disease vectors, fires, odors, blowing litter and scavenging. A notation of the date and time of the cover placement must be recorded and placed in the operating record, as stated in Paragraph 11 of this section.

b. Except as in Subparagraph (c), areas which will not have additional wastes placed on them for three months or more, but where final termination of disposal operations has not occurred, will be covered and stabilized with vegetative ground cover or other stabilizing material.

c. Alternative material or an alternative thickness of cover may be used, if the County demonstrates that the alternative material or thickness controls disease vectors, fires, odors, blowing litter, and scavenging without presenting a threat to human health and the environment, and is approved by the Division.

3. Spreading and compacting requirements.

   a. C&DLF units will restrict solid waste to the smallest area feasible.
   b. Solid waste will be compacted as densely as practical into cells.
   c. Fencing and/or diking will be provided within the area to confine solid waste which is subject to be blown by the wind. At the conclusion of each operating day, all windblown material resulting from the operation will be collected and disposed of by the County.

4. Explosive gases control

   a. The County must ensure that:

      i. The concentration of methane and hydrogen sulfide (H_2S) gases generated by the landfill does not exceed 25 percent of the lower explosive limit for methane and hydrogen sulfide (H_2S) in landfill structures (excluding gas control or recovery system components); and

      ii. The concentration of methane and hydrogen sulfide (H_2S) gas does not exceed 100 percent of the lower explosive limit for methane and hydrogen sulfide (H_2S) at the landfill property boundary.

   b. The County will continue a routine gas monitoring program to ensure that the standards of 4 (a) are met. (Section 2.5-Appendix III-Explosive Gas Monitoring Plan)
      i. The type and frequency of monitoring must be determined based on the following factors:

         (i) Soil conditions;
         (ii) The hydrogeologic conditions surrounding the facility;
         (iii) The hydraulic conditions surrounding the facility;
         (iv) The location of facility structures and property boundaries.

      ii. The minimum frequency of monitoring will be quarterly.

   c. If methane and hydrogen sulfide (H_2S) gas levels exceeding the limits specified in 4 (a) are detected, the owner or operator will:

      i. Immediately take all necessary steps to ensure protection of human health, i.e. no smoking, temporarily abandon the structure and notify the Division of Waste Management.

      ii. Within seven days of detection, place in the operating record the methane gas levels detected and a description of the steps taken to protect human health; and

      iii. Within 60 days of detection, implement a remediation plan for the methane gas releases, place a copy of the plan in the operating record, and notify the Division of Waste Management that the plan has been implemented. The plan will describe the nature and extent of the problem and the proposed remedy.

   d. "Lower explosive limit" means the lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at 25°C and atmospheric pressure.

5. Disease vector control

   a. The County will prevent or control on-site populations of disease vectors using techniques appropriate for protection of human health and the environment.

   b. "Disease vectors" means any rodents, flies, mosquitoes, or other animals, including insects, capable of transmitting disease to humans.

6. Air Criteria and Fire Control

a. The County will ensure that the landfill does not violate any applicable requirements developed under a State Implementation Plan (SIP) approved or promulgated by the US EPA Administrator pursuant to Section 110 of the Clean Air Act, as amended.

b. Open burning of solid waste, except for the infrequent burning of land clearing debris generated on site or debris from emergency clean-up operations, is prohibited. Any such infrequent burning will be approved by the Division of Waste Management, NC Division of Air Quality and the local fire department or fire marshal.

c. In the event of an emergency the operator(s) will call 911. Earth moving equipment will be provided to control accidental fires. Arrangements have been made with the local fire department to provide actual fire protection. The site will be served by the Thoroughfare Volunteer Fire Department. This Fire Department is located within 2 miles of the landfill. Should the need arise Grantham Volunteer Fire Department and Arrington Volunteer Fire Department are also located with 7 miles of the landfill. This Fire department has access at all times to the landfill to provide fire fighting services when needed. Fire extinguishers are located in all buildings and on all equipment. Dirt piles are also on site to use in emergency situations. Landfill personnel can use soil to isolate the fire so it will not spread any further but actual fighting of the fire should be the responsibility of the trained fire department.

d. Fires that occur at the landfill will be reported to the Division of Waste Management within 24 hours and written notification will be submitted within 15 days. Written Notification may be submitted by using NCDEQ - Fire Occurrence Form. (Section 2.9-Appendix VII)

7. Access and safety requirements

a. The C&DLF will be adequately secured by means of gates, chains, beams, fences and other security measures approved by the Division of Waste Management to prevent unauthorized entry.

b. An attendant will be on duty at the site at all times while it is open for public use to ensure compliance with operational requirements.

c. The access road to the site and monitoring locations will be of all-weather construction and maintained in good condition.

d. Dust control measures will be implemented when necessary. If dust problems should arise, the County will use any reasonable means necessary to reduce it. At a minimum the County will spray water on necessary areas.

e. Signs providing information on tipping or disposal procedures, the hours during which the site is open for pubic use, the permit number and other pertinent information will be posted at the site entrance.

f. Signs will be posted stating that no hazardous or liquid waste can be received.

g. Traffic signs or markers will be provided as necessary to promote an orderly traffic pattern to and from the discharge area and to maintain efficient operating conditions.

h. The removal of solid waste from the C&DLF will be prohibited unless the County has included in it's operational plan a recycling program which has been approved by the Division. The general public is prohibited from removal activities on the working face.

8. Erosion and Sedimentation Control Requirements

a. Adequate sediment control measures (structures or devices), will be utilized to prevent silt from leaving the landfill.

b. Adequate sediment control measures (structures or devices), will be utilized to prevent excessive on-site erosion.

c. Provisions for a vegetative ground cover sufficient to restrain erosion will be accomplished within **30 working days** or **120 calendar days** upon completion of any phase of landfill development.

9. Drainage Control and Water Protection Requirements

a. Surface water will be diverted from the operational area and will not be impounded over waste.

b. Solid waste will not be disposed of in water.

c. Leachate will be contained on site and properly treated prior to discharge.

d. The landfill will not:

(i) Cause a discharge of pollutants into waters of the United States, including wetlands, that violates any requirements of the Clean Water Act, including, but not limited to, the National Pollutant Discharge Elimination System (NPDES) requirements pursuant to Section 402.

(ii) Cause the discharge of a nonpoint source of pollution to waters of the United States, including wetlands, that violates any requirements of an area-wide or state-wide water quality management plan that has been approved under Section 208 or 319 of the Clean Water Act, as amended.

e. The County will inspect the exterior slopes of the landfill at least weekly and after major storm events and/or drenched raining season to determine if there are any breakouts of leachate in the slopes. If any are discovered, they will be contained immediately to assure that they will not leave the site. [See Part 1(MSW): Section 2.8-Appendix VI-Corrective Action for Leachate Break-outs] The containment can consist but not be limited to an earthen berm, sand bags, erosion control logs and/or anything that will contain the leachate on the slope.

The repair of the breakout will require excavating into the cover soil on the slope down to the waste and into the waste to determine what is causing the leachate to come to the surface. Normally it is another layer of soil that has been used as cover and the leachate is flowing along that layer to the slope and surfacing on the slope. The lower layer of cover needs to be removed at the breakout so that the leachate that is flowing along this cover has a point where it will go vertically into the landfill instead of flowing along the soil boundary that was once either daily cover or an intermediate cover.

Once this soil layer has been breached, the excavation can be filed back with stone, clean waste or any material, other than soil, that will allow the leachate to flow vertically instead of horizontally. Once the excavation has been filled with this material, the surface can be cover with soil so that surface water does not intrude into the excavation. Vegetative cover will be reestablished over the excavated area.

Records of all inspections and break-outs shall become part of the operating record.

10. Survey for Compliance

Within 60 days of a permittee's receipt of the Division's written request, the permittee will have a survey conducted of active and/or closed portions of the unit(s) at the facility in order to determine whether operations are being conducted in accordance with the approved design and operation plans. The permittee must report the results of the survey, including a map produced by the survey, to the Division within 90 days of receipt of the Division's request.

a. A survey shall be required by the Division:

(i) If there is reason to believe that the operations are being conducted in a manner that deviates from the plan listed in the effective permit, or

(ii) As verification that operations are being conducted in accordance with the plan listed in the effective permit.

b. Any survey pursuant to this Paragraph must be performed by a professional land surveyor duly authorized under North Carolina law to conduct such activities.

11. Record keeping Requirements

a. The County will record and retain at the facility, or an alternative location near the facility approved by the Division, in an operating record the following information as it becomes available.

(i) Inspection records, waste determination records, and training procedures;

(ii) Amounts by weight of solid waste received at the landfill to include source of generation.

(iii) Any demonstration, certification, findings, monitoring, testing or analytical data required for surface, groundwater and gas monitoring;

(iv) Any monitoring, testing, or analytical data required for closure or post-closure;
(v) Any cost estimates and financial assurance documentation;

(vi) Notation of date and time of placement of cover material; and,

(vii) All audit records, compliance records and inspection reports.

(viii) Notation of approval date and the name of the Division personnel who approved the type of the open burning; and

(ix) Approved monitoring plan and corrective action plans.

b. All information contained in the operating record will be furnished to the Division of Waste Management according to the permit or upon request, or be made available for inspection by the Division.

c. The operating record will also include a copy of the approved operation plan and all required permits.

2.3 <u>Engineering/Operation Drawings – C&D</u> [see Part 1 (MSWLF), Section 2.10]

2.4 <u>Land Clearing and Inert Debris Landfill Facility (LCID)</u>

<u>Introduction</u>
Wayne County will operate a Land Clearing and Inert Debris (LCID) landfill on the 28.40 acre property owned by the County (Deed Book 1927, Page 382).

The LCID landfill will have a waste footprint of no greater than two (2) acres and have 3 (horizontal) to 1(vertical) final side slopes. There is no projected use for the land after closure.

The landfill will accept land clearing waste, inert debris, untreated wood and yard trash from within Wayne County.

2.5 Operational Requirements

The owner/operator will maintain and operate the site in conformance with the following practices, unless otherwise specified in the permit:

(1) The approved plans will be followed.
(2) The facility will only accept those solid wastes which it is permitted to receive. The facility will only except wastes from within Wayne County.
(3) Solid waste will be restricted to the smallest area feasible and compacted as densely as practical into cells.
(4) Adequate soil cover will be applied monthly. Or when the active area reaches one acre in size, whichever occurs first.
(5) Within 120 calendar days after completion of any phase of disposal operations or upon revocation of permit, the disposal area will be cover with a minimum of one foot of suitable soil cover sloped to allow surface water to runoff in a controlled manner. The Division may require further action in order to correct any condition which is or may become injurious to the public health, or a nuisance to the community.
(6) Adequate erosion control measures, structures, or devices will be utilized to prevent silt from leaving the site and to prevent excessive on site erosion.
(7) Groundcover sufficient to restrain erosion will be accomplished within 30 working days or 120 calendar days upon completion of any phase of landfill development.
(8) The facility will be adequately secured by means of gates, chains, berms, fences, etc. to prevent unauthorized access except when an operator is on duty. An attendant shall be on duty at all times while the landfill is open for public use to assure compliance with operational requirements and to prevent acceptance of unauthorized wastes.
(9) Access roads are of all-weather construction and will be properly maintained.
(10) Surface water will be diverted from the working face and will not be impounded over waste.
(11) Solid Waste will not be disposed of in water.
(12) Open burning of solid waste is prohibited.
(13) The concentration of explosive gases generated by the facility will not exceed the following:

    (a) Twenty five percent of the lower explosive limit for the gases in facility structures.
    (b) The lower explosive limit for the gases at the property boundary.

(14) Leachate will be contained on site and properly treated prior to discharge.
(15) Should the Division deem it necessary, ground water and/or surface water monitoring, or both, may be require as provided for under Rules .0601 and .0602.
(16) A sign will be posted at the facility entrance showing the contact name and number, in case of an emergency, and the Landfill Permit Number.
(17) Vegetative requirements are as follows:

    (a) Within six months after final termination of disposal operations at the site or a major part thereof or upon revocation of permit, the area will be stabilized with native grasses.
    (b) Temporary seeding will be utilized as necessary to stabilize the site.

2.6 Operation Plans for Tear-off Shingles, Passive Composting, and Inert Debris Storage and Processing

Wayne County
Construction and Demolition Debris Landfill
Permit No. 9601-CDLF-1997

460 B S. Landfill Rd.
Dudley, NC 28333

Operation Plans for:

Sorting Tear-off Asphalt Shingles for Recycling

Passive Compositing in Borrow Pit #1

Inert Debris Storage and Processing in Borrow Pit #1

Permit No.	Date	Document ID No.
96-01	**August 09, 2013**	**19483**

DOCUMENT APPROVED
Division of Waste Management
Solid Waste Section
Received Dated: **July 22, 2013 and revised through August 06 7, 2013**
Date: **August 09, 2013** By: **Ming-Tai Chao**

Prepared by:
Wayne County Solid Waste Department
460 B S. Landfill Rd.
Dudley, NC 28333

July 2013

Sorting Tear-off Asphalt Shingles for Recycling – Operation Plan

I. Introduction

This operation plan describes how tear-off asphalt shingles will be collected, sorted, stored, and managed at this facility in order to provide a material that can be used in paving asphalt production. All tear-off shingle handling will occur within the disposal limits of the C&D landfill. Our facility uses best practices for acceptance and sorting to remove the tear-off shingles from the waste stream and divert the "clean" shingles to other facilities. Our facility will not engage in sorting, processing, or grinding of the collected recyclable asphalt shingles.

II. Waste Acceptance

Asphalt roofing shingles contain asphalt cement, mineral aggregate, and mineral filler, which are raw materials used in asphalt production. Asbestos was used in shingle manufacture until the mid-1970s and in other roofing materials such as roof felt, roof putty, surface coating, and mastic until the mid-1980s.

Our facility provides roofers with a list of acceptable and unacceptable items for tear-off shingle recycling and requires source separation at the job site by the roofer. Materials from flat and built-up roofing systems are disposed rather than accepted for recycling due to the higher use of asbestos roofing materials in those systems. Roofers are instructed to separate tear-off shingles into either a dedicated trailer or to layer their waste when loading so that the shingles can be easily separated from the unacceptable debris. Our list of acceptable and unacceptable material is shown in Attachment 1. Only tear-off shingles originating from Wayne County are accepted.

The shingle suppliers are also required to complete a supplier certification form. The handling and disposal of asbestos during demolition and renovation is regulated under the National Emission Standards for Hazardous Air Pollutants (NESHAP). Before work can be started at a NESHAP-regulated facility, a notification of demolition and renovation must be submitted. The notification includes an inspection by a North Carolina accredited inspector or roofing supervisor and an analysis for asbestos. The supplier of shingles from a NESHAP-regulated facility must present documentation that the shingles do not contain greater than 1% asbestos. The documentation is a letter from the accredited asbestos inspector or roofing supervisor that sampled the shingles and the analytical test results. A copy of the documentation is kept with the supplier certification form. Shingles from a NESHAP-regulated facility that do not have the required documentation or that are documented to contain greater than 1% asbestos are disposed.

Shingles from single-family homes or residential building containing four or fewer dwelling units are generally not regulated under NESHAP. Only the source of shingles is required for these shingles.

Our supplier certification form is shown in Attachment 2. These practices help ensure that only recyclable tear-off shingles are sent for asphalt production while reducing sorting at our facility.

III. Flow and Management of Tear-off Shingles

Loads are visually inspected when entering the facility to determine whether the shingles have been separated or if it is a mixed load. The roofer is asked to complete a supplier certification form. Mixed loads, shingles from a NESHAP-regulated facility that contain greater than 1% asbestos, and shingles from a NESHAP-regulated facility without the proper documentation are directed to the C&D landfill working face for disposal.

Source-separation by the roofer eliminates most of the unacceptable materials that cannot be used in tear-off shingle recycling. Loads that were source-separated into dedicated containers are sent directly to the stockpile area and unloaded. Loads that were separated into layers usually have the shingles on the bottom and other material on the top. These loads are first directed to the C&D landfill working face to remove the non-shingle roofing waste and then to the stockpile area for unloading the shingles. The stockpiled tear-off shingles are examined for unacceptable materials and any unacceptable materials are removed. If unacceptable C&D material is placed in the stockpile area, the landfill equipment operator immediately removes that material and disposes it in the C&D landfill working face. If other unacceptable material is discovered in the stockpile area, the material is handled in accordance with the C&D landfill's "Waste Screening Plan" (Appendix C of the Operation Plan, Doc. ID 16639, revised through May 2012). Any unacceptable waste is removed and disposed properly at the end of each working day.

No additional traffic controls are needed because the shingle stockpile area will always be located in close proximity to the C&D working face. Vehicles, regardless of whether they have C&D or source-separated shingles, are all directed to follow the signage to the C&D landfill. Signs indicate the location of the shingle stockpile area. A landfill equipment operator is always present to provide unloading instructions and traffic direction.

The remaining sorted shingles are accumulated in the stockpile area until there is a sufficient amount to transport to a facility that will grind and use or sell the ground shingles for asphalt production. At least 75% of the tear-off shingles that are stockpiled leave the facility during the same year.

IV. Stockpile Details

A sign identifies the shingle stockpile area. It is also marked by highly-visible cones. The stockpile area has dimensions of approximately 20' X 20', which is 400 square feet. A maximum of 24 tons of shingles are stockpiled at any given time. Shingles are not stockpiled in an area with standing water. The shingle stockpile area will always be located in close proximity to the C&D landfill working face. The stockpile area is close to the C&D landfill working face so that in the event the sorted material is unable to be recycled, the material can be easily pushed into the working face for disposal. The working face will move as phases of the C&D landfill are filled, and the shingle stockpile will move after each phase is filled. Due to variability of waste receipts, we are unable to provide an exact frequency at which the stockpile will be relocated. Our current estimate is that the stockpile will be relocated once or twice a year. Attachment 3: Figure 1 shows the location of the stockpile area.

V. Gas Collection System Concerns

Shingle and C&D placement activities will be conducted in accordance with Section 1.5 Landfill Gas Collection System of the Operation Plan (Doc. ID 16639, revised through May 2012). Gas collection system components are marked by high-visibility flags and protected by concrete barriers. Shingle and C&D placement will not impact the integrity of the landfill gas collection system.

VI. Recordkeeping

Records are kept of shingles entering the facility, sorted shingles leaving the facility for recycling, and waste that is disposed. These records are kept for use in the facility's monthly and annual reports. Supplier certification forms and any supporting documents are also kept.

VII. Contracting Company

Barnhill Contracting Company purchases and hauls the stockpiled shingles off-site. Our facility contacts them when the amount of stockpiled shingles reaches a sufficient load size. Our facility uses a loader or an excavator to load shingles into the contractor's hauling vehicle. Approximately 12 tons of shingles constitutes a load. The Barnhill Contracting Company and/or the facility that processes or grinds the recyclable asphalt shingles is responsible for conducting required asbestos sampling and testing prior to processing or grinding the recyclable shingles. Barnhill Contracting Company's contact information is:

Barnhill Contracting Company
PO Box 399
Kinston, NC 28502
(252) 527-8021

Passive Compositing in Borrow Pit #1 – Operation Plan

I. Introduction

This operation plan describes how passive compositing will be conducted in a designated area within Borrow Pit #1. This area is outside the disposal limits of the C&D landfill. All waste placement and management activities will be conducted by landfill employees only. The general public will not have access to this area. Material resulting from this passive compositing will only be used by the Wayne County Solid Waste Department for use as a soil amendment in daily and intermediate landfill cover. Material will not be given to or sold to the general public. Composting as it is described in and regulated by 15A NCAC 13B, Section .1400 is not conducted in this area.

II. Waste Streams

"Yard waste" and "land clearing waste" are managed in this area. "Yard waste" by definition means "Yard Trash" and "Land-clearing Debris" as defined in G.S. 130A-290, including stumps, limbs, leaves, grass, and untreated wood. "Yard trash" means solid waste resulting from landscaping and yard maintenance such as brush, grass, tree limbs, and similar vegetative material. "Land clearing debris" means solid waste which is generated solely from land clearing activities. "Land clearing waste" means solid waste which is generated solely from land clearing activities such as stumps, trees, limbs, brush, grass, and other naturally occurring vegetative material. Only material generated within Wayne County is accepted.

III. Material Management

Scales are used to weigh incoming loads of yard waste and land clearing waste. Customers deposit yard waste and land clearing waste in a roll-off container at our facility's Recycling Collection Center, which is located on the east side of the scale house as shown on Drawing No. F1/Sheet 3 of 9 in the C&D Landfill Operation Plan (Doc. ID 16639, revised through May 2012).

Landfill employees remove the roll-off container once it is full, weigh the load, and dump the material in the passive compositing area. Landfill employees then remove any solid waste or C&D that may be incidentally deposited in the area and dispose it properly by the end of each working day. If other unacceptable material is discovered in the stockpile area, the material is handled in accordance with the C&D landfill's "Waste Screening Plan" (Appendix C of the Operation Plan, Doc. ID 16639, revised through May 2012).

Landfill employees use heavy machinery to arrange the material into windrows. Green wastes (grass and leaves) and trunks/limbs/untreated wood are separately stockpiled initially. Periodically, and at least annually, the windrows will be turned

using an excavator and/or a loader. Then, it is estimated that a useable product will be produced after two years of this minimal processing.

3,500 tons of yard waste and land clearing waste will be placed in this area per year. This amount translates to 875 tons of material per quarter. Because passive composting is the only processing applied to the storage pile, we are unable to determine the amount of processed material that will be removed from the area on a quarterly basis. It is estimated that a minimum of two years of passive composting will be needed to render a usable product. Records are kept of the amount of material placed in the passive compositing area and of the amount of material used for cover. These records are kept for use in the facility's monthly and annual reports.

Attachment 3: Figure 1 shows the location of the passive compositing area. The area is restricted to 0.94 acres. The unit is at least 50 feet away from water bodies, the LCIDLF, and other waste management units.

Adequate erosion control measures, structures, or devices will be utilized to prevent silt from leaving the site and to prevent excessive on-site erosion. Storm water run-off is controlled by Riser Basin #1 as described in the attached Erosion and Sedimentation Control Plan (Attachment 4). Access roads to and from the unit are maintained for use in all weather conditions.

IV. Fire Prevention and Control

Our facility has a water wagon and fire extinguishers on-site. Emergency procedures and emergency responder information are located in the C&D landfill's *Operation Plan* (Doc. ID 16639, revised through May 2012) and fire emergencies in this yard waste and land clearing waste management area will be handled in accordance with that plan.

To prevent fires, the windrows will be limited to 12 feet in height and 10 feet in width. A minimum of 25 feet will be kept between windrows. Piles will be turned during periods of precipitation, which will also help with odor control and provide needed moisture to the material.

Inert Debris Storage & Processing in Borrow Pit #1 – Operation Plan

I. Introduction

This operation plan describes how inert debris will be stored and processed into usable aggregate in a designated area within Borrow Pit #1. All waste placement and management activities will be supervised and/or conducted by Wayne County Solid Waste employees. The general public will not have access to this area. Processed material will be used for road material at the Wayne County Landfill only. The storage and processing activities in this area involve neither excavation nor filling.

II. Waste Streams

Inert debris is stored and processed in this area. The material consists solely of concrete, brick, concrete block, uncontaminated soil, gravel and rock. Only material generated within Wayne County is accepted.

III. Material Management

Customers with inert debris typically notify the weigh-master that they have inert debris when they arrive on the scales. At this time the landfill operations supervisor is notified that a load of inert debris has arrived. The supervisor examines the load while it is in the hauling vehicle and determines if the material is eligible for placement in the inert debris area. The supervisor escorts the customer to the inert debris storage area and supervises unloading of the debris. Attachment 3: Figure 1 shows the location of the inert debris storage area (also known as the concrete recycling area).

The supervisor immediately removes any solid waste or C&D that may be incidentally deposited in the inert debris area and disposes it properly by the end of each working day. If other unacceptable material is discovered in the storage area, the material is handled in accordance with the C&D landfill's "Waste Screening Plan" (Appendix C of the Operation Plan, Doc. ID 16639, revised through May 2012).

Adequate erosion control measures, structures, or devices will be utilized to prevent silt from leaving the site and to prevent excessive on-site erosion. Storm water run-off is controlled by Riser Basin #1 as described in the attached Erosion and Sedimentation Control Plan (Attachment 4). Access roads to and from the unit are maintained for use in all weather conditions.

A maximum of 4,000 tons of unprocessed material is stored in this area. Records are kept on the amount of material stored and processed for use in the facility's

monthly and annual reports. The pile's area is restricted to 0.38 acres. The unit is at least 50 feet away from water bodies, the LCIDLF, and other waste management units.

IV. Contracting Company

Best Sand & Gravel Inc. is contacted when our facility determines that there is sufficient stockpiled material. Best Sand & Gravel Inc. brings a crusher and conveyor belt with a scale to the site and processes the material into aggregate. Their contact information is:

Best Sand & Gravel Inc.
2390 NC 111 South
Goldsboro, NC 27534
(919) 778-3252

Attachment 1

TEAR-OFF ASPHALT SHINGLE RECYCLING

List of Acceptable and Unacceptable Materials

"YES"

Include these items:

- Shingles
- Felt attached to shingles

"NO"

Do NOT include these items:

- Wood
- Metal flashings, gutters, etc.
- Nails (best effort)
- Rolls of sheets of felt paper
- Plastic wrap, buckets
- Paper waste
- No garbage, trash, or other waste materials
- Built-up asphalt roofing
- Asbestos-containing materials
- Shingles containing mastics

Attachment 2

Wayne County Landfill

SHINGLE SUPPLIER CERTIFICATION FORM

Supplier of Whole Tear-off Asphalt Shingles

Supplier Name: _____

Address: _____

Contact Name: _____

Phone: _____

We the undersigned certify that (check appropriate boxes):

☐ The tear-off shingles are from a NESHAP regulated facility and documentation stating that the shingles do not contain >1% asbestos is attached. (Documentation is a letter from the North Carolina accredited asbestos inspector or roofing supervisor that collected the samples with the analytical results attached.)

☐ The tear-off shingles are from a single family home or residential building having four or fewer dwelling units that is not regulated under NESHAP.

Tear-off shingles were removed from the following addresses:

_____

_____

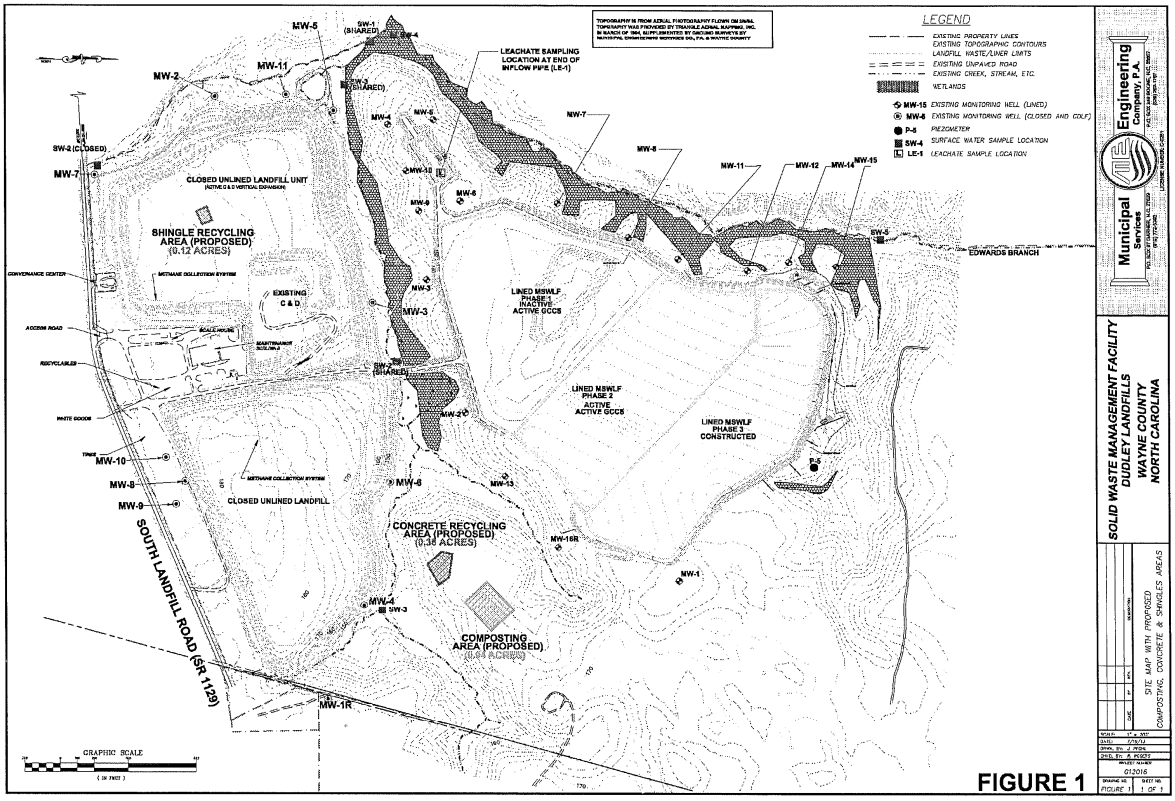
_____

(Please attach additional sheets as needed to record each building address.)

_____ Shingle Supplier (signature)

_____ Date

Attachment 3


LEGEND
EXISTING PROPERTY LINES
EXISTING TOPOGRAPHIC CONTOURS
LANDFILL WASTE/LINER LIMITS
EXISTING UNPAVED ROAD
EXISTING CREEK, STREAM, ETC.
WETLANDS
MW-15 EXISTING MONITORING WELL (LINED)
MW-6 EXISTING MONITORING WELL (CLOSED AND GOLF)
P-5 PIEZOMETER
SW-4 SURFACE WATER SAMPLE LOCATION
LE-1 LEACHATE SAMPLE LOCATION
LEACHATE SAMPLING LOCATION AT END OF INFLOW PIPE (LE-1)
CLOSED UNLINED LANDFILL UNIT
SHINGLE RECYCLING AREA (PROPOSED) (0.12 ACRES)
EXISTING C & D
LINED MSWLF PHASE 1 INACTIVE ACTIVE GCCS
LINED MSWLF PHASE 2 ACTIVE ACTIVE GCCS
LINED MSWLF PHASE 3 CONSTRUCTED
CLOSED UNLINED LANDFILL
CONCRETE RECYCLING AREA (PROPOSED) (0.38 ACRES)
COMPOSTING AREA (PROPOSED) (0.44 ACRES)
SOUTH LANDFILL ROAD (SR 1129)
EDWARDS BRANCH
GRAPHIC SCALE
Municipal Services Engineering Company, P.A.
SOLID WASTE MANAGEMENT FACILITY
DUDLEY LANDFILLS
WAYNE COUNTY
NORTH CAROLINA
SITE MAP WITH PROPOSED COMPOSTING, CONCRETE & SHINGLES AREAS
FIGURE 1

Attachment 4

Original to Lisa Hampton
Copy to Wayne Sullivan

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
April 15, 2002

LETTER OF APPROVAL OF REVISED PLAN

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

MUNICIPAL ENGINEERING SERVICES COMPANY
RECEIVED
APR 16 2002

RE: Erosion and Sedimentation Control Plan No. Wayne-2002-041
Landfill Borrow Sites #1 & #2
SR 1129 - Wayne County
River Basin: Neuse
Date Received: April 4, 2002
Responsible Party: County of Wayne

Dear Sir:

This office has completed its review of the revised erosion and sedimentation control plan for the referenced 39.0 acre disturbance. Based on the information provided, we have determined the submitted plan for the excavation of 2 on-site borrow pits to provide material for proper 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.

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 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;*

943 Washington Square Mall, Washington, North Carolina 27889
An Equal Opportunity Employer

Telephone 252-946-6481, FAX 252-975-3716
50%recycled/10% post-consumer paper

County of Wayne
ATTN: Mr. W. Lee Smith, III, Manager
April 15, 2002
Page 2

-- *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;*

-- *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;*

-- *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 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.

County of Wayne
ATTN: Mr. W. Lee Smith, III, Manager
April 15, 2002
Page 4

Please be advised that all land-disturbing activities affecting 5 or more acres are required to have a 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. 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: Jimmy D Woodie, PE, Municipal Engineering
(via e-mail) Jim Mulligan, Division of Water Quality

REVISED EROSION CONTROL PLAN

FOR THE

WAYNE COUNTY MUNICIPAL SOLID WASTE LANDFILL FACILITY BORROW SITES

PROJECT NO. G02039

NORTH CAROLINA PROFESSIONAL SEAL 6262 ENGINEER JIMMY D. WOODLI

4/11/2002

Rev. April 2002
February 2002

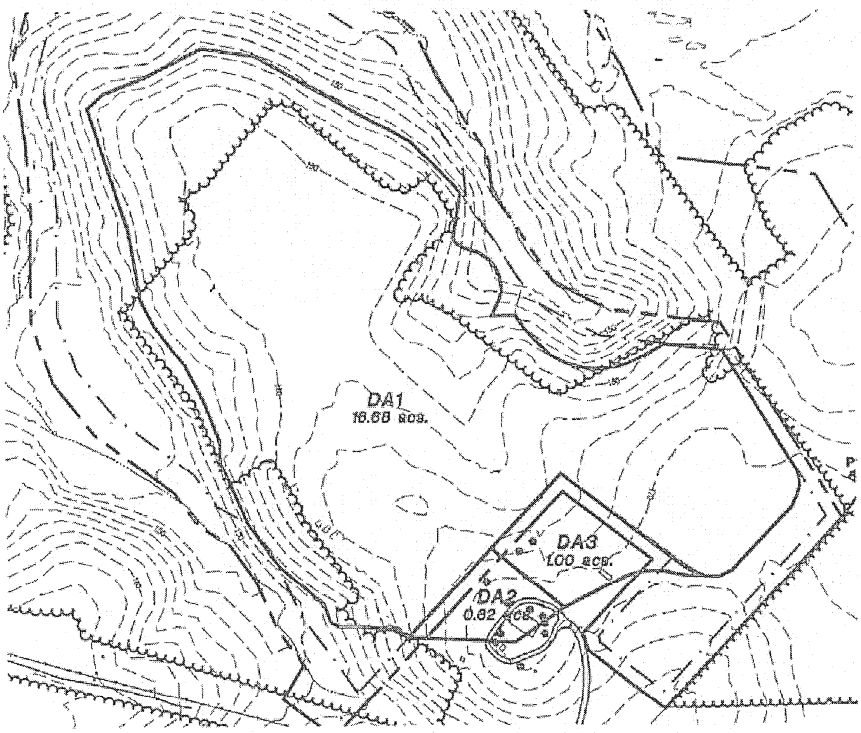
Municipal Engineering Services Co., PA
Garner and Boone, North Carolina

DRAINAGE AREAS BORROW SITE #1

Area Designation	Area (ac.)
DA1	16.68
DA2	0.62
DA3	1.00

Rainfall Intensity
i = 7.4

Runoff Coefficient
C = .25



Areas Draining Into Riser Basin #1

Area	A	I	C
DA1	=16.68 acs.	7.4 in/hr.	.25
DA2	=0.62 acs.	7.4 in/hr.	.25
DA3	=1.00 acs.	7.4 in/hr.	.25
	= 18.30 acs.	7.4 in/hr.	.25

$Q_{(10)}$ = CIA = (.25)(7.4)(18.30) = 33.86 cfs.

DESIGN RISER BASIN #1

Q = 33.86 cfs
A = 18.30 acs.

Surface area of riser basin:

Surface area S = .01Q S=(.01)(33.86) =0.3386 acs.
S = 0.3386 x 43560 ft^2 = 14,749 ft^2

Depth of riser basin:

depth = Capacity/surface area

Capacity needed is 1800 ft^3/acre.
Capacity = (1800)(18.30) = 32,940 ft^3.

Due the location and the shape of the basin, the average end method of calculating the storage of the basin is as follows:

bottom area elevation	148	= 126,708
½ riser height	150	= 313,369

therefore:

126,708 + 313,369 = (440,077÷ 2) 2' = 440,077 ft^3

The actual storage capacity of the basin is adequate to contain the runoff.

Principal spillway barrel size:

Use Capacity of 0.2 cfs/acre
Q = (18.30)(.2) = 3.66 cfs
1.5% grade

$D = 16\,(Q\,n \div \sqrt{s})^{.375}$ Use corrugated metal pipe

Q = 3.66 cfs n = .024 s = .015

$D = 16[(3.66)(.024) \div \sqrt{.015}]^{.375} = 14.12''$ Use 18" pipe diameter

Outlet Protection

L = 24' W = 25.5' d_{50} = 13" 29.25" min. thickness

Riser pipe for Principal spillway:
1.5 times the barrel = 1.5x 14.12 = 21.18"
use 30" pipe diameter

Footing for riser pipe:

Weight of water: $\pi r^2 h(62.4) = 1{,}960$ given: r = 1.25' h = 4'
Concrete: 150 lbs per ft^3
13.07 ft^3 of concrete needed
use 16 ft^3 of concrete
1'x4.0'x4.0' footing.

Emergency Spillway:

$Q = C_W L H^{3/2}$ $C_W = 3.0$ H = 1 Q = 33.85
$L = Q \div (C_w)(H^{3/2}) = 33.85 \div (3)(1^{3/2}) = 11.28'$ Required

Bottom of Weir = 12'
Top of Weir = 21'
Line with 9" Rip Rap

Elevations:

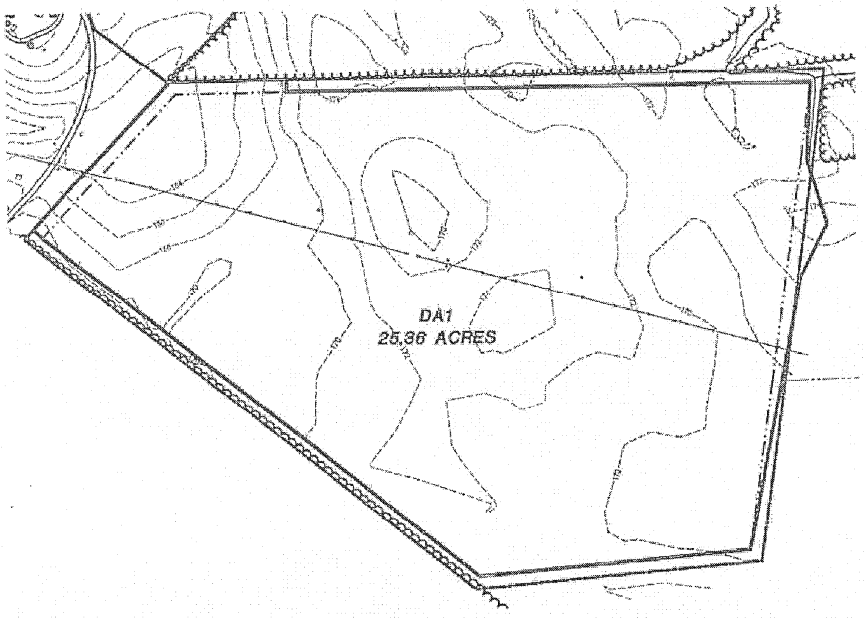
Top of Dam	154.0'
Emergency Spillway	152.5'
Riser Crest	152.0'
Conduit Inlet	148.0'
Conduit Outlet	147.5'
Bottom Elevation	148.0'

DRAINAGE AREAS BORROW SITE #2

Area Designation	Area (ac.)
DA1	25.36

Rainfall Intensity
i = 7.4

Runoff Coefficient
C = .25



Areas Draining Into Riser Basin #1

Area	A	I	C
DA1	=25.36 acs.	7.4 in/hr.	.25

$Q_{(10)}$ = CIA = (.25)(7.4)(25.36) = 46.92 cfs.

DESIGN RISER BASIN #1

Q = 46.92 cfs
A = 25.36 acs.

Surface area of riser basin:

Surface area S = .01Q S=(.01)(46.92) =0.4692 acs.
S = 0.4692 x 43560 ft^2 = 20,439 ft^2

Depth of riser basin:

depth = Capacity/surface area

Capacity needed is 1800 ft^3/acre.
Capacity = (1800)(25.36) = 45,648 ft^3.

Due the location and the shape of the basin, the average end method of calculating the storage of the basin is as follows:

bottom area elevation	164	= 979,569
½ riser height	166	= 995,850

therefore:

979,569 + 995,850 = (1,975,419÷ 2) 2' = 1,975,419 ft^3

The actual storage capacity of the basin is adequate to contain the runoff.

Principal spillway barrel size:

Use Capacity of 0.2 cfs/acre
Q = (25.36)(.2) = 5.07 cfs
0.5% grade

$D = 16\,(Q\,n \div \sqrt{s})^{.375}$ Use corrugated metal pipe

Q = 5.07 cfs n = .024 s = .005

$D = 16[(5.07)(.024) \div \sqrt{.005}]^{.375}$ = 19.61"(required min.) Use 24" pipe diameter

Outlet Protection

L = 24' W = 26' d_{50} = 11" 24.75" min. thickness

Riser pipe for Principal spillway:
1.5 times the required min. barrel size = 1.5(19.61") =
30" pipe diameter

Footing for riser pipe:

Weight of water: $\pi r^2 h(62.4) = 1{,}960$ given: r = 1.25' h = 4'
Concrete: 150 lbs per ft^3
13.07 ft^3 of concrete needed
use 16 ft^3 of concrete
1'x4.0'x4.0' footing.

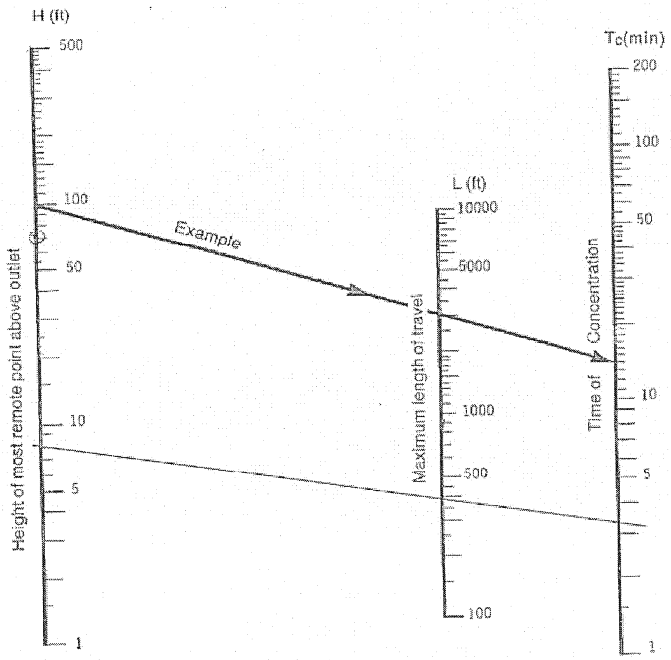
Emergency Spillway:

$Q = C_W L H^{3/2}$ $C_W = 3.0$ H = 1 Q = 46.92
$L = Q \div (C_w)(H^{3/2}) = 46.92 \div (3)(1^{3/2}) = 15.64'$ Required

Bottom of Weir = 16'
Top of Weir = 25'
Line with 6" Rip Rap

Elevations:

Top of Dam	170.0'
Emergency Spillway	168.5'
Riser Crest	168.0'
Conduit Inlet	164.0'
Conduit Outlet	163.5'
Bottom Elevation	164.0'



Note:
Use nomograph Tc for natural basins with well-defined channels, for overland flow on bare earth, and for mowed-grass roadside channels.

For overland flow, grassed surfaces, multiply Tc by 2.

For overland flow, concrete or asphalt surfaces, multiply Tc by 0.4.

For concrete channels, multiply Tc by 0.2.

Figure 8.03a Time of concentration of small drainage basins.

8.03.4

8

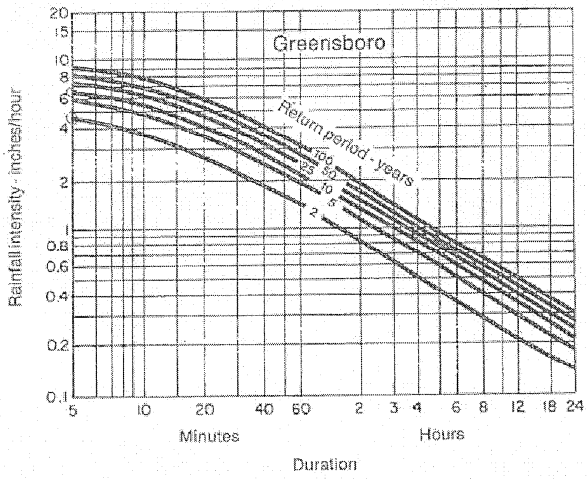


Figure 8.03d Rainfall intensity duration curves—Greensbor

USE THIS ONE

7.4 in.\hr.

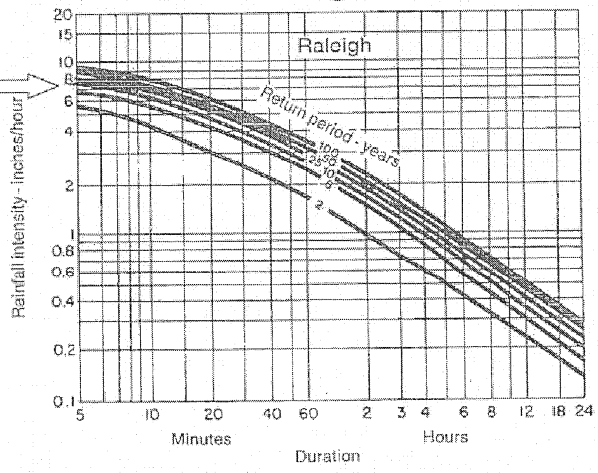
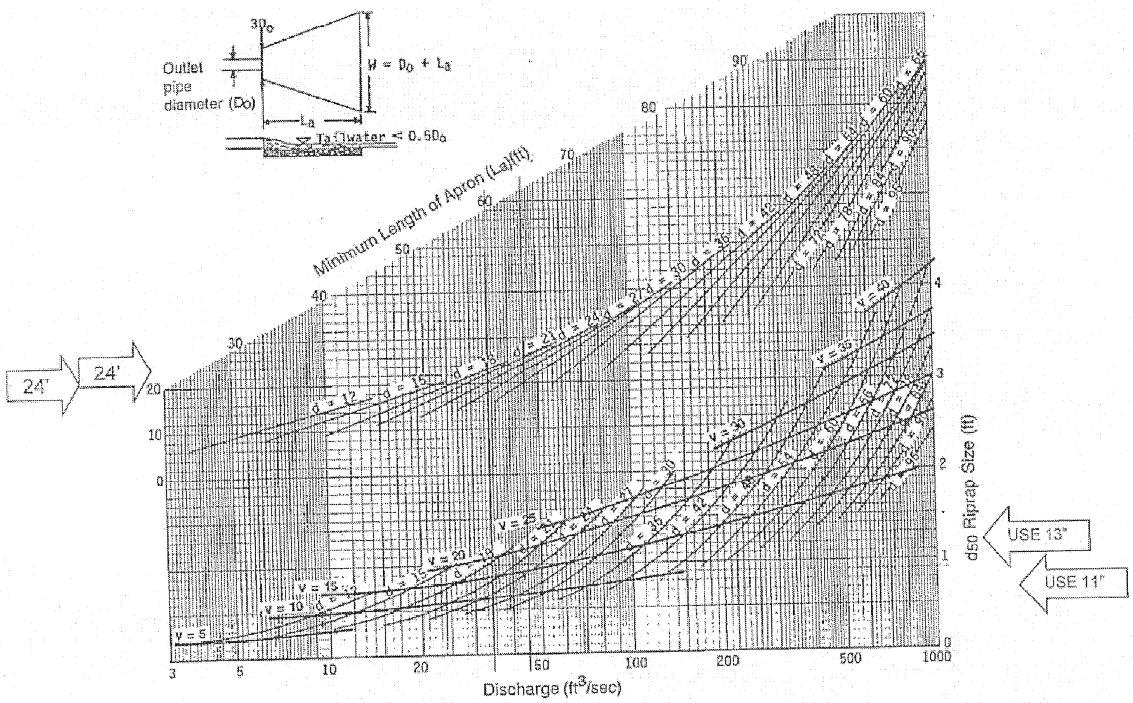


Figure 8.03e Rainfall intensity duration curves—Raleigh.

8.03.6



Curves may not be extrapolated.

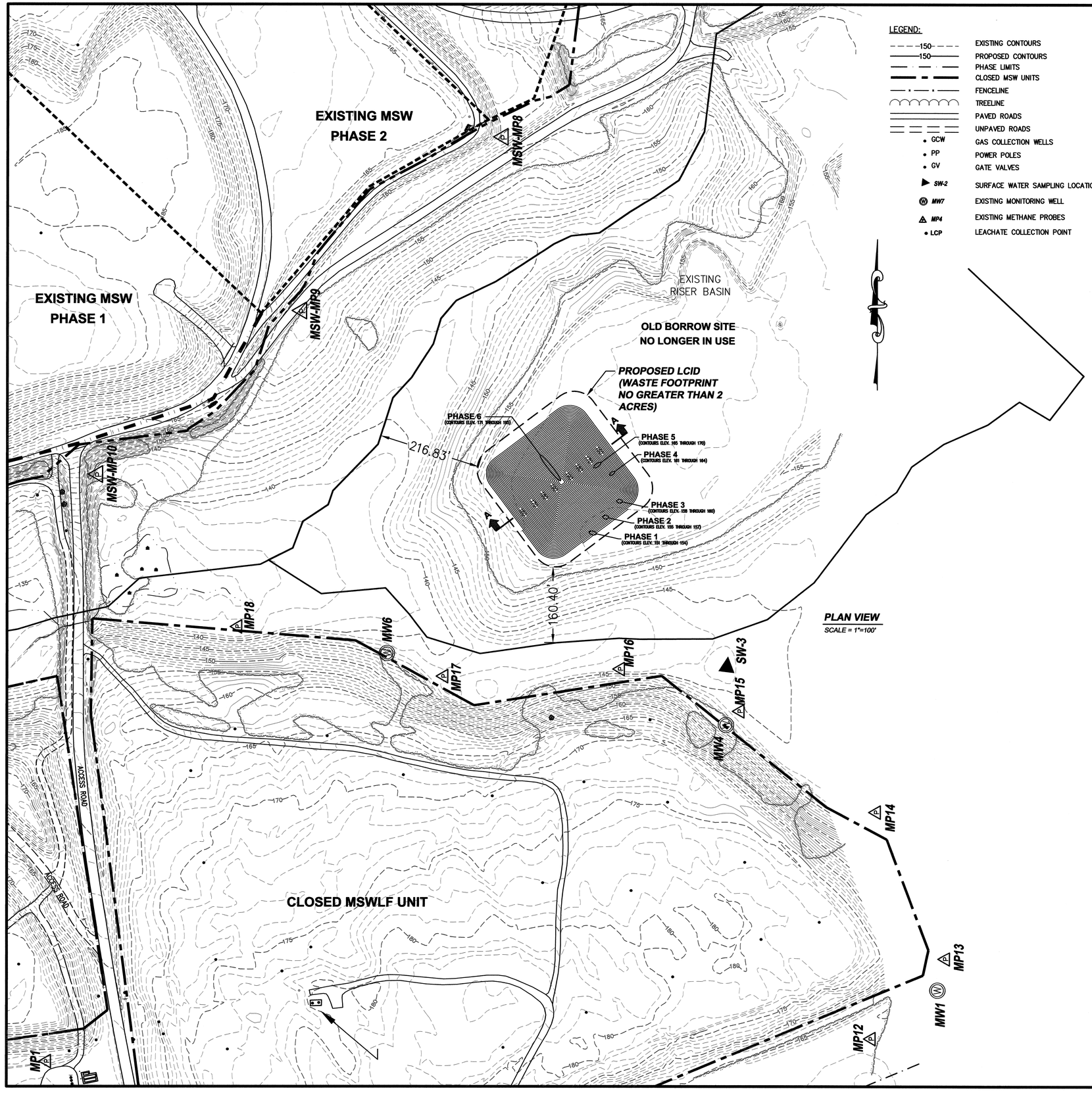
Figure 8.06a Design of outlet protection protection from a round pipe flowing full, minimum tailwater condition (T_W < 0.5 diameter).

2.7 Chronological Description of the Corrective Action Plan

Water quality at this landfill has been monitored at least semi-annually since 1991. Municipal Engineering Services Company, P.A. (MESCO) submitted an *Assessment and Corrective Action* (*ACM*) [DIN8821] report dated August 30, 2007 which was approved by the NC Solid Waste Section (SWS) on November 1, 2007 [DIN3328]. MESCO then developed a *Corrective Action Plan* (*CAP*) [DIN8821] on October 22, 2009 which was approved by the SWS on October 23, 2009 [DIN8822]. Groundwater remediation using Monitored Natural Attenuation (MNA) was initiated on August 6, 2009 and has continued on a semi-annual basis. Following establishment of the two year MNA baseline, MESCO completed a *Corrective Action Evaluation Report* (*CAER*) [DIN 13923] on May 10, 2011. The *CAER* dated May 10, 2011 concluded that only contaminant attributed to an anthropogenic source is benzene at MW-2 which is decreasing in concentrations over time and proposed a revision to the Sampling and Analysis Plan (SAP). Interpretation of MNA data and Biochlor modeling contained in the *CAER* indicate there is adequate evidence of natural attenuation occurring at the site. The SWS approved the CAER and the proposed modifications of MNA parameters and frequency [DIN 16967]. Background well MW-1 was abandoned and replaced by MW-1R as pre-authorized by SWS [DIN 19050] on June 4, 2013. MESCO submitted a *Request for Appendix II Groundwater Monitoring Modification* dated April 24, 2014 which was approved by the SWS. The *Water Quality Sampling and Analysis Plan* (*SAP*) which provides for a subset of wells to decrease Appendix II monitoring frequency and incorporates changes to the MNA program was revised and submitted on December 15, 2014 as requested by Ms. Christine Ritter of the SWS. Water quality conditions continue to improve since the *CAER* with benzene in MW-2 the only constituent attributed to anthropogenic sources that has been detected in excess of applicable groundwater Standards. No constituents attributed to an anthropogenic source was detected above applicable Standards site-wide during both 2015 events but benzene reappeared in MW-2 in March 2016. Groundwater remediation through MNA per the *CAP* is scheduled to continue provided there is no change directed by the SWS.

2.8 Engineering/Operation Drawing-LCID

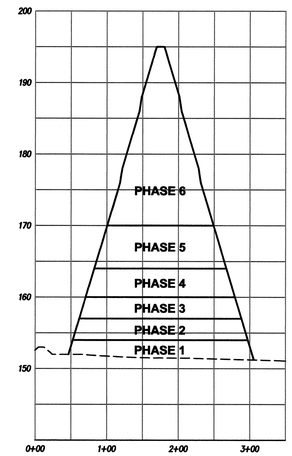
2.8.1 LCID Landfill - Fill Plan and Cross-Section



PLAN VIEW
SCALE = 1"=100'

LEGEND:

150	EXISTING CONTOURS
150	PROPOSED CONTOURS
	PHASE LIMITS
	CLOSED MSW UNITS
	FENCELINE
	TREELINE
	PAVED ROADS
	UNPAVED ROADS
GCW	GAS COLLECTION WELLS
PP	POWER POLES
GV	GATE VALVES
SW-2	SURFACE WATER SAMPLING LOCATION
MW7	EXISTING MONITORING WELL
MP4	EXISTING METHANE PROBES
LCP	LEACHATE COLLECTION POINT



SECTION A
SCALE: HORIZ. = 1"=100'
VERT. = 1"=10'

Municipal Engineering Services Company, P.A.
P.O. BOX 97, GARNER, N.C. 27529 (919) 772-5393
P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1767
LICENSE NUMBER: C-0281

MUNICIPAL SOLID WASTE
LANDFILL FACILITY
WAYNE COUNTY
NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

LCID LANDFILL
FILL PLAN AND CROSS SECTION

NORTH CAROLINA PROFESSIONAL SEAL 21100 ENGINEER STEVEN R. GANDY

1/12/16

SCALE:	AS SHOWN
DATE:	12/20/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	S. GANDY
PROJECT NUMBER	G15124
DRAWING NO.	LCID1
SHEET NO.	1 OF 1

P:\SolidWaste\G15124-Wayne Co. MSW & CD Permit Renewal\dwg\Eng-Op\LCID1.dwg, 1/8/2016 10:04:39 AM, lnc,lnc

SECTION 3.0

CLOSURE PLAN

3.1 Introduction

The County will cap their landfill within 180 days after the final receipt of solid waste. The cap system will consist of 12 inches of intermediate cover, 1.50 feet of cohesive soil with a permeability no greater than 1.0 x 10^{-5} cm/sec, and 18 inches of erosive layer. The cap contains gas venting system consisting of a series of washed stone trenches below the soil liner that will be vented through 10" diameter PVC pipes that penetrate the cap. The cap system will also include the proper seeding and mulching of the erosive layer and other erosion control devices.

Estimated schedule of closure will be approximately 24 years (see C&D Air Space calculations in Appendix A).

The Division requires that the Engineer certifies that the constructed cap is built according to approved plans and specifications. The Engineer that will accomplish this task is the one who did the planning and has written the Closure Plan specifications.

Before construction can begin, a pre-construction meeting will be held and the responsibilities and duties of each party will be discussed.

The Contractor is responsible for following and meeting the requirements set forth in the contract documents. The Contractors will provide to the Owner of the landfill and the Engineer a completed landfill constructed by Division's approved plans and specifications. The Contractor will give the Engineer a schedule for completion of the landfill including dates for expected construction of the cohesive soil test pad, cohesive soil cap, erosive layer, and estimated time for project completion. The Contractor is responsible for providing a foreman to remain on site at all times during construction, provide qualified personnel to conduct quality control, scheduling and coordinating the subcontractors, provide progress reports and as-built drawings, and coordinating construction activities with the Engineer. The foreman is responsible for supervising and coordinating with his crew, subcontractors, quality control personnel, attending all meetings and notifying the Engineer's Construction Observer when any discrepancies occur. The Contractor will meet with the Construction Observer on a daily basis to discuss the days construction activities. The results of all tests and any change in schedule shall be given to the Construction Observer as soon they are known by the Contractor. The Contractor must be registered in the State of North Carolina.

The Engineer is responsible for providing the engineering design, drawings and specifications, contract documents and Construction Quality Assurance (CQA) needed for construction of the landfill. The Engineer is responsible for conducting the pre-construction meeting, which will lay out the foundation for the project. The Engineer will approve any design changes and certify to the Division that the cap was constructed according to the requirements of Rule .0541 Construction Quality Assurance Plan and .0540 Construction requirements for C&D Facilities, and Division approved plans and specifications. This will be accomplished by on-site observation and independent laboratory soil testing to test site-specific soil properties including permeability. The Engineer will provide Quality Assurance by spot testing along side the Contractor, who will be providing the Quality Control. The Engineer will certify that the construction was completed in accordance with the CQA manual. The Engineer must be a professional engineer registered in North Carolina.

The Construction Observer (CO) is the Engineer's representative on-site. It is the CO's responsibility to know and interpret the plans and specifications of the project. On a daily basis the CO will coordinate with the Foreman to help ensure a quality product for the Owner. The CO will keep a daily log on the activities of the Contractor, keep notes on all meetings, and handle all quality assurance activities indicated in this document. The CO will keep a log of all material delivered on site and ensure the materials meets or exceeds the specifications indicated in this report. If the need arises, additional meetings will be scheduled as determined by the CO.

The estimate of maximum inventory of C&D wastes on-site over the life to date of the landfill facility is 1,193,004 cubic yards.

Prior to beginning closure, the County shall notify the Division that a "Notice of the Intent to Close" the unit has been placed in the operating record. The County shall begin closure activities no later than thirty (30) days after the date on which the landfill receives the final wastes, or if the landfill has remaining capacity and there is a

reasonable likelihood that the landfill will receive additional wastes, no later than one year after the most recent receipt of wastes. Extensions beyond the one-year deadline for beginning closure may be granted by the Division if the County demonstrates that the landfill has the capacity to receive additional waste and the County has taken and will continue to take all steps necessary to prevent threats to human health and the environment from the closed landfill.

The County shall complete closure activities in accordance with the Closure Plan within 180 days following the final receipt of waste. Extensions of the closure period may be granted by the Division if the County demonstrates that closure will, of necessity, take longer than one hundred eighty (180) days and the County has taken and will continue to take all steps to prevent threats of human health and environment from the enclosed landfill.

Following closure of the landfill, the County shall notify the Division that a certification, signed by the Project Engineer verifying that closure has been completed in accordance with the Closure Plan, and has been placed in the operating record. The County shall record a notation on the deed to the landfill property and notify the Division that the notation has been recorded and a copy has been placed in the operating record. The notation on the deed shall in perpetuity notify any potential purchaser of the property that the land has been used as a landfill and its use is restricted under the Closure Plan approved by the Division. The County may request permission from the Division to remove the notation from the deed if all waste is removed from the landfill.

3.2 Closure Cap System

The County will cap their landfill within 180 days after the final receipt of solid waste. The cap system will consist of 12 inches of intermediate cover, 1.50 feet of cohesive soil with a permeability no greater than 1.0 x 10^{-5} cm/sec, and 18 inches of erosive layer. All depths shall be measured perpendicular to the slope surface. The cap will contain a gas venting system consisting of a series of washed stone trenches below the soil liner that will be vented through 10" diameter PVC pipes that penetrate the cap. The cap system will also include the proper seeding and mulching of the erosive layer and other erosion control devices. The largest area currently requiring a cap system will be 40 acres.

3.3 Closure Cohesive Soil Cap

All materials and equipment shall be furnished by an established and reputable manufacturer or supplier. All materials and equipment shall be new and shall be of first class ingredients and construction, designed and guaranteed to perform the service required and shall conform with the following standard specifications or shall be the product of the listed manufacturers or similar and equal thereto as approved by the Engineer.

Cohesive Soil Cap Borrow Material

Test Name	Test Method	Contractor/Engineer Frequency
Moisture/Density	ASTM D698/D1557	1 per 5000 c.y.
Remolded Permeability	ASTM D5084	1 per 5000 c.y.
Atterberg Limits	ASTM D4318	1 per 5000 c.y.
Visual Classification	ASTM D2488	1 per 5000 c.y.
Grain Size Distribution	ASTM D422	1 per 5000 c.y.

Cohesive Soil Cap Test Pad

Test Name	Test Method	Contractor/Engineer Frequency
Field Moisture/Density	ASTM D1556 (sand cone) ASTM D2922/D3017 (nuclear gauge) ASTM D2937 (drive cylinder)	3 per lift
Permeability	ASTM D5084	1 per lift
Remolded Permeability	ASTM D5084	1 per lift
Atterberg Limits	ASTM D4318	1 per lift
Visual Classification	ASTM D2488	1 per lift
Grain Size Distribution	ASTM D422	1 per lift

In-Place Cohesive Soil Cap

Test Name	Test Method	Contractor/Engineer Frequency
Field Moisture/Density	ASTM D1556 (sand cone) ASTM D2922/D3017 (nuclear gauge) ASTM D2937 (drive cylinder)	1 per lift per acre
Permeability	ASTM D5084	1 per lift per acre
Atterberg Limits	ASTM D4318	1 per lift per acre
Visual Classification	ASTM D2488	1 per lift per acre
Grain Size Distribution	ASTM D422	1 per lift per acre

(a) Suitable on-site and/or off-site soils may be used as cohesive soil cap if it can achieve an in-place permeability of 1.0 x 10^{-5} cm/sec or less and meets all testing requirements indicated in the material testing paragraph in this section. Wyoming bentonite or an approved equivalent may be blended with the soil to lower the soil's permeability.

(b) A permeability "window" shall be developed for each type of soil from the borrow material that will be used for construction of the cohesive soil cap. The window shall be plotted on a semi-log plot with moisture content versus density. Laboratory testing to develop the window shall include a series of remolded samples compacted to various dry densities and moisture contents utilizing the same compactive effort (ASTM D 698 or D 1557). The remolded samples shall be tested for permeability to determine whether or not the particular soil type will provide the maximum permeability (1.0 x 10^{-5} cm/sec) at various dry densities and moisture contents. The window is then developed from the accepted remolded samples and moisture contents from the semi-log plot. A straight line is typically drawn between the acceptable points on the moisture-density curve to indicate a range of probable acceptable permeability results. The window will be used in the construction of the test strip to verify the laboratory remolded permeability results.

(c) Atterberg Limits (ASTM D4318) and grain size distribution (ASTM D422) and visual classification (ASTM D2488) shall also be conducted on the bulk samples used to prepare the permeability window. These tests can be used as indices on random samples collected from the borrow site during construction to verify the soil type is the same as was used to develop the "window". As a minimum, sufficient visual classifications and Atterberg Limits shall be conducted in association with each permeability test to verify that the construction materials meet specifications.

(d) A test strip of compacted cohesive soil cap shall be prepared to verify the permeability "window" prior to general installation of the cohesive soil cap. The test strip will be used to verify the results from the remolded permeabilities from the borrow site utilizing the permeability window(s) for each soil type that is going to be used for construction of the cohesive soil cap. At a minimum, the verification will consist of three moisture density tests, one Atterberg limits test, one grain size distribution test (ASTM D2488, D4318, and D422), and one Shelby Tube sample for each lift constructed in the test pad. Laboratory permeability tests shall be performed on tube (Shelby or drive tubes) samples of the cohesive soil cap after placement and compaction. The permeability must be a maximum of 1.0 x10^{-5}cm/sec. Tests shall be performed in accordance with the ASTM D5084. The test strip shall be approximately 2,500 sq. ft. in surface area and constructed to conform geometrically to the site topography with a minimum lateral dimension in any direction of 25 ft. The test strip shall consist of at least three compacted 6 inch lifts of cohesive soil cap. Placement and testing of the test strip shall be in conformance with the construction specifications and requirements for general installation of the cohesive soil cap. Test results from the test strip shall be used to guide placement and achievement of the required maximum permeability of 1.0 x 10^{-5} cm/sec of the cohesive soil cap. The test strip may be used as an integral part of the overall cohesive soil cap if it meets the required specification for the cap. All results shall be given to the Construction Observer.

(e) The soils shall be placed to the total thickness shown on the plans in maximum 8-inch thick loose lifts resulting in a maximum 6" lift compacted preferably at a moisture content between 0 to 3% above optimum moisture content to 95% (Standard Proctor) maximum dry density (ASTM D698). A sheepsfoot roller or approved alternative may be used to compact the soil cap provided the compaction and permeability requirements can be achieved. Each lift shall be tested for permeability, moisture content, particle size distribution analysis, Atterberg Limits, moisture-density-permeability relation, and if needed, percent bentonite admixed with soil, prior to the placement of the succeeding lift. Each lift shall also be visually inspected to confirm that all soil clods have been broken and that the surface is sufficiently scarified so that adequate bonding can be achieved. Soils for cohesive soil cap shall be screened, disked, or prepared using any other approved method as necessary to obtain a homogeneous cohesive soil with clod sizes in a soil matrix no larger than approximately 1.5 inches in maximum diameter. After each lift, the surface shall be scarified prior to the placement of the next lift to provide good bonding from one lift to the next.

(f) The cohesive soil cap shall be tested in the field to evaluate the coefficient of permeability. The coefficient of permeability of the soil cap shall be equal to or less than 1.0×10^{-5} cm/sec after placement and compaction. The soil cap must be a minimum of 1.5 feet thick (measured perpendicular to slope).

(g) Laboratory permeability tests shall be performed on tube (Shelby or drive tubes) samples of the cohesive soil cap after placement and compaction. The permeability must be a maximum of 1.0×10^{-5} cm/sec. Tests shall be performed in accordance with ASTM D5084. All laboratory permeability tests shall be performed at a confining pressure of 10 psi and at a hydraulic gradient of 20.

(h) The soil cap shall be tested a minimum of one soil sample per lift per acre for laboratory permeability. All permeability testing will be on random samples judged by the Engineer to be representative of the most permeable soil conditions for the area being tested. The project engineer shall certify that the materials used in construction were tested according to the Division approved plans. If after placement of the soil cap it fails the required tests, the material will either be reworked or replaced and then retested for permeability. The soil cap must remain moist at all times. If any section becomes dry, rework the dry area and moisten.

(i) A minimum of two (2) inches of soil shall be removed prior to securing each sample for permeability testing. The sampling tube shall be advanced vertically into the soil with as little soil disturbance as possible and should be pushed using a uniform pressure. The sampling tube (Shelby tube), when extracted, shall be free of dents, and the ends shall not be distorted. A backhoe or approved alternative should be used to advance the sampling tube (Shelby tube) as long as disturbance is minimized. Drive tube samples of the cap may be obtained for permeability testings. If the Engineer judges the sample to be too disturbed, another sample shall be taken. Once an acceptable sample has been secured and properly prepared, all sample excavations or other holes created by survey stakes, etc. shall be backfilled to grade with a 50% mixture of bentonite and similar soils in maximum 3-inch loose lifts and hand tamped with a blunt tool to achieve a tight seal equivalent to the original density.

(j) No additional construction shall proceed on the soil layers at the area being tested until the Engineer has reviewed the results of the tests and judged the desired permeability is being achieved.

(k) As a minimum, sufficient visual classifications (ASTM D2487) , Gradation analyses (ASTM D422) and Atterberg limits (ASTM D4318) shall be conducted in association with each permeability test to verify that the construction materials meet specifications. The minimum number of tests will be one per lift per acre.

(l) If the soil for the cohesive soil cap is incapable of achieving the required permeability when compacted, bentonite or approved alternative may be mixed with the soils to decrease the permeability. The amount of additive required must be determined in the laboratory and mixed in the field using either a pug mill or a soil stabilizer. Where additives are required, the soil shall be placed in maximum 8-inch thick loose lifts and compacted preferably between 0 to +3% optimum moisture content to 95%

standard Proctor maximum dry density (ASTM Test Designation D698) for the soil-additive mixture. All other compaction procedures for the soil apply.

(m) The Contractor shall protect the cohesive soil cap from desiccation, flooding and freezing. Protection, if required, may consist of a thin plastic protective cover, (or other material as approved by the engineer) installed over the completed cohesive soil cap until such time as the placement of flexible membrane liner begins. Areas found to have any desiccation cracks or which exhibit swelling, heaving or other similar conditions shall be replaced or reworked and retested by the contractor to remove these defects.

(n) The thickness and grade of the soil cap will be verified by the surveyor. The soil cap will be surveyed at 100 foot grid points and any grade change (top of slopes, bottom of slopes, breaks in slopes, etc.) where the elevations of the top of landfill will be checked with the top of soil cap to verify 1.5 feet (measured perpendicular to slope) of soil cap. The grade will then be verified with the surveyed information. The survey will be performed by North Carolina Professional Land Surveyor.

3.4 Closure Erosive Layer

The soil for the 18-inch thick erosive layer shall consist of any soils suitable of supporting vegetative growth.

(a) Native vegetation will be used, as recommended in the NC Erosion and Sediment Control Planning and Design Manual.

(b) The thickness and grade of the erosive layer will be verified by the surveyor. The erosive soil layer will be surveyed at 100 foot grid points and any grade change (top of slopes, bottom of slopes, breaks in slopes, etc.) where the elevations of the top of landfill will be checked with the top of soil cap to verify 1.5 feet (measured perpendicular to slope) of erosive soil layer. The grade will then be verified with the surveyed information. The survey will be performed by North Carolina Professional Land Surveyor.

3.5 Closure Gas Venting System

The existing gas collection system and any future expansions of the system, shall remain in service until collection of gas is no longer functional. The wells will then be converted to methane vents and the gas collection laterals shall remain in place and be capped.

The well heads shall be removed and replaced with a methane vent turndown and the opening shall be covered with a stainless steel screen.

3.6 Closure Construction Quality Assurance (CQA)

At the completion of the closure, it is the Engineer's responsibility to provide to the Owner and eventually to the Division of Waste Management the following:

1. All parties involved in the landfill construction including name and contact information and responsibilities'.
2. As-built drawings of the existing surface, the top of cohesive soil liner, and the top of the vegetative /protective cover, gas vents, etc. provided by NC Professional Land Surveyor.
3. Documentation of all cohesive soil liner standard Proctor tests.
4. Documentation of all cohesive soil liner tests including test pads, permeability, standard Proctor and Atterberg limits.
5. Completed and signed meeting minutes including pre-construction, progress and any trouble shooting.
6. Summary of all construction activities from the Engineer.
7. Provide color photographs of major construction features.
8. Any other pertinent documentation.

The CQA report shall be sealed by the Engineer and a certification that construction was completed in accordance with the CQA plan, Conditions of the permit to construct, the requirements of rule .540 Construction Requirements for C&DLF Facilities, and acceptable engineering practices.

Shop Drawings

Contractor is required to submit to the Engineer a descriptive detail and any shop and setting drawings.

3.7 Closure Costs

The largest area to be closed within the permitted life will be 40 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 $1x10^{-5}$ cm/sec. cohesive soil cap;
2. Erosion Control Devices;
3. 18" Erosive layer;
4. Seeding and Mulching;
5. Mobilization/Demobilization;
6. Labor Costs; and
7. Engineering Costs and QA/QC of the Composite liner and certification of closure.

Estimate of Probable Costs:

1. 18" of $1x10^{-5}$ cm/sec. cohesive soil cap for 40 acres:
   (including surface preparation)
   40 x 43,560 = 1,742,400 x 1.5 = 2,613,600 / 27 = 96,800 cy
   Total yardage + 15% = 111,320 yd^3 @ a cost of \$9.00/yd^3
   ∴ Cost = $1,001,800

2. Erosion Control devices

   Estimated costs @ $75,000
   ∴ Cost = $75,000

3. 18" erosive soil layer for 40 acres.
   40 x 43,560 = 1,742,400 x 1.5 = 2,613,600 / 27 = 96,800cy
   Total yardage + 15% = 111,320 yd^3 @ a cost of \$4.38/yd^3
   ∴ Cost = $487,582

4. Seeding and Mulching for 40 acres.

   Estimated cost of $2,000/acre
   ∴ Cost = $80,000

5. Mobilization/Demobilization.
   (including Machine/Equipment costs and fuel costs)

   Estimated cost of $200,000

6. Labor Costs.

   Estimated cost of $310,000
   ∴ Cost = $310,000

7. Vent pipes for methane gas collection.

   Estimated cost @ $600.00 each (25 vents).
   ∴ Cost = $15,000

8. Engineering Costs and QA/QC of the Composite liner and certification of closure. (including CQA field monitoring and lab testing, CQA reporting and certification, construction administration, construction documentation and bidding, Survey as-builts and recordation fees)

Estimated cost = $200,000
∴ Cost = $200,000

Total of Estimated Closure Costs:

	1.	$ 1,001,800
	2.	$ 75,000
	3.	$ 487,582
	4.	$ 80,000
	5.	$ 200,000
	6.	$ 310,000
	7.	$ 15,000
	8.	$ 200,000
Total:		$ 2,369,382

SECTION 4.0

POST-CLOSURE PLAN

4.1 Introduction

CONTACTS:

Name:	Tim Rogers
Title:	Solid Waste Director
Phone No.:	(919) 689-2994
Address:	460 B. S. Landfill Rd. Dudley, NC 28333

DESCRIPTION OF USE:

The County has no future use planned for their landfill at this time. However, any future use of the landfill shall not disturb the integrity of the cap system, base line system or any other components of the containment system or the functioning of the monitoring systems.

DESCRIPTION OF MAINTENANCE ACTIVITIES:

The County Landfill will be monitored quarterly for evidence of settlement, subsidence and ponding in the cap system. The entire site will be monitored quarterly for evidence and effects of erosion. The erosion control plan will be preserved. The quarterly inspection will also include observation and necessary repair of the security fence, entrance sign, access roads to the methane and groundwater monitoring points, the actual ground water monitoring wells and methane probes, accumulated silt in the sediment basins, and edge of waste markers. Annually in the Spring, the vegetative cover will be monitored to assure a good stand of vegetation, and where needed, it will be reseeded. Semi-annually the cap vegetation will be mowed and any saplings removed. These maintenance activities will take place over the entire post closure period of thirty years.

Any repairs to the cap system will be done according to the approved closure plan and documented according to the approved quality assurance plan. Damages that require repairs shall be reported to the NC Solid Waste Section within 3 days of inspection/observation.

All quarterly inspections/observations will be documented and become part of the landfill's operating record. All repairs/maintenance will be documented and also become part of the landfill's operating record.

DESCRIPTION OF MONITORING ACTIVITIES:

The County will monitor and analyze ground and surface water semi-annually according to the approved monitoring plan for a period of thirty years. The County will also monitor methane gas at landfill structures and the boundary quarterly according to the approved methane monitoring plan for the thirty-year period. All reports and records required by the approved monitoring plans will become part of the landfill's operating record.

The County will inspect the exterior slopes of the landfill at least weekly to determine if there are any breakouts of leachate in the slopes. If any are discovered, they will be contained immediately to assure that they will not leave the site. The containment can consist but not be limited to an earthen berm, sand bags, erosion control logs and/or anything that will contain the leachate on the slope.

The repair of the breakout will require excavating into the cover soil on the slope down to the waste and into the waste to determine what is causing the leachate to come to the surface. Normally it is another layer of soil that has been used as cover and the leachate is flowing along that layer to the slope and surfacing on the slope. The lower layer of cover needs to be removed at the breakout so that the leachate that is flowing along this cover has a point where it will go vertically into the landfill instead of flowing along the soil boundary that was once either daily cover or an intermediate cover.

Once this soil layer has been breached, the excavation can be filed back with stone, clean waste or any material, other than soil, that will allow the leachate to flow vertically instead of horizontally. Once the excavation has been filled with this material, the surface can be cover with soil so that surface water does not intrude into the excavation. Vegetative cover will be reestablished over the excavated area.

COMPLETION OF POST-CLOSURE CARE

Following completion of the post-closure care period for each unit, the owner or operator will notify the Division of Waste Management that a certification, signed by a registered professional engineer, verifying that post-closure care has been completed in accordance with the post-closure plan, has been placed in the operating record.

4.2 Post Closure Costs

The largest closed area to be monitored within the post closure life will 40 acres.

Post Closure Costs:

Methane gas, ground water and surface water will be monitored for 30 years after closure. The cap will also have to be monitored for the 30 year period. All costs include reports, data analysis, and certifications.

1. Ground and Surface Water monitoring semi-annually for 30 years for appendix I constituents and statistical analysis.
   Estimated cost/sample = $840.00/sample
   Total annual samples = 2(11 wells + 3 surface) =28 samples/year
   Estimated cost = 30 years x 28 samples/year x $840.00/sample =

   ∴ Cost = $705,600

2. Methane Gas monitoring quarterly for 30 years.
   Estimate $600.00/quarter = $2,400.00/year
   Estimated cost = 30 year x $2,400.00 = $72,000.00

   ∴ Cost = $72,000

3. Cap Monitoring and repairing (including maintenance of all gates, fencing, access roads and signs, mowing and re-vegetation)

   Estimate $300,000 for the 30 years.

   ∴ Cost = $300,000

4. Closure of sedimentation and erosion control devices.
   Estimate $24,000.00 for closure

   ∴ Cost = $24,000

5. Maintenance of gas extraction system.
   Estimated cost/year = $3,000.00/year

   ∴ Cost = $90,000

6. Decommissioning of LGCCS System.
   Estimated cost/well head = $500.00
   25 well heads x 500.00 = $12,500

   ∴ Cost = $11,000

7. Administration/Record keeping
   Estimate $4,000.00/year for 30 years

   ∴ Cost = $120,000

Total of Estimated Post Closure Costs:

1.	$ 705,600
2.	$ 72,000
3.	$ 300,000
4.	$ 24,000
5.	$ 90,000
6.	$ 12,500
7.	$ 120,000
Total:	$1,324,100

4.3 Corrective Action Plan Costs

Semi-annual sampling costs are/were estimated in the post closure financial assurance. However, even though estimated costs to perform corrective action are relatively minor, to date, financial assurance for corrective action has not been submitted. MNA sampling will be incorporated into the existing semi-annual sampling schedule. The additional expense for MNA is seen in laboratory costs.

MNA Sampling + Laboratory Cost Estimates
Sampling equipment for MNA Parameters ($1,200/event) = $2,400
Estimated cost/sample = $750/sample
Total MNA samples = 6 (3 monitoring wells) samples/year
Estimated total annual MNA laboratory & sampling costs = $6,900
Estimated total 5-year MNA laboratory & sampling costs = $34,500
Estimated total 30-year MNA laboratory & sampling costs = $207,000

Continued operation of the GCCS is included in Closure/Post-Closure costs and is, therefore, not included in the estimated corrective action costs. The financial assurance test for closure/post-closure costs is included in the Permit Application for Continued Operation. A revised financial assurance mechanism including the proposed 30-year corrective action costs will be submitted to the Solid Waste Section under separate cover.

These costs are not included in the PACA Cost estimate in [Part1 (MSW) Section 4.3].

SECTION 5.0

FINANCIAL ASSURANCES

(TO BE SUBMITTED AT A LATER DATE)

APPENDIX A

AIRSPACE CALCULATIONS

REVISED FACILITY DRAWINGS

CURRENT AIR QUALITY PERMITS

	Air Space	MESCO's #'s			14-15 survey			Wayne-MS
	101,959				3	518,328	5.08	0.83% incr
	102,805				4	540,199	5.08	
	103,659				5	562,992	5.08	
	104,519				6	586,748	5.08	
5	105,386	**518,328**	**561,630**	**phase 4**	7	611,505	5.08	
	106,261				8	637,307	5.08	
	107,143				9	664,198	5.08	
	108,032				10	692,224	5.08	
	108,929				11	721,432	5.08	
5	109,833	**540,199**	**575,270**	**phase 5**	12	751,873	5.08	
	110,745				13	783,598	5.08	
	111,664				14	816,661	5.08	
	112,591					**7,887,065**	**61.00**	
	113,525							
5	114,468	**562,992**	**625,214**	**phase 6**				
	115,418							
	116,376					**MESCO's #'s**		
	117,341					**CY'S**	**YRS/REMAIN**	
	118,315				4	561,630	5.51	
5	119,297	**586,748**	**649,015**	**phase 7**	5	575,270	5.41	
	120,288				6	625,214	5.65	
	121,286				7	649,015	5.62	
	122,293				8	415,885	3.46	
	123,308				9	0	0.00	
5	124,331	**611,505**	**415,885**	**phase 8**	10	0	0.00	
	125,363				11	0	0.00	
	126,404				12	0	0.00	
	127,453				13	0	0.00	
	128,511				14	0	0.00	
5	129,577	**637,307**		**phase 9**	15	0	0.00	
	130,653					**2,827,014**	**25.65**	
	131,737							
	132,831							
	133,933							
5	135,045	**664,198**		**phase 10**				
	136,166							
	137,296							
	138,435							
	139,584							
5	140,743	**692,224**		**phase 11**				
	141,911							
	143,089							
	144,277							
	145,474							
5	146,681	**721,432**		**phase 12**				
	147,899							
	149,127							
	150,364							
	151,612							
5	152,871	**751,873**		**phase 13**				

	Air Space		MESCO's #'s				Wayne-CD
	55,488			3	289,340	5.21	0.83% incr
	56,653			4	321,024	5.21	
	57,843			5	356,177	5.21	
	59,058						
5	60,298	**289,340**	**284,019 Phase 3**				
	61,564						
	62,857						
	64,177						
	65,525				**966,540**	**15.64**	
5	66,901	**321,024**	**307,651 Phase 4**				
	68,306						
	69,740						
	71,205						
	72,700						
5	74,227	**356,177**	**323,518 Phase 5**				
	75,785						
	77,377				**MESCO's #'s**		
	79,002				**CY'S**	**YRS/REMAIN**	
	80,661			3	284,019	5.12	
5	82,355	**395,179**	**329,624 Phase 6**	4	307,651	5.00	
	84,084			5	323,518	4.74	
	85,850			6	329,624	4.73	
	87,653			7	299,067	4.20	
	89,493						
5	91,373	**438,453**	**299,067 Phase 7**				
					1,543,879	**23.78**	

WAYNE COUNTY MUNICIPAL SOLID WASTE LANDFILL FACILITY

REVISED FACILITY PLAN

Permit Number: 9606-MSWLF-1998 and 9601-CDLF-1997

Site Location: 460 B South Landfill Road
Dudley, NC 28333

Applicant: Wayne County

Applicant's Address: 224 E. Walnut St., 3rd Floor
Goldsboro, NC 27530

BOARD OF COMMISSIONERS

Joe Daughtery - Chairman
Bill Pate - Vice-Chairman
George Wayne Aycock
Edward Cromartie
John M. Bell
E. Ray Mayo
A. Joe Gurley. III

COUNTY MANAGER

George Wood

SOLID WASTE DIRECTOR

Tim Rogers

Engineer
Municipal Engineering Services Company, P.A.
Garner, NC - Boone, NC

NORTH CAROLINA PROFESSIONAL SEAL 21320 ENGINEER STEVEN R. GANDY

by 1/12/16
Professional Engineer
(Garner Office)

Municipal Engineering Services Company, P.A.
LICENSE NUMBER: C-0281
P.O. BOX 97 GARNER, N.C. 27529 (919) 772-5393
P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1767
LICENSE NUMBER: C-0281

SCALE:	1:1
DATE:	12/10/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	S. GANDY
PROJECT NUMBER	G15124
DRAWING NO. T1	SHEET NO. 1 OF 8

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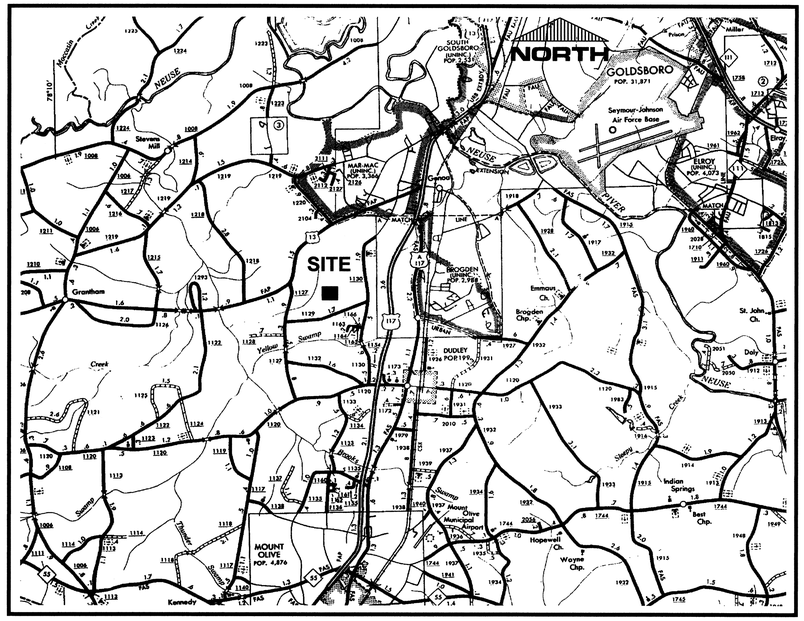
INDEX

SHEET NO.	DRAWING NO.	DESCRIPTION
1	T1	TITLE SHEET
2	T2	INDEX AND VICINITY MAP
3	F1	EXISTING CONDITIONS
4	F2	PHASE 4 (MSW) AND PHASE 3 (C&D) FILL PLANS
5	F3	PHASE 5 (MSW) AND PHASE 4 (C&D) FILL PLANS
6	F4	PHASE 6 (MSW) AND PHASE 5 (C&D) FILL PLANS
7	F5	PHASE 7 (MSW) AND PHASE 6 (C&D) FILL PLANS
8	F6	PHASE 8 (MSW) AND PHASE 7 (C&D) FILL PLANS



VICINITY MAP

Municipal Engineering Services Company, P.A.
P.O. BOX 97 GARNER, N.C. 27529 (919) 772-5393
P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1767
LICENSE NUMBER: C-0281

MUNICIPAL SOLID WASTE LANDFILL FACILITY
WAYNE COUNTY
NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

INDEX AND VICINITY MAP

SCALE:	1:1
DATE:	12/23/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	S. GANDY
PROJECT NUMBER	G15124
DRAWING NO. T2	SHEET NO. 2 OF 8

NORTH CAROLINA PROFESSIONAL SEAL 31520 ENGINEER STEVEN R. GANDY

4/12/16

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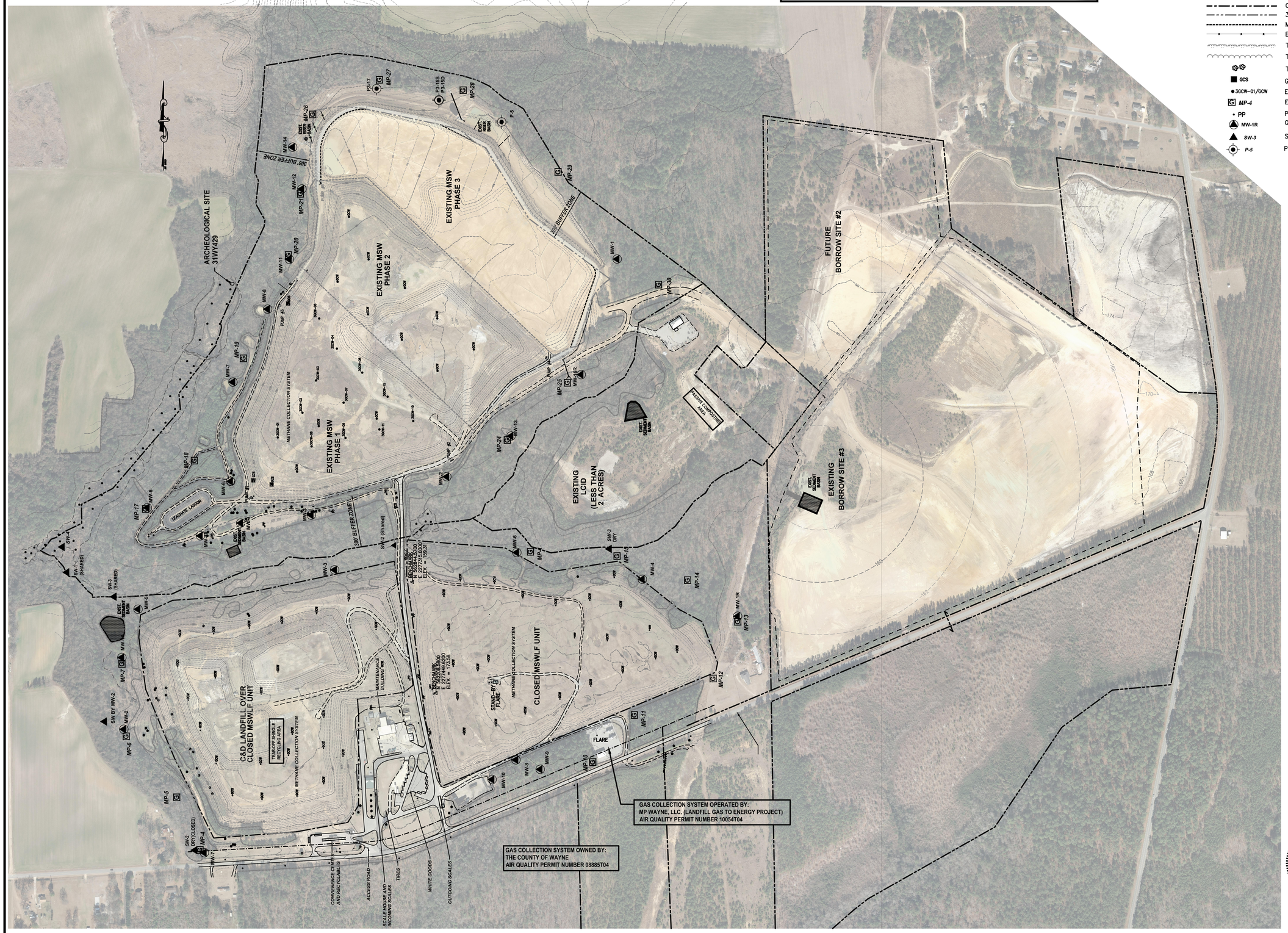
BACKGROUND PHOTOGRAPHS WERE OBTAINED FROM NC ONEMAP AND DATED FEBRUARY 2013.

TOPOGRAPHY IS FROM AERIAL PHOTOGRAPHY FLOWN AND A TOPOGRAPHIC MAP WAS PROVIDED BY DARREL S. MILLER, PLS ON 8/17/2007 AND SUPPLEMENTED WITH FIELD SURVEYS BY MUNICIPAL ENGINEERING SERVICES COMPANY, PA.



LEGEND

- EXISTING CONTOURS
- PROPERTY LINE
- EXISITNG UNPAVED ROAD
- EXISTING CREEK, STREAM, ETC.
- EXISTING DIVERSION DITCHES
- CLOSED MSWLF SANITARY UNIT
- 300' BUFFER ZONE
- MSWLF PHASE LIMITS
- EXISTING CHAINLINK FENCE
- TREE LINE (AERIAL MAPPING)
- TREE LINE (SURVEYED)
- TREES/SHRUBS
- GCS — GAS COLLECTION SUMP
- 3GCW-01/GCW — EXISTING GAS COLLECTION WELL
- MP-4 — EXISTING METHANE PROBES
- PP — POWER POLE
- MW-1R — GROUNDWATER MONITORING WELL
- SW-3 — SURFACEWATER MONITORING POINT
- P-5 — PIEZOMETER

Municipal Engineering Services Company, P.A.
P.O. BOX 97, GARNER, N.C. 27529 (919) 772-5393
P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1767
LICENSE NUMBER: C-0281

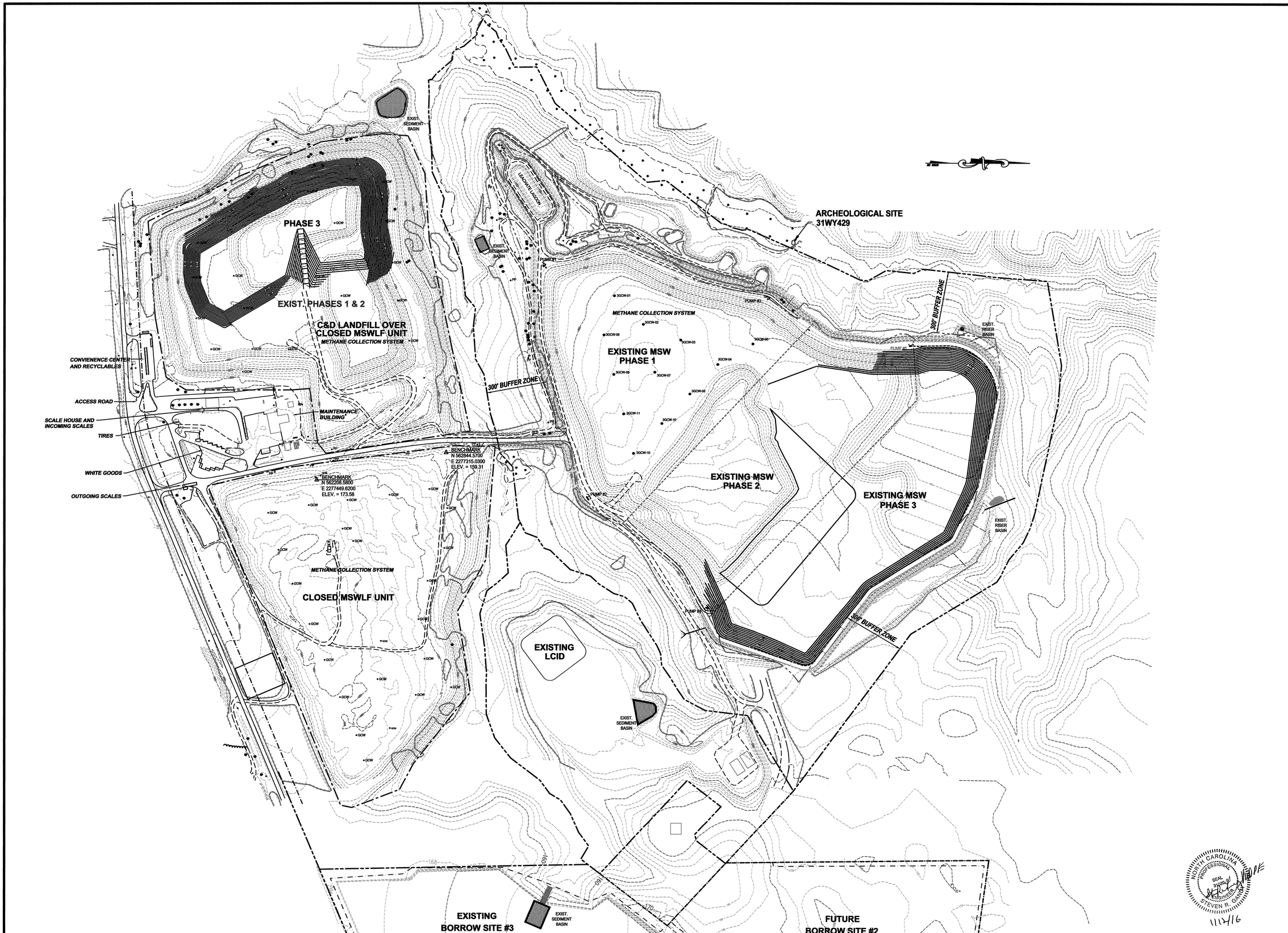
MUNICIPAL SOLID WASTE LANDFILL FACILITY
WAYNE COUNTY NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION
3/25/2016	LHC	1	CHANGED SCALE, ADDED BACKGROUNDS & SWS PER SWS LETTER DATED 3/16/16

REVISED FACILITY PLAN– MSW AND C&D EXISTING CONDITIONS

NORTH CAROLINA PROFESSIONAL SEAL ENGINEER STEVEN R. GANDY
4/14/16

SCALE:	1" = 250'
DATE:	12/10/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	S. GANDY
PROJECT NUMBER	G15124
DRAWING NO.	F1
SHEET NO.	3 OF 8



NORTH CAROLINA PROFESSIONAL SEAL 31920 ENGINEER STEVEN R. GANDY

11/17/16

Municipal Services Engineering Company, P.A.

P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1767

P.O. BOX 97 GARNER, N.C. 27529 (919) 772-5393

LICENSE NUMBER: C-0281

MUNICIPAL SOLID WASTE LANDFILL FACILITY
WAYNE COUNTY NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

REVISED FACILITY PLAN– MSW AND C&D FILL PLAN–PHASE 4 (MSW), AND PHASE 3 (C&D)

SCALE:	1" = 300'
DATE:	12/10/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	S. GANDY
PROJECT NUMBER	G15124
DRAWING NO.	F2
SHEET NO.	4 OF 8

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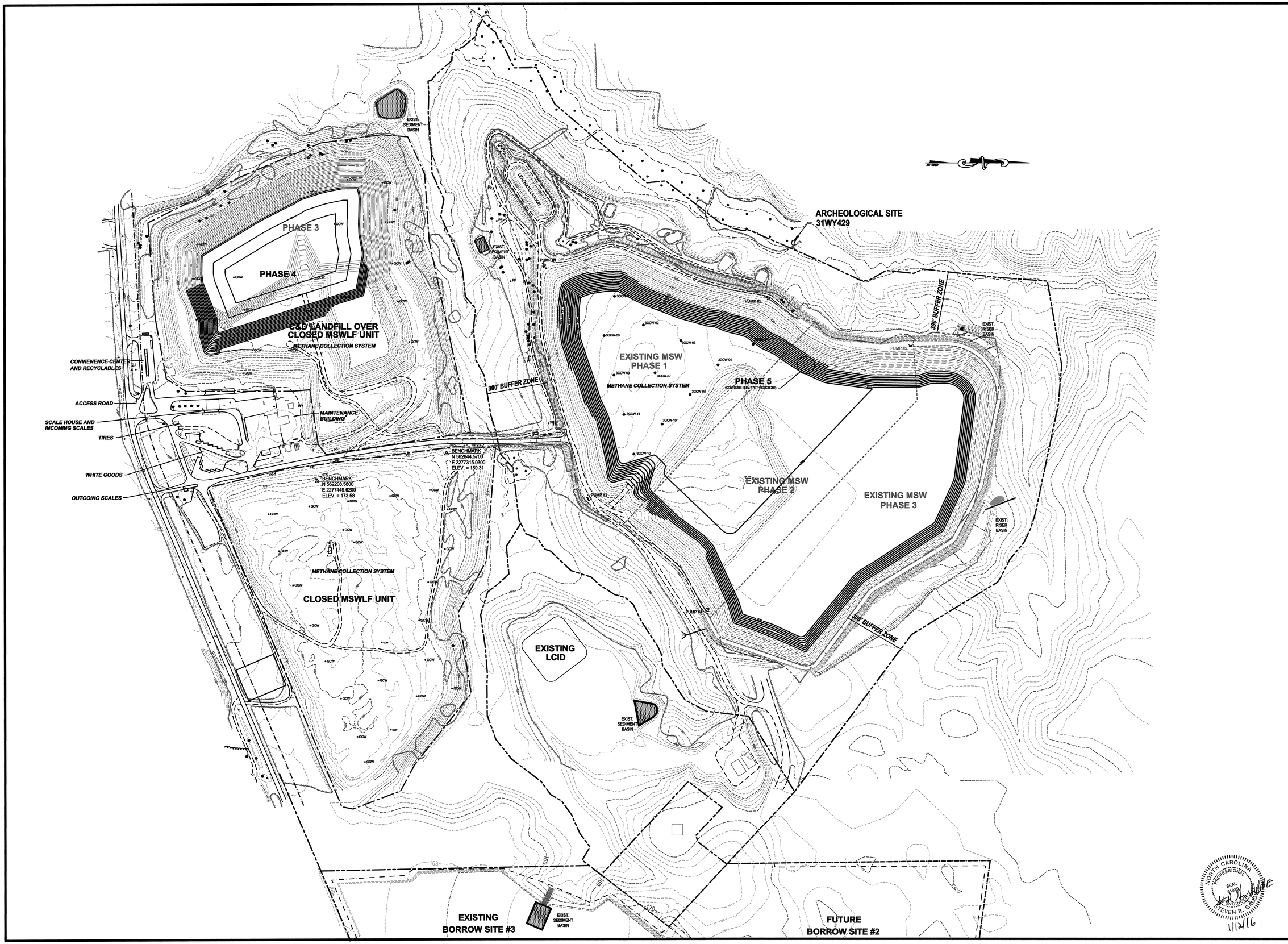

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WAYNE COUNTY NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

REVISED FACILITY PLAN– MSW AND C&D FILL PLAN–PHASE 5 (MSW), AND PHASE 4 (C&D)

SCALE:	1" = 300'
DATE:	12/10/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	S. GANDY
PROJECT NUMBER	G15124
DRAWING NO.	F3
SHEET NO.	5 OF 8

NORTH CAROLINA PROFESSIONAL SEAL 31989 ENGINEER STEVEN R. GANDY
11/21/16

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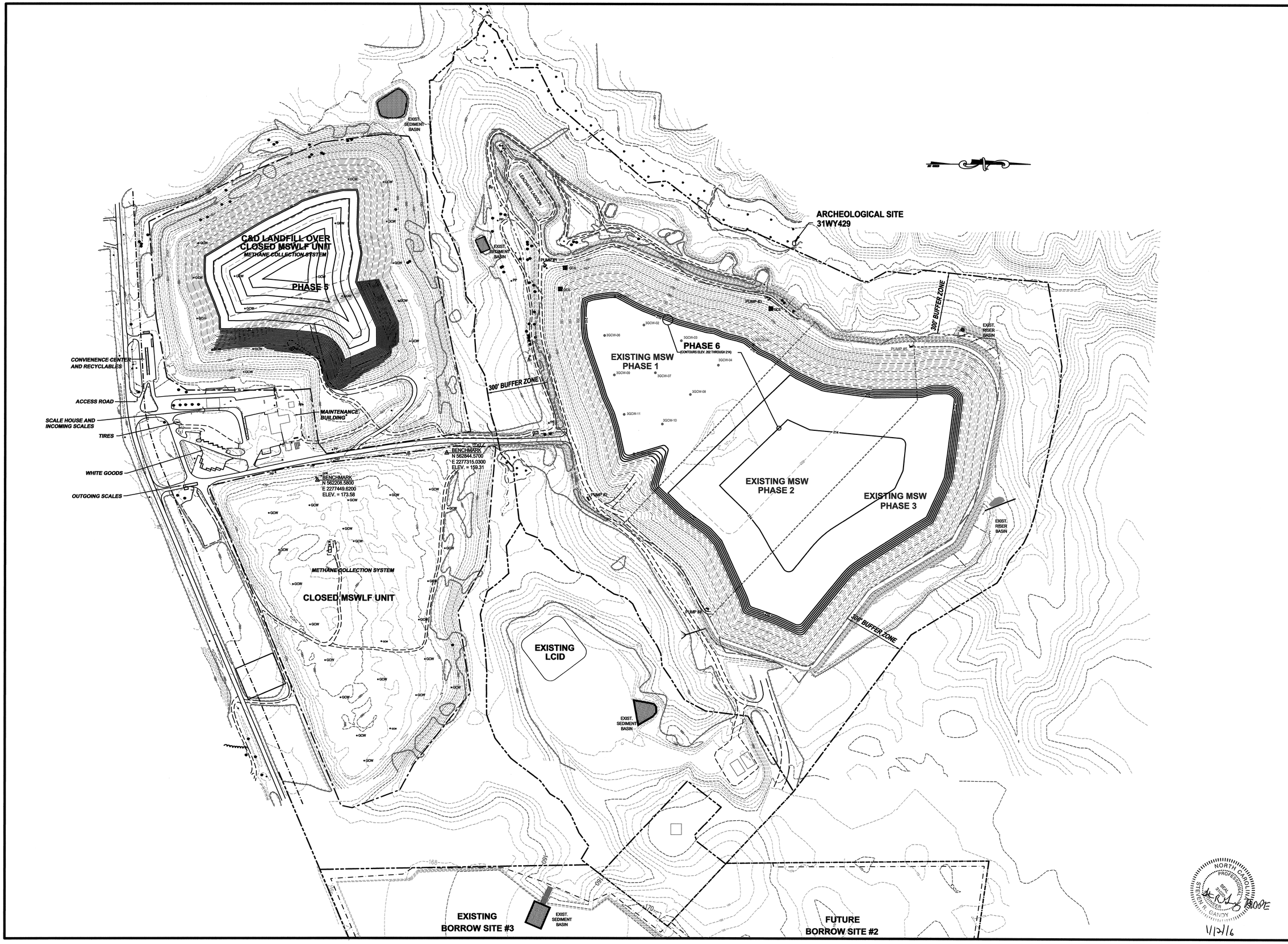

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WAYNE COUNTY NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

REVISED FACILITY PLAN– MSW AND C&D FILL PLAN–PHASE 6 (MSW), AND PHASE 5 (C&D)

NORTH CAROLINA PROFESSIONAL SEAL 019 ENGINEER STEVEN R. GANDY

1/12/16

SCALE:	1" = 200'
DATE:	12/10/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	S. GANDY
PROJECT NUMBER	G15124
DRAWING NO. F4	SHEET NO. 6 OF 8

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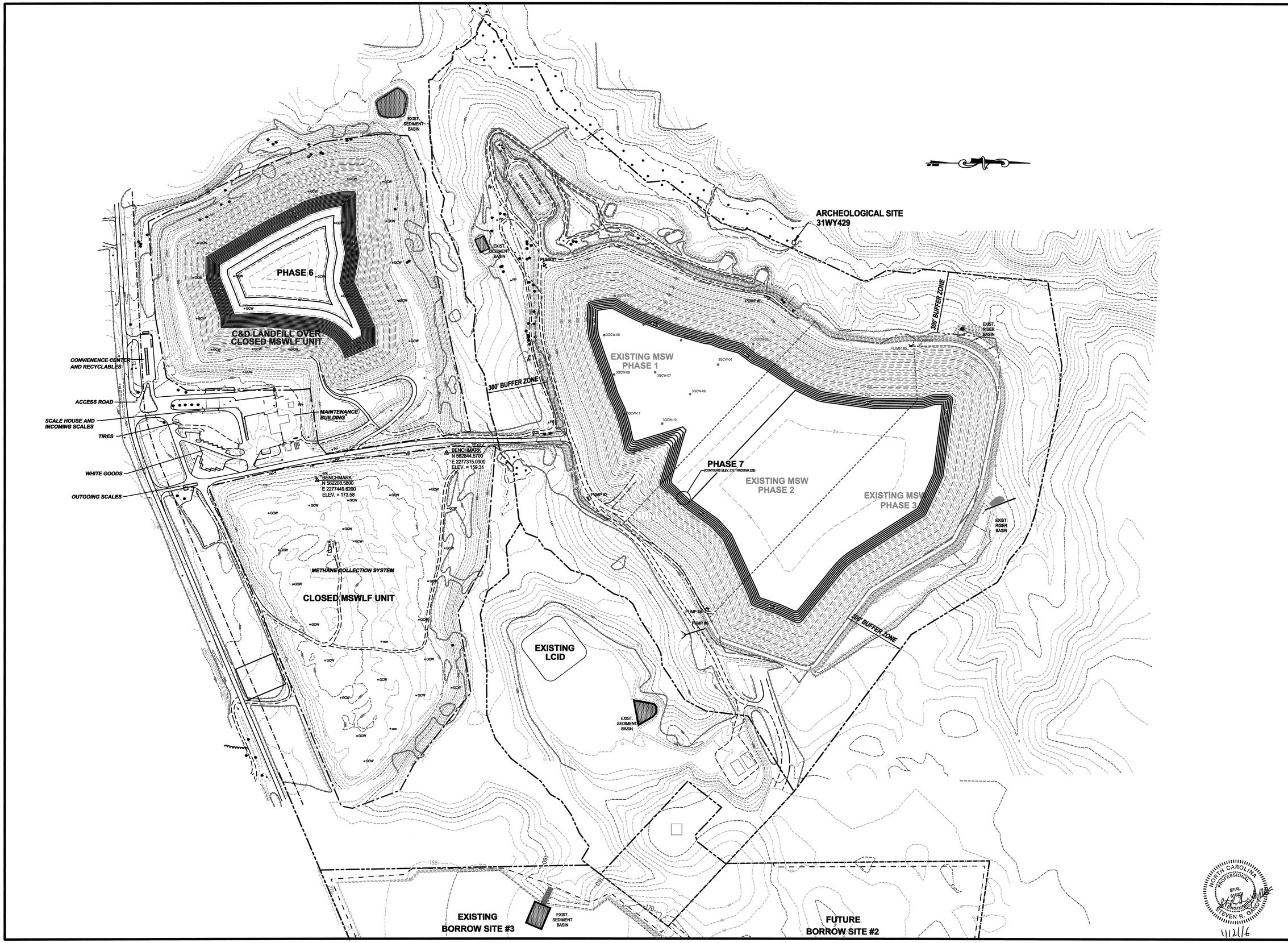

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LICENSE NUMBER: C-0281

MUNICIPAL SOLID WASTE LANDFILL FACILITY
WAYNE COUNTY NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

REVISED FACILITY PLAN– MSW AND C&D FILL PLAN–PHASE 7 (MSW), AND PHASE 6 (C&D)

SCALE:	1" = 200'
DATE:	12/10/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	S. GANDY
PROJECT NUMBER	G15124
DRAWING NO.	F5
SHEET NO.	7 OF 8

NORTH CAROLINA PROFESSIONAL SEAL 019001 ENGINEER STEVEN R. GANDY

1/12/16

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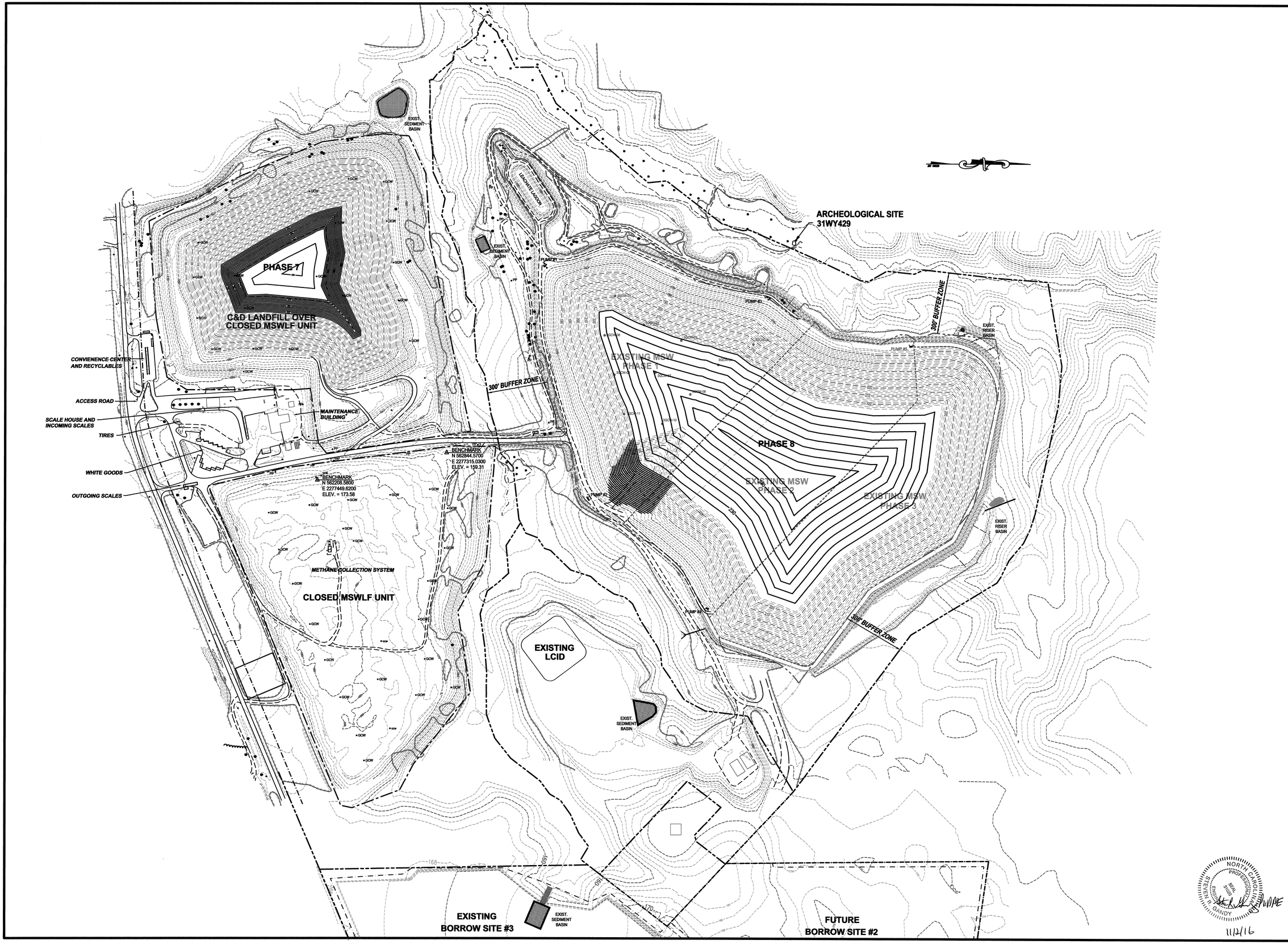

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LICENSE NUMBER: C-0281

MUNICIPAL SOLID WASTE LANDFILL FACILITY
WAYNE COUNTY NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

REVISED FACILITY PLAN– MSW AND C&D FILL PLAN–PHASE 8 (MSW) AND PHASE 7 (C&D)

SCALE:	1" = 300'
DATE:	12/10/2015
DRWN. BY:	L. CRAWFORD
CHKD. BY:	S. GANDY
PROJECT NUMBER	G15124
DRAWING NO.	F6
SHEET NO.	8 OF 8

NORTH CAROLINA PROFESSIONAL SEAL 31608 ENGINEER STEVEN R. GANDY

11/2/16

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NCDENR
North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

June 16, 2015

Mr. George A. Wood
County Manager
P.O. Box 227
Goldsboro, NC 27533

SUBJECT: Air Quality Permit No. 08885T04
Facility ID: 9600250
Wayne County Municipal Solid Waste Landfill
Dudley, North Carolina
Wayne County
Fee Class: Title V

Dear Mr. Wood;

In accordance with your completed Air Quality Permit Application for a renewal of a Title V permit received July 21, 2014, we are forwarding herewith Air Quality Permit No. 08885T04 to Wayne County Municipal Solid Waste Landfill, located at 460B South Landfill Road, Dudley, North Carolina authorizing the construction and operation, of the emission source(s) and associated air pollution control device(s) specified herein. Additionally, any emissions activities determined from your Air Quality Permit Application as being insignificant per 15A North Carolina Administrative Code 2Q .0503(8) have been listed for informational purposes as an "ATTACHMENT." Please note the requirements for the annual compliance certification are contained in General Condition P in Section 3. The current owner is responsible for submitting a compliance certification for the entire year regardless of who owned the facility during the year.

As the designated responsible official it is your responsibility to review, understand, and abide by all of the terms and conditions of the attached permit. It is also your responsibility to ensure that any person who operates any emission source and associated air pollution control device subject to any term or condition of the attached permit reviews, understands, and abides by the condition(s) of the attached permit that are applicable to that particular emission source.

If any parts, requirements, or limitations contained in this Air Quality Permit are unacceptable to you, you have the right to request a formal adjudicatory hearing within 30 days following receipt of this permit, identifying the specific issues to be contested. This hearing request must be in the form of a written petition, conforming to NCGS (North Carolina General Statutes) 150B-23, and filed with the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, North Carolina 27699-6714 and the Division of Air Quality, Permitting Section, 1641 Mail Service Center, Raleigh, North Carolina 27699-1641. The form for requesting a formal adjudicatory hearing may be obtained upon request from the Office of Administrative Hearings. Please note that this permit will be stayed in its entirety upon receipt

of the request for a hearing. Unless a request for a hearing is made pursuant to NCGS 150B-23, this Air Quality Permit shall be final and binding 30 days after issuance.

You may request modification of your Air Quality Permit through informal means pursuant to NCGS 150B-22. This request must be submitted in writing to the Director and must identify the specific provisions or issues for which the modification is sought. Please note that this Air Quality Permit will become final and binding regardless of a request for informal modification unless a request for a hearing is also made under NCGS 150B-23.

The construction of new air pollution emission source(s) and associated air pollution control device(s), or modifications to the emission source(s) and air pollution control device(s) described in this permit must be covered under an Air Quality Permit issued by the Division of Air Quality prior to construction unless the Permittee has fulfilled the requirements of GS 143-215.108A(b) and received written approval from the Director of the Division of Air Quality to commence construction. Failure to receive an Air Quality Permit or written approval prior to commencing construction is a violation of GS 143-215.108A and may subject the Permittee to civil or criminal penalties as described in GS 143-215.114A and 143-215.114B.

This Air Quality Permit shall be effective from June 16, 2015 until May 31, 2020, is nontransferable to future owners and operators, and shall be subject to the conditions and limitations as specified therein.

Should you have any questions concerning this matter, please contact Ms. Yuki Puram at (919) 707-8470.

Sincerely yours,

William D. Willets, P.E., Chief, Permitting Section
Division of Air Quality, NCDENR

Enclosure

c: Heather Ceron, EPA Region 4 (with review)
Wilmington Regional Office
Central Files

Wayne County Municipal Solid Waste Landfill
Air Quality Permit No. 08885T04

ATTACHMENT 1: Insignificant Activities Pursuant to 15A NCAC 2Q .0503(8)

Source ID No.	Emission Source Description
IES-1	Leachate storage (maximum capacity 5.7 million gallons)
IES-2 (GACT Subpart ZZZZ[3])	Emergency/Backup Propane Generator

1. Because an activity is exempted from being required to have a permit or permit modification does not mean that the activity is exempted from an applicable requirement or that the owner or operator of the source is exempted from demonstrating compliance with any applicable requirement.

2. When applicable, emissions from stationary source activities identified above shall be included in determining compliance with the permit requirements for toxic air pollutants under 15A NCAC 2D .1100 "Control of Toxic Air Pollutants" or 2Q .0711 "Emission Rates Requiring a Permit."

3. For additional information regarding the applicability of GACT see the DAQ page titled "The Regulatory Guide for Insignificant Activities/Permits Exempt Activities". The link to this site is as follows: http://daq.state.nc.us/permits/insig/.

Wayne County MSW Landfill
Air Quality Permit No. 08885T04

ATTACHMENT 2: Summary of Changes to the Permit

The following table describes the modifications to the current permit as part of the renewal process.

Pages	Section	Description of Changes
Cover and throughout	-	Updated all dates and permit revision numbers.
Attachment 1	Table	Added Emergency/Backup Propane Generator (ID No. IES-2) to the Insignificant Activities list.
3	1 – Table	Added the page number section to the equipment list table.
3	2.1.A – Table	Reorganized the table in order of the regulation number.
3	2.1.A – Table	Modified the NMOC emissions standards to be consistent with the regulation.
3	2.1.A – Table	Removed the toxic air pollutants standard.
3-4	2.1.A.1 and 2	Inserted 15A NCAC 2D .0516 and 2D .0521 before 2D .0524 to list them in order of the rule numbers.
4-10	2.1.A.3.	Rearranged to bring the "Standards for Air Emissions from Municipal Solid Waste Landfills" section before the "Test Methods and Procedures" section.
4	2.1.A.3.b	Deleted conditions for the 2.5 million megagrams standard since the landfill is already above the capacity.
6	2.1.A.3.g.i	Inserted the equation required to use to calculate the gas flow rate.
8	2.1.A.3.l.	Inserted a testing condition.
9	2.1.A.3.h (existing permit)	Removed the specification of active collection systems since the facility already installed the collection system as specified.
10	2.1.A.3.i. (existing permit)	Removed the condition of well closure since it is incorporated in the reporting requirement.
10	2.1.A.3.j.(B) (existing permit)	Removed the condition of the initial annual report. The facility already submitted an initial annual report.
9-10	2.1.A.3.w	Inserted a closure report condition.
10	2.1.A.3.x	Inserted an equipment removal reporting requirement.
10	2.1.A.3.a	Change the language to include Subpart A, "General Provisions."
10-11	2.1.A.4.a through e (existing permit)	Removed the following conditions: • Applicability • Definitions and Nomenclature • Regulated Pollutants • Applicability to General Provisions • Compliance Dates
10	2.1.A.3.c	Inserted the SSM provision, §63.6(e).
11	2.1.A.3.f	Added §63.6(e)(iii), the SSM plan requirements.

State of North Carolina,
Department of Environment,
and Natural Resources

Division of Air Quality

AIR QUALITY PERMIT

Permit No.	Replaces Permit No.(s)	Effective Date	Expiration Date
08885T04	08885T03	June 16, 2015	May 31, 2020

Until such time as this permit expires or is modified or revoked, the below named Permittee is permitted to construct and operate the emission source(s) and associated air pollution control device(s) specified herein, in accordance with the terms, conditions, and limitations within this permit. This permit is issued under the provisions of Article 21B of Chapter 143, General Statutes of North Carolina as amended, and Title 15A North Carolina Administrative Codes (15A NCAC), Subchapters 2D and 2Q, and other applicable Laws.

Pursuant to Title 15A NCAC, Subchapter 2Q, the Permittee shall not construct, operate, or modify any emission source(s) or air pollution control device(s) without having first submitted a complete Air Quality Permit Application to the permitting authority and received an Air Quality Permit, except as provided in this permit.

Permittee:	**Wayne County Municipal Solid Waste Landfill**
Facility ID:	**9600250**
Facility Site Location:	**460B South Landfill Road**
City, County, State, Zip:	**Dudley, Wayne County, North Carolina, 28633**
Mailing Address:	**460B South Landfill Road**
City, County, State, Zip:	**Dudley, Wayne County, North Carolina, 28633**
Application Number:	**9600250.14A**
Complete Application Date:	**July 25, 2014**
Primary SIC Code:	**4953**
Division of Air Quality:	**Washington Regional Office**
Regional Office Address:	**943 Washington Square Mall** **Washington, North Carolina 27899**

Permit issued this the 16th day of June, 2015.

William D. Willets, P.E., Chief, Permitting Section
By Authority of the Environmental Management Commission

Table of Contents

SECTION 1: PERMITTED EMISSION SOURCE(S) AND ASSOCIATED AIR POLLUTION CONTROL DEVICE(S) AND APPURTENANCES

SECTION 2: SPECIFIC LIMITATIONS AND CONDITIONS

2.1 – Emission Source(s) Specific Limitations and Conditions
(Including specific requirements, testing, monitoring, recordkeeping, and reporting requirements)

SECTION 3: GENERAL PERMIT CONDITIONS

ATTACHMENT
List of Acronyms

SECTION 1 - PERMITTED EMISSION SOURCES AND ASSOCIATED AIR POLLUTION CONTROL DEVICE S AND APPURTENANCES

The following table contains a summary of all permitted emission sources and associated air pollution control devices and appurtenances:

Page No.	Emissions Source ID No.	Emission Source Description	Control Device	Control Device Description
3	ES-01 ES-02 ES-03 **NSPS Subpart WWW, MACT Subpart AAAA**	Municipal Solid Waste Landfill (ES-01 and ES-02 are closed units. ES-03 is active)	CD-GCCS1 CD-Treatment CD-F1	Landfill gas collection and control system One landfill gas treatment system One landfill gas-fired candlestick-type flare (30 million Btu per hour heat input capacity)

SECTION 2 - SPECIFIC LIMITATIONS AND CONDITIONS

2.1- Emission Sources and Control Devices Specific Limitations and Conditions

The emission source and associated air pollution control device and appurtenances listed below are subject to the following specific terms, conditions, and limitations, including the testing, monitoring, recordkeeping, and reporting requirements as specified herein:

A. Municipal solid waste landfill (ID Nos. ES-01, ES-02 and ES-03) with associated landfill gas collection system (ID No. CD-GCCS1), one landfill gas treatment system (ID No. CD-Treatment) and one landfill gas-fired candlestick-type flare (ID No. CD-F1)

The following table provides a summary of limits and standards for the emission sources described above:

Regulated Pollutant	Limits/Standards	Applicable Regulation
Sulfur dioxide	2.3 pounds per million Btu heat input	15A NCAC 2D .0516
Visible emissions	20 percent opacity	15A NCAC 2D .0521
Nonmethane organic compounds (NMOC)	Route all the collected gas to a control system that complies with the following requirement: • An open flare designed and operated in accordance with §60.18 except as noted in §60.754(e); • A control system designed and operated to reduce NMOC by 98 weight-percent or when an enclosed combustion device is used for control, to either reduce NMOC by 98 weight percent or reduce the outlet NMOC concentration to less than 20 parts per million by volume, dry basis as hexane at 3 percent oxygen; or • Route the collected gas to a treatment system that processes the collected gas for subsequent sale or use.	15A NCAC 2D .0524 40 CFR Part 60, Subpart WWW
Hazardous air pollutants	Comply with the requirements of 40 CFR part 60, subpart WWW.	15A NCAC 2D .1111 40 CFR Part 63, Subpart AAAA
Odorous emissions	Apply suitable odor control measures **[State-enforceable only]**	15A NCAC 2D .1806

1. 15A NCAC 2D .0516: SULFUR DIOXIDE EMISSIONS FROM COMBUSTION SOURCES

a. Emissions of sulfur dioxide from flare (CD-F1) shall not exceed 2.3 pounds per million Btu heat input. Sulfur dioxide formed by the combustion of sulfur in fuels, wastes, ores, and other substances shall be included when

determining compliance with this standard. [15A NCAC 2D .0516]

Testing [15A NCAC 2Q .0508(f)]

b. If emissions testing is required, the testing shall be performed in accordance with General Condition JJ found in Section 3. If the results of this test are above the limit given in Section 2.1 A.1.a. above, the Permittee shall be deemed in noncompliance with 15A NCAC 2D .0516.

Monitoring/Recordkeeping [15A NCAC 2Q .0508(f) and 15A NCAC 2D .2601]

c. No monitoring/recordkeeping is required for sulfur dioxide emissions from the firing of landfill gas in the flare (CD-F1).

2. 15A NCAC 2D .0521: CONTROL OF VISIBLE EMISSIONS

a. Visible emissions from the flare (CD-F1) shall not be more than **20 percent opacity** when averaged over a six-minute period. However, six-minute averaging periods may exceed 20 percent not more than once in any hour and not more than four times in any 24-hour period. In no event shall the six-minute average exceed 87 percent opacity. [15A NCAC 2D .0521 (d)]

Testing [15A NCAC 2D .0501(c)(8)]

b. If emissions testing is required, the testing shall be performed in accordance with 15A NCAC 2D .0501(c)(8) and General Condition JJ located in Section 3. If the results of this test are above the limit given in Section 2.1 A.2. a. above, the Permittee shall be deemed in noncompliance with 15A NCAC 2D .0521.

Monitoring/Recordkeeping/Reporting [15A NCAC 2Q .0508(f)]

c. No monitoring, recordkeeping, or reporting is required for visible emissions from the firing of landfill gas in the flare (CD-F1).

3. 15A NCAC 2D .0524, 40 CFR Part 60, Subpart WWW "New Source Performance Standards"

a. The Permittee shall comply with all applicable provisions, including the notification, testing, recordkeeping, and monitoring requirements contained in Environmental Management Commission Standard 15A NCAC 2D .0524 "New Source Performance Standards (NSPS) as promulgated in 40 CFR Part 60 Subpart WWW, including Subpart A "General Provisions."[15A NCAC 2D .0524]

Standards for Air Emissions from Municipal Solid Waste Landfills [40 CFR 60.752]

b. The facility's collection and control system that captures the gas generated within the landfill shall meet the following requirements:
   i. Be designed to handle the maximum expected gas flow rate from the entire area of the landfill that warrants control over the intended use period of the gas control or treatment system equipment;
   ii. Collect gas from each area, cell, or group of cells in the landfill in which the initial solid waste has been placed for a period of:
      (A) 5 years or more if active; or
      (B) 2 years or more if closed or at final grade.
   iii. Collect gas at a sufficient extraction rate;
   iv. Be designed to minimize off-site migration of subsurface gas.

c. The Permitee shall collect gas from the landfill (ID Nos. ES-01, ES-02 and ES-03) to a control system (ID No. CD-GCCS1) that routes all the collected gas to one of the following:
   i. One landfill gas-fired candlestick-type flare (ID No. CD-F1). The flare must be designed and operated in accordance with §60.18 except as noted in §60.754(e).
   ii. A control system designed and operated to reduce NMOC by 98 weight-percent. The control device (CD-F1) shall be operated within the parameter ranges established during the initial or most recent performance test. The operating parameters to be monitored are specified in §60.754(d).
   iii. Route the collected gas to the treatment system (ID No. CD-Treatment) that processes the collected gas for subsequent sale or use. All emissions from any atmospheric vent from the gas treatment system shall be subject to the requirements of paragraph (i) and (ii) above.

d. Operate the collection and control device installed to comply with this subpart in accordance with the provisions of §§60.753, 60.755 and 60.756.

e. The collection and control system may be capped or removed provided that all the following conditions are met:
   i. Closed landfill means a landfill in which solid waste is no longer being placed, and in which no additional solid wastes will be placed without first filing a notification of modification as prescribed under §60.7(a)(4). Once a notification of modification has been filed, and additional solid waste is placed in the landfill, the landfill is no longer closed. A closure report shall be submitted to the DAQ as provided in A.3.w of this section;
   ii. The collection and control system shall have been in operation a minimum of 15 years; and
   iii. Following the procedures specified in §60.754(b) of this subpart, the calculated NMOC gas produced by the landfill shall be less than 50 megagrams per year on three successive test dates. The test dates shall be no less than 90 days apart, and no more than 180 days apart.

Operational Standards for Collection and Control Systems [40 CFR 60.753]

f. The Permittee shall operate the collection and control system (ID Nos. CD-GCCS1, CD-Treatment and CD-F1) in accordance with the following standards:
   i. Operate the collection system such that gas is collected from each area, cell, or group of cells in the MSW landfill in which solid waste has been in place for 5 years or more if active, or 2 years or more if closed or at final grade.
   ii. Operate the collection system with negative pressure at each wellhead except under the following conditions:
      (A) A fire or increased well temperature. The Permittee shall record instances when positive pressure occurs in efforts to avoid a fire. These records shall be submitted with the annual reports as provided in A.3.u.i of this section;
      (B) Use of a geomembrane or synthetic cover. The Permittee shall develop acceptable pressure limits in the design plan;
      (C) A decommissioned well. A well may experience a static positive pressure after shut down to accommodate for declining flows. All design changes shall be approved by the DAQ.
   iii. Operate each interior wellhead in the collection system with a landfill gas temperature less than 55 °C and with either a nitrogen level less than 20 percent or an oxygen level less than 5 percent. The facility may establish a higher operating temperature, nitrogen, or oxygen value at a particular well. A higher operating value demonstration shall show supporting data that the elevated parameter does not cause fires or significantly inhibit anaerobic decomposition by killing methanogens.
      (A) The nitrogen level shall be determined using Method 3C, unless an alternative test method is established by DAQ under §60.752(b)(2)(i).
      (B) Unless an alternative test method is approved by DAQ under §60.752(b)(2)(i), the oxygen shall be determined by an oxygen meter using Method 3A or 3C except that:
         (a) The span shall be set so that the regulatory limit is between 20 and 50 percent of the span;
         (b) A data recorder is not required;
         (c) Only two calibration gases are required, a zero and span, and ambient air may be used as the span;
         (d) A calibration error check is not required; or
         (e) The allowable sample bias, zero drift, and calibration drift are ±10 percent.
   iv. Operate the collection system so that the methane concentration is less than 500 parts per million above background at the surface of the landfill. To determine if this level is exceeded, the facility shall conduct surface testing around the perimeter of the collection area and along a pattern that traverses the landfill at 30 meter intervals and where visual observations indicate elevated concentrations of landfill gas, such as distressed vegetation and cracks or seeps in the cover. The owner or operator may establish an alternative traversing pattern that ensures equivalent coverage. A surface monitoring design plan shall be developed that includes a topographical map with the monitoring route and the rationale for any site-specific deviations from the 30 meter intervals. Areas with steep slopes or other dangerous areas may be excluded from the surface testing.
   v. Operate the system such that all collected gases are vented to a control system designed and operated in compliance with A.3.c of this section. In the event the collection or control system is inoperable, the gas mover system shall be shut down and all valves in the collection and control system contributing to venting of the gas to the atmosphere shall be closed within 1 hour; and
   vi. Operate the control or treatment system at all times when the collected gas is routed to the system.
   vii. If monitoring demonstrates that the operational requirements in ii, iii or iv above are not met, corrective action shall be taken as specified in A.3.g.i through ii or A.3.c of this section. If corrective actions are

taken as specified in the compliance provisions specified in A.3.g through k, the monitored exceedance is not a violation of the operational requirements in this section.

Compliance Provisions [40 CFR 60.755]

g. Unless the facility's collection and control system design include any alternatives to the monitoring provisions approved by DAQ as provided in §60.752(b)(2)(i)(B), the following methods shall be used to determine whether the gas collection system is in compliance with A.3.b of this section.

i. For the purposes of calculating the maximum expected gas generation flow rate from the landfill to determine compliance with A.3.b.i of this section, the following equation shall be used. The k and L_o kinetic factors should be those published in the most recent Compilation of Air Pollutant Emission Factors (AP-42) or other site specific values demonstrated to be appropriate and approved by DAQ. If k has been determined by Tier 3 testing as specified in §60.754(a)(4), the value of k determined from the test shall be used. A value of no more than 15 years shall be used for the intended use period of the gas mover equipment. The active life of the landfill is the age of the landfill plus the estimated number of years until closure.

(A) For sites with known year-to year solid waste acceptance rate:

$$Q_m = \sum_{i=1}^{n} 2kL_o M_i (e^{-kt_i})$$

where, Q_M = maximum expected gas generation flow rate, cubic meters per year
k = methane generation rate constant, $year^{-1}$
L_o = methane generation potential, cubic meters per megagram solid waste
M_i = mass of solid waste in the ith section, megagrams
t_i = age of the ith section, years

(B) The Permittee may use actual flow data to project the maximum expected gas generation flow rate instead of, or in conjunction with the above equation. If the landfill is still accepting waste, the actual measured flow data will not equal the maximum expected gas generation rate, so calculations using the equation above or other methods shall be used to predict the maximum expected gas generation rate over the intended period of use of the gas control system equipment.

ii. For the purposes of determining sufficient density of gas collectors for compliance with A.3.b.ii of this section, the Permittee shall design a system of vertical wells, horizontal collectors, or other collection devices, satisfactory to DAQ, capable of controlling and extracting gas from all portions of the landfill sufficient to meet all operational and performance standards.

iii. For the purpose of demonstrating whether the gas collection system flow rate is sufficient to determine compliance with A.3.b.iii, the Permittee shall measure gauge pressure in the gas collection header at each individual well, monthly. If a positive pressure exists, action shall be initiated to correct the exceedance within 5 calendar days, except for the three conditions allowed under A.3.f.ii of this section. If negative pressure cannot be achieved without excess air infiltration within 15 calendar days of the first measurement, the gas collection system shall be expanded to correct the exceedance within 120 days of the initial measurement of positive pressure. Any attempted corrective measure shall not cause exceedances of other operational or performance standards. An alternative timeline for correcting the exceedance shall be submitted to the DAQ Regional Office for approval.

iv. For the purpose of identifying whether excess air infiltration into the landfill is occurring, the Permittee shall monitor each well monthly for temperature and nitrogen or oxygen as provided in A.3.f.iii of this section. If a well exceeds one of these operating parameters, action shall be initiated to correct the exceedance within 5 calendar days. If correction of the exceedance cannot be achieved within 15 calendar days of the first measurement, the gas collection system shall be expanded to correct the exceedance within 120 days of the initial exceedance. Any attempted corrective measure shall not cause exceedances of other operational or performance standards. An alternative timeline for correcting the exceedance shall be submitted to the DAQ Regional Office for approval.

v. The Permittee seeking to demonstrate compliance with A.3.b.iv of this section through the use of a collection system not conforming o to the specification provided in §60.759 shall provide information satisfactory to DAQ as specified in §60.752(b)(2)(i)(C) demonstrating that off-site migration is being controlled.

h. For purposes of compliance with A.3.f.i of this section, the Permittee shall place each well or design component as specified in the approved design plan as provided in §60.752(b)(2)(i). Each well shall be installed no later than 60 days after the date on which the initial solid waste has been in place for a period of:
   i. 5 years or more if active; or
   ii. 2 years or more if closed or at final grade.

i. The following procedures shall be used for compliance the surface methane operational standard as provided in A.3.f.iv of this section.
   i. The Permittee shall monitor surface concentrations of methane along the entire perimeter of the collection area and along a pattern that traverses the landfill at 30 meter intervals (or a site-specific established spacing) for each collection area on a quarterly basis using an organic vapor analyzer, flame ionization detector, or other portable monitor meeting the specifications provided in A.3.j. of this section.
   ii. The background concentration shall be determined by moving the probe inlet upwind and downwind outside the boundary of the landfill at a distance of at least 30 meters from the perimeter wells.
   iii. Surface emission monitoring shall be performed in accordance with section 4.3.1 of Method 21 of appendix A of this part, except that the probe inlet shall be placed within 5 to 10 centimeters of the ground. Monitoring shall be performed during typical meteorological conditions.
   iv. Any reading of 500 parts per million or more above background at any location shall be recorded as a monitored exceedance and the actions specified in the following paragraphs (A) through (E) shall be taken. As long as the specified actions are taken, the exceedance is not a violation of the operational requirements of A.3.j.
      (A) The location of each monitored exceedance shall be marked and the location recorded.
      (B) Cover maintenance or adjustments to the vacuum of the adjacent wells to increase the gas collection in the vicinity of each exceedance shall be made and the location shall be re-monitored within 10 calendar days of detecting the exceedance.
      (C) If the re-monitoring of the location shows a second exceedance, additional corrective action shall be taken and the location shall be monitored again within 10 days of the second exceedance. If the re-monitoring shows a third exceedance for the same location, the action specified in paragraph (E) below shall be taken, and no further monitoring of that location is required until the action specified in paragraph (E) below has been taken.
      (D) Any location that initially showed an exceedance but has a methane concentration less than 500 ppm methane above background at the 10-day re-monitoring specified in paragraph (B) or (C) above shall be re-monitored 1 month from the initial exceedance. If the 1-month remonitoring shows a concentration less than 500 parts per million above background, no further monitoring of that location is required until the next quarterly monitoring period. If the 1-month remonitoring shows an exceedance, the actions specified in paragraph (C) or (E) of this section shall be taken.
      (E) For any location where monitored methane concentration equals or exceeds 500 parts per million above background three times within a quarterly period, a new well or other collection device shall be installed within 120 calendar days of the initial exceedance. An alternative remedy to the exceedance, such as upgrading the blower, header pipes or control device, and a corresponding timeline for installation shall be submitted to the DAQ for approval.
   v. The Permittee shall implement a program to monitor for cover integrity and implement cover repairs as necessary on a monthly basis.

j. The Permittee shall comply with the following instrumentation specifications and procedures for surface emission monitoring devices:
   i. The portable analyzer shall meet the instrument specifications provided in section 3 of Method 21 of appendix A of this part, except that "methane" shall replace all references to VOC.
   ii. The calibration gas shall be methane, diluted to a nominal concentration of 500 parts per million in air.
   iii. To meet the performance evaluation requirements in section 3.1.3 of Method 21 of appendix A of this part, the instrument evaluation procedures of section 4.4 of Method 21 of appendix A of this part shall be used.
   iv. The calibration procedures provided in section 4.2 of Method 21 of appendix A of this part shall be followed immediately before commencing a surface monitoring survey.

k. The provisions of this subpart apply at all times, except during periods of start-up, shutdown, or malfunction, provided that the duration of start-up, shutdown, or malfunction shall not exceed 5 days for collection systems and shall not exceed 1 hour for treatment or control devices.

Test Methods and Procedures [40 CFR 60.754]

l. When testing is required, the testing shall be performed in accordance with §60.754 and General Condition JJ located in Section 3 of this permit.
   i. The Permittee shall calculate the NMOC emission rate for purpose of determining when the system can be removed as provided in Section 2.1.A.3.d of this permit, using the equation listed in §60.754(b).
   ii. When calculating emissions for PSD purposes, the Permittee shall estimate the NMOC emission rate for comparison to the PSD major source and significance levels in §§51.166 or 52.21 using AP-42 or other approved measurement procedures.

Monitoring [15A NCAC 2Q .0508(f), 40 CFR 60.755 and 60.756]
Unless the facility's collection and control system design include any alternatives to the monitoring provisions approved by DAQ as provided in §60.752(b)(2)(i)(B),

m. The Permittee shall monitor the following parameters at each wellhead:
   i. Measure the gauge pressure in the gas collection header on a monthly basis as provided in A.3.g.iii of this section;
   ii. Monitor nitrogen or oxygen concentration in the landfill gas on a monthly basis as provided in A.3.g.iv of this section;
   iii. Monitor temperature of the landfill gas on a monthly basis as provided in A.3.g.iv; and
   iv. Monitor surface concentrations of methane along the entire perimeter of the collection area (or site-specific established spacing) for each collection area on a quarterly basis.

n. The Permittee shall calibrate, maintain, and operate according to the manufacture's recommendations the following equipment when using an open flare:
   i. A heat sensing device, such as an ultraviolet beam sensor or thermocouple, at the pilot light or the flame itself to indicate the continuous presence of a flame.
   ii A device that records flow to or bypass of the flare. The owner or operator shall either:
      (A) Install, calibrate, and maintain a gas flow rate measuring device that shall record the flow to the control device at least every 15 minutes; or
      (B) Secure the bypass line valve in the closed position with a car-seal or a lock-and-key type configuration. A visual inspection of the seal or closure mechanism shall be performed at least once every month to ensure that the valve is maintained in the closed position and that the gas flow is not diverted through the bypass line.

o. The Permittee shall monitor surface concentrations of methane according to the instrument specifications and procedure provided in A.3.j of this section. Any closed landfill that has no monitored exceedances of the operational standard in three consecutive quarterly monitoring periods may skip to annual monitoring. Any methane reading of 500 ppm or more above background detected during the annual monitoring returns the frequency for that landfill to quarterly monitoring.

Recordkeeping requirements [40 CFR 60.758]
Unless the facility's collection and control system design include any alternatives to the recordkeeping provisions approved by DAQ as provided in §60.752(b)(2)(i)(B),

p. The Permittee shall keep for at least 5 years up-to-date, readily accessible, on-site records of the design capacity report which triggered the standard of 2.5 million megagrams and 2.5 million cubic meters, the current amount of solid waste in-place, and the year-by-year waste acceptance rate. Off-site records may be maintained if they are retrievable within 4 hours. Either paper copy or electronic formats are acceptable.

q. The Permittee shall keep up-to-date, readily accessible records for the life of the control equipment of the data listed below in this section as measured during the initial performance test or compliance determination. Records of subsequent tests or monitoring shall be maintained for a minimum of 5 years. Records of the control device vendor specifications shall be maintained until removal.
   i. In order to demonstrate compliance with §60.752(b)(2)(ii) through use of gas collection and control system:
      (A) The maximum expected gas generation flow rate as calculated in A.3.g.i of this section. The Permittee may use another method to determine the maximum gas generation flow rate, if the method has been approved by the DAQ.

(B) The density of wells, horizontal collectors, surface collectors, or other gas extraction devices determined using the procedures specified in §60.759(a)(1).

ii. In order to demonstrate compliance with A.3.c.i through use of an open flare, the flare type (i.e., steam-assisted, air-assisted, or nonassisted), all visible emission readings, heat content determination, flow rate or bypass flow rate measurements, and exit velocity determinations made during the performance test as specified in §60.18; continuous records of the flare pilot flame or flare flame monitoring and records of all periods of operations during which the pilot flame of the flare flame is absent.

r. The Permittee shall keep for 5 years up-to-date, readily accessible continuous records of the equipment operating parameters specified to be monitored in paragraphs A.3.g through A.3.m as well as up-to-date, readily accessible records for periods of operation during which the parameter boundaries established during the most recent performance test are exceeded.

i. The Permittee shall keep up-to-date, readily accessible continuous records of the indication of flow to the control device or the indication of bypass flow or records of monthly inspections of car-seals or lock-and-key configurations used to seal bypass lines, specified in A.3.n of this section.

ii. The Permittee shall keep up-to-date, readily accessible continuous records of the flame or flare pilot flame monitoring specified in A.3.n of this section, and up-to-date, readily accessible records of all periods of operation in which the flame or flare pilot flame is absent.

s. The Permittee shall keep for the life of the collection system an up-to-date, readily accessible plot map showing each existing and planned collector in the system and providing a unique identification location label for each collector.

i. Each owner or operator subject to the provisions of this subpart shall keep up-to-date, readily accessible records of the installation date and location of all newly installed collectors as specified in A.3.h of this section.

ii. Each owner or operator subject to the provisions of this subpart shall keep readily accessible documentation of the nature, date of deposition, amount, and location of asbestos-containing or nondegradable waste excluded from collection as provided in §60.759(a)(3)(i) as well as any nonproductive areas excluded from collection as provided in §60.759(a)(3)(ii).

t. The Permittee shall keep for at least 5 years up-to-date, readily accessible records of all collection and control system exceedances of the operational standards in A.3.f of this section, the reading in the subsequent month whether or not the second reading is an exceedance, and the location of each exceedance.

Reporting [40 CFR 60.757]

u. The Permittee shall submit to DAQ annual reports of the recorded information listed below.

i. Value and length of time for exceedance of applicable parameters monitored in A.3.m and A.3.n of this section.

ii. Description and duration of all periods when the gas stream is diverted from the control device through a bypass line or the indication of bypass flow as specified in A.3.m and A.3.n of this section.

iii. Description and duration of all periods when the control device was not operating for a period exceeding one hour and length of time the control device was not operating.

iv. All periods when the collection system was not operating in excess of 5 days.

v. The location of each exceedance of the 500 parts per million methane concentration and the concentration recorded at each location for which an exceedance was recorded in the previous month.

vi. The date of installation and the location of each well or collection system expansion added in accordance with A.3.g.iii, A.3.h and A.3.i.iv of this section.

vii. Summary of all DAQ approved well closures that have been decommissioned in accordance with wells A.3.f.ii(C) of this section.

viii. Summary of all DAQ approved nonproductive areas of the landfill in accordance with §60.759(a)(3)(ii).

v. The Permittee shall submit a summary report of monitoring and recordkeeping activities by January 30 of each calendar year for the preceding six-month period between July and December and July 30 of each calendar year for the preceding six-month period between January and June. All instances of deviations from the requirements of this permit must be clearly identified.

w. The Permittee shall submit a closure report to DAQ within 30 days of waste acceptance cessation. DAQ may request additional information as may be necessary to verify that permanent closure has taken place in

accordance with the requirements of 40 CFR 258.60. If a closure report has been submitted to DAQ, no additional wastes may be placed into the landfill without filing a notification of modification as described under §60.7(a)(4).

x. The Permittee shall submit an equipment removal report to DAQ 30 days prior to removal or cessation of operation of the control equipment.
   i. The equipment removal report shall contain all of the following items:
      (A) A copy of the closure report submitted in accordance with paragraph u of this section;
      (B) A copy of the initial performance test report demonstrating that the 15 year minimum control period has expired; and
      (C) Dated copies of three successive NMOC emission rate reports demonstrating that the landfill is no longer producing 50 megagrams or greater of NMOC per year
   ii. DAQ may request such additional information as may be necessary to verify that all of the conditions for removal in A.3.e have been met.

3. 15A NCAC 2D .1111: MAXIMUM ACHIVABLE CONTROL TECHNOLOGY (40 CFR Part 63, Subpart AAAA)

a. For all sources located at this facility, the Permittee shall comply with all applicable provisions contained in Environmental Management Commission Standard 15A NCAC 2D .1111, "Maximum Achievable Control Technology" (MACT) as promulgated in 40 CFR Part 63, Subpart AAAA, including Subpart A, "General Provisions."

Operation/Emission Standards [40 CFR 63.1955]

b. The Permittee shall meet the requirements of 40 CFR Part 60 Subpart WWW as indicated in Section 2.1.A.3 of this permit in order to comply with 40 CFR Part 63, Subpart AAAA.

c. At all times, including periods of startup, shutdown, and malfunction, the owner or operator must operate and maintain any affected source, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. During a period of startup, shutdown, or malfunction, this general duty to minimize emissions requires that the owner or operator reduce emissions from the affected source to the greatest extent which is consistent with safety and good air pollution control practices. The general duty to minimize emissions during a period of startup, shutdown, or malfunction does not require the owner or operator to achieve emission levels that would be required by the applicable standard at other times if this is not consistent with safety and good air pollution control practices, nor does it require the owner or operator to make any further efforts to reduce emissions if levels required by the applicable standard have been achieved. Determination of whether such operation and maintenance procedures are being used will be based on information available to DAQ which may include, but is not limited to, monitoring results, review of operation and maintenance procedures (including the startup, shutdown, and malfunction plan required in paragraph 3.f. of this section), review of operation and maintenance records, and inspection of the source. [40 CFR 63.6(e)]

Monitoring Requirements [40 CFR 63.1960]

d. Compliance is determined in the same way it is determined for 40 CFR part 60, subpart WWW, including performance testing, monitoring of the collection system, continuous parameter monitoring, and other credible evidence. In addition, continuous parameter monitoring data, collected under n.i. of this section, are used to demonstrate compliance with the operating conditions for control systems. If a deviation occurs, the Permittee have failed to meet the control device operating conditions described in this subpart and have deviated from the requirements of this subpart. Finally, the Permittee must develop a written SSM plan according to the provisions in 3.f. of this section. A copy of the SSM plan must be maintained on site. Failure to write or maintain a copy of the SSM plan is a deviation from the requirements of this subpart. The Permittee shall be deemed in noncompliance with 15A NCAC 2D .1111 if these monitoring, record keeping and reporting requirements are not met.

e. For the purposes of the landfill monitoring and SSM plan requirements, deviations include the following:
   i. A deviation occurs when the control device operating parameter boundaries described in 40 CFR 60.758(c)(1) of Subpart WWW are exceeded.

ii. A deviation occurs when 1 hour or more of the hours during the 3-hour block averaging period does not constitute a valid hour of data. A valid hour of data must have measured values for at least three 15-minute monitoring periods within the hour.
iii. A deviation occurs when a SSM plan is not developed or maintained on site. [40 CFR 63.1965]

Startup, Shutdown and Malfunction Plan [40 CFR 63.6(e)(iii)]

f. The Permittee must develop a written startup, shutdown, and malfunction plan that describes, in detail, procedures for operating and maintaining the source during periods of startup, shutdown, and malfunction; and a program of corrective action for malfunctioning process, air pollution control, and monitoring equipment used to comply with the relevant standard. The startup, shutdown, and malfunction plan does not need to address any scenario that would not cause the source to exceed an applicable emission limitation in the relevant standard. This plan must be developed by the owner or operator by the source's compliance date for that relevant standard. The purpose of the startup, shutdown, and malfunction plan is to:
   i. Ensure that, at all times, the owner or operator operates and maintains each affected source, including associated air pollution control and monitoring equipment, in a manner which satisfies the general duty to minimize emissions established by paragraph (e)(1)(i) of this section;
   ii. Ensure that owners or operators are prepared to correct malfunctions as soon as practicable after their occurrence in order to minimize excess emissions of hazardous air pollutants; and
   iii. Reduce the reporting burden associated with periods of startup, shutdown, and malfunction (including corrective action taken to restore malfunctioning process and air pollution control equipment to its normal or usual manner of operation).

Recordkeeping/Reporting Requirements [15A NCAC 2Q .0508(f)]

g. The Permittee shall keep records and reports as described in Section 2.1.A.3.p through x of this permit. [40 CFR 63.1980]

h. When actions taken by the Permittee during a startup or shutdown (and the startup or shutdown causes the source to exceed any applicable emission limitation in the relevant emission standards), or malfunction (including actions taken to correct a malfunction) are consistent with the procedures specified in the affected source's startup, shutdown, and malfunction plan, the Permittee must keep records for that event which demonstrate that the procedures specified in the plan were followed. These records may take the form of a "checklist," or other effective form of recordkeeping that confirms conformance with the startup, shutdown, and malfunction plan and describes the actions taken for that event. In addition, the Permittee must keep records of these events as specified in paragraph 63.10(b), including records of the occurrence and duration of each startup or shutdown (if the startup or shutdown causes the source to exceed any applicable emission limitation in the relevant emission standards), or malfunction of operation and each malfunction of the air pollution control and monitoring equipment. Furthermore, the Permittee shall confirm that actions taken during the relevant reporting period during periods of startup, shutdown, and malfunction were consistent with the affected source's startup, shutdown and malfunction plan in the semiannual startup, shutdown, and malfunction report required in §63.10(d)(5). [40 CFR 63.6(c)(iii)]

i. If an action taken by the Permittee during a startup, shutdown, or malfunction (including an action taken to correct a malfunction) is not consistent with the procedures specified in the affected source's startup, shutdown, and malfunction plan, and the source exceeds any applicable emission limitation in the relevant emission standard, then the Permittee must record the actions taken for that event and must report such actions within 2 working days after commencing actions inconsistent with the plan, followed by a letter within 7 working days after the end of the event, in accordance with §63.10(d)(5) unless the owner or operator makes alternative reporting arrangements, in advance, with DAQ. [40 CFR 63.6(c)(iv)]

j. The Permittee must maintain at the affected source a current startup, shutdown, and malfunction plan and must make the plan available upon request for inspection and copying by DAQ. In addition, if the startup, shutdown, and malfunction plan is subsequently revised as provided in paragraph 3.c of this section, the Permittee must maintain at the affected source each previous (i.e., superseded) version of the startup, shutdown, and malfunction plan, and must make each such previous version available for inspection and copying by the DAQ for a period of 5 years after revision of the plan. [40 CFR 63.6(c)(v)]

STATE-ONLY REQUIREMENT: ODOR REQUIREMENTS

3. **15A NCAC 2D .1806 "Control and Prohibition of Odorous Emissions" (State-enforceable only)**
The Permittee shall not operate the facility without implementing management practices or installing and operating odor control equipment sufficient to prevent odorous emissions from the facility from causing or contributing to objectionable odors beyond the facility's boundary.

SECTION 3 - GENERAL CONDITIONS (version 3.6 01/31/12)

This section describes terms and conditions applicable to this Title V facility.

A. **General Provisions** [NCGS 143-215 and 15A NCAC 2Q .0508(i)(16)]
1. Terms not otherwise defined in this permit shall have the meaning assigned to such terms as defined in 15A NCAC 2D and 2Q.
2. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are binding and enforceable pursuant to NCGS 143-215.114A and 143-215.114B, including assessment of civil and/or criminal penalties. Any unauthorized deviation from the conditions of this permit may constitute grounds for revocation and/or enforcement action by the DAQ.
3. This permit is not a waiver of or approval of any other Department permits that may be required for other aspects of the facility which are not addressed in this permit.
4. This permit does not relieve the Permittee from liability for harm or injury to human health or welfare, animal or plant life, or property caused by the construction or operation of this permitted facility, or from penalties therefore, nor does it allow the Permittee to cause pollution in contravention of state laws or rules, unless specifically authorized by an order from the North Carolina Environmental Management Commission.
5. Except as identified as state-only requirements in this permit, all terms and conditions contained herein shall be enforceable by the DAQ, the EPA, and citizens of the United States as defined in the Federal Clean Air Act.
6. Any stationary source of air pollution shall not be operated, maintained, or modified without the appropriate and valid permits issued by the DAQ, unless the source is exempted by rule. The DAQ may issue a permit only after it receives reasonable assurance that the installation will not cause air pollution in violation of any of the applicable requirements. A permitted installation may only be operated, maintained, constructed, expanded, or modified in a manner that is consistent with the terms of this permit.

B. **Permit Availability** [15A NCAC 2Q .0507(k) and .0508(i)(9)(B)]
The Permittee shall have available at the facility a copy of this permit and shall retain for the duration of the permit term one complete copy of the application and any information submitted in support of the application package. The permit and application shall be made available to an authorized representative of Department of Environment and Natural Resources upon request.

C. **Severability Clause** [15A NCAC 2Q .0508(i)(2)]
In the event of an administrative challenge to a final and binding permit in which a condition is held to be invalid, the provisions in this permit are severable so that all requirements contained in the permit, except those held to be invalid, shall remain valid and must be complied with.

D. **Submissions** [15A NCAC 2Q .0507(e) and 2Q .0508(i)(16)]
Except as otherwise specified herein, two copies of all documents, reports, test data, monitoring data, notifications, request for renewal, and any other information required by this permit shall be submitted to the appropriate Regional Office. Refer to the Regional Office address on the cover page of this permit. For continuous emissions monitoring systems (CEMS) reports, continuous opacity monitoring systems (COMS) reports, quality assurance (QA)/quality control (QC) reports, acid rain CEM certification reports, and NOx budget CEM certification reports, one copy shall be sent to the appropriate Regional Office and one copy shall be sent to:

Supervisor, Stationary Source Compliance
North Carolina Division of Air Quality
1641 Mail Service Center
Raleigh, NC 27699-1641

All submittals shall include the facility name and Facility ID number (refer to the cover page of this permit).

E. **Duty to Comply** [15A NCAC 2Q .0508(i)(2)]
The Permittee shall comply with all terms, conditions, requirements, limitations and restrictions set forth in this permit. Noncompliance with any permit condition except conditions identified as state-only requirements constitutes a violation of the Federal Clean Air Act. Noncompliance with any permit condition is grounds for enforcement action, for permit termination, revocation and reissuance, or modification, or for denial of a permit renewal application.

F. **Circumvention** - STATE ENFORCEABLE ONLY
The facility shall be properly operated and maintained at all times in a manner that will effect an overall reduction in air pollution. Unless otherwise specified by this permit, no emission source may be operated without the concurrent operation of its associated air pollution control device(s) and appurtenances.

G. **Permit Modifications**
1. Administrative Permit Amendments [15A NCAC 2Q .0514]
The Permittee shall submit an application for an administrative permit amendment in accordance with 15A NCAC 2Q .0514.
2. Transfer in Ownership or Operation and Application Submittal Content [15A NCAC 2Q .0524 and 2Q .0505]
The Permittee shall submit an application for an ownership change in accordance with 15A NCAC 2Q.0524 and 2Q .0505.
3. Minor Permit Modifications [15A NCAC 2Q .0515]
The Permittee shall submit an application for a minor permit modification in accordance with 15A NCAC 2Q .0515.
4. Significant Permit Modifications [15A NCAC 2Q .0516]
The Permittee shall submit an application for a significant permit modification in accordance with 15A NCAC 2Q .0516.
5. Reopening for Cause [15A NCAC 2Q .0517]
The Permittee shall submit an application for reopening for cause in accordance with 15A NCAC 2Q .0517.

H. **Changes Not Requiring Permit Modifications**
1. Reporting Requirements
Any of the following that would result in new or increased emissions from the emission source(s) listed in Section 1 must be reported to the Regional Supervisor, DAQ:
   a. changes in the information submitted in the application;
   b. changes that modify equipment or processes; or
   c. changes in the quantity or quality of materials processed.

If appropriate, modifications to the permit may then be made by the DAQ to reflect any necessary changes in the permit conditions. In no case are any new or increased emissions allowed that will cause a violation of the emission limitations specified herein.

2. Section 502(b)(10) Changes [15A NCAC 2Q .0523(a)]
   a. "Section 502(b)(10) changes" means changes that contravene an express permit term or condition. Such changes do not include changes that would violate applicable requirements or contravene federally enforceable permit terms and conditions that are monitoring (including test methods), recordkeeping, reporting, or compliance certification requirements.
   b. The Permittee may make Section 502(b)(10) changes without having the permit revised if:
      i. the changes are not a modification under Title I of the Federal Clean Air Act;
      ii. the changes do not cause the allowable emissions under the permit to be exceeded;
      iii. the Permittee notifies the Director and EPA with written notification at least seven days before the change is made; and
      iv. the Permittee shall attach the notice to the relevant permit.
   c. The written notification shall include:
      i. a description of the change;
      ii. the date on which the change will occur;
      iii. any change in emissions; and

iv. any permit term or condition that is no longer applicable as a result of the change.

d. Section 502(b)(10) changes shall be made in the permit the next time that the permit is revised or renewed, whichever comes first.

3. Off Permit Changes [15A NCAC 2Q .0523(b)]
   The Permittee may make changes in the operation or emissions without revising the permit if:
   a. the change affects only insignificant activities and the activities remain insignificant after the change; or
   b. the change is not covered under any applicable requirement.
4. Emissions Trading [15A NCAC 2Q .0523(c)]
   To the extent that emissions trading is allowed under 15A NCAC 2D, including subsequently adopted maximum achievable control technology standards, emissions trading shall be allowed without permit revision pursuant to 15A NCAC 2Q .0523(c).

I.A. **Reporting Requirements for Excess Emissions and Permit Deviations**
[15A NCAC 2D .0535(f) and 2Q .0508(f)(2)]
"Excess Emissions" - means an emission rate that exceeds any applicable emission limitation or standard allowed by any rule in Sections .0500, .0900, .1200, or .1400 of Subchapter 2D; or by a permit condition; or that exceeds an emission limit established in a permit issued under 15A NCAC 2Q .0700. *(Note: Definitions of excess emissions under 2D .1110 and 2D .1111 shall apply where defined by rule.)*
"Deviations" - for the purposes of this condition, any action or condition not in accordance with the terms and conditions of this permit including those attributable to upset conditions as well as excess emissions as defined above lasting less than four hours.

Excess Emissions

1. If a source is required to report excess emissions under NSPS (15A NCAC 2D .0524), NESHAPS (15A NCAC 2D .1110 or .1111), or the operating permit provides for periodic (e.g., quarterly) reporting of excess emissions, reporting shall be performed as prescribed therein.
2. If the source is not subject to NSPS (15A NCAC 2D .0524), NESHAPS (15A NCAC 2D .1110 or .1111), or these rules do NOT define "excess emissions," the Permittee shall report excess emissions in accordance with 15A NCAC 2D .0535 as follows:
   a. Pursuant to 15A NCAC 2D .0535, if excess emissions last for more than four hours resulting from a malfunction, a breakdown of process or control equipment, or any other abnormal condition, the owner or operator shall:
      i. notify the Regional Supervisor or Director of any such occurrence by 9:00 a.m. Eastern Time of the Division's next business day of becoming aware of the occurrence and provide:
         - name and location of the facility;
         - nature and cause of the malfunction or breakdown;
         - time when the malfunction or breakdown is first observed;
         - expected duration; and
         - estimated rate of emissions;
      ii. notify the Regional Supervisor or Director immediately when corrective measures have been accomplished; and
      iii. submit to the Regional Supervisor or Director within 15 days a written report as described in 15A NCAC 2D .0535(f)(3).

Permit Deviations

3. Pursuant to 15A NCAC 2Q .0508(f)(2), the Permittee shall report deviations from permit requirements (terms and conditions) as follows:
   a. Notify the Regional Supervisor or Director of all other deviations from permit requirements not covered under 15A NCAC 2D .0535 quarterly. A written report to the Regional Supervisor shall include the probable cause of such deviation and any corrective actions or preventative actions taken. The responsible official shall certify all deviations from permit requirements.

I.B. **Other Requirements under 15A NCAC 2D .0535**
The Permittee shall comply with all other applicable requirements contained in 15A NCAC 2D .0535, including 15A NCAC 2D .0535(c) as follows:

1. Any excess emissions that do not occur during start-up and shut-down shall be considered a violation of the

appropriate rule unless the owner or operator of the sources demonstrates to the Director, that the excess emissions are a result of a malfunction. The Director shall consider, along with any other pertinent information, the criteria contained in 15A NCAC 2D .0535(c)(1) through (7).

2. 15A NCAC 2D .0535(g). Excess emissions during start-up and shut-down shall be considered a violation of the appropriate rule if the owner or operator cannot demonstrate that excess emissions are unavoidable.

J. **Emergency Provisions** [40 CFR 70.6(g)]

The Permittee shall be subject to the following provisions with respect to emergencies:

1. An emergency means any situation arising from sudden and reasonably unforeseeable events beyond the control of the facility, including acts of God, which situation requires immediate corrective action to restore normal operation, and that causes the facility to exceed a technology-based emission limitation under the permit, due to unavoidable increases in emissions attributable to the emergency. An emergency shall not include noncompliance to the extent caused by improperly designed equipment, lack of preventive maintenance, careless or improper operation, or operator error.
2. An emergency constitutes an affirmative defense to an action brought for noncompliance with such technology-based emission limitations if the conditions specified in 3. below are met.
3. The affirmative defense of emergency shall be demonstrated through properly signed contemporaneous operating logs or other relevant evidence that include information as follows:
   a. an emergency occurred and the Permittee can identify the cause(s) of the emergency;
   b. the permitted facility was at the time being properly operated;
   c. during the period of the emergency the Permittee took all reasonable steps to minimize levels of emissions that exceeded the standards or other requirements in the permit; and
   d. the Permittee submitted notice of the emergency to the DAQ within two working days of the time when emission limitations were exceeded due to the emergency. This notice must contain a description of the emergency, steps taken to mitigate emissions, and corrective actions taken.
4. In any enforcement proceeding, the Permittee seeking to establish the occurrence of an emergency has the burden of proof.
5. This provision is in addition to any emergency or upset provision contained in any applicable requirement specified elsewhere herein.

K. **Permit Renewal** [15A NCAC 2Q .0508(e) and 2Q .0513(b)]

This 15A NCAC 2Q .0500 permit is issued for a fixed term not to exceed five years and shall expire at the end of its term. Permit expiration terminates the facility's right to operate unless a complete 15A NCAC 2Q .0500 renewal application is submitted at least nine months before the date of permit expiration. If the Permittee or applicant has complied with 15A NCAC 2Q .0512(b)(1), this 15A NCAC 2Q .0500 permit shall not expire until the renewal permit has been issued or denied. Permit expiration under 15A NCAC 2Q .0400 terminates the facility's right to operate unless a complete 15A NCAC 2Q .0400 renewal application is submitted at least six months before the date of permit expiration for facilities subject to 15A NCAC 2Q .0400 requirements. In either of these events, all terms and conditions of these permits shall remain in effect until the renewal permits have been issued or denied.

L. **Need to Halt or Reduce Activity Not a Defense** [15A NCAC 2Q .0508(i)(4)]

It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

M. **Duty to Provide Information (submittal of information)** [15A NCAC 2Q .0508(i)(9)]

1. The Permittee shall furnish to the DAQ, in a timely manner, any reasonable information that the Director may request in **writing** to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit or to determine compliance with the permit.
2. The Permittee shall furnish the DAQ copies of records required to be kept by the permit when such copies are requested by the Director. For information claimed to be confidential, the Permittee may furnish such records directly to the EPA upon request along with a claim of confidentiality.

N. **Duty to Supplement** [15A NCAC 2Q .0507(f)]

The Permittee, upon becoming aware that any relevant facts were omitted or incorrect information was submitted in the permit application, shall promptly submit such supplementary facts or corrected information to the DAQ. The Permittee shall also provide additional information as necessary to address any requirement that becomes applicable to

the facility after the date a complete permit application was submitted but prior to the release of the draft permit.

O. **Retention of Records** [15A NCAC 2Q .0508(f) and 2Q .0508 (l)]
The Permittee shall retain records of all required monitoring data and supporting information for a period of at least five years from the date of the monitoring sample, measurement, report, or application. Supporting information includes all calibration and maintenance records and all original strip-chart recordings for continuous monitoring information, and copies of all reports required by the permit. These records shall be maintained in a form suitable and readily available for expeditious inspection and review. Any records required by the conditions of this permit shall be kept on site and made available to DAQ personnel for inspection upon request.

P. **Compliance Certification** [15A NCAC 2Q .0508(n)]
The Permittee shall submit to the DAQ and the EPA (Air and EPCRA Enforcement Branch, EPA, Region 4, 61 Forsyth Street, Atlanta, GA 30303) postmarked on or before March 1 a compliance certification (for the preceding calendar year) by a responsible official with all federally-enforceable terms and conditions in the permit, including emissions limitations, standards, or work practices. It shall be the responsibility of the current owner to submit a compliance certification for the entire year regardless of who owned the facility during the year. The compliance certification
shall comply with additional requirements as may be specified under Sections 114(a)(3) or 504(b) of the Federal Clean Air Act. The compliance certification shall specify:
1. the identification of each term or condition of the permit that is the basis of the certification;
2. the compliance status (with the terms and conditions of the permit for the period covered by the certification);
3. whether compliance was continuous or intermittent; and
4. the method(s) used for determining the compliance status of the source during the certification period.

Q. **Certification by Responsible Official** [15A NCAC 2Q .0520]
A responsible official shall certify the truth, accuracy, and completeness of any application form, report, or compliance certification required by this permit. All certifications shall state that based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

R. **Permit Shield for Applicable Requirements** [15A NCAC 2Q .0512]
1. Compliance with the terms and conditions of this permit shall be deemed compliance with applicable requirements, where such applicable requirements are included and specifically identified in the permit as of the date of permit issuance.
2. A permit shield shall not alter or affect:
   a. the power of the Commission, Secretary of the Department, or Governor under NCGS 143-215.3(a)(12), or EPA under Section 303 of the Federal Clean Air Act;
   b. the liability of an owner or operator of a facility for any violation of applicable requirements prior to the effective date of the permit or at the time of permit issuance;
   c. the applicable requirements under Title IV; or
   d. the ability of the Director or the EPA under Section 114 of the Federal Clean Air Act to obtain information to determine compliance of the facility with its permit.
3. A permit shield does not apply to any change made at a facility that does not require a permit or permit revision made under 15A NCAC 2Q .0523.
4. A permit shield does not extend to minor permit modifications made under 15A NCAC 2Q .0515.

S. **Termination, Modification, and Revocation of the Permit** [15A NCAC 2Q .0519]
The Director may terminate, modify, or revoke and reissue this permit if:
1. the information contained in the application or presented in support thereof is determined to be incorrect;
2. the conditions under which the permit or permit renewal was granted have changed;
3. violations of conditions contained in the permit have occurred;
4. the EPA requests that the permit be revoked under 40 CFR 70.7(g) or 70.8(d); or
5. the Director finds that termination, modification, or revocation and reissuance of the permit is necessary to carry out the purpose of NCGS Chapter 143, Article 21B.

T. **Insignificant Activities** [15A NCAC 2Q .0503]
Because an emission source or activity is insignificant does not mean that the emission source or activity is exempted

from any applicable requirement or that the owner or operator of the source is exempted from demonstrating compliance with any applicable requirement. The Permittee shall have available at the facility at all times and made available to an authorized representative upon request, documentation, including calculations, if necessary, to demonstrate that an emission source or activity is insignificant.

U. **Property Rights** [15A NCAC 2Q .0508(i)(8)]
This permit does not convey any property rights in either real or personal property or any exclusive privileges.

V. **Inspection and Entry** [15A NCAC 2Q .0508(l) and NCGS 143-215.3(a)(2)]
1. Upon presentation of credentials and other documents as may be required by law, the Permittee shall allow the DAQ, or an authorized representative, to perform the following:
   a. enter the Permittee's premises where the permitted facility is located or emissions-related activity is conducted, or where records are kept under the conditions of the permit;
   b. have access to and copy, at reasonable times, any records that are required to be kept under the conditions of the permit;
   c. inspect at reasonable times and using reasonable safety practices any source, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under the permit; and
   d. sample or monitor substances or parameters, using reasonable safety practices, for the purpose of assuring compliance with the permit or applicable requirements at reasonable times.

   Nothing in this condition shall limit the ability of the EPA to inspect or enter the premises of the Permittee under Section 114 or other provisions of the Federal Clean Air Act.
2. No person shall refuse entry or access to any authorized representative of the DAQ who requests entry for purposes of inspection, and who presents appropriate credentials, nor shall any person obstruct, hamper, or interfere with any such authorized representative while in the process of carrying out his official duties. Refusal of entry or access may constitute grounds for permit revocation and assessment of civil penalties.

W. **Annual Fee Payment** [15A NCAC 2Q .0508(i)(10)]
1. The Permittee shall pay all fees in accordance with 15A NCAC 2Q .0200.
2. Payment of fees may be by check or money order made payable to the N.C. Department of Environment and Natural Resources. Annual permit fee payments shall refer to the permit number.
3. If, within 30 days after being billed, the Permittee fails to pay an annual fee, the Director may initiate action to terminate the permit under 15A NCAC 2Q .0519.

X. **Annual Emission Inventory Requirements** [15A NCAC 2Q .0207]
The Permittee shall report by **June 30 of each year** the actual emissions of each air pollutant listed in 15A NCAC 2Q .0207(a) from each emission source within the facility during the previous calendar year. The report shall be in or on such form as may be established by the Director. The accuracy of the report shall be certified by a responsible official of the facility.

Y. **Confidential Information** [15A NCAC 2Q .0107 and 2Q. 0508(i)(9)]
Whenever the Permittee submits information under a claim of confidentiality pursuant to 15A NCAC 2Q .0107, the Permittee may also submit a copy of all such information and claim directly to the EPA upon request. All requests for confidentiality must be in accordance with 15A NCAC 2Q .0107.

Z. **Construction and Operation Permits** [15A NCAC 2Q .0100 and .0300]
A construction and operating permit shall be obtained by the Permittee for any proposed new or modified facility or emission source which is not exempted from having a permit prior to the beginning of construction or modification, in accordance with all applicable provisions of 15A NCAC 2Q .0100 and .0300.

AA. **Standard Application Form and Required Information** [15A NCAC 2Q .0505 and .0507]
The Permittee shall submit applications and required information in accordance with the provisions of 15A NCAC 2Q .0505 and .0507.

BB. **Financial Responsibility and Compliance History** [15A NCAC 2Q .0507(d)(4)]
The DAQ may require an applicant to submit a statement of financial qualifications and/or a statement of substantial

compliance history.

CC. **Refrigerant Requirements (Stratospheric Ozone and Climate Protection)** [15A NCAC 2Q .0501(e)]

1. If the Permittee has appliances or refrigeration equipment, including air conditioning equipment, which use Class I or II ozone-depleting substances such as chlorofluorocarbons and hydrochlorofluorocarbons listed as refrigerants in 40 CFR Part 82 Subpart A Appendices A and B, the Permittee shall service, repair, and maintain such equipment according to the work practices, personnel certification requirements, and certified recycling and recovery equipment specified in 40 CFR Part 82 Subpart F.
2. The Permittee shall not knowingly vent or otherwise release any Class I or II substance into the environment during the repair, servicing, maintenance, or disposal of any such device except as provided in 40 CFR Part 82 Subpart F.
3. The Permittee shall comply with all reporting and recordkeeping requirements of 40 CFR 82.166. Reports shall be submitted to the EPA or its designee as required.

DD. **Prevention of Accidental Releases - Section 112(r)** [15A NCAC 2Q .0508(h)]
If the Permittee is required to develop and register a Risk Management Plan with EPA pursuant to Section 112(r) of the Clean Air Act, then the Permittee is required to register this plan in accordance with 40 CFR Part 68.

EE. **Prevention of Accidental Releases General Duty Clause - Section 112(r)(1)**
FEDERALLY-ENFORCEABLE ONLY
Although a risk management plan may not be required, if the Permittee produces, processes, handles, or stores any amount of a listed hazardous substance, the Permittee has a general duty to take such steps as are necessary to prevent the accidental release of such substance and to minimize the consequences of any release.

FF. **Title IV Allowances** [15A NCAC 2Q .0508(i)(1)]
This permit does not limit the number of Title IV allowances held by the Permittee, but the Permittee may not use allowances as a defense to noncompliance with any other applicable requirement. The Permittee's emissions may not exceed any allowances that the facility lawfully holds under Title IV of the Federal Clean Air Act.

GG. **Air Pollution Emergency Episode** [15A NCAC 2D .0300]
Should the Director of the DAQ declare an Air Pollution Emergency Episode, the Permittee will be required to operate in accordance with the Permittee's previously approved Emission Reduction Plan or, in the absence of an approved plan, with the appropriate requirements specified in 15A NCAC 2D .0300.

HH. **Registration of Air Pollution Sources** [15A NCAC 2D .0200]
The Director of the DAQ may require the Permittee to register a source of air pollution. If the Permittee is required to register a source of air pollution, this registration and required information will be in accordance with 15A NCAC 2D .0202(b).

II. **Ambient Air Quality Standards** [15A NCAC 2D .0501(c)]
In addition to any control or manner of operation necessary to meet emission standards specified in this permit, any source of air pollution shall be operated with such control or in such manner that the source shall not cause the ambient air quality standards in 15A NCAC 2D .0400 to be exceeded at any point beyond the premises on which the source is located. When controls more stringent than named in the applicable emission standards in this permit are required to prevent violation of the ambient air quality standards or are required to create an offset, the permit shall contain a condition requiring these controls.

JJ. **General Emissions Testing and Reporting Requirements** [15A NCAC 2Q .0508(i)(16)]
Emission compliance testing shall be by the procedures of Section .2600, except as may be otherwise required in Rules .0524, .0912, .1110, .1111, or .1415 of Subchapter 2D.
If emissions testing is required by this permit or the DAQ or if the Permittee submits emissions testing to the DAQ to demonstrate compliance, the Permittee shall perform such testing in accordance with 15A NCAC 2D .2600 and follow the procedures outlined below:

1. The owner or operator of the source shall arrange for air emission testing protocols to be provided to the Director prior to air pollution testing. Testing protocols are not required to be pre-approved by the Director prior to air pollution testing. The Director shall review air emission testing protocols for pre-approval prior to

testing if requested by the owner or operator at least **45 days** before conducting the test.

2. Any person proposing to conduct an emissions test to demonstrate compliance with an applicable standard shall notify the Director at least **15 days** before beginning the test so that the Director may at his option observe the test.
3. The owner or operator of the source shall arrange for controlling and measuring the production rates during the period of air testing. The owner or operator of the source shall ensure that the equipment or process being tested is operated at the production rate that best fulfills the purpose of the test. The individual conducting the emission test shall describe the procedures used to obtain accurate process data and include in the test report the average production rates determined during each testing period.
4. Two copies of the final air emission test report shall be submitted to the Director not later than **30 days** after sample collection unless otherwise specified in the specific conditions. The owner or operator may request an extension to submit the final test report. The Director shall approve an extension request if he finds that the extension request is a result of actions beyond the control of the owner or operator.
   a. The Director shall make the final determination regarding any testing procedure deviation and the validity of the compliance test. The Director may:
      (1) Allow deviations from a method specified under a rule in this Section if the owner or operator of the source being tested demonstrates to the satisfaction of the Director that the specified method is inappropriate for the source being tested.
      (2) Prescribe alternate test procedures on an individual basis when he finds that the alternative method is necessary to secure more reliable test data.
      (3) Prescribe or approve methods on an individual basis for sources or pollutants for which no test method is specified in this Section if the methods can be demonstrated to determine compliance of permitted emission sources or pollutants.
   b. The Director may authorize the Division of Air Quality to conduct independent tests of any source subject to a rule in this Subchapter to determine the compliance status of that source or to verify any test data submitted relating to that source. Any test conducted by the Division of Air Quality using the appropriate testing procedures described in Section 2D .2600 has precedence over all other tests.

KK. **Reopening for Cause** [15A NCAC 2Q .0517]

1. A permit shall be reopened and revised under the following circumstances:
   a. additional applicable requirements become applicable to a facility with remaining permit term of three or more years;
   b. additional requirements (including excess emission requirements) become applicable to a source covered by Title IV;
   c. the Director or EPA finds that the permit contains a material mistake or that inaccurate statements were made in establishing the emissions standards or other terms or conditions of the permit; or
   d. the Director or EPA determines that the permit must be revised or revoked to assure compliance with the applicable requirements.
2. Any permit reopening shall be completed or a revised permit issued within 18 months after the applicable requirement is promulgated. No reopening is required if the effective date of the requirement is after the expiration of the permit term unless the term of the permit was extended pursuant to 15A NCAC 2Q .0513(c).
3. Except for the state-enforceable only portion of the permit, the procedures set out in 15A NCAC 2Q .0507, .0521, or .0522 shall be followed to reissue the permit. If the State-enforceable only portion of the permit is reopened, the procedures in 15A NCAC 2Q .0300 shall be followed. The proceedings shall affect only those parts of the permit for which cause to reopen exists.
4. The Director shall notify the Permittee at least 60 days in advance of the date that the permit is to be reopened, except in cases of imminent threat to public health or safety the notification period may be less than 60 days.
5. Within 90 days, or 180 days if the EPA extends the response period, after receiving notification from the EPA that a permit needs to be terminated, modified, or revoked and reissued, the Director shall send to the EPA a proposed determination of termination, modification, or revocation and reissuance, as appropriate.

LL. **Reporting Requirements for Non-Operating Equipment** [15A NCAC 2Q .0508(i)(16)]

The Permittee shall maintain a record of operation for permitted equipment noting whenever the equipment is taken from and placed into operation. During operation the monitoring recordkeeping and reporting requirements as prescribed by the permit shall be implemented within the monitoring period.

MM. **Fugitive Dust Control Requirement** [15A NCAC 2D .0540] - STATE ENFORCEABLE ONLY

As required by 15A NCAC 2D .0540 "Particulates from Fugitive Dust Emission Sources," the Permittee shall not cause or allow fugitive dust emissions to cause or contribute to substantive complaints or excess visible emissions beyond the property boundary. If substantive complaints or excessive fugitive dust emissions from the facility are observed beyond the property boundaries for six minutes in any one hour (using Reference Method 22 in 40 CFR, Appendix A), the owner or operator may be required to submit a fugitive dust plan as described in 2D .0540(f). "Fugitive dust emissions" means particulate matter from process operations that does not pass through a process stack or vent and that is generated within plant property boundaries from activities such as: unloading and loading areas, process areas stockpiles, stock pile working, plant parking lots, and plant roads (including access roads and haul roads).

NN. **Specific Permit Modifications** [15A NCAC 2Q.0501 and .0523]

1. For modifications made pursuant to 15A NCAC 2Q .0501(c)(2), the Permittee shall file a Title V Air Quality Permit Application for the air emission source(s) and associated air pollution control device(s) on or before 12 months after commencing operation.
2. For modifications made pursuant to 15A NCAC 2Q .0501(d)(2), the Permittee shall not begin operation of the air emission source(s) and associated air pollution control device(s) until a Title V Air Quality Permit Application is filed and a construction and operation permit following the procedures of Section .0500 (except for Rule .0504 of this Section) is obtained.
3. For modifications made pursuant to 502(b)(10), in accordance with 15A NCAC 2Q .0523(a)(1)(C), the Permittee shall notify the Director and EPA (EPA - Air Planning Branch, 61 Forsyth St., Atlanta, GA 30303) in writing at least seven days before the change is made. The written notification shall include:
   a. a description of the change at the facility;
   b. the date on which the change will occur;
   c. any change in emissions; and
   d. any permit term or condition that is no longer applicable as a result of the change.

   In addition to this notification requirement, with the next significant modification or Air Quality Permit renewal, the Permittee shall submit a page "E5" of the application forms signed by the responsible official verifying that the application for the 502(b)(10) change/modification, is true, accurate, and complete. Further note that modifications made pursuant to 502(b)(10) do not relieve the Permittee from satisfying preconstruction requirements.

OO. **Third Party Participation and EPA Review** [15A NCAC 2Q .0521, .0522 and .0525(7)]

For permits modifications subject to 45-day review by the federal Environment Protection Agency (EPA), EPA's decision to not object to the proposed permit is considered final and binding on the EPA and absent a third party petition, the failure to object is the end of EPA's decision-making process with respect to the revisions to the permit. The time period available to submit a public petition pursuant to 15A NCAC 2Q .0518 begins at the end of the 45-day EPA review period.

ATTACHMENT

List of Acronyms

AOS	Alternate Operating Scenario
BACT	Best Available Control Technology
Btu	British thermal unit
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CEM	Continuous Emission Monitor
CFR	Code of Federal Regulations
DAQ	Division of Air Quality
DENR	Department of Environment and Natural Resources
EMC	Environmental Management Commission
EPA	Environmental Protection Agency
FR	Federal Register
GACT	Generally Available Control Technology
HAP	Hazardous Air Pollutant
MACT	Maximum Achievable Control Technology
NAA	Non-Attainment Area
NCAC	North Carolina Administrative Code
NCGS	North Carolina General Statutes
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NO_X	Nitrogen Oxides
NSPS	New Source Performance Standard
OAH	Office of Administrative Hearings
PM	Particulate Matter
PM_{10}	Particulate Matter with Nominal Aerodynamic Diameter of 10 Micrometers or Less
POS	Primary Operating Scenario
PSD	Prevention of Significant Deterioration
RACT	Reasonably Available Control Technology
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
tpy	Tons Per Year
VOC	Volatile Organic Compound

NCDENR
North Carolina Department of Environment and Natural Resources
Division of Air Quality

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

August 24, 2015

Mr. Steve Laliberty
President
MP Wayne, LLC
One Grove Street, 6th Floor
New Britain, CT 06053

Dear Mr. Laliberty:

SUBJECT: Air Quality Permit No. 10054T04
Facility ID: 9600269
MP Wayne, LLC (Landfill Gas-To-Energy Project)
Dudley, North Carolina
Wayne County
Fee Class: Title V

In accordance with your completed Air Quality Permit Application for an ownership change of a Title V Permit, received August 14, 2015, we are forwarding herewith Air Quality Permit No. 10054T04 to MP Wayne LLC, located at 460B South Landfill Road, Dudley, North Carolina authorizing the construction and operation, of the emission sources and associated air pollution control devices specified herein. Additionally, any emissions activities determined from your Air Quality Permit Application as being insignificant per 15A North Carolina Administrative Code 2Q .0503(8) have been listed for informational purposes as an "ATTACHMENT." Please note the requirements for the annual compliance certification are contained in General Condition P in Section 3.

As the designated responsible official it is your responsibility to review, understand, and abide by all of the terms and conditions of the attached permit. It is also your responsibility to ensure that any person who operates any emission source and associated air pollution control device subject to any term or condition of the attached permit reviews, understands, and abides by the conditions of the attached permit that are applicable to that particular emission source.

If any parts, requirements, or limitations contained in this Air Quality Permit are unacceptable to you, you have the right to request a formal adjudicatory hearing within 30 days following receipt of this permit, identifying the specific issues to be contested. This hearing request must be in the form of a written petition, conforming to NCGS (North Carolina General Statutes) 150B-23, and filed with both the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, North Carolina 27699-6714 and the Division of Air Quality, Permitting Section, 1641 Mail Service Center, Raleigh, North Carolina 27699-1641. The form for requesting a formal adjudicatory hearing may be obtained upon request from the Office of Administrative Hearings. Please note that this permit will be stayed in its entirety upon receipt of the request for a hearing. Unless a request for a hearing is made pursuant to NCGS 150B-23, this Air Quality Permit shall be final and binding 30 days after issuance.

You may request modification of your Air Quality Permit through informal means pursuant to NCGS 150B-22. This request must be submitted in writing to the Director and must identify the specific provisions or issues for which the modification is sought. Please note that this Air Quality Permit will become final and binding regardless of a request for informal modification unless a request for a hearing is also made under NCGS 150B-23.

The construction of new air pollution emission source(s) and associated air pollution control device(s), or modifications to the emission source(s) and air pollution control device(s) described in this permit must be covered under an Air Quality Permit issued by the Division of Air Quality prior to construction unless the Permittee has fulfilled the requirements of GS 143-215.108A(b) and received written approval from the Director of the Division of Air Quality to commence construction. Failure to receive an Air Quality Permit or written approval prior to commencing construction is a violation of GS 143-215.108A and may subject the Permittee to civil or criminal penalties as described in GS 143-215.114A and 143-215.114B.

This Air Quality Permit shall be effective from August 24, 2015 until February 28, 2018, is nontransferable to future owners and operators, and shall be subject to the conditions and limitations as specified therein.

Should you have any questions concerning this matter, please contact Ms. Connie J. Horne, at (919) 707-8722.

Sincerely yours,

for Baker T. Fuller

William D. Willets, P. E., Chief, Permitting Section
Division of Air Quality, NCDENR

Enclosure

c: Heather Ceron, EPA Region 4
Washington Regional Office
Central Files

ATTACHMENT to Permit No. 10054T04

Insignificant Activities per 15A NCAC 2Q .0503(8)

Emission Source ID No.	Emission Source Description
IES-Drums	Storage drums
IES-CondTk	Condensate storage tank
IES-Main	Engine maintenance shop

1. Because an activity is insignificant does not mean that the activity is exempted from an applicable requirement or that the owner or operator of the source is exempted from demonstrating compliance with any applicable requirement.

2. When applicable, emissions from stationary source activities identified above shall be included in determining compliance with the permit requirements for toxic air pollutants under 15A NCAC 2D .1100 "Control of Toxic Air Pollutants" or 2Q .0711 "Emission Rates Requiring a Permit".

3. For additional information regarding the applicability of GACT see the DAQ page titled "The Regulatory Guide for Insignificant Activities/Permits Exempt Activities". The link to this site is as follows: http://daq.state.nc.us/permits/insig/

Changes to permit per application 9600269.15A

Page(s)	Section	Description of Change(s)
Cover letter	---	Modified to reflect current permit number, issue and effective dates.
All	Headers	Amended permit revision number.
Attachments and Pages 1-17	Entire permit, where applicable	Modified to reflect current permit number, issue and effective dates, and associated ownership change information.

State of North Carolina,
Department of Environment,
and Natural Resources

Division of Air Quality

AIR QUALITY PERMIT

Permit No.	Replaces Permit No.	Issue Date	Expiration Date
10054T04	10054T03	August 24, 2015	February 28, 2018

Until such time as this permit expires or is modified or revoked, the below named Permittee is permitted to construct and operate the emission sources and associated air pollution control devices specified herein, in accordance with the terms, conditions, and limitations within this permit. This permit is issued under the provisions of Article 21B of Chapter 143, General Statutes of North Carolina as amended, and Title 15A North Carolina Administrative Codes (15A NCAC), Subchapters 2D and 2Q, and other applicable Laws.

Pursuant to Title 15A NCAC, Subchapter 2Q, the Permittee shall not construct, operate, or modify any emission sources or air pollution control devices without having first submitted a complete Air Quality Permit Application to the permitting authority and received an Air Quality Permit, except as provided in this permit.

Permittee:	**MP Wayne, LLC (Landfill Gas-To-Energy Project)**
Facility ID:	**9600269**
Facility Site Location:	**460B South Landfill Road**
City, County, State, Zip:	**Dudley, North Carolina 28333**
Mailing Address:	**One Grove Street, 6th Floor**
City, State, Zip:	**New Britain, Connecticut 06053**
Application Number:	**9600269.15A**
Complete Application Date:	**August 14, 2015**
Primary SIC Code:	**9711**
Division of Air Quality, Regional Office Address:	**Washington Regional Office 943 Washington Square Mall Washington, North Carolina 27889**

Permit issued this the 24th day of August, 2015

for William D. Willets, P.E., Chief, Permitting Section
By Authority of the Environmental Management Commission

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ATTACHMENT
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SECTION 1- PERMITTED EMISSION SOURCES AND ASSOCIATED AIR POLLUTION CONTROL DEVICES AND APPURTENANCES

The following table contains a summary of all permitted emission sources and associated air pollution control devices and appurtenances:

Page No.	Emission Source ID No.	Emission Source Description	Control Device ID No.
3	ES-04	One landfill gas-fired open type backup flare (1600 scfm maximum flow rate, 45.3 mmBtu per hour heat input at 472 Btu/scf of landfill gas)	None
3, 4, 5, 6	ES-EG1 MACT, NSPS	Landfill gas-fired, lean burn, spark ignition engine (1468 hp output)/generator (1060 kW output) unit	None
3, 4, 5, 6	ES-EG2 MACT, NSPS	Landfill gas-fired, lean burn, spark ignition engine (1468 hp output)/generator (1060 kW output) unit	None
3, 4, 5, 6	ES-EG3 MACT, NSPS	Landfill gas-fired, lean burn, spark ignition engine (1468 hp output)/generator (1060 kW output) unit	None

SECTION 2 - SPECIFIC LIMITATIONS AND CONDITIONS

2.1- Emission Source(s) and Control Devices(s) Specific Limitations and Conditions
The emission source(s) and associated air pollution control device(s) and appurtenances listed below are subject to the following specific terms, conditions, and limitations, including the testing, monitoring, recordkeeping, and reporting requirements as specified herein:

A. One landfill gas-fired, open type, backup flare (1600 scfm maximum flow rate, 45.3 mmBtu per hour heat input at 472 Btu/scf of landfill gas, ES-04)

The following table provides a summary of limits and standards for the emission source(s) described above:

Regulated Pollutant	Limits/Standards	Applicable Regulation
Sulfur dioxide	2.3 pounds per million Btu heat input	15A NCAC 2D .0516
Visible emissions	20 percent opacity	15A NCAC 2D .0521
Carbon monoxide	Less than 250 tons per year for the flare and the engines	15A NCAC 2Q.0317 of (2D .0530) PSD Avoidance

1. 15A NCAC 2D .0516 "Sulfur Dioxide Emissions from Combustion Sources"
   a. Emissions of sulfur dioxide from the flare (ES-04) shall not exceed 2.3 pounds per million Btu heat input. Sulfur dioxide formed by the combustion of sulfur in fuels, wastes, ores, and other substances shall be included when determining compliance with this standard. [15A NCAC 02D .0516]

   Testing [15A NCAC 2Q .0508(f)]
   b. If emission testing is required, the testing shall be performed in accordance with General Condition JJ.

   Monitoring/Recordkeeping/Reporting [15A NCAC 02Q .0508(f) and 15A NCAC .2D 2601]
   c. No monitoring, recordkeeping, or reporting is required for sulfur dioxide emissions from the firing of landfill gas in the flare.

2. 15A NCAC 2D .0521: Control of Visible Emissions
   a. Visible emissions from flare (ES-04) shall not be more than 20 percent opacity each when averaged over a six-minute period. However, six-minute averaging periods may exceed 20 percent not more than once in any hour and not more than four times in any 24-hour period. In no event shall the six-minute average exceed 87 percent opacity. [15A NCAC 2D .0521 (d)]

Testing [15A NCAC 2Q .0508(f)]

b. If emission testing is required, the testing shall be performed in accordance with General Condition JJ.

Monitoring [15A NCAC 2Q .0508(f)]

c. No monitoring, recordkeeping, or reporting is required for visible emissions from the firing of landfill gas in the flare.

B. Landfill gas-fired, lean burn, spark ignition engine/generator unit

- ES-EG1 (1468 hp engine output, 1060 kW output generator)
- ES-EG2 (1468 hp engine output, 1060 kW output generator)
- ES-EG3 (1468 hp engine output, 1060 kW output generator)

The following table provides a summary of limits and standards for the emission source(s) described above:

Regulated Pollutant	Limits/Standards	Applicable Regulation
Sulfur dioxide	2.3 pounds per million Btu heat input	15A NCAC 2D .0516
Visible emissions	20 percent opacity	15A NCAC 2D .0521
NOx, CO, VOC	NOx = 3.0 g/hp-hr CO = 5.0 g/hp-hr VOC = 1.0 g/hp-hr	15A NCAC 2D .0524 NSPS, Subpart JJJJ
NOx, CO, PM10/PM2.5, SO_2, VOCs, Lead, Mercury	BACT: CO = 3.0 g/hp-hr NOx = 0.6 g/hp-hr PM10/PM2.5 = 0.15 g/hp-hr SO_2 = burn landfill gas in engine VOCs = burn landfill gas in engine Lead = burn landfill gas in engine Mercury = burn landfill gas in engine	NC GS §62-133.8 (g) State BACT (SB-3), STATE ONLY
Hazardous air pollutants	Meet the requirements of NSPS, Subpart JJJJ	15A NCAC 2D .1111 MACT, Subpart ZZZZ [§63.6590(c)]

1. 15A NCAC 2D .0516 "Sulfur Dioxide Emissions from Combustion Sources"

a. Emissions of sulfur dioxide from these engines shall not exceed 2.3 pounds per million Btu heat input. Sulfur dioxide formed by the combustion of sulfur in fuels, wastes, ores, and other substances shall be included when determining compliance with this standard. [15A NCAC 2D .0516]

Testing [15A NCAC 2Q .0508(f)]

b. If emission testing is required, the testing shall be performed in accordance with General Condition JJ.

Monitoring/Recordkeeping/Reporting [15A NCAC 02Q .0508(f) and 15A NCAC 2D. 2601]

c. No monitoring, recordkeeping, or reporting is required for sulfur dioxide emissions from the firing of landfill gas in any engine.

2. 15A NCAC 2D .0524: New Source Performance Standards for Stationary Spark Ignition Internal Combustion Engines [40 CFR 60 Subpart JJJJ], "NOx, CO, VOC"

a. The Permittee shall comply with all applicable provisions, including the requirements for emission standards, notification, testing, reporting, record keeping, and monitoring, contained in Environmental Management Commission Standard 15A NCAC 2D .0524 "New Source Performance Standards (NSPS)" as promulgated in 40 CFR Part 60 Subpart JJJJ, including Subpart A "General Provisions." [15A NCAC 2D .0524]

Emission Standards

b. The Permittee shall comply with the following emission standards for spark ignition, landfill gas-fired generators.

Table 1 to NSPS, 40 CFR Part 60, Subpart JJJJ Standards for landfill gas-fired engines > 500 hp

Pollutant	Emission Standard (g/hp-hr) -or-	Emission Standard (ppmvd at 15% O_2)
NOx	3.0 g/hp-hr	220 ppmvd at 15% O_2
CO	5.0 g/hp-hr	610 ppmvd at 15% O_2
VOC	1.0 g/hp-hr	80 ppmvd at 15% O_2

c. Testing [15A NCAC 2Q .0508(f)]
If emission testing is required, the testing shall be performed in accordance with General Condition JJ. If the results of this test are above the limit given in Section 2.1 B. 2. b. above, the Permittee shall be deemed in noncompliance with 15A NCAC 2D .0524.

d. Monitoring [15A NCAC 2D .0524, 40 CFR §60.4233(e), §60.4243]
   i. Owners and operators of landfill gas-fired stationary spark ignition internal combustion engines with a maximum engine power greater than or equal to 75 KW (100 HP) shall comply with the emission standards in Table 1 of 40 CFR Part 60, Subpart JJJJ. For owners and operators of stationary SI ICE with a maximum engine power greater than or equal to 100 HP manufactured prior to January 1, 2011 that were certified to the certification emission standards in 40 CFR part 1048 applicable to engines that are not severe duty engines, if such stationary SI ICE was certified to a carbon monoxide (CO) standard above the standard in Table 1 to this subpart, then the owners and operators may meet the CO certification (not field testing) standard for which the engine was certified.
   ii. Owners and operators of landfill gas-fired stationary spark ignition internal combustion engines that are considered non certified engines shall demonstrate compliance as follows:
      (A) Keep maintenance plans and records of conducted maintenance and shall, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions.
      (B) An initial performance test shall be conducted within 1 year of engine startup and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, thereafter to demonstrate compliance. [15A NCAC 2Q .0508(f), 40 CFR §60.4214, §60.4243]

e. Recordkeeping/Reporting [15A NCAC 2Q .0508(f)]
Owners and operators of all stationary spark ignition internal combustion engines shall keep records of:
   i. All notifications submitted to comply with this subpart and all documentation supporting any notification.
      (A) Maintenance conducted on the engine.
      If the stationary SI internal combustion engine is not a certified engine or is a certified engine operating in a non-certified manner and subject to §60.4243(a)(2), documentation that the engine meets the emission standards.

3. 15A NCAC 2D .1111, 40 CFR Part 63, Subpart ZZZZ, "National Emissions Standards for Hazardous Air Pollutants for "New" Stationary Reciprocating Internal Combustion Engines (RICE) Located At an Area Source of HAPS
   - ES-EG1 - landfill gas-fired engine (1,468 hp output)/generator (1,060 kW output) unit
   - ES-EG2 - landfill gas-fired engine (1,468 hp output)/generator (1,060 kW output) unit
   - ES-EG3 - landfill gas-fired engine (1,468 hp output)/generator (1,060 kW output) unit

Emission Limitations/Monitoring/Reporting/Recordkeeping

a. Owners and operators of a new stationary RICE located at areas sources of HAP emissions shall meet the requirement of the final spark ignition (SI) NSPS (40 CFR Part 60, Subpart JJJJ), as appropriate.
   i. Compliance with 40 CFR Part 60, Subpart JJJJ meets the compliance requirements of 40 CFR Part 63, Subpart ZZZZ, for new SI RICE located at an area source of HAP emissions.

b. Area sources of HAP emissions may become major sources the area source increases its emissions or its potential to emit such that it becomes a major source of HAP as defined in 40 CFR 63.2, the compliance dates are as follows:
   i. Any stationary RICE for which construction or reconstruction is commenced after the date when an area source becomes a major source of HAP, the IC RICE must be in compliance with 40 CFR Part 63, Subpart ZZZZ upon startup of the affected source.
   ii. Any stationary RICE for which construction or reconstruction is commenced before the area source becomes a major source of HAP must be in compliance with 40 CFR Part 63, Subpart ZZZZ within 3 years after the area source becomes a major source of HAP.
   iii. Owning or operating an affected source requires that the applicable notification requirements in 40 CFR §63.6645 and in 40 CFR Part 63, Subpart A, are met.

2.2 - Multiple Emissions Section:

A. State BACT Analysis [NC GS §62-133.8 (g)] – **STATE ENFORCEABLE ONLY -**
In accordance with North Carolina General Statute §62-133.7 (g) the Permittee shall control the emissions of Carbon monoxide (CO), Nitrogen Oxides (NOx), Particulate Matter (PM10/PM2.5), Sulfur Dioxide (SO_2), Mercury (Hg), Lead (Pb), and Volatile Organic Compounds (VOCs) using Best Available Control Technology (BACT).

- ES-EG1 - landfill gas-fired engine (1,468 hp output)/generator (1,060 kW output) unit
- ES-EG2 - landfill gas-fired engine (1,468 hp output)/generator (1,060 kW output) unit
- ES-EG3 - landfill gas-fired engine (1,468 hp output)/generator (1,060 kW output) unit

1. Best Available Control Technology
   a. In order to comply with the best available control technology (BACT) determination pursuant to GS 62.133.8 (g) for Carbon Monoxide:
      - Carbon Monoxide shall be controlled from each engine using good combustion practices.
      - Carbon Monoxide emissions shall not exceed 3.0 g/hp-hr

   b. In order to comply with the best available control technology (BACT) determination pursuant to GS 62.133.8 (g) for Nitrogen Oxides:
      - Nitrogen Oxide shall be controlled from each engine using good combustion practices.
      - Nitrogen Oxide emissions shall not exceed 0.6 g/hp-hr.

   c. In order to comply with the best available control technology (BACT) determination pursuant to GS 62.133.8 (g) for PM10/PM2.5:
      - PM10/PM2.5 shall be controlled from each engine using good combustion practices.
      - PM10/PM2.5 emissions shall not exceed 0.15 g/hp-hr.

   d. In order to comply with the best available control technology (BACT) determination pursuant to GS 62.133.8 (g) for Sulfur Dioxide:
      - Sulfur Dioxide shall be controlled from each engine using good combustion practices and the burning of landfill gas in each engine.

   e. In order to comply with the best available control technology (BACT) determination pursuant to GS §62.133.8 (g) for Volatile Organic Compounds:
      - Volatile Organic Compounds shall be controlled from each engine using good combustion practices and the burning of landfill gas in each engine.

f. In order to comply with the best available control technology (BACT) determination pursuant to GS 62.133.8 (g) for Mercury:
   - Mercury shall be controlled from each engine using good combustion practices and the burning of landfill gas in each engine.

g. In order to comply with the best available control technology (BACT) determination pursuant to GS 62.133.8 (g) for Lead:
   - Lead shall be controlled from each engine using good combustion practices and the burning of landfill gas in each engine.

2. If emission testing is required, the testing shall be performed in accordance with 15A NCAC 2D .2602 and General Condition 18 of the Permit. If the results of this test are above the applicable limit, the Permittee shall be deemed in noncompliance with GS §62-133.7(g).

3. To assure compliance, the Permittee shall purchase an engine that meets the limitations of BACT and the Permittee shall perform inspections and maintenance as recommended by the manufacturer. In addition to the manufacturer's inspection and maintenance recommendations, or if there is no manufacturer's inspection and maintenance recommendations, as a minimum, the inspection and maintenance requirement shall include the following:
   a. The results of inspection and maintenance shall be maintained in a logbook (written or electronic format) on-site and made available to an authorized representative upon request. The logbook shall record the following:
      i. The date and time of each recorded action;
      ii. The results of each inspection;
      iii. The results of any maintenance performed on the engines;
      iv. Any variance from manufacturer's recommendations, if any, and corrections made.

<u>Reporting Requirements</u> [15A NCAC 2Q .0508(f)]

4. The Permittee shall maintain a monthly summary report, acceptable to the Regional Air Quality Supervisor, of monitoring and recordkeeping listed above and shall submit the results within 30 days of a written request by the DAQ.

SECTION 3 - GENERAL CONDITIONS {version 3.6 (01/31/12)}

This section describes terms and conditions applicable to this Title V facility.

A. General Provisions [NCGS 143-215 and 15A NCAC 2Q .0508(i)(16)]

1. Terms not otherwise defined in this permit shall have the meaning assigned to such terms as defined in 15A NCAC 2D and 2Q.
2. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are binding and enforceable pursuant to NCGS 143-215.114A and 143-215.114B, including assessment of civil and/or criminal penalties. Any unauthorized deviation from the conditions of this permit may constitute grounds for revocation and/or enforcement action by the DAQ.
3. This permit is not a waiver of or approval of any other Department permits that may be required for other aspects of the facility which are not addressed in this permit.
4. This permit does not relieve the Permittee from liability for harm or injury to human health or welfare, animal or plant life, or property caused by the construction or operation of this permitted facility, or from penalties therefore, nor does it allow the Permittee to cause pollution in contravention of state laws or rules, unless specifically authorized by an order from the North Carolina Environmental Management Commission.
5. Except as identified as state-only requirements in this permit, all terms and conditions contained herein shall be enforceable by the DAQ, the EPA, and citizens of the United States as defined in the Federal Clean Air Act.
6. Any stationary source of air pollution shall not be operated, maintained, or modified without the appropriate and valid permits issued by the DAQ, unless the source is exempted by rule. The DAQ may issue a permit only after it receives reasonable assurance that the installation will not cause air pollution in violation of any of the applicable requirements. A permitted installation may only be operated, maintained, constructed, expanded, or modified in a manner that is consistent with the terms of this permit.

B. Permit Availability [15A NCAC 2Q .0507(k) and .0508(i)(9)(B)]

The Permittee shall have available at the facility a copy of this permit and shall retain for the duration of the permit term one complete copy of the application and any information submitted in support of the application package. The permit and application shall be made available to an authorized representative of Department of Environment and Natural Resources upon request.

C. Severability Clause [15A NCAC 2Q .0508(i)(2)]

In the event of an administrative challenge to a final and binding permit in which a condition is held to be invalid, the provisions in this permit are severable so that all requirements contained in the permit, except those held to be invalid, shall remain valid and must be complied with.

D. Submissions [15A NCAC 2Q .0507(e) and 2Q .0508(i)(16)]

Except as otherwise specified herein, two copies of all documents, reports, test data, monitoring data, notifications, request for renewal, and any other information required by this permit shall be submitted to the appropriate Regional Office. Refer to the Regional Office address on the cover page of this permit. For continuous emissions monitoring systems (CEMS) reports, continuous opacity monitoring systems (COMS) reports, quality assurance (QA)/quality control (QC) reports, acid rain CEM certification reports, and NOx budget CEM certification reports, one copy shall be sent to the appropriate Regional Office and one copy shall be sent to:

Supervisor, Stationary Source Compliance
North Carolina Division of Air Quality
1641 Mail Service Center
Raleigh, NC 27699-1641

All submittals shall include the facility name and Facility ID number (refer to the cover page of this permit).

E. Duty to Comply [15A NCAC 2Q .0508(i)(3)]

The Permittee shall comply with all terms, conditions, requirements, limitations and restrictions set forth in this permit. Noncompliance with any permit condition except conditions identified as state-only requirements constitutes a violation of the Federal Clean Air Act. Noncompliance with any permit condition is grounds for enforcement action, for permit termination, revocation and reissuance, or modification, or for denial of a permit renewal application.

F. Circumvention - STATE ENFORCEABLE ONLY
The facility shall be properly operated and maintained at all times in a manner that will effect an overall reduction in air pollution. Unless otherwise specified by this permit, no emission source may be operated without the concurrent operation of its associated air pollution control device(s) and appurtenances.

G. Permit Modifications
1. Administrative Permit Amendments [15A NCAC 2Q .0514]
The Permittee shall submit an application for an administrative permit amendment in accordance with 15A NCAC 2Q .0514.
2. Transfer in Ownership or Operation and Application Submittal Content [15A NCAC 2Q .0524 and 2Q .0505]
The Permittee shall submit an application for an ownership change in accordance with 15A NCAC 2Q.0524 and 2Q .0505.
3. Minor Permit Modifications [15A NCAC 2Q .0515]
The Permittee shall submit an application for a minor permit modification in accordance with 15A NCAC 2Q .0515.
4. Significant Permit Modifications [15A NCAC 2Q .0516]
The Permittee shall submit an application for a significant permit modification in accordance with 15A NCAC 2Q .0516.
5. Reopening for Cause [15A NCAC 2Q .0517]
The Permittee shall submit an application for reopening for cause in accordance with 15A NCAC 2Q .0517.

H. Changes Not Requiring Permit Modifications
1. Reporting Requirements
Any of the following that would result in new or increased emissions from the emission source(s) listed in Section 1 must be reported to the Regional Supervisor, DAQ:
a. changes in the information submitted in the application;
b. changes that modify equipment or processes; or
c. changes in the quantity or quality of materials processed.

If appropriate, modifications to the permit may then be made by the DAQ to reflect any necessary changes in the permit conditions. In no case are any new or increased emissions allowed that will cause a violation of the emission limitations specified herein.

2. Section 502(b)(10) Changes [15A NCAC 2Q .0523(a)]
a. "Section 502(b)(10) changes" means changes that contravene an express permit term or condition. Such changes do not include changes that would violate applicable requirements or contravene federally enforceable permit terms and conditions that are monitoring (including test methods), recordkeeping, reporting, or compliance certification requirements.
b. The Permittee may make Section 502(b)(10) changes without having the permit revised if:
i. the changes are not a modification under Title I of the Federal Clean Air Act;
ii. the changes do not cause the allowable emissions under the permit to be exceeded;
iii. the Permittee notifies the Director and EPA with written notification at least seven days before the change is made; and
iv. the Permittee shall attach the notice to the relevant permit.
c. The written notification shall include:
i. a description of the change;
ii. the date on which the change will occur;
iii. any change in emissions; and
iv. any permit term or condition that is no longer applicable as a result of the change.
d. Section 502(b)(10) changes shall be made in the permit the next time that the permit is revised or renewed, whichever comes first.
3. Off Permit Changes [15A NCAC 2Q .0523(b)]
The Permittee may make changes in the operation or emissions without revising the permit if:
a. the change affects only insignificant activities and the activities remain insignificant after the change; or
b. the change is not covered under any applicable requirement.

4. Emissions Trading [15A NCAC 2Q .0523(c)]
   To the extent that emissions trading is allowed under 15A NCAC 2D, including subsequently adopted maximum achievable control technology standards, emissions trading shall be allowed without permit revision pursuant to 15A NCAC 2Q .0523(c).

I.A. Reporting Requirements for Excess Emissions and Permit Deviations
[15A NCAC 2D .0535(f) and 2Q .0508(f)(2)]
"Excess Emissions" - means an emission rate that exceeds any applicable emission limitation or standard allowed by any rule in Sections .0500, .0900, .1200, or .1400 of Subchapter 2D; or by a permit condition; or that exceeds an emission limit established in a permit issued under 15A NCAC 2Q .0700. *(Note: Definitions of excess emissions under 2D .1110 and 2D .1111 shall apply where defined by rule.)*
"Deviations" - for the purposes of this condition, any action or condition not in accordance with the terms and conditions of this permit including those attributable to upset conditions as well as excess emissions as defined above lasting less than four hours.

Excess Emissions

1. If a source is required to report excess emissions under NSPS (15A NCAC 2D .0524), NESHAPS (15A NCAC 2D .1110 or .1111), or the operating permit provides for periodic (e.g., quarterly) reporting of excess emissions, reporting shall be performed as prescribed therein.
2. If the source is not subject to NSPS (15A NCAC 2D .0524), NESHAPS (15A NCAC 2D .1110 or .1111), or these rules do NOT define "excess emissions," the Permittee shall report excess emissions in accordance with 15A NCAC 2D .0535 as follows:
   a. Pursuant to 15A NCAC 2D .0535, if excess emissions last for more than four hours resulting from a malfunction, a breakdown of process or control equipment, or any other abnormal condition, the owner or operator shall:
      i. notify the Regional Supervisor or Director of any such occurrence by 9:00 a.m. Eastern Time of the Division's next business day of becoming aware of the occurrence and provide:
         - name and location of the facility;
         - nature and cause of the malfunction or breakdown;
         - time when the malfunction or breakdown is first observed;
         - expected duration; and
         - estimated rate of emissions;
      ii. notify the Regional Supervisor or Director immediately when corrective measures have been accomplished; and
      iii. submit to the Regional Supervisor or Director within 15 days a written report as described in 15A NCAC 2D .0535(f)(3).

Permit Deviations

3. Pursuant to 15A NCAC 2Q .0508(f)(2), the Permittee shall report deviations from permit requirements (terms and conditions) as follows:
   a. Notify the Regional Supervisor or Director of all other deviations from permit requirements not covered under 15A NCAC 2D .0535 quarterly. A written report to the Regional Supervisor shall include the probable cause of such deviation and any corrective actions or preventative actions taken. The responsible official shall certify all deviations from permit requirements.

I.B. Other Requirements under 15A NCAC 2D .0535
The Permittee shall comply with all other applicable requirements contained in 15A NCAC 2D .0535, including 15A NCAC 2D .0535(c) as follows:

1. Any excess emissions that do not occur during start-up and shut-down shall be considered a violation of the appropriate rule unless the owner or operator of the sources demonstrates to the Director, that the excess emissions are a result of a malfunction. The Director shall consider, along with any other pertinent information, the criteria contained in 15A NCAC 2D .0535(c)(1) through (7).
2. 15A NCAC 2D .0535(g). Excess emissions during start-up and shut-down shall be considered a violation of the appropriate rule if the owner or operator cannot demonstrate that excess emissions are unavoidable.

J. Emergency Provisions [40 CFR 70.6(g)]

The Permittee shall be subject to the following provisions with respect to emergencies:

1. An emergency means any situation arising from sudden and reasonably unforeseeable events beyond the control of the facility, including acts of God, which situation requires immediate corrective action to restore normal operation, and that causes the facility to exceed a technology-based emission limitation under the permit, due to unavoidable increases in emissions attributable to the emergency. An emergency shall not include noncompliance to the extent caused by improperly designed equipment, lack of preventive maintenance, careless or improper operation, or operator error.
2. An emergency constitutes an affirmative defense to an action brought for noncompliance with such technology-based emission limitations if the conditions specified in 3, below, are met.
3. The affirmative defense of emergency shall be demonstrated through properly signed contemporaneous operating logs or other relevant evidence that include information as follows:
   a. an emergency occurred and the Permittee can identify the cause(s) of the emergency;
   b. the permitted facility was at the time being properly operated;
   c. during the period of the emergency the Permittee took all reasonable steps to minimize levels of emissions that exceeded the standards or other requirements in the permit; and
   d. the Permittee submitted notice of the emergency to the DAQ within two working days of the time when emission limitations were exceeded due to the emergency. This notice must contain a description of the emergency, steps taken to mitigate emissions, and corrective actions taken.
4. In any enforcement proceeding, the Permittee seeking to establish the occurrence of an emergency has the burden of proof.
5. This provision is in addition to any emergency or upset provision contained in any applicable requirement specified elsewhere herein.

K. Permit Renewal [15A NCAC 2Q .0508(e) and 2Q .0513(b)]

This 15A NCAC 2Q .0500 permit is issued for a fixed term not to exceed five years and shall expire at the end of its term. Permit expiration terminates the facility's right to operate unless a complete 15A NCAC 2Q .0500 renewal application is submitted at least nine months before the date of permit expiration. If the Permittee or applicant has complied with 15A NCAC 2Q .0512(b)(1), this 15A NCAC 2Q .0500 permit shall not expire until the renewal permit has been issued or denied. Permit expiration under 15A NCAC 2Q .0400 terminates the facility's right to operate unless a complete 15A NCAC 2Q .0400 renewal application is submitted at least six months before the date of permit expiration for facilities subject to 15A NCAC 2Q .0400 requirements. In either of these events, all terms and conditions of these permits shall remain in effect until the renewal permits have been issued or denied.

L. Need to Halt or Reduce Activity Not a Defense [15A NCAC 2Q .0508(i)(4)]

It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

M. Duty to Provide Information (submittal of information) [15A NCAC 2Q .0508(i)(9)]

1. The Permittee shall furnish to the DAQ, in a timely manner, any reasonable information that the Director may request in writing to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit or to determine compliance with the permit.
2. The Permittee shall furnish the DAQ copies of records required to be kept by the permit when such copies are requested by the Director. For information claimed to be confidential, the Permittee may furnish such records directly to the EPA upon request along with a claim of confidentiality.

N. Duty to Supplement [15A NCAC 2Q .0507(f)]

The Permittee, upon becoming aware that any relevant facts were omitted or incorrect information was submitted in the permit application, shall promptly submit such supplementary facts or corrected information to the DAQ. The Permittee shall also provide additional information as necessary to address any requirement that becomes applicable to the facility after the date a complete permit application was submitted but prior to the release of the draft permit.

O. Retention of Records [15A NCAC 2Q .0508(f) and 2Q .0508 (l)]
The Permittee shall retain records of all required monitoring data and supporting information for a period of at least five years from the date of the monitoring sample, measurement, report, or application. Supporting information includes all calibration and maintenance records and all original strip-chart recordings for continuous monitoring information, and copies of all reports required by the permit. These records shall be maintained in a form suitable and readily available for expeditious inspection and review. Any records required by the conditions of this permit shall be kept on site and made available to DAQ personnel for inspection upon request.

P. Compliance Certification [15A NCAC 2Q .0508(n)]
The Permittee shall submit to the DAQ and the EPA (Air and EPCRA Enforcement Branch, EPA, Region 4, 61 Forsyth Street, Atlanta, GA 30303) postmarked on or before March 1 a compliance certification (for the preceding calendar year) by a responsible official with all federally-enforceable terms and conditions in the permit, including emissions limitations, standards, or work practices. It shall be the responsibility of the current owner to submit a compliance certification for the entire year regardless of who owned the facility during the year. The compliance certification shall comply with additional requirements as may be specified under Sections 114(a)(3) or 504(b) of the Federal Clean Air Act. The compliance certification shall specify:
1. the identification of each term or condition of the permit that is the basis of the certification;
2. the compliance status (with the terms and conditions of the permit for the period covered by the certification);
3. whether compliance was continuous or intermittent; and
4. the method(s) used for determining the compliance status of the source during the certification period.

Q. Certification by Responsible Official [15A NCAC 2Q .0520]
A responsible official shall certify the truth, accuracy, and completeness of any application form, report, or compliance certification required by this permit. All certifications shall state that based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

R. Permit Shield for Applicable Requirements [15A NCAC 2Q .0512]
1. Compliance with the terms and conditions of this permit shall be deemed compliance with applicable requirements, where such applicable requirements are included and specifically identified in the permit as of the date of permit issuance.
2. A permit shield shall not alter or affect:
   a. the power of the Commission, Secretary of the Department, or Governor under NCGS 143-215.3(a)(12), or EPA under Section 303 of the Federal Clean Air Act;
   b. the liability of an owner or operator of a facility for any violation of applicable requirements prior to the effective date of the permit or at the time of permit issuance;
   c. the applicable requirements under Title IV; or
   d. the ability of the Director or the EPA under Section 114 of the Federal Clean Air Act to obtain information to determine compliance of the facility with its permit.
3. A permit shield does not apply to any change made at a facility that does not require a permit or permit revision made under 15A NCAC 2Q .0523.
4. A permit shield does not extend to minor permit modifications made under 15A NCAC 2Q .0515.

S. Termination, Modification, and Revocation of the Permit [15A NCAC 2Q .0519]
The Director may terminate, modify, or revoke and reissue this permit if:
1. the information contained in the application or presented in support thereof is determined to be incorrect;
2. the conditions under which the permit or permit renewal was granted have changed;
3. violations of conditions contained in the permit have occurred;
4. the EPA requests that the permit be revoked under 40 CFR 70.7(g) or 70.8(d); or
5. the Director finds that termination, modification, or revocation and reissuance of the permit is necessary to carry out the purpose of NCGS Chapter 143, Article 21B.

T. Insignificant Activities [15A NCAC 2Q .0503]
Because an emission source or activity is insignificant does not mean that the emission source or activity is exempted from any applicable requirement or that the owner or operator of the source is exempted from demonstrating compliance with any applicable requirement. The Permittee shall have available at the facility at all times and made available to an authorized representative upon request, documentation, including calculations, if necessary, to demonstrate that an emission source or activity is insignificant.

U. Property Rights [15A NCAC 2Q .0508(i)(8)]
This permit does not convey any property rights in either real or personal property or any exclusive privileges.

V. Inspection and Entry [15A NCAC 2Q .0508(l) and NCGS 143-215.3(a)(2)]
1. Upon presentation of credentials and other documents as may be required by law, the Permittee shall allow the DAQ, or an authorized representative, to perform the following:
   a. enter the Permittee's premises where the permitted facility is located or emissions-related activity is conducted, or where records are kept under the conditions of the permit;
   b. have access to and copy, at reasonable times, any records that are required to be kept under the conditions of the permit;
   c. inspect at reasonable times and using reasonable safety practices any source, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under the permit; and
   d. sample or monitor substances or parameters, using reasonable safety practices, for the purpose of assuring compliance with the permit or applicable requirements at reasonable times.

   Nothing in this condition shall limit the ability of the EPA to inspect or enter the premises of the Permittee under Section 114 or other provisions of the Federal Clean Air Act.
2. No person shall refuse entry or access to any authorized representative of the DAQ who requests entry for purposes of inspection, and who presents appropriate credentials, nor shall any person obstruct, hamper, or interfere with any such authorized representative while in the process of carrying out his official duties. Refusal of entry or access may constitute grounds for permit revocation and assessment of civil penalties.

W. Annual Fee Payment [15A NCAC 2Q .0508(i)(10)]
1. The Permittee shall pay all fees in accordance with 15A NCAC 2Q .0200.
2. Payment of fees may be by check or money order made payable to the NC Department of Environment and Natural Resources. Annual permit fee payments shall refer to the permit number.
3. If, within 30 days after being billed, the Permittee fails to pay an annual fee, the Director may initiate action to terminate the permit under 15A NCAC 2Q .0519.

X. Annual Emission Inventory Requirements [15A NCAC 2Q .0207]
The Permittee shall report by June 30 of each year the actual emissions of each air pollutant listed in 15A NCAC 2Q .0207(a) from each emission source within the facility during the previous calendar year. The report shall be in or on such form as may be established by the Director. The accuracy of the report shall be certified by a responsible official of the facility.

Y. Confidential Information [15A NCAC 2Q .0107 and 2Q. 0508(i)(9)]
Whenever the Permittee submits information under a claim of confidentiality pursuant to 15A NCAC 2Q .0107, the Permittee may also submit a copy of all such information and claim directly to the EPA upon request. All requests for confidentiality must be in accordance with 15A NCAC 2Q .0107.

Z. Construction and Operation Permits [15A NCAC 2Q .0100 and .0300]
A construction and operating permit shall be obtained by the Permittee for any proposed new or modified facility or emission source which is not exempted from having a permit prior to the beginning of construction or modification, in accordance with all applicable provisions of 15A NCAC 2Q .0100 and .0300.

AA. Standard Application Form and Required Information [15A NCAC 2Q .0505 and .0507]
The Permittee shall submit applications and required information in accordance with the provisions of 15A NCAC 2Q .0505 and .0507.

BB. Financial Responsibility and Compliance History [15A NCAC 2Q .0507(d)(4)]
The DAQ may require an applicant to submit a statement of financial qualifications and/or a statement of substantial compliance history.

CC. Refrigerant Requirements (Stratospheric Ozone and Climate Protection) [15A NCAC 2Q .0501(e)]

1. If the Permittee has appliances or refrigeration equipment, including air conditioning equipment, which use Class I or II ozone-depleting substances such as chlorofluorocarbons and hydrochlorofluorocarbons listed as refrigerants in 40 CFR Part 82 Subpart A Appendices A and B, the Permittee shall service, repair, and maintain such equipment according to the work practices, personnel certification requirements, and certified recycling and recovery equipment specified in 40 CFR Part 82 Subpart F.
2. The Permittee shall not knowingly vent or otherwise release any Class I or II substance into the environment during the repair, servicing, maintenance, or disposal of any such device except as provided in 40 CFR Part 82 Subpart F.
3. The Permittee shall comply with all reporting and recordkeeping requirements of 40 CFR 82.166. Reports shall be submitted to the EPA or its designee as required.

DD. Prevention of Accidental Releases - Section 112(r) [15A NCAC 2Q .0508(h)]
If the Permittee is required to develop and register a Risk Management Plan with EPA pursuant to Section 112(r) of the Clean Air Act, then the Permittee is required to register this plan in accordance with 40 CFR Part 68.

EE. Prevention of Accidental Releases General Duty Clause - Section 112(r)(1) -
FEDERALLY-ENFORCEABLE ONLY
Although a risk management plan may not be required, if the Permittee produces, processes, handles, or stores any amount of a listed hazardous substance, the Permittee has a general duty to take such steps as are necessary to prevent the accidental release of such substance and to minimize the consequences of any release.

FF. Title IV Allowances [15A NCAC 2Q .0508(i)(1)]
This permit does not limit the number of Title IV allowances held by the Permittee, but the Permittee may not use allowances as a defense to noncompliance with any other applicable requirement. The Permittee's emissions may not exceed any allowances that the facility lawfully holds under Title IV of the Federal Clean Air Act.

GG. Air Pollution Emergency Episode [15A NCAC 2D .0300]
Should the Director of the DAQ declare an Air Pollution Emergency Episode, the Permittee will be required to operate in accordance with the Permittee's previously approved Emission Reduction Plan or, in the absence of an approved plan, with the appropriate requirements specified in 15A NCAC 2D .0300.

HH Registration of Air Pollution Sources [15A NCAC 2D .0202]
The Director of the DAQ may require the Permittee to register a source of air pollution. If the Permittee is required to register a source of air pollution, this registration and required information will be in accordance with 15A NCAC 2D .0202(b).

II. Ambient Air Quality Standards [15A NCAC 2D .0501(c)]
In addition to any control or manner of operation necessary to meet emission standards specified in this permit, any source of air pollution shall be operated with such control or in such manner that the source shall not cause the ambient air quality standards in 15A NCAC 2D .0400 to be exceeded at any point beyond the premises on which the source is located. When controls more stringent than named in the applicable emission standards in this permit are required to prevent violation of the ambient air quality standards or are required to create an offset, the permit shall contain a condition requiring these controls.

JJ. General Emissions Testing and Reporting Requirements [15A NCAC 2Q .0508(i)(16)]
Emission compliance testing shall be by the procedures of Section .2600, except as may be otherwise required in Rules .0524, .0912, .1110, .1111, or .1415 of Subchapter 2D. If emissions testing is required by this permit or the DAQ or if the Permittee submits emissions testing to the DAQ to demonstrate compliance, the Permittee shall perform such testing in accordance with 15A NCAC 2D .2600 and follow the procedures outlined below:

1. The owner or operator of the source shall arrange for air emission testing protocols to be provided to the Director prior to air pollution testing. Testing protocols are not required to be pre-approved by the Director prior to air pollution testing. The Director shall review air emission testing protocols for pre-approval prior to testing if requested by the owner or operator at least 45 days before conducting the test.
2. Any person proposing to conduct an emissions test to demonstrate compliance with an applicable standard shall notify the Director at least 15 days before beginning the test so that the Director may at his option observe the test.
3. The owner or operator of the source shall arrange for controlling and measuring the production rates during the period of air testing. The owner or operator of the source shall ensure that the equipment or process being tested is operated at the production rate that best fulfills the purpose of the test. The individual conducting the emission test shall describe the procedures used to obtain accurate process data and include in the test report the average production rates determined during each testing period.
4. Two copies of the final air emission test report shall be submitted to the Director not later than 30 days after sample collection unless otherwise specified in the specific conditions. The owner or operator may request an extension to submit the final test report. The Director shall approve an extension request if he finds that the extension request is a result of actions beyond the control of the owner or operator.
   a. The Director shall make the final determination regarding any testing procedure deviation and the validity of the compliance test. The Director may:
      (1) Allow deviations from a method specified under a rule in this Section if the owner or operator of the source being tested demonstrates to the satisfaction of the Director that the specified method is inappropriate for the source being tested.
      (2) Prescribe alternate test procedures on an individual basis when he finds that the alternative method is necessary to secure more reliable test data.
      (3) Prescribe or approve methods on an individual basis for sources or pollutants for which no test method is specified in this Section if the methods can be demonstrated to determine compliance of permitted emission sources or pollutants.
   b. The Director may authorize the Division of Air Quality to conduct independent tests of any source subject to a rule in this Subchapter to determine the compliance status of that source or to verify any test data submitted relating to that source. Any test conducted by the Division of Air Quality using the appropriate testing procedures described in Section 2D .2600 has precedence over all other tests.

KK. Reopening for Cause [15A NCAC 2Q .0517]

1. A permit shall be reopened and revised under the following circumstances:
   a. additional applicable requirements become applicable to a facility with remaining permit term of three or more years;
   b. additional requirements (including excess emission requirements) become applicable to a source covered by Title IV;
   c. the Director or EPA finds that the permit contains a material mistake or that inaccurate statements were made in establishing the emissions standards or other terms or conditions of the permit; or
   d. the Director or EPA determines that the permit must be revised or revoked to assure compliance with the applicable requirements.
2. Any permit reopening shall be completed or a revised permit issued within 18 months after the applicable requirement is promulgated. No reopening is required if the effective date of the requirement is after the expiration of the permit term unless the term of the permit was extended pursuant to 15A NCAC 2Q .0513(c).
3. Except for the state-enforceable only portion of the permit, the procedures set out in 15A NCAC 2Q .0507, .0521, or .0522 shall be followed to reissue the permit. If the State-enforceable only portion of the permit is reopened, the procedures in 15A NCAC 2Q .0300 shall be followed. The proceedings shall affect only those parts of the permit for which cause to reopen exists.

4. The Director shall notify the Permittee at least 60 days in advance of the date that the permit is to be reopened, except in cases of imminent threat to public health or safety the notification period may be less than 60 days.
5. Within 90 days, or 180 days if the EPA extends the response period, after receiving notification from the EPA that a permit needs to be terminated, modified, or revoked and reissued, the Director shall send to the EPA a proposed determination of termination, modification, or revocation and reissuance, as appropriate.

LL. Reporting Requirements for Non-Operating Equipment [15A NCAC 2Q .0508(i)(16)]
The Permittee shall maintain a record of operation for permitted equipment noting whenever the equipment is taken from and placed into operation. During operation the monitoring recordkeeping and reporting requirements as prescribed by the permit shall be implemented within the monitoring period.

MM. Fugitive Dust Control Requirement [15A NCAC 2D .0540] - STATE ENFORCEABLE ONLY
As required by 15A NCAC 2D .0540 "Particulates from Fugitive Dust Emission Sources," the Permittee shall not cause or allow fugitive dust emissions to cause or contribute to substantive complaints or excess visible emissions beyond the property boundary. If substantive complaints or excessive fugitive dust emissions from the facility are observed beyond the property boundaries for six minutes in any one hour (using Reference Method 22 in 40 CFR, Appendix A), the owner or operator may be required to submit a fugitive dust plan as described in 2D .0540(f).
"Fugitive dust emissions" means particulate matter from process operations that does not pass through a process stack or vent and that is generated within plant property boundaries from activities such as: unloading and loading areas, process areas stockpiles, stock pile working, plant parking lots, and plant roads (including access roads and haul roads).

NN. Specific Permit Modifications [15A NCAC 2Q.0501 and .0523]
1. For modifications made pursuant to 15A NCAC 2Q .0501(c)(2), the Permittee shall file a Title V Air Quality Permit Application for the air emission source(s) and associated air pollution control device(s) on or before 12 months after commencing operation.
2. For modifications made pursuant to 15A NCAC 2Q .0501(d)(2), the Permittee shall not begin operation of the air emission source(s) and associated air pollution control device(s) until a Title V Air Quality Permit Application is filed and a construction and operation permit following the procedures of Section .0500 (except for Rule .0504 of this Section) is obtained.
3. For modifications made pursuant to 502(b)(10), in accordance with 15A NCAC 2Q .0523(a)(1)(C), the Permittee shall notify the Director and EPA (EPA - Air Planning Branch, 61 Forsyth St., Atlanta, GA 30303) in writing at least seven days before the change is made. The written notification shall include:
   a. a description of the change at the facility;
   b. the date on which the change will occur;
   c. any change in emissions; and
   d. any permit term or condition that is no longer applicable as a result of the change.

   In addition to this notification requirement, with the next significant modification or Air Quality Permit renewal, the Permittee shall submit a page "E5" of the application forms signed by the responsible official verifying that the application for the 502(b)(10) change/modification, is true, accurate, and complete. Further note that modifications made pursuant to 502(b)(10) do not relieve the Permittee from satisfying preconstruction requirements.

OO. Third Party Participation and EPA Review [15A NCAC 2Q .0521, .0522 and .0525(7)]
For permits modifications subject to 45-day review by the federal Environmental Protection Agency (EPA), EPA's decision to not object to the proposed permit is considered final and binding on the EPA and absent a third party petition, the failure to object is the end of EPA's decision-making process with respect to the revisions to the permit. The time period available to submit a public petition pursuant to 15A NCAC 2Q .0518 begins at the end of the 45-day EPA review period.

ATTACHMENT

List of Acronyms

AOS	Alternate Operating Scenario
BACT	Best Available Control Technology
Btu	British thermal unit
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CEM	Continuous Emission Monitor
CFR	Code of Federal Regulations
DAQ	Division of Air Quality
DENR	Department of Environment and Natural Resources
EMC	Environmental Management Commission
EPA	Environmental Protection Agency
FR	Federal Register
GACT	Generally Available Control Technology
HAP	Hazardous Air Pollutant
MACT	Maximum Achievable Control Technology
NAA	Non-Attainment Area
NCAC	North Carolina Administrative Code
NCGS	North Carolina General Statutes
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NO_X	Nitrogen Oxides
NSPS	New Source Performance Standard
OAH	Office of Administrative Hearings
PM	Particulate Matter
PM_{10}	Particulate Matter with Nominal Aerodynamic Diameter of 10 Micrometers or Less
POS	Primary Operating Scenario
PSD	Prevention of Significant Deterioration
RACT	Reasonably Available Control Technology
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
tpy	Tons Per Year
VOC	Volatile Organic Compound