DURHAM
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CITY OF MEDICINE

CITY OF DURHAM | NORTH CAROLINA

Permit No.	Date	Document ID No.
32-01	**June 30, 2016,**	**26386**

June 29, 2016

Ms Sarah Rice
Solid Waste Section
DENR – Division of Waste Management
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

Received by an -email
Date: **June 30, 2016**
Solid Waste Section
Raleigh Central Office

Dear Ms Rice:

I am the chief financial officer of the City of Durham, North Carolina, 101 City Hall Plaza, Durham, North Carolina 27701. This letter is in support of this unit of local government's use of the financial test to demonstrate financial assurance, as specified in 15A NCAC 13B Rule .1628 (e)(1)(F).

This unit of local government is the owner or operator of the following facilities for which financial assurance for closure, post-closure or corrective action is demonstrated through the financial test specified in 15A NCAC 13B Rule .1628 (e)(1)(F). The current closure, post-closure, or corrective action cost estimates covered by the test are shown for each facility:

> Durham City Sanitary Landfill, permit no. 32-01, is located at 2115 East Club Boulevard, Durham, North Carolina. This facility closed in January 1998. The closure construction has been completed. The anticipated annual post-closure cost estimate is approximately $655,647.36 (in 2015 dollars assuming 1.4% inflation). With twelve (12) years of responsibility left, this represents a need for financial assurance for a total of $7,212,120.96.

The fiscal year of this unit of local government ends on June 30, 2015. The figures for the following items marked with an asterisk are derived from this unit of local government's Annual Financial Information Report (AFIR) for the latest completed fiscal year, ended June 30, 2015.

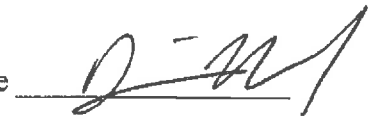
BOND RATING INDICATOR OF FINANCIAL STRENGTH

1. Sum of current closure, post-closure and corrective action cost estimates [total of all cost estimates shown in the paragraphs above]	$ 4,526,434.67
2. Current bond rating of most recent issuance and name of rating service	AAA Standard and Poor's Aaa Moody's AAA Fitch
3. Date of issuance bond	March 4, 2015
4. Date of maturity of bond	September 1, 2025
5. Assured environmental costs to demonstrate financial responsibility in the following amounts under Division rules:	
MSWLF under 15A NCAC 13B Section .1600	$ 7,212,120.96
Hazardous waste treatment, storage and disposal facilities under 15A NCAC 13A Rules .0009 and .0010	$ 0
Petroleum underground storage tanks under 15A NCAC 2N Sections .0100 - .0800	$ 0
Underground Injection Control System facilities under 15A NCAC 2D Section .0400 and 15A NCAC 2C Section .0200	$ 0
PCB commercial storage facilities under 15A NCAC 2O Section .0100 and 15A NCAC 2N Section .0100	$ 0
Total assured environmental costs	$ 7,212,120.96
*6. Total Annual Revenue (AFIR Part 2)	$399,526,319.00

Circle either "yes" or "no" to the following question.

7. Is line 5 divided by line 6 less than or equal to 0.43?	yes

I hereby certify that the wording of this letter is identical to the wording specified in 15A NCAC 13B .1628 (e)(2)(G) as such rules were constituted on the date shown immediately below. I further certify the following: (1) that the unit of local government has not operated at a total operating fund deficit equal to five percent or more of total annual revenue in either of the past two fiscal years, (2) that the unit of local government is not in default on any outstanding general obligations bonds or long-term obligations, and (3) does not have any outstanding general obligation bonds rated lower than Baa as issued by Moody's, BBB as issued by Standard & Poor's, BBB as issued by Fitch's, or 75 as issued by the Municipal Council.

Signature 

Name: David Boyd

Title: Finance Officer

Date: June 29, 2016

Chao, Ming-tai

From: Boyd, David <David.Boyd@durhamnc.gov>
Sent: Thursday, June 30, 2016 11:21 AM
To: Rice, Sarah M
Cc: Chao, Ming-tai; Green, Bryant
Subject: RE: FA meeting with City of Durham LF, 32-01
Attachments: Scan_20160630_110809.pdf

Sarah - See attached revised Financial Assurance...I believe these numbers are consistent with what Ming had indicated. Sorry for the delay.

David Boyd
Director
Finance Department, City of Durham
101 City Hall Plaza (Annex)
Durham, NC 27701

919-560-4455 ext. 18229

David.Boyd@DurhamNC.gov
www.DurhamNC.gov

E-mail correspondence to and from this sender may be subject to the North Carolina Public Records Law and can be disclosed to third parties.

From: Rice, Sarah M [mailto:sarah.rice@ncdenr.gov]
Sent: Tuesday, May 17, 2016 6:19 PM
To: Boyd, David
Cc: Chao, Ming-tai; Green, Bryant
Subject: RE: FA meeting with City of Durham LF, 32-01

Good evening David,

Friday would be perfect. Is there a number that would be best for us to call?

Regards,

Sarah M Rice

Compliance Officer

Field Operations Branch, Solid Waste Section

Division of Waste Management

NC Dept of Environmental Quality

919 707 8287 office/fax

sarah.rice@ncdenr.gov

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-------- Original message --------
From: "Boyd, David" <David.Boyd@durhamnc.gov>
Date: 5/16/16 4:19 PM (GMT-05:00)
To: "Rice, Sarah M" <sarah.rice@ncdenr.gov>
Cc: "Chao, Ming-tai" <ming.chao@ncdenr.gov>, "Green, Bryant" <Bryant.Green@durhamnc.gov>
Subject: RE: FA meeting with City of Durham LF, 32-01

Can we have a call at 10 a.m. on Friday the 20th?

David Boyd

Director

Finance Department, City of Durham

101 City Hall Plaza (Annex)

Durham, NC 27701

919-560-4455 ext. 18229

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www.DurhamNC.gov

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From: Rice, Sarah M [mailto:sarah.rice@ncdenr.gov]
Sent: Friday, May 13, 2016 10:44 AM
To: Boyd, David
Cc: Chao, Ming-tai
Subject: FW: FA meeting with City of Durham LF, 32-01

Good morning David,

I apologize for the time it has taken for me to get back to you on a contact. Bryant Green is the appropriate contact for a meeting. Ming Chao and I are available mid-morning through the afternoon on Thursday and Friday the 19th and 20th, and 26th and 27th.

Please let us know which days and what times would work best for both you and Bryant.

Thank you for your time and assistance.

Regards,

Sarah M Rice

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From: Chao, Ming-tai
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Hi Sarah:

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Ming

From: Chao, Ming-tai
Sent: Tuesday, May 03, 2016 9:18 AM
To: Rice, Sarah M <sarah.rice@ncdenr.gov>
Subject: FW: FA for Durham LF, 32-01

Hi Sarah:

The point of contact for the landfill are:

Mr. Simon Lobdell, P.E.

Department of Water Management, City of Durham

1600 Mist Lake Drive

Durham, NC 27704

Simon.lobdell@durhamnc.gov

(the info is shown the 2014 letter)

Or

Bryant Green, P.E.

City of Durham Water Management

Phone: 919-560-4381, ext. 35268

(his info shows on the latest CC list in the report/cover letter)

MIng

From: Chao, Ming-tai
Sent: Monday, May 02, 2016 3:27 PM
To: Rice, Sarah M <sarah.rice@ncdenr.gov>
Subject: Re: FA for Durham LF, 32-01

Hi Sarah:

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Thanks.

Ming Chao

From: Rice, Sarah M
Sent: Monday, May 2, 2016 11:42 AM
To: Chao, Ming-tai
Subject: RE: FA for Durham LF, 32-01

Ming, I talked to the Finance Director this morning. Who at the Solid waste section with the City of Durham would have requested FA numbers for the facility? He is trying to determine who would be best to pull into the meeting from the city.

Thanks,

Sarah M Rice

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Hi Sarah:

I need to know if the County agrees to add the new costs for O&M of the LFGGCs wells to the FA or if the County agrees to adopt the FA that I created. Please inform me the final decision so I can approve on the Certified Record Report of the 2014 LFGCCS expansion project at City Durham Landfill, 32-01. Thanks.

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Ming Chao

Ming-Tai Chao, P.E.
Environmental Engineer
Permitting Branch, Solid Waste Section
NCDEQ, Division of Waste Management
(Mailing Address)

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(Street Address)

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Tel. 919-707-8251
ming.chao@ncdenr.gov

http://portal.ncdenr.org/web/wm/sw

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Chao, Ming-tai

From: Boyd, David <David.Boyd@durhamnc.gov>
Sent: Wednesday, May 18, 2016 11:35 AM
To: Chao, Ming-tai; Rice, Sarah M
Cc: Green, Bryant
Subject: RE: FA meeting with City of Durham LF, 32-01

Call 919-560-1321

Bryant, I will try to conference you in unless you can come to my office.

David

From: Chao, Ming-tai [mailto:ming.chao@ncdenr.gov]
Sent: Wednesday, May 18, 2016 11:30 AM
To: Boyd, David; Rice, Sarah M
Cc: Green, Bryant
Subject: RE: FA meeting with City of Durham LF, 32-01

Dear Mr. Boyd:

Sarah and I will call you from her office at 10 a.m. on Friday because we are in the same building. Additionally, to assist you in preparing the meeting/call and ask questions, I forward you several documents & spreadsheet to review so we all can read/refer the same information.

1. Letter Approval of FA_2009. This letter approved the 2009-FY FA (in the amount of $6,502,362.36) for 30-yr post closure cares at the unlined Durham City MSWLF, Permit # 32-01. The 2009-FY FA amount is the basis for calculating the 2015-FY FA.

2. The spreadsheet (Durham_2015. pdf format) to show the 2015-FY FA (in the amount of $7,212,120.96) that Solid Waste Section think that the City of Durham should submit to the SWS for an approval. This spreadsheet provides the chorological events/activities inside the landfill facility after the landfill was closed in 1998 which trigger the increase of FA, in addition to the rule-required annually inflation adjustment. These activities are directly related to landfill gas operation/remediation – landfill gas collection and control systems (LFGCCS) and landfill gas to energy system (LFGTE) at the landfill and considered as the post-closure land uses or remediation. These activities may extend the prescribed 30-yr post-closure period (1998 – 2028) to a date beyond 2028 (when the LFGCCS or LFGTE are decommissioned). Although the extension of the prescribed post-closure periods is uncertain at this moment and depends on the landfill gas volume and O&M of the existing system. The costs for the decommissioning and/or removal of the installed LFGCCS and LFGTE are required (referring the attached document DIN 2248 and DIN 7319) and shall be added to the 2015-FY FA and future FA documents.

3. The attached last document is the 2015-FY FA letter issued by the City Of Durham. The FA amount is $4,526,434.67. The Solid Waste Section doesn't agree this number.

Sarah and I would like to discuss the financial assurance (FA) of the landfill with you and Mr. Green via the scheduled phone call. If you have any questions of the attached documents please contact me. Thanks and have a wonderful day.

Ming Chao
Ming-Tai Chao, P.E.
Environmental Engineer
Permitting Branch, Solid Waste Section
NCDEQ, Division of Waste Management
(Mailing Address)
1646 Mail Service Center
Raleigh, NC 27699-1646

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NCDENR
North Carolina Department of Environment and Natural Resources

Dexter Matthews, Director | Division of Waste Management | Beverly Eaves Perdue, Governor
Dee Freeman, Secretary

February 8, 2010

Keith Herrmann
Finance Officer
101 City Hall Plaza
4th Floor
Durham, NC 27701

Re: Local Government Financial Assurance for FY 2009
Durham City Sanitary Landfill, Permit #32-01

Dear Mr. Herrmann:

The Solid Waste Section has approved your financial mechanism dated December 1, 2009, for closure, post-closure, and corrective action costs.

Durham City Landfill Permit #32-01

Closure Costs	$0.00
Post Closure Costs	$6,502,362.36
Corrective Action	$0.00
Total	$6,502,362.36

Please contact me at (919) 508-8502, if you have any questions or concerns.

Sincerely,

Donald Herndon

Donald Herndon
Compliance Officer
Solid Waste Section

cc: Donald Long, City of Durham Solid Waste Director
Chris Marriott, Environmental Senior Specialist
Ming Chao, Permitting Engineer

1646 Mail Service Center, Raleigh, North Carolina 27699-1646
Phone: 919-508-8400 \ FAX: 919-715-4061 \ Internet: www.wastenotnc.org

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Chao, Ming-tai

From: Chao, Ming-tai
Sent: Friday, April 29, 2016 2:45 PM
To: Rice, Sarah M
Subject: FW: FA for Durham LF, 32-01
Attachments: Approval-City of Durham 2009.pdf; Durham_2015.xlsx; Scan__20160120_072509.pdf

Hi Sarah:

I need to know if the County agrees to add the new costs for O&M of the LFGGCs wells to the FA or if the County agrees to adopt the FA that I created. Please inform me the final decision so I can approve on the Certified Record Report of the 2014 LFGCCS expansion project at City Durham Landfill, 32-01. Thanks.

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Need closure letter/plan (one copy)
(in the Back)

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City Durham Landfill, Permit # 32-01

The Facility ceased receiving waste on 12/31/1997 (03/09/98 letter)
The Facility completed site closure in December 1998(?)

The LFGGCs system was installed in the closed landfill in the course of the site closure
Phase I LFGGCs installed 36 gas extraction wells -EW-1 through EW-36 in 1998
Phase II LFGGCs expansion installed 30 gas extraction wells -EW-37 through EW-66 (completion date is unknown)
A total of **66** wells were installed

The 2009 approved LFGTE system installed and operated in 2011. The system includes 3 gensets.
The decommissioning cost of the system that was drafted in approved work plan (DIN 7319) is $ **16,500.00**
In 2011 the system is operational, so the FA in FY- 2011 should include the decomissioning $$

The 2014 approved LFGCCs expansion and modification was completed in 2015 by installing .
16 new gas extraction wells - GW-1 through GW-16
The existing gas well EW-22 was replaced (at different location from the existing well)

According to S+G data (from Sampson Co), the cost to convert gas well to gas vent is **$150.00** per well

Financial Assurance info.

According to the Transition Plan (Page 3-8 December 1994), the FA for 30-yr post-closure was $ **8,477,000.00**
The approved FY-2009 FA the 30-yr post closure was **$6,502,362.36**
Note these two FA amount did not include any cost for decomissioning LFGCCs or LFGTE systems.

FY		Inflat. Factor	decomissioning gas well	decomissioning LFGTE	FA amount (in my calc)
2009	$6,502,362.36	1.022			
2010		1.012	$9,900.00		$ **6,590,409.51**
2011		1.01			$ **6,656,313.60**
2012		1.021		$ 16,500.00	$ **6,812,942.69**
2013		1.018			$ **6,935,575.66**
2014		1.015			$ **7,039,609.29**
2015		1.014			$ **7,138,163.82**

2016	1.01	$	2,550.00	$	**7,212,120.96**

FA submitted by the City of Durham in 2016 for FA of 2015-FY is **$ 4,526,434.67** which is far less than the c
Additionally, please mentioned that the County must add the decom cost ($2550) for new-installed 17 gas wells in FA for 2016-FY

decom 17 gas well

one that I calc **$7,138,163.82**

in 2009 dollar value

in 1996 dollar value

decom 66 gas well

decom LFGTE

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
Division of Waste Management

Pat McCrory
Governor

John E. Skvarla, III
Secretary

Solid Waste Section

December 09, 2014

Mr. Simon Lobdell, P.E.
Department of Water Management, City of Durham
1600 Mist Lake Drive
Durham, NC 27704

Subject: Approval for Conducting Expansion of the Existing Landfill Gas Collection and Control System
City of Durham Landfill, Durham County, North Carolina
Permit No. 3201-MSWLF-1979, Document ID No. (Doc ID) 22448

Dear Mr. Lobdell:

On December 5, 2010, the Division of Waste Management (DWM), Solid Waste Section (SWS) received the following letter proposal (Proposal) submitted on behalf of the City of Durham and Methane Power/Biogas Energy Solutions (BES) by Smith Gardner Inc. in Raleigh, North Carolina:

- "*Authorization Request for GCCS Expansion Project, City of Durham Landfill (NC Solid Waste Permit No. 32-01)*" dated December 4, 2014. The submittal includes the letter work plan and a set of figure - a total of seven drawings (Doc ID 22434).

According to the above-referenced Proposal, the City of Durham and Methane Power/BES requested the SWS approval to:

a) Recommence the project of expanding the existing gas well-field at the closed Durham Sanitary Landfill which was originally approved on December 10, 2010 (DIN 12510).

b) Modify the work plan (DIN 11604) previously approved in December 2010 by installing sixteen (16) additional gas extraction wells – GW1 through GW-16 and valves, replacing/re-drilling the existing extraction well EW-22 , and constructing approximately 2,850 linear-feet lateral/header piping. Upon completion of the expansion project, the new wells, piping, and apparatus will be connected to the existing on-site landfill gas collection and control system (LFGCCs) and the landfill gas-to-energy system (LFGTE).

After completing the review of the above-referenced Proposal, the SWS hereby approves your request for the LFGCCs expansion project. The electronic format of the approved documents can be directly downloaded from the DWM's web site at https://edm.nc.gov/DENR-Portal/. Type in the Doc ID Number (only numeric number) in the boxed area next to the "**Description**" in the "**Property Criteria**" area. Then click "**Search**" box. The

document in "pdf" format will appear on the lower section of the screen called "**Content**" area. Please place the approval documents to the operating records at the landfill facility.

Please note that this authorization for the LFGCCs expansion project does not remove any responsibilities that the City of Durham, the owner and operator of the above-referenced landfill property as defined in NCGS 130A-290(a)(21), may have to comply with any permit condition, or any local, state or federal regulation.

To initiate construction activities at the landfill, the City of Durham agrees to accept and implement following actions, in addition to the tasks described in the approved Proposal (DIN 22434):

i. In order to address potential nuisances, such as odors and vectors and to keep dry trench condition, the pipe trench shall not be left open more than 200 feet in advance of pipe installation and trench backfill so there is no exposed waste and open trench at the conclusion of each working day. The excavated wastes generated either from well installation or trench excavation must be removed from the working areas and disposed either at a permitted solid waste management facility or on-site cover containers which later will be transported to a permitted solid waste management facility.

ii. During the course of installing piping and backfilling trench, the disturbed clay liner, a component of the Type 2 final cover system shall be restored to have a minimum permeability (hydraulic conductivity) of less than or equal to $1*10^{-5}$ cm/sec, which shall be tested and confirmed by testing method - ASTM D 5084 (at a confining pressure simulated to the final cover loading condition, maximum confining pressure of 5 psi and maximum hydraulic gradient of 15) at a frequency of one test per lift. The restored clay liner must also be tested at the frequency of once per every 300 feet by ASTM D 6938 or equivalent methods to demonstrate the in-place densities of at least 90 percent of the maximum of the density as determined by the method - ASTM D698. Should the results from the first four consecutive tests meet or exceed the above-specified density criterion, then the testing frequency can be adjusted to once every 500 feet. If a test fails to achieve the density criterion, the testing frequency must return to the original request of one test every 300 linear feet.

iii. During the course of installing piping and backfilling trench in the Type 1 final cover areas, the visual monitoring for compaction efforts and confirmation are required.

iv. The Asbestos Work Plan that approved by the NC DHHS/ Division of Public Health must be implemented for this project.

v. The Erosion and Sediment Control Plan and/or its amendment that approved by the NC Land Quality Section or the City of Durham must be executed to protect the surface water quality and prevent soil from erosion in the course of construction.

Upon completion of the construction of LFGCCs project, the SWS may approve the City of Durham to operate the constructed systems. The authorization for operation will be issued pending receipt and approval of the following documents and fee:

i. The Construction Record Report according to the approved Proposal (DIN 22434) including, but not limited to, the narratives to describe the expansion projects, the certification prepared, signed, and sealed by a Professional Engineer registered in the State of North Carolina, material testing results, supporting document for all work and repairs to the landfill cover system, representative photographs, gas well

completion logs, as-built drawings of the components of the LFGCCs – wells (including final well scheme as shown on Sheet No. 5/Drawing No. D2 [DIN 22434]), valves, leachate/condensate sumps, and/or piping/header alignments. As-built drawings shall be prepared by a surveyor registered in the State of Carolina.

ii. The revised cost estimates for post-closure cares for the above-referenced landfill including costs to decommissioning the LFGCCs and LFGTE system.

iii. Approval documents - the asbestos work plan and erosion and sediment control plan issued by the state or local government agencies.

iv. The statutorily required permit modification fee of $1,500.00 dollars. 3/11/15 paid

If you should have any questions about this authorization, please contact me at 919-707-8251 or ming.chao@ncdenr.gov.

Sincerely,

Ming-Tai Chao, P.E.
Environmental Engineer
Division of Waste Management, NCDENR

cc:

Stacey Smith, P.E., Smith Gardner, Inc.
Ed Mussler, Permitting Branch Supervisor
John Patrone, DWM
Dennis Shackelford, DWM
Central Files

DURHAM
1869
CITY OF MEDICINE

CITY OF DURHAM | NORTH CAROLINA

January 20, 2016

Ms Sarah Rice
Solid Waste Section
DENR – Division of Waste Management
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

Dear Ms Rice:

I am the chief financial officer of the City of Durham, North Carolina, 101 City Hall Plaza, Durham, North Carolina 27701. This letter is in support of this unit of local government's use of the financial test to demonstrate financial assurance, as specified in 15A NCAC 13B Rule .1628 (e)(1)(F).

This unit of local government is the owner or operator of the following facilities for which financial assurance for closure, post-closure or corrective action is demonstrated through the financial test specified in 15A NCAC 13B Rule .1628 (e)(1)(F). The current closure, post-closure, or corrective action cost estimates covered by the test are shown for each facility:

> Durham City Sanitary Landfill, permit no. 32-01, is located at 2115 East Club Boulevard, Durham, North Carolina. This facility closed in January 1998. The closure construction has been completed. The anticipated annual post-closure cost estimate is approximately $377,202.89 (in 2015 dollars assuming 1.4% inflation). With twelve (12) years of responsibility left, this represents a need for financial assurance for a total of $4,526,434.67

The fiscal year of this unit of local government ends on June 30, 2015. The figures for the following items marked with an asterisk are derived from this unit of local government's Annual Financial Information Report (AFIR) for the latest completed fiscal year, ended June 30, 2015.

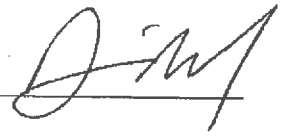
BOND RATING INDICATOR OF FINANCIAL STRENGTH

1. Sum of current closure, post-closure and corrective action cost estimates [total of all cost estimates shown in the paragraphs above]	$ 4,526,434.67
2. Current bond rating of most recent issuance and name of rating service	AAA Standard and Poor's Aaa Moody's AAA Fitch
3. Date of issuance bond	March 4, 2015
4. Date of maturity of bond	September 1, 2025
5. Assured environmental costs to demonstrate financial responsibility in the following amounts under Division rules:	
MSWLF under 15A NCAC 13B Section .1600	$ 4,526,434.67
Hazardous waste treatment, storage and disposal facilities under 15A NCAC 13A Rules .0009 and .0010	$ 0
Petroleum underground storage tanks under 15A NCAC 2N Sections .0100 - .0800	$ 0
Underground Injection Control System facilities under 15A NCAC 2D Section .0400 and 15A NCAC 2C Section .0200	$ 0
PCB commercial storage facilities under 15A NCAC 2O Section .0100 and 15A NCAC 2N Section .0100	$ 0
Total assured environmental costs	$ 4,526,434.67
*6. Total Annual Revenue (AFIR Part 2)	$399,526,319.00

Circle either "yes" or "no" to the following question.

7. Is line 5 divided by line 6 less than or equal to 0.43?	yes

I hereby certify that the wording of this letter is identical to the wording specified in 15A NCAC 13B .1628 (e)(2)(G) as such rules were constituted on the date shown immediately below. I further certify the following: (1) that the unit of local government has not operated at a total operating fund deficit equal to five percent or more of total annual revenue in either of the past two fiscal years, (2) that the unit of local government is not in default on any outstanding general obligations bonds or long-term obligations, and (3) does not have any outstanding general obligation bonds rated lower than Baa as issued by Moody's, BBB as issued by Standard & Poor's, BBB as issued by Fitch's, or 75 as issued by the Municipal Council.

Signature 

Name: David Boyd

Title: Finance Officer

Date: January 20, 2016

RMT

• ENVIRONMENT • ENERGY • ENGINEERING

Solid Waste Permit Modification

Landfill Gas-to-Energy System

DIN 7319

Durham Sanitary Landfill
Durham, North Carolina

Revised April 2009

Section 5
Post-Closure Plan Addendum

5.1 Amendments to the Post-Closure Plan

The Closure and Post-Closure Plan, submitted in April 1994, and followed by subsequent Addenda, was approved by the SW-NCDENR on July 29, 1996. A copy of the approved Post-Closure Plan is attached in Appendix D. These documents provided the agreed-upon requirements to be performed during the closure and post-closure care periods at the landfill. The landfill is now in its post-closure care period of operation, and the activities presented in the approved plans remain unchanged. This LFGTE project adds new equipment and infrastructure to the existing LFG management systems to beneficially utilize the LFG to generate electricity. And, as a result, additional activities are necessary to properly maintain proper operation of the proposed systems.

This section has been prepared to provide additional information to addend the existing Post-Closure Plan for the inclusion of the LFGTE system and its components. The following aspects of the Post-Closure Plan are discussed as part of this submittal:

- The inspection plan
- The maintenance plan
- The monitoring plan

Post-closure maintenance and monitoring activities are discussed in the previous sections of this modification request. Inspections, monitoring, and maintenance will be performed routinely to meet the equipment manufacturer's recommendations to maintain warranties and the longevity of equipment operation. Operations will be maintained to maximize the sale of electricity and to provide sufficient vacuum to the existing landfill collection system to control migration and emissions.

5.2 Post-Closure Cost Estimate and Financial Assurance

A post-closure cost estimate was originally prepared as part of the Post-Closure Plan. The cost estimate indicates the amount of money that was determined necessary on an annual basis to meet landfill post-closure obligations in accordance with 15A NCAC 13B.1627(d) and .1628. The City of Durham continues to financially assure the post-closure care period with annual updates to the determined dollar value. The installation and operation of the proposed LFGTE system is not included as part of this process. If operation of the LFGTE system is terminated,

the existing LFG collection system will continue to operate as originally intended. Financial assurance for maintaining the LFGTE system is currently under negotiation between the City and MP Durham, LLC.

Operation of the LFGTE System will be systematically reduced in magnitude as the landfill's LFG generation rate declines over time. The LFGTE System is anticipated to utilize three engine gensets initially. Each genset will utilize approximately 300 to 350 cfm of LFG during operation. As the LFG generation rate declines, System operation will eventually transition to the operation of two gensets, and ultimately one genset based on the amount of available LFG. Once the LFG generation rate is insufficient for the operation of one engine genset, or economics become unfavorable, operation of the LFGTE system will be terminated. At that time, the blower and flare will be utilized to extract and combust the LFG that remains available. When operation of the LFGTE System ends, the responsibilities of the operation of the LFG collection system will revert back to the City of Durham and MP Durham's involvement will cease. The operation of the LFGTE System is anticipated to operate for a period of approximately 20 years.

A draft cost estimate for the decommissioning of the LFGTE System and restoration of the site has been prepared for the enclosed Revised Application. The activities associated with the decommissioning include disconnection of LFGTE System equipment from the LFG collection system and from the electrical utility grid, and removal of applicable equipment from the site. For purposes of the decommissioning cost estimate, the concrete pads associated with the LFGTE System will be demolished, removed from the site and disposed of. The electrical and control building is assumed to remain at the site (following LFGTE System operations) for use by the City as part of continued operation of the LFG collection system. The draft cost estimate is included as a new Appendix H of the Revised Application. The draft cost estimate is currently being evaluated by the City of Durham. The final estimate will be submitted to NCDENR in the Construction Documentation Report.

CITY OF DURHAM SANITARY LANDFILL TRANSITION PLAN

DURHAM

1869

CITY OF MEDICINE

City of Durham, North Carolina

APPROVED
DIVISION OF SOLID WASTE MANAGEMENT
DATE 7/29/96 BY

April 1994

0759-022

MALCOLM PIRNIE

ENVIRONMENTAL ENGINEERS, SCIENTISTS & PLANNERS

CITY OF DURHAM SANITARY LANDFILL
CLOSURE AND POST-CLOSURE PLAN

CITY OF DURHAM, NORTH CAROLINA

APRIL 1994

MALCOLM PIRNIE, INC.

11832 Rock Landing Drive, Suite 400
Newport News, Virginia 23606

0759-022-340

Transition Plan Amendment
December 1994

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3.0 POST-CLOSURE

3.1 POST-CLOSURE CONTACT

The City of Durham is the owner, permit holder and operator of the facility. The primary contact person and address is:

Mr. Don Robinson
Acting Director Sanitation Department
City of Durham
101 City Hall Plaza
Durham, North Carolina 27201

Telephone: (919) 560-4185

3.2 MAINTENANCE PLAN

In accordance with Rule .1629(c)(1) and Rule .1627(d), post-closure care will be conducted for 30 years. The following sections describe post-closure maintenance procedures, equipment requirements and material needs for preventative and corrective maintenance of active landfill systems including:

- Groundwater and surface water monitoring
- Gas control
- Gas monitoring
- Final cover
- Storm water management

Anticipated preventive and corrective maintenance requirements of these systems are summarized in Table 3-1 and the following sections.

Groundwater Monitoring System

The groundwater monitoring system will be maintained so as to remain operational in accordance with Rules .1631 through .1637. The system, shown on the Site Plan Sheet,

TABLE 3-1

SUMMARY OF POST-CLOSURE MAINTENANCE

CLOSURE SYSTEM	*SYSTEM COMPONENT*	*MAINTENANCE PROCEDURES*	*FREQUENCY*
Groundwater Monitoring	▪ Monitoring Wells	▪ Development in conjunction with water quality monitoring.	▪ Semi-Annual
	▪ Protective Casing	▪ N/A	▪ N/A
	▪ Lock Mechanism	▪ Lubricate	▪ As Necessary
Gas Control	▪ Extraction Wells	▪ Repair as necessary	▪ Annually
	▪ Gas Blower	▪ Check shaft packing and seals, repair as necessary.	▪ Monthly
		▪ Check oil level, add oil as required.	▪ Monthly
		▪ Check belts or drive, adjust as required.	▪ Monthly
		▪ Lubricate all bearings and grease fittings.	▪ Semi-Annually
		▪ Clean motor.	▪ Semi-Annually
		▪ Change oil.	▪ Annually
	▪ Moisture Separator	▪ Drain moisture trap, clean out collected debris, as necessary.	▪ Monthly

TABLE 3-1
(Continued)

SUMMARY OF POST-CLOSURE MAINTENANCE

CLOSURE SYSTEM	*SYSTEM COMPONENT*	*MAINTENANCE PROCEDURES*	*FREQUENCY*
Gas Control (Continued)	▪ Waste Gas Burner	▪ Fill propane tank, as required. ▪ Drain condensate traps. ▪ Clean flame trap. ▪ Check gas piping for leaks.	▪ Monthly ▪ Monthly ▪ Semi-Annually ▪ Semi-Annually
	▪ Valves and Appurtenances	▪ Exercise components and repair as required.	▪ Annually
Gas Monitoring System	▪ PVC piping, bentonite seal, valve and concrete pad	▪ Repair as necessary.	▪ As neccessary
Cap	▪ Final Cover	▪ Erosion Repair ▪ Re-vegetation	▪ As necessary
Storm Water Drainage System	▪ Storm Water Detention Basins	▪ Repair localized erosion ▪ Clear debris and sediment	▪ Semi-annual ▪ As necessary when sediment reaches 85 percent clean out elevation
	▪ Ditches, Reverse Slope Benches, Diversion Berms, Chutes ▪ Culverts	▪ Repair localized erosion ▪ Remove sediment ▪ Regrade ▪ Revegetate ▪ Remove debris or obstructions ▪ Clean-out via high pressure wash	▪ As necessary ▪ Semi-annual ▪ Annual ▪ As necessary ▪ Semi-annual ▪ As necessary

Sheet 1 of the Operation Plan drawings, is comprised of permanent, low maintenance, PVC monitoring wells with dedicated bladder sampling pumps. These PVC wells do not contain any other active components and will be maintained by monitoring well development coincident with groundwater quality sampling throughout the post-closure period. No other preventive maintenance of this system is required. Groundwater monitoring wells which sustain damage or become unable to provide representative samples will be replaced as necessary. This may include decommissioning and appropriate abandonment of any non-functional wells. Materials and equipment anticipated for well installation and/or decommissioning abandonment includes standard geotechnical drilling rig equipped with hollow stem augers, tri-cone rotary drilling bit, bentonite slurry and tremie pump. Bladder pumps will be subject to corrective maintenance as necessary to maintain.

Gas Control

The proposed gas control is shown on the Gas Monitoring and Collection Sheet, Sheet 4 of the Operation Plan drawings. The following information summarizes the anticipated preventive and corrective maintenance activities to be performed through the duration of the post-closure period.

Extraction Wells

The extraction wells will consist of 3-inch diameter High Density Polyethylene (HDPE) pipe. Wells will be spaced relatively uniformly across the landfill topdeck. The wells will be capped at the bottom, perforated for gas accumulation, screened through the waste, and surrounded with open graded coarse aggregate.

Preventive maintenance includes only an annual inspection of the extraction wells to determine the condition of the well head, valve, and flexible pipe. Corrective maintenance would consist of replacement of well head components as needed.

Gas Blower

A blower is proposed to extract gas from the wells and deliver collected gas to the adjacent flare.

Preventive maintenance for the blower should include the following:

- Check shaft packing and seals monthly. Under normal operating conditions, seals generally last up to 3 years.
- Inspect impeller vanes every 2 years. Replace if worn or show evidence of corrosion.

- Replace impeller vanes after 6 years of operation.
- Lubricate all bearings and grease fittings every 6 months.
- Check oil level at site glass monthly. Add to fill line as needed.
- Change oil annually.
- Inspect bearings annually. Replace after 6 years of operation.
- Check condition of drive mechanism monthly. Adjust as needed.

Corrective measures consist of replacing or repairing components as needed according to the preventive maintenance duties listed above.

Moisture Separator

A cyclone separator is proposed to remove and collect any moisture. Gas drawn from the landfill by the blower passes through the separator in a spiral pattern, forcing moisture out and down to be collected and drained.

Preventive maintenance consists of monthly moisture trap drainage and annual inspection of the internals of the separator to observe for any corrosion.

No corrective maintenance is anticipated.

Waste Gas Burner

An automatic ignition gas burner is proposed to ignite and burn the collected gas. A propane tank is proposed for the ignition pilot light. The blower forces the collected gas up through the flare and is ignited by the propane pilot. The system also includes a flame trap and back pressure regulator. A control panel performs all control functions automatically.

Preventive maintenance duties consist of the following:

- Refill propane tank as needed.
- Drain condensate traps monthly.
- Disassemble and clean flame trap (gas piping) semi-annually.
- Check all gas piping for leaks semi-annually. Repair as needed.

Corrective maintenance consists of repair and replacement of worn parts, as a result of the preventive maintenance inspections described above.

The City is currently reviewing the feasibility of recovery of landfill gas for use in the adjacent wastewater treatment plant. If it is determined that recovery is feasible, this system would operate either in lieu of or in parallel to the above mentioned control system.

Valves and Appurtenances

Valves and appurtenances proposed as part of the gas collection and flaring system should be exercised on an annual basis. Any components identified as damaged, corroded, or leaking during scheduled inspections will be repaired or replaced as necessary.

Gas Monitoring System

The gas monitoring system is comprised of a series of perimeter gas monitoring probes. A detail of the gas monitoring probe is shown on Sheet 5 of the Operation Plan drawings. During inspections of the gas monitoring probes, any damage to the probe will be repaired or replaced. If the probe is unrepairable, a new probe will be constructed adjacent to the existing probe.

Final Cap System

Landfill surface maintenance will be performed as necessary over the entire post-closure period. Signs of erosion, settling, cracking or other site maintenance problems detected during routine site inspections will be corrected as soon as possible. Eroded areas will be repaired by backfilling and stabilizing the effected areas or by providing additional drainage feature systems to prevent future erosion where settlement results in ponding of surface water, the cap will be regraded and re-vegetated to eliminate the ponding. All large areas without vegetation in the final cover will be reseeded and fertilized, as necessary, but not less than once every year.

Storm Drainage System

Storm water drainage systems shown on Sheet 3 of the Operation Plan drawings and described in detail in The Operation Plan, are comprised of passive components, including storm water detention basins, outfall structures, ditches, sideslope chutes, and reverse slope benches.

Preventive maintenance of the storm water detention basins and outlet structures will occur semi-annually, during late summer and early spring, prior to and following fall and winter periods which typically experience much higher rainfall events, and as required after heavy precipitation events. Sediment removal will occur annually to ensure adequate

capacity and function. Spillways and outlet structures will be cleared of all loose debris on an as needed basis. Basin sideslopes will be uniformly graded to their original design slope on an annual basis to minimize sloughing and potential impacts on storage capacity and water quality.

Corrective maintenance, including repair and/or replacement of damaged structures, will occur as needed for satisfactory performance.

3.3 INSPECTION PLAN

The following section describes post-closure inspection procedures, frequency and recordkeeping associated with the post-closure care of the following landfill closure systems:

- Groundwater monitoring
- Gas collection and flare
- Gas monitoring
- Landfill cap
- Storm drainage including run-on/run-off control devices such as storm water detention basins, outlet structures, ditches, chutes and reverse slope benches

Inspection of the landfill facility closure systems will be conducted by City personnel to prevent and/or detect malfunction or damage to system components. The following information will be recorded in conjunction with each inspection activity:

- Date and time of inspection
- Name of inspector
- Observation made
- Data measurements (if any)
- Recommended corrective measure (if any)

Inspection procedures, frequency and rationale are summarized in Table 3-2 and the following sections.

Groundwater Monitoring System

The groundwater monitoring system will be inspected on a semi-annual basis in conjunction with post-closure groundwater quality monitoring activities. The integrity of each well will be verified by visual inspection and observation of damage (if any) to the well installation, riser pipe, protective casing, and lock mechanism.

Gas Control System

Inspection of the gas control system will be inspected on a regular basis as described in Table 3-2. Visual inspection will be made of the condition of the extraction wells, gas blower, moisture separator, waste gas flare, and valves and appurtenances. Specifically, inspection will be made for any evidence of malfunction, corrosion, and operation of any of these components.

Gas Monitoring System

Inspection of gas monitoring probes will be performed prior to each monitoring event. The inspection will include examination of the PVC pipe, bentonite seal and valve for physical damage. Probes will also be examined for accumulation of water above the bentonite seal. Any excess water will be removed.

Final Cover System

Inspection of final cover system components will occur semi-annually for the first 5 years and annually throughout the remaining post-closure period, corresponding with site monitoring and other preventive maintenance activities, or on an as-needed basis following heavy precipitation events. Integrity of the final cover system will be evaluated over the entire landfill surface by visual inspection and observation of damage related to soil loss via erosion, differential settlement and resulting ponding of surface water, sloughing of surficial materials along slopes due to inadequate drainage of cover system, consistency and adequacy of vegetative cover condition.

Storm Water Drainage System

Storm water system components will be inspected on a semi-annual basis in late summer and late winter, prior to anticipated seasons with typically high precipitation levels, and subsequent to heavy rainfall events. Integrity of the drainage system components, including detention basins, ditches, culverts, diversion berms, release structures and reverse slope benches, as well as miscellaneous sediment and erosion control devices, will be verified

TABLE 3-2

SUMMARY OF POST-CLOSURE INSPECTION

CLOSURE SYSTEM	*SYSTEM COMPONENT*	*INSPECTION PROCEDURE*	*FREQUENCY*
Groundwater Monitoring System	▪ Monitoring Wells - Riser Pipe - Protective Casing - Lock Mechanism	▪ Visual inspection of damage, corrosion.	▪ Semi-Annual
Gas Control	▪ Extraction Wells	▪ Visual inspection for possible damage.	▪ Annually
	▪ Gas Blower	▪ Check shaft packing and seals. ▪ Visual inspection of oil level. ▪ Visual inspection of drive mechanism. ▪ Measure pressure on either side. ▪ Check gages via pitot tube. ▪ Check bearings for wear. ▪ Check impeller vanes for wear.	▪ Monthly ▪ Monthly ▪ Monthly ▪ Monthly ▪ Monthly ▪ Annually ▪ Bi-Annually
	▪ Moisture Separator	▪ Inspect condensate drainage system. ▪ Internal inspection.	▪ Monthly ▪ Monthly ▪ Annually

TABLE 3-2
(Continued)

SUMMARY OF POST-CLOSURE INSPECTION

CLOSURE SYSTEM	SYSTEM COMPONENT	INSPECTION PROCEDURE	FREQUENCY
Gas Control (Continued)	▪ Waste Gas Burner	▪ Inspect propane tank status. ▪ Inspect gas piping for leaks. ▪ Inspect status of fire fighting equipment.	▪ Monthly ▪ Semi-Annually ▪ Semi-Annually
	▪ Valves and Appurtenances	▪ Inspect and exercise components for visable malfunction or leakage.	▪ Annually
Gas Monitoring Probe	▪ PVC Piping ▪ Bentonite Soil ▪ Valve	▪ Visual inspection of condition.	▪ Quarterly
Final Cover System	▪ Vegetation Cover ▪ Topsoil	▪ Visual inspection and observation of damage.	▪ Semi-Annual for first five years. ▪ Annual for remaining post-closure period or an as needed basis following heavy precipitation.

TABLE 3-2
(Continued)

SUMMARY OF POST-CLOSURE INSPECTION

CLOSURE SYSTEM	*SYSTEM COMPONENT*	*INSPECTION PROCEDURE*	*FREQUENCY*
Storm Water Drainage System	▪ Storm Water Detention Basins ▪ Ditches ▪ Culverts ▪ Chutes ▪ Release Structures ▪ Reverse Slope Benches ▪ Erosion and Sediment Control Devices	▪ Visual inspection and observation of damage.	▪ Semi-Annual

by visual inspection and observation of damage (if any) which would result or impact surface water flow and/or cause further soil loss or damage to structures. Specifically, visual inspection will be made for obstruction, accumulation of sediment or debris, vegetation stress, evidence of scour, erosion of channel lining and soils, as well as structural integrity and corrosion of release structures.

3.4 MONITORING PLAN

Post-closure monitoring activities and locations are shown on Table 3-3.

Post-closure activities will include monitoring of the following closure systems:

- Groundwater monitoring wells
- Storm water runoff
- Landfill gas

Groundwater Monitoring

Groundwater monitoring activities to be performed throughout the post-closure care period are summarized in the Water Quality Monitoring Plan. The plan indicates that groundwater monitoring wells will be monitored on a regular basis throughout the duration of the post-closure care period. These monitoring wells have been selected on the basis of their location relative to the landfill unit, and will be used to evaluate variations in groundwater quality and flow direction in the uppermost aquifer.

Landfill Gas Monitoring

Perimeter gas monitoring probes are shown on Sheet 4 of the Operations Drawings. All perimeter gas monitoring probes and structures will be monitored on a quarterly basis for percent lower explosive limit (percent LEL) and percent total volume (percent TV) of methane. All data will be recorded on a monitoring sheet and maintained on file at the landfill site.

In the event that any gas probe indicates a concentration of methane exceeding 25 percent LEL, contingency measures detailed in the Operations Plan will be taken to further evaluate the source of landfill gas and mitigate any detrimental effects.

TABLE 3-3

SUMMARY OF POST-CLOSURE MONITORING [1]

CLOSURE SYSTEM	*MONITORING LOCATION(S)*	*PARAMETERS*	*FREQUENCY*
Storm Water Management	▪ Storm Water Detention Basins	▪ Surface Water Quality	▪ Quarterly and/or following storm events for first year. ▪ Semi-annual basis after first year.
Gas Management	▪ Gas Monitoring Probes ▪ Buildings	▪ Methane Concentration (%LEL/%TV)	▪ Quarterly
[1] See Water Quality Monitoring Plan, for details of groundwater quality monitoring frequency and sampling protocol.			

3.5 POST-CLOSURE LAND USE

The City of Durham plans a passive use of the landfill during the post-closure period. No disturbance will be made to the integrity of the final cap, waste containment systems, or monitoring systems. Following completion of the post-closure care period, the City shall notify the Solid Waste Section that a certification, signed by a registered Professional Engineer, has been placed in the operating record. The certification will verify that post-closure care has been completed in accordance with the post-closure plan.

3.6 POST-CLOSURE COST ESTIMATE

The capital cost estimate for post-closure activities for the City of Durham Sanitary Landfill is included in Appendix F. The estimated maximum annual total post-closure cost is approximately $256,300 (in 1994 dollars). Given a 30-year post-closure period, the estimated present worth of post-closure care and maintenance throughout the maximum anticipated post-closure period at year 1996 is approximately $8,477,000 (in 1996 dollars). The City will provide financial assurance for this amount in accordance with one of the financial instruments outlined in Rule .1628.2

Appendix H
Draft Cost Estimate for LFGTE System Decommissioning

Engineering Opinion of Probable Cost for LFGTE System Decommissioning

Landfill Post-Closure Care Efforts

Durham Municipal Landfill

Solid Waste Permit Modification (Revised Application)

MAJOR COST ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST [1]
LFGTE System Disconnections [2]				
-Electrical Systems	Lump Sum	$2,000	1	$2,000.00
-Mechanical Systems	Lump Sum	$2,000	1	$2,000.00
-Condensate Systems	Lump Sum	$1,000	1	$1,000.00
Removal From Site [3]				
-Blower System Skid	Lump Sum	$1,000	1	$1,000.00
-Chiller System Skid	Lump Sum	$1,000	1	$1,000.00
-Generator Sets	Each	$1,000	3	$3,000.00
-Generator Transformers	Lump Sum	$500	3	$1,500.00
- Motor Control Center, Etc.	Lump Sum	$1,000	1	$1,000.00
Infrastructure Abandonments -Concrete pad demolition, removal, and disposal	LS	$3,000	1	$3,000.00
Final Site Clean-Up Efforts -Trash and Housekeeping	LS	$1,000	1	$1,000.00
		APPROXIMATE TOTAL COST =		$16,500.00

Assumptions:

1. Annual costs are in 2003 dollars.
2. Costs include making proper modifications to maintain back-up blower and flare system operation.
3. Costs assume that the Electrical and Control building remains for City use.

Date: April 14, 2009

By: D. Free

Checked: J. Schoephoester