NORTH CAROLINA DIVISION OF AIR QUALITY

Air Permit Review (Significant Modification/Renewal)

Permit Issue Date: XXXXXXX

Region: Fayetteville Regional Office
County: Sampson
NC Facility ID: 8200135
Inspector's Name: Robert Hayden
Date of Last Inspection: 05/20/2004
Compliance Code: W/In Violation W/regard To Proc Compliance

Facility Data

Applicant (Facility's Name): Sampson County Landfill

Facility Address:
Sampson County Landfill
7434 Roseboro Highway
Roseboro, NC 28382

SIC: 4953 / Refuse Systems
NAICS: 562212 / Solid Waste Landfill

Facility Classification: Before: Title V **After:** Title V
Fee Classification: Before: Title V **After:** Title V

Permit Applicability (this application only)

SIP: 15A NCAC 2D .1100; 2Q .0711, 2Q .0516
NSPS: N/A
NESHAP: MACT, Subpart AAAA
PSD: N/A
PSD Avoidance: N/A
NC Toxics: Modeling for Air Toxics
112(r): N/A
Other: N/A

CDS ID No. 3716300125

Contact Data

Facility Contact	Authorized Contact	Technical Contact
Troy Mitchell Landfill Manager (910) 525-4132 7434 Roseboro Hwy Roseboro NC, 28382	Scott Sauer County Manager (910) 592-6308 313 East Rowan Rd. Clinton NC, 28382	Troy Mitchell Landfill Manager (910) 525-4132 7434 Roseboro Hwy Roseboro NC, 28382 G.N. Richardson & Consultants Matt Lamb (919) 828-0577

Application Data

Application Numbers: 8200135.05A & 05B
Date Received: 05/06/2005 and 06/30/2005
Application Type: Modification
Application Schedule: Significant Modification/ Renewal

Existing Permit Data
Existing Permit Number: 08644/T01
Existing Permit Issue Date: 06/11/2001
Existing Permit Expiration Date: 05/31/2006

Review Engineer: Booker Pullen Regional Engineer: Tom Mckinney

Review Engineer's Signature: **Begin Date:** **June 9, 2005**

Comments / Recommendations:
Issue: 08644T02
Permit Issue Date: XXXXXXXXX
Permit Expiration Date: 05/31/2006

I. Introduction:

The Sampson County Landfill is located at 7434 Roseboro Highway, in Roseboro North Carolina. This facility was issued a Notice of Violation on March 4, 2005 by the Division of Air Quality's Compliance Section. The Notice of Violation was for failure on the part of the landfill to demonstrate facility wide compliance with the North Carolina air toxics program in accordance with 15A NCQC 2Q .0705 because the compliance date for the last MACT for this facility had passed (January 16, 2004).

II. Description:

The Sampson County Solid Waste Landfill collects household, commercial, and industrial wastes. This facility is currently closed and does not accept any new waste.

III. Statement of Compliance:

On the latest inspection of the facility, May 20, 2004 by Mr. Robert Hayden of the Fayetteville Regional Office, the facility was in compliance with the requirements of 40 CFR Part 63, Subpart AAAA (Landfill MACT). This facility was issued an NOV on March 4, 2005 for failure to submit a facility wide air toxics evaluation for the landfill because the last MACT for this facility had passed. This facility should be in compliance after adequately modeling toxic air emissions at the facility. Six toxic pollutants (acrylonitrile, benzene, methyl mercaptan, hydrochloric acid (HCl), vinyl chloride, and hydrogen sulfide) were shown to be greater than the TPERs listed in 15A NCAC 2Q .0711. A toxic pollutant evaluation and a modeling demonstration was submitted in the application.

IV. Summary of Emission Sources and Control Devices:

This table identifies all emission sources & control devices for which this permit is being issued

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
ES-1 **NSPS, MACT**	One municipal solid waste landfill including:		
	One lined section (closed)	CD-1 & GCCS1	Gas collection and control system with utility flare (32.5 million Btu per hour heat input rate)
	Two unlined sections, area A (closed) & 20 acre area (closed)	CD-2 & GCCS2	Gas collection and control system with utility flare (4.8 million Btu per hour heat input rate)
		None	Odor control solar flares

V. Emission Source-by-source

A. Municipal solid waste landfill (ID No. ES-1) with associated gas collection and control systems (ID Nos. GCCS1 & CD-1 and GCCS2 & CD-2).

1. **Description**: The Sampson County Municipal Solid Waste Landfill served as a collection and disposal point for the municipal solid waste generated in about 14 counties in North Carolina coming from Waste Industries operations.
2. **Application Regulatory Requirements:** This municipal solid waste landfill (ID No. ES-1) was modified after May 30, 1991, and is therefore subject to NSPS as listed in 40 CFR Part 60, Subpart WWW. The design capacity of the landfill is greater than 2.5 million megagrams by mass, and 2.5 million cubic meters by volume and is therefore subject to Title V. This landfill is also subject to 40 CFR Part 63, Subpart AAAA, MACT, because it is subject to Title V and is required to install a gas collection and control system. All areas of the landfill have been closed and do not currently accept any municipal solid waste.

The following table provides a summary of standards for the emission sources described above

Regulated Pollutant	Limits/Standards	Applicable Regulation
Nonmethane organic compounds (NMOC)	Route landfill gas to a flare designed in accordance with 40 CFR Part 60, §60.18; or Route the collected gas to a treatment system; or Use a closed combustion device that reduces the outlet NMOC concentration to less than 20 part per million by volume, dry basis as hexane at 3 percent oxygen	15A NCAC 2D .0524 **40 CFR Part 60, Subpart WWW**
Sulfur dioxide	2.3 pounds per million Btu heat input	15A NCAC 2D .0516
Visible emissions	20 percent opacity	15A NCAC 2D .0521
Odorous emissions	Apply suitable odor control measures **State-enforceable only**	15A NCAC 2D .1806
HAPs	Work practice standards and startup, shutdown, malfunction requirements	15A NCAC 2D .1111 **40 CFR Part 63, Subpart AAAA**
Toxic air pollutants	Modeled limits	15A NCAC 2D .1100
	Last MACT toxics evaluation	15A NCAC 2Q .0705

Regulation Analysis:

a. **Applicable Regulatory Requirements**:
This landfill and associated equipment are subject to the following regulations:
- 15A NCAC 2D .0516
- 15A NCAC 2D .0521
- 15A NCAC 2D .0524, 40 CFR Part 60, Subpart WWW
- 15A NCAC 2D .1806

No regulatory review is required for the regulations listed above, because there are no new sources added under this permit application. The regulations listed below will also be evaluated for this permit modification/application.

- 15A NCAC 2D .0614 "Compliance Assurance Monitoring"
The Sampson County Landfill **is not subject** to CAM in accordance with 15A NCAC 2D .0614 (b) "Exemptions" because it is subject to a New Source Performance Standard that was proposed after November 15, 1990. The New Source Performance Standard for Landfills (Subpart WWW) was first proposed in the Federal Register on May 30, 1991 (56 Fr 24468). This regulation was finally promulgated on March 12, 1996. The published date (January 16, 2004) of the final MACT, Subpart AAAA, is also after November 15, 1990.

- 15A NCAC 2D .1111, 40 CFR Part 63, Subpart AAAA: National Emission Standards for Hazardous Air Pollutants, Municipal Solid Waste Landfills.

The effective date of this MACT was **January 16, 2003**. The compliance date for existing sources was **January 16, 2004**. The Sampson County Landfill is by definition an existing area source because it was constructed/reconstructed before November 7, 2000. Also, because the landfill has a design capacity that is greater than 2.5 million megagrams (Mg) and 2.5 million cubic meters (m^3) with estimated uncontrolled emissions of NMOCs equal to or greater than 50 megagrams per year (Mg/yr) and is required to install a gas collection and control system, it is subject to this MACT.

Applicability
Sampson County Landfill (**ID No. ES-1**) shall comply with all requirements of 15A NCAC 2D .1111 "Maximum Achievable Control Technology" and 40 CFR Part 63, Subpart AAAA "National Emission Standards for Hazardous Air Pollutants, Municipal Solid Waste Landfills" [40 CFR §63.1935]

Definitions and Nomenclature [40 CFR §63.1990]
For the purpose of this permit condition, the definitions and nomenclature contained in 40 CFR 63. §1990 shall apply.

REGULATED POLLUTANTS [40 CFR §63.2]
Hazardous Air Pollutant (HAP) means any air pollutant listed in or pursuant to section 112(b) of the Clean Air Act. [40 CFR §63.2]

40 CFR Part 63 Subpart A "GENERAL PROVISIONS"
The Permittee shall comply with the requirements of 40 CFR §63 Subpart A "General Provisions" according to the applicability of Subpart A to such sources as identified in 40 CFR Part 63, Subpart AAAA, §63.1935.

Compliance dates [40 CFR Part 63, §63.1945]
The Permittee (Sampson County Landfill) is an **existing affected area source** in accordance with 40 CFR Part 63, §63.1935 (a)(3). An area source is by definition a landfill that is not major due to the annual emission rate of HAPs, but one that has greater than 2.5 million megagrams (Mg) and 2.5 million cubic meters (m^3) and has estimated uncontrolled emissions equal to or greater than 50 megagrams per year (Mg/yr) NMOC emissions.

This facility shall be in compliance with this regulation by the date this landfill is required to install a collection and control system in accordance with 40 CFR §60.752(b)(2) of the New Source Performance Standards, Subpart WWW. [§ 63.1945]

Monitoring [40 CFR Part 63, §63.1955 and §63.1960]
Compliance with this Subpart (AAAA) is determined in accordance with the New Source Performance Subpart WWW, including performance testing, monitoring of the collection system, continuous parameter monitor, and other credible evidence. In addition, continuous parameter monitoring data, collected under 40 CFR §60.756(c)(1) and (d) of Subpart WWW, are used to demonstrate compliance with the operating conditions for control systems.

The Permittee shall develop and implement a written Start-Up/Shutdown/Malfunction (SSM) plan according to the provision in 40 CFR 63.6(e)(3). A copy of the SSM shall be maintained on site.

For the purposes of this Requirement, **deviation means** any instance in which an affected source subject to this subpart, or an owner or operator of such a source:

i. fails to meet any requirement or obligation established by this subpart, including, but not limited to, any emissions limitation (including any operating limit) or work practice standard;
ii. fails to meet any term or condition that is adopted to implement an applicable requirement in this subpart and that is included in the operating permit for any affected source required to obtain such a permit;
iii. fails to meet any emission limitation, (including any operating limit), or work practice standard in this subpart during SSM, regardless of whether or not such failure is permitted by this subpart; or
iv. fails to write, develop, implement, or maintain a copy of the SSM plan.
If a deviation occurs, the Permittee has failed to meet the control device operating conditions describe in this subpart and have deviated from the requirements of this subpart.

Recordkeeping/Reporting Requirements [40 CFR Part 63, §63.1980]
Keep records and reports as specified in the general provisions of 40 CFR Part 60, and in Subpart WWW, except the annual report described in 40 CFR §60.757(f) shall be submitted every 6 months.

If actions taken during a startup, shutdown, and malfunction plan are consistent with the procedures in the startup, shutdown, and malfunction plan, this information shall be included in a semi-annual startup, shutdown, and malfunction plan report. Any time an action taken during a startup, shutdown and malfunction plan is not consistent with the startup, shutdown and malfunction plan, the source shall report actions taken within **2 working days** after commencing such action, followed by a letter **7 days** after the event.

3. **Toxic Air pollutants - STATE ENFORCEABLE ONLY**

State-Enforceable Only

a. **15A NCAC 2Q .0705 "EXISTING FACILITES AND SIC CALLS"**
For sources at a facility subject to a MACT standard, a permit application shall be required demonstrating compliance with the 15A NCAC 2D .1100 by the same deadline that the facility is required to comply with the last MACT, excluding the MACT for combustion sources, as outlined in 15A NCAC 2D .0705.

b. Schedule Of Compliance

Sampson County was subject to compliance with the landfill MACT in accordance with 40 CFR Part 63, Subpart AAAA on January 16, 2005. The Sampson County Landfill was issued a Notice of Violation (NOV) on March 4, 2005 from the Division of Air Quality's Compliance Section. The NOV was issued because this facility did not demonstrate a facility wide compliance evaluation/demonstration with the North Carolina air toxics program in accordance with 15A NCQC 2Q .0705 upon promulgation of the their last MACT on January 16, 2004. The consultant for Sampson County Landfill submitted a toxics demonstration to the DAQ on May 6, 2005. North Carolina air toxic pollutants were evaluated, and six toxic air pollutants acrylonitrile, benzene, methyl mercaptan, hydrochloric acid (HCl), vinyl chloride, and hydrogen sulfide) were found to be higher than the TPER limits. AP-42 factors were used along with equations from NSPS for landfills listed in 40 CFR Part 60, Subpart WWW to calculate emissions.

Toxic Air Pollutant Emission Rate Calculation Methodology:

- The maximum landfill gas generation rate for the lined "Allied" area occurred in 2001 at a rate of 6.95 x 10^6 cubic meters per year. This section of the landfill stopped receiving waste in the year 2000. The landfill gas generation rate in 2004 was 6.16 x 10^6 cubic meters per year, which was used to represent the maximum future rate of the emissions from this area because the emission rate will decrease for all future years.

- The maximum landfill gas generation rate for the unlined "Area A" occurred in 1993 at a rate of 9.20 x 10^5 cubic meters per year. This section of the landfill stopped receiving waste in the year 1992. The landfill gas generation rate in 2004 was 5.93 x 10^5 cubic meters per year, which was used to represent the maximum future rate of the emissions from this area because the emission rate will decrease for all future years.

- The maximum landfill gas generation rate for the unlined "20-Acre " area occurred in 1984 at a rate of 5.69 x 10^5 cubic meters feet per year. This section of the landfill stopped receiving waste in the year 1983. The landfill gas generation rate in 2004 was 2.56 x 10^5 cubic meters per year, which was used to represent the maximum future rate of the emissions from this area because the emission rate will decrease for all future years.

The Methane generation rate for each of the three areas at the Sampson County Landfill were calculated using the first order rate of decay equation to calculate landfill gas generation in accordance with NSPS, 40 CFR Part 60, Subpart WWW. This equation is based on the in-place waste amount and age of the waste for each individual disposal unit.

$$Q_M = \sum_{i=1}^{n} 2\,k\,L_o\,M_i\left(e^{-kt_i}\right) \quad \{\text{Landfill gas generation rate}\}$$

AP-42 and the EPA LandGem Landfill Gas emission Model, version 3.02, assume that landfill gas is 50% methane. Therefore, the methane generation rate can be found by taking ½ of the landfill gas generation rate. The equation can be modified as follows:

$$Q_{CH_4} = \sum_{i=1}^{n} k\,L_o\,M_i\left(e^{-kt_i}\right) \quad \{\text{Methane gas generation rate}\}$$

Where:

Q_{CH4} = maximum expected methane gas generation flow rate, cubic meters per year
k = methane generation rate constant, year $^{-1}$ **(0.04/year**, AP-42 inventory default value)
L_o = methane generation potential, cubic meter per megagrams solid waste (**100 m^3/Mg,** AP- 42 inventory default value)
M_i = mass of solid waste in the ith section, megagrams
t_i = age of the ith section, years

The following is an example calculation for methane generation for the closed, lined "Allied" area in the first and second year, where t=0 and t = 1 respectively.

$$Q_{CH_4} = \sum_{i=1}^{n} \frac{0.04}{year} \times \frac{100\ m^3}{Mg} \times 22{,}000\ Mg \times \left(e^{-(0.04 \times 0)}\right) = 88{,}000\ \frac{m^3\ CH_4}{year}$$ When t = 0, M_i = 22,000 Mg

$$Q_{CH_4} = \sum_{i=1}^{n} \frac{0.04}{year} \times \frac{100\ m^3}{Mg} \times 140{,}000\ Mg \times \left(e^{-(0.04 \times 1)}\right) = 538{,}000\ \frac{m^3\ CH_4}{year}$$ When t = 1, M_i = 140,000 Mg

The following tables (Table 1.A, 1.B, 1.C) listing the methane emission rates for the three closed landfill areas were in the permit application for this facility. The emission rates listed in the tables are slightly higher than those calculated by the DAQ and the EPA LandGem model. The rates calculated by the consultant predict a higher toxic pollutant emission rate and thus a more conservative air toxics emission rate for the toxic evaluation/modeling exercise.

Table 1 .A Lined "Allied" Area

Calendar Year	Waste Acceptance Rate (Megagrams)	Age of Waste (years)	Amount of Waste-in-place	Methane Emission Rate
1993	22,000 Mg	0	0	0
1994	118,000 Mg	1	22,000 Mg	88,000 m^3/yr
1995	179,000 Mg	2	140,000 Mg	557,000 m^3/yr
1996	222,000 Mg	3	319,000 Mg	1,250,000 m^3/yr
1997	292,000 Mg	4	541,000 Mg	2,090,000 m^3/yr
1998	435,000 Mg	5	833,000 Mg	3,180,000 m^3/yr
1999	522,000 Mg	6	1,268,000 Mg	4,790,000 m^3/yr
2000	130,000 Mg	7	1,790,000 Mg	6,690,000 m^3/yr
2001	0.00 Mg	8	1,920,000 Mg	6,950,000 m^3/yr
2002	0.00 Mg	9	1,920,000 Mg	6,680,000 m^3/yr
2003	0.00 Mg	10	1,920,000 Mg	6,410,000 m^3/yr
2004	0.00 Mg	11	1,920,000 Mg	6,160,000 m^3/yr

Table 1 .B Unlined "Area A"

Calendar Year	Waste Acceptance Rate (Megagrams)	Age of Waste (years)	Amount of Waste-in-place	Methane Emission Rate
1984	29,900 Mg	0	0	0
1985	29,800 Mg	1	29,900 Mg	119,000 m^3/yr
1986	29,900 Mg	2	59,700 Mg	234,000 m^3/yr
1987	29,900 Mg	3	89,600 Mg	344,000 m^3/yr
1988	29,800 Mg	4	119,500 Mg	450,000 m^3/yr
1989	29,900 Mg	5	149,300 Mg	552,000 m^3/yr
1990	29,800 Mg	6	179,200 Mg	650,000 m^3/yr
1991	29,900 Mg	7	209,000 Mg	743,000 m^3/yr
1992	29,800 Mg	8	238,900 Mg	834,000 m^3/yr
1993	0.00 Mg	9	268,700 Mg	920,000 m^3/yr
1994	0.00 Mg	10	268,700 Mg	884,000 m^3/yr
1995	0.00 Mg	11	268,700 Mg	850,000 m^3/yr
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2003	0.00 Mg	19	268,700 Mg	617,000 m^3/yr
2004	0.00 Mg	20	268,700 Mg	593,000 m^3/yr

Table 1 .C Unlined "20 Acre Area"

Calendar Year	Waste Acceptance Rate (Megagrams)	Age of Waste (years)	Amount of Waste-in-place	Methane Emission Rate
1977	22,800 Mg	0	0	0
1978	23,700 Mg	1	22,800 Mg	91,400 m^3/yr
1979	21,900 Mg	2	46,500 Mg	183,000 m^3/yr
1980	22,800 Mg	3	68,400 Mg	263,000 m^3/yr
1981	22,800 Mg	4	91,200 Mg	344,000 m^3/yr
1982	22,800 Mg	5	114,000 Mg	422,000 m^3/yr
1983	22,900 Mg	6	136,800 Mg	497,000 m^3/yr
1984	0 Mg	7	159,700 Mg	569,000 m^3/yr
1985	0 Mg	8	159,700 Mg	547,000 m^3/yr
1986	0 Mg	9	159,700 Mg	525,000 m^3/yr
1987	0 Mg	10	159,700 Mg	505,000 m^3/yr
1988	0 Mg	11	159,700 Mg	485,000 m^3/yr
1989	0 Mg	12	159,700 Mg	466,000 m^3/yr
1990	0 Mg	13	159,700 Mg	448,000 m^3/yr
1991	0 Mg	14	159,700 Mg	430,000 m^3/yr
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2003	0 Mg	26	159,700 Mg	266,000 m^3/yr
2004	0 Mg	27	159,700 Mg	256,000 m^3/yr

The mass emissions of toxic air pollutants constituents found in landfill gas were calculated for each disposal unit based on methane generation rates and average sampled constituent concentrations determined by EPA during emission factor compilation in AP-42.

The following equation from AP-42, fifth edition, Section 2.4.4.1 "Emissions", Revised November 1998, was used to calculate the individual toxic air pollutants in methane.

$$Q_p = 1.82 \times Q_{CH_4} \left(\frac{C_p}{1 \times 10^6} \right)$$

Where:

Q_p = Emission rate of pollutants, m^3/yr
Q_{CH4} = Methane generation rate, m^3/yr
C_p = concentration of pollutant in landfill gas (from Table 2.4-1, "Default Concentration for Landfill gas constituents, Section 2.4.5
Multiplication factor = 1.82 assumes 55% landfill gas is methane

The following equation from AP-42, fifth edition, Section 2.4.4.1 "Emissions", Revised November 1998, to calculate the uncontrolled emission of individual toxic air pollutants present in landfill gas.

$$UM_p = Q_p\,(m^3/yr) \left[\frac{MW\,(g/gmole) \times (1\,atmosphere)}{\left(\frac{8.205 \times 10^{-5}\ m^3 - atmospere}{gmol - {}^0K}\right) \times \frac{1000\ g}{kg} \times (273 + 25^0 C)\ {}^0K} \right]$$

Where:

UM_p = Uncontrolled mass emissions of pollutants, kg/yr
MW_p = Molecular weight of pollutant, g/mol
Q_p = Emission rate of pollutant, m^3/yr
T^0 = 25^0 C (77 ^{0}F), recommended by AP-42 for landfill gas temperature if temperature is unknown

The following equation is an example calculation for the mass emissions flow rate (m^3/yr) of vinyl chloride constituents found in landfill gas. It was calculated based on methane generation rates and average sampled constituent concentrations determined by EPA during emission factor compilation in AP-42.

$$Q_p = 1.82 \times Q_{CH_4} \left(\frac{C_p}{1 \times 10^6} \right)$$ Where: Q_{CH4} = 6.16 x 10^6 m^3/yr (Lined Allied Area)

Cp (vinyl chloride) = 7.34 ppmv (Table 2.4-1, AP-42, Section 2.4.5

$$Q_{vinyl\ chloride} = 1.82 \times \frac{6.16 \times 10^6\ m^3}{year} \times \left(\frac{7.34\ parts}{1 \times 10^6} \right) = \frac{82.3\ m^3}{year} \quad (Lined\ Allied\ Area)$$

$$Q_{vinyl\ chloride} = 1.82 \times \frac{5.93 \times 10^5\ m^3}{year} \times \left(\frac{7.34\ parts}{1 \times 10^6} \right) = \frac{7.92\ m^3}{year} \quad (Unlined\ Area\ A)$$

$$Q_{vinyl\ chloride} = 1.82 \times \frac{2.56 \times 10^5\ m^3}{year} \times \left(\frac{7.34\ parts}{1 \times 10^6} \right) = \frac{3.42\ m^3}{year} \quad (20\ Acre\ Area)$$

Total $Q_{\text{vinyl chloride}}$ emission rate from landfill = 82.3 m^3/yr + 7.92 m^3/yr + 3.42 m^3/yr = 93.64 m^3/yr

The following equation is an example calculation for the mass emissions rate of toxic air pollutants constituents found in landfill gas were calculated for each disposal unit based on methane generation rates and average sampled constituent concentrations determined by EPA during emission factor compilation in AP-42.

Where: Molecular weight of vinyl chloride = 62.5 grams/gmole
Q_p = emission rate of vinyl chloride (93.64 m^3/yr)
T = 25 ^{0}C

$$UM_p = 93.64\ m^3\ \frac{\text{vinyl chloride}}{year} \times \left[\frac{62.5\ g/gmole \times 1\ atmosphere}{\left(\frac{8.205 \times 10^{-5}\ m^3 - atmospere}{gmol - {}^0K}\right) \times \frac{1000\ g}{kg} \times (273 + 25^0C)\ {}^0K} \right] \times \frac{2.2\ lbs\ vinyl\ chloride}{kg\ vinyl\ chloride} = \frac{526.59\ lbs\ vinyl\ chloride}{year}$$

The total vinyl chloride emission rate has been calculated to be 526.59 lbs per year. The threshold TPER amount is 26 lbs of vinyl chloride per year. Therefore, the vinyl chloride emission rate is greater than the TPER listed in 15A NCAC 2Q .0711 and will be modeled for compliance with the National Ambient Air Quality Standards.

The applicant calculated the emission rates of the other toxic air pollutants that are common in landfill gas, and placed them in Table 4 below. The applicant indicated that five pollutants (acrylonitrile, benzene, methyl mercaptan, hydrochloric acid (HCl) and vinyl chloride) were greater than the TPER listed in the North Carolina Air Toxic regulations. Effective April 1, 2005, the TPER threshold limit for hydrogen sulfide was changed from 0.52 **pounds per hour** to 1.7 **pounds per day**, making the threshold much more stringent than before. Due to this change in the TPER limit, hydrogen sulfide will be included in the facility wide model and the applicant/consultant was asked to remodel to include this pollutant.

The following example calculation is for the emission of hydrochloric acid (HCl) created from the combustion of landfill gas in a flare generated in the **unlined areas** of the landfill. The calculation method used is from AP-42, Section 2.4.4.2 – Controlled Emissions.

Hydrochloric acid (HCl) is formed when chlorinated compounds in landfill gas are combusted in control equipment. The best methods to estimate emission are mass balance methods using site specific data on total chloride [expressed in ppmv as the chloride ion (Cl^-)].

$$Q_{cl^-} = 2.0 \times Q_{CH_4} \left(\frac{C_{cl}}{1 \times 10^6} \right)$$ **(Equation 3, AP-42, Section 2.4.4.2)**

Q_{cl}^- = Emission rate of chloride ions, m^3/yr
Q_{CH4} = 951,194 m^3/yr (2004 actual emission rate of CH_4 from submitted inventory)
C_{cl}^- = concentration of chloride ions (42.0 ppmv, AP-42 default value when concentration not known)
Multiplication factor = 2.0 assumes 50% landfill gas is methane

$$Q_{cl^-} = 2.0 \times 951{,}194 \frac{m^3}{year} \left(\frac{42.0 \ parts \ Cl^-}{1 \times 10^6} \right) = \frac{79.90 \ m^3}{year}$$

The uncontrolled mass emissions of chloride ions present in the methane were found in the following manner using **Equation 4, AP-42, Section 2.4.4.2**.

Where:
UM_{cl}^- = Uncontrolled mass emissions of chloride ions, kg/yr
MW_{cl}^- = Molecular weight of chloride ions (35.45 g/mol)
Q_{cl}^- = Emission rate of chloride ions, (79.90, m^3/yr)
T^0 = 25^0 C (77 ^{0}F), recommended by AP-42 for landfill gas temperature if temperature is unknown

$$UM_{cl^-} = \frac{79.90 \ m^3}{year} \times \left[\frac{35.45 \ g/gmole \times 1 \ atmosphere}{\left(\frac{8.205 \times 10^{-5} \ m^3 - atmospere}{gmol - {}^0K} \right) \times \frac{1000 \ g}{kg} \times (273 + 25^0 C) \ {}^0K} \right] = \frac{115.84 \ kg \ (Cl^-)}{year}$$

The mass emissions of hydrochloric acid (HCl) created by the flare combustion of chloride ions is found by using **Equation 10, AP-42, Section 2.4.4.2**.:

Where:
CM_{HCl} = Controlled mass emissions of hydrogen chloride, kg/yr
UM_{cl}^- = Uncontrolled mass emission of chloride ions (115.84 kg/yr)
η_{col} = LFG collection system capture efficiency (73%)
1.03 = Ratio of molecular weight of HCL to CL^-
η_{col} = Control efficiency of flare for chlorinated hydrocarbons (98%)

$$CM_{cl^-} = UM_{cl^-} \times \left(\frac{\eta_{col}}{100} \right) \times 1.03 \times \left(\frac{\eta_{cnt}}{100} \right)$$

$$CM_{cl^-} = \frac{115.8 \ kg}{year} \times (0.73) \times 1.03 \times (0.98) = \frac{84.88 \ kg}{year}$$

The applicant calculated the hydrogen chloride emissions from the **lined area** using a collection efficiency of 93% using the same methodology as used in the preceding example to get a value of 952.25 kg/yr.

Total facility wide emissions of HCl from the flare = Unlined area emissions + lined area emissions
84.88 kg/yr + 952.25 kg/yr = 1037.13 kg HCl/year (2286.5 lbs HCl/year or 0.261 lbs HCl/hour)

Table 4 {The toxic air pollutant emissions from each of the three landfill areas (lined "Allied" area, unlined "area A", and unlined "20 acre area") at this facility have been added together and summarized in this table}

Constituent	Threshold (lbs/yr)	Emission Rate (lbs/yr)	Threshold (lbs/day)	Emission Rate (lbs/day)	Threshold (lbs/hr)	Emission Rate (lbs/hr)	Threshold Exceedance (Yes/No)
1,1,1-Trichloroethane (Methyl chloroform)	----------	----------	250	0.2041	----------	----------	No
1,1,2,2-Tetrachloroethane	430	216.8	----------	----------	----------	----------	No
1,1-Dichloroethene (Vinylidene chloride)	----------	----------	2.5	0.0618	----------	----------	No
1,2-Dichloroethane (Ethylene dichloride)	260	47.2	----------	----------	----------	----------	No
Acrylonitrile	10	390.7	----------	----------	----------	----------	**Yes**
Benzene	8.1	173.6	----------	----------	----------	----------	**Yes**
Carbon disulfide	----------	----------	3.9	0.1407	----------	----------	No
Carbon tetrachloride	460	0.7	----------	----------	----------	----------	No
Chlorobenzene	----------	----------	46	0.0897	----------	----------	No
Chloroform	290	4.2	----------	----------	----------	----------	No
p-Dichlorobenzene	----------	----------	----------	----------	16.8	0.004	No
Dichlorodifluoromethane	----------	----------	5200	6.0505	----------	----------	No
Dichlorofluoromethane	----------	----------	10	0.8595	----------	----------	No
Dichloromethane (Methylene chloride)	1600	1413.1	----------	----------	0.39	0.161	No
Ethyl mercaptan (Ethanethiol)	----------	----------	----------	----------	0.025	0.019	No
Ethyl mercaptan (Ethanethiol)	----------	----------	----------	----------	0.025	0.019	No
Ethylene dibromide	27	0.2	----------	----------	----------	----------	No
Hydrogen sulfide	----------	----------	1.7	3.864	----------	----------	**Yes**
Hydrogen chloride **	----------	----------	----------	----------	0.18	0.261	**Yes**
Mercury	----------	----------	0.013	0.0002	----------	----------	No
Methyl ethyl ketone	----------	----------	78	1.6296	22.4	0.068	No
Methyl isobutyl ketone	----------	----------	52	0.5970	7.6	0.025	No
Methyl mercaptan	----------	----------	----------	----------	0.013	0.016	**Yes**
Perchloroethylene (Tetrachloroethene)	13000	719.6	----------	----------	----------	----------	No
Toluene	----------	----------	98	11.5404	14.4	0.481	No
Trichloroethylene (Trichloroethene)	4000	431.1	----------	----------	----------	----------	No
Trichlorofluoromethane	----------	----------	----------	----------	140	0.014	No
Vinyl chloride	26	533.7	----------	----------	----------	----------	**Yes**
Xylenes	----------	----------	57	4.0942	16.4	0.171	No

** Pollutant formed by the combustion process of landfill gas

VI. Toxic modeling results:

SCREEN3 (96043) was used to evaluate simple and elevated terrain impacts from each source and the impacts were summed to provide a maximum facility-wide impact. Receptors were placed beginning at the closest distance to property boundary from each source and extended outward to 5,000 meters. There are no significant structures on site, so a cavity analysis was not required.

DAQ Air Quality Analysis Branch Comments (Toxics memo dated August 17, 2005, from Tom Anderson, Meteorologist):
Several toxics are emitted from the landfill as fugitives from three waste areas and also from two flares on site. The waste areas were treated as volume sources and the flares as point sources.

All toxic impact s were well below their respective AALs and the percentages of their respective AALs are shown in the following table. This facility appears to be in compliance with the State Air Toxics.

Pollutant	Averaging Period	% of AAL
Acrylonitrile	Annual	30%
Benzene	Annual	16%
Hydrogen chloride	1-hour	Less than 1%
Hydrogen sulfide	1-hour	Less than 1%
Methyl mercaptan	1-hour	Less than 1%
Vinyl chloride	1-hour	16%

STATE-ONLY REQUIREMENT:
Pursuant to 15A NCAC 2D .1100 and in accordance with the approved application for an air toxic compliance demonstration, the following permit limits shall not be exceeded:

Emission Sources	Toxic Air Pollutants	Emission Limits
ES-1 (Municipal solid waste landfill)	Acrylonitrile	390.7 lbs per year
	Benzene	173.6 lbs per year
	Hydrogen sulfide	3.864 lbs per day
	Methyl mercaptan	0.016 lbs per hour
	Vinyl chloride	533.7 lbs per year

The toxic air pollutants, listed in Table 4 of this review, represent the maximum emission rates from the landfill as of the year 2004. Since the maximum landfill gas generation rates have passed for all three areas, the year 2004 total emissions represent the maximum gas generation of the landfill presently and in the future. Those toxic air pollutants that do not exceed the listed TPER threshold limits, will be placed in the body of the permit as a "not to exceed limit". For the calculation of combustion toxics generated by the flare, all of the collected landfill gas was routed to the flare in this toxics demonstration. Therefore, since the TPERs were not exceeded by those air toxic pollutants that are not being modeled, and the landfill must operate in compliance with both NSPS (Subpart WWW), and MACT (Subpart AAAA), the DAQ believes that the gas collection and control system capture efficiency, and flare efficiency will be adequate to keep this facility in compliance with toxic air pollutant emissions through the life of this landfill.

No monitoring, recordkeeping or reporting will be required in the permit. However, the Permittee shall maintain records of operational information demonstrating that the toxic air pollutant emissions do not exceed the emission rates that require a permit (TPERs).

VII. A Professional Engineers Seal **is not** required for this modification/application because no new control devices are being added and the design plan for the gas collection and control system is not being changed.

VIII. A consistency determination **is not** required for this significant modification/Renewal because no new sources are being added.

IX. An application fee **is not** required for this significant modification because the DAQ requested that the permit be reopened and modified. Also, Title V renewal application require no application fee.

X. The appropriate number of copies of the application were received by the DAQ on May 6, 2005, and June 30, 2005.

XI. **PSD does not apply** for this modification.

XII. **Public Notice**

Public notice **is required** for this Title V Significant Modification/Renewal. The permit will go through a 30-day public comment period and a 45-day EPA review period.

The 30-day public comment period was from _____ through _____. ___public comments were received during the public comment period.

The EPA 45-Day review period was from _____through _____. An email was received by the DAQ from the EPA (Scott Miller) on _____stating that _____on the proposed permit for the Sampson County Landfill.

Changes to existing Title V Permit No. 08644T01 per applications (8200135.05A and 05B):

Old Page No.	New Page No.	Condition No.	Changes
Pg 1	Pg 1	Cover letter	Changed date, revised permit number, used the latest version of the cover letter, changed authorized official to Scott T. Sauer
Pg 2	Pg 2	Cover letter	Changed date on letter, effective date of permit, changed authorized official to Scott T. Sauer
Part I Operation Permit			
Pg 1	Pg 1	Cover page	Changed: Permit No., "Replaces Permit No.", effective date of permit, application No., permit issue date
All	All	Top of pages	Changed permit revision number
Pg 4	Pg 4	Specific Limitations and Conditions	Added hazardous air pollutants and toxic air pollutants to the table of conditions
Pg 6	Pg 6 - 8	Specific Limitations and Conditions	Added MACT language to permit
N/A	Pg 8-9	Specific Limitations and Conditions	Added toxic air pollutant language to the permit along will a table of modeled limits Added table of pollutant limits and thresholds for toxic air pollutants that were not modeled
N/A	Pg 10	General Conditions	Added revised general conditions

XIII. **Recommendations:**

A copy of the draft review and the draft permit were sent to the Fayetteville Regional Office on August 26, 2005. This permit, issued as a Significant Modification to a Title V permit for the Sampson County Landfill, located in Roseboro, North Carolina, has been reviewed by the DAQ to determine compliance with all requirements. The _____concurs with the issuance of this permit.

Issue permit No. 08644T02.