Kelley Montgomery
713-552-1360

RICHARD E. OAKLEY III
President
Gas Services

reference #111

January 22, 1997

Ms. Susan A. Thorneloe
Senior Environmental Engineer
Global Emissions & Control Division
U.S. Environmental Protection Agency
Air & Energy Engineering Research Laboratory (MD-63)
Research Triangle Park, NC 27711

Re: *Tier 2 Testing Data*

Dear Ms. Thorneloe:

We have recently completed Tier 2 testing at several of our landfills that are considered "Affected Facilities" under the New Source Performance Standards for Municipal Solid Waste Landfills (NSPS). Attached you will find (I.) Tier 2 NMOC emission rate calculations, (II.) U.S. EPA landfill gas generation model output , and (III.) NSPS Tier 2 sampling and analysis summary report; for eleven (11) landfill locations listed below.

1. Brewton, AL
2. Fountain, CO
3. Conley, GA
4. Milan, IL
5. Leland, MS
6. Missoula, MT
7. Harrisburg, NC
8. Beaumont, TX
9. Canyon, TX
10. Fresno, TX
11. Mexia, TX

The site specific NMOC concentrations for these sites produce a numeric mean concentration of 557 ppm, measured as hexane. This value corresponds nicely with the proposed AP-42 standard of 542 ppm. Please note that the NMOC concentrations reported in the sampling and analysis summary report (Attachment III) are measured and reported as parts per million-volume (ppmv) methane. The same concentrations when reported to the hexane standard (U.S. EPA reference) are about a factor of 6 lower.

Corporate Office · 757 N. Eldridge · P.O. Box 3151 (77253) · Houston, Texas 77079
Phone 713-870-8100 · Fax 713-870-7844
Anna Patterson - 281-870-7446

We understand the agency intends to use this generic data (a.) in support of the proposed AP-42 standards, as proposed or with further refinement, and (b.) in possible future environmental life-cycle analyses (LCA), that may be performed by the agency. A copy of this letter and attached data is also being forwarded to Dr. Ed Repa with the National Solid Wastes Management Association (NSWMA), for that organizations use in their current environmental LCA project. Both the U.S. EPA and the NSWMA are free to use this data for the above referenced purposes, along with the city and state of the subject site. As a courtesy, I do ask that if we have inadvertently left other specific information (such as personnel names, phone numbers, etc.) on these documents, that such information not be used in publications arising from your respective efforts.

Sincerely,

R. E. Oakley

Richard E. Oakley III

REO:sjc
Attachment

xc: Edward W. Repa, Ph.D.

ATTACHMENT 1

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

Brewton, AL

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

11/19/96

Assumption: For this landfill, it has been assumed that the annual MSW acceptance rate is unknown.

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

where,

M_{NMOC}	=	Mass emission rate of NMOC	**Mg/yr**
L_0	=	Refuse methane generation potential	170 **m^3/Mg**
R	=	Average annual acceptance rate	254804 **Mg/yr**
k	=	Methane generation rate constant	0.05 **1/yr**
c	=	Years since closure (c=0 for active and/or new landfills)	0 **yrs**
t	=	Age of landfill	2.69 **yrs**
C_{NMOC}	=	Concentration of NMOC	511 **ppm**
Conversion factor	=		3.595×10^{-9}

Using the values from above,

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

= 20.05 **Mg/yr**

ATTACHMENT 2

U.S. EPA LANDFILL GAS GENERATION MODEL

OUTPUT

[redacted]

Model Parameters

Lo : 6000.000000 ft^3 / Mg
k : 0.050000 1/yr

NMOC : 511.000000 ppmv ***** Note : Default value not used ****
Methane : 50.000000 % volume
Carbon Dioxide : 50.000000 % volume

Landfill Parameters

Year Opened : 1993 Current Year : 1996 Year Closed: 2010
Capacity : 4300000.000000 Mg
Average Acceptance Rate : 254804.000000 Mg/year
Average Acceptance Rate Required from
Current Year to Closure Year : 252542.000000 Mg/year

Year	Refuse In Place (Mg)	NMOC Emission Rate (as Hexane) (Mg/yr)	(Cubic Ft/yr)
1994	2.548E+005	7.930E+000	7.812E+004
1995	5.096E+005	1.547E+001	1.524E+005
1996	7.644E+005	2.265E+001	2.231E+005
1997	1.017E+006	2.940E+001	2.897E+005
1998	1.269E+006	3.583E+001	3.530E+005
1999	1.522E+006	4.194E+001	4.132E+005
2000	1.775E+006	4.775E+001	4.705E+005
2001	2.027E+006	5.328E+001	5.250E+005
2002	2.280E+006	5.854E+001	5.768E+005
2003	2.532E+006	6.355E+001	6.261E+005
2004	2.785E+006	6.831E+001	6.730E+005
2005	3.037E+006	7.284E+001	7.176E+005
2006	3.290E+006	7.714E+001	7.600E+005
2007	3.542E+006	8.124E+001	8.004E+005
2008	3.795E+006	8.514E+001	8.388E+005
2009	4.047E+006	8.884E+001	8.753E+005
2010	4.300E+006	9.237E+001	9.100E+005
2011	4.300E+006	8.786E+001	8.657E+005
2012	4.300E+006	8.358E+001	8.234E+005
2013	4.300E+006	7.950E+001	7.833E+005
2014	4.300E+006	7.563E+001	7.451E+005
2015	4.300E+006	7.194E+001	7.087E+005
2016	4.300E+006	6.843E+001	6.742E+005
2017	4.300E+006	6.509E+001	6.413E+005
2018	4.300E+006	6.192E+001	6.100E+005
2019	4.300E+006	5.890E+001	5.803E+005
2020	4.300E+006	5.602E+001	5.520E+005
2021	4.300E+006	5.329E+001	5.250E+005
2022	4.300E+006	5.069E+001	4.994E+005
2023	4.300E+006	4.822E+001	4.751E+005
2024	4.300E+006	4.587E+001	4.519E+005
2025	4.300E+006	4.363E+001	4.299E+005
2026	4.300E+006	4.150E+001	4.089E+005
2027	4.300E+006	3.948E+001	3.890E+005
2028	4.300E+006	3.755E+001	3.700E+005
2029	4.300E+006	3.572E+001	3.519E+005
2030	4.300E+006	3.398E+001	3.348E+005
2031	4.300E+006	3.232E+001	3.185E+005
2032	4.300E+006	3.075E+001	3.029E+005

2033	4.300E+006	2.925E+001	2.882E+005
2034	4.300E+006	2.782E+001	2.741E+005
2035	4.300E+006	2.646E+001	2.607E+005
2036	4.300E+006	2.517E+001	2.480E+005
2037	4.300E+006	2.395E+001	2.359E+005
2038	4.300E+006	2.278E+001	2.244E+005
2039	4.300E+006	2.167E+001	2.135E+005
2040	4.300E+006	2.061E+001	2.031E+005
2041	4.300E+006	1.961E+001	1.932E+005
2042	4.300E+006	1.865E+001	1.837E+005
2043	4.300E+006	1.774E+001	1.748E+005
2044	4.300E+006	1.687E+001	1.662E+005
2045	4.300E+006	1.605E+001	1.581E+005
2046	4.300E+006	1.527E+001	1.504E+005
2047	4.300E+006	1.452E+001	1.431E+005
2048	4.300E+006	1.382E+001	1.361E+005
2049	4.300E+006	1.314E+001	1.295E+005
2050	4.300E+006	1.250E+001	1.232E+005
2051	4.300E+006	1.189E+001	1.172E+005
2052	4.300E+006	1.131E+001	1.114E+005
2053	4.300E+006	1.076E+001	1.060E+005
2054	4.300E+006	1.023E+001	1.008E+005
2055	4.300E+006	9.736E+000	9.592E+004
2056	4.300E+006	9.261E+000	9.124E+004
2057	4.300E+006	8.809E+000	8.679E+004
2058	4.300E+006	8.380E+000	8.256E+004
2059	4.300E+006	7.971E+000	7.853E+004
2060	4.300E+006	7.582E+000	7.470E+004

ATTACHMENT 3

NSPS TIER 2 SAMPLING AND ANALYSIS SUMMARY REPORT

[redacted]

New Source Performance Standards
Tier 2 Sampling and Analysis Summary Report
for the
[redacted]
Brewton, Alabama

Presented to:

Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079

Presented by:

SCS ENGINEERS
701 Brazos, Suite 500
Austin, Texas 78701
(512) 480-8557

File No. 1696012.00
November 26, 1996

Environmental Consultants

701 Brazos Street
Suite 500
Austin Texas 78701

512 480-8557
FAX 512 320-5722

SCS ENGINEERS

November 26, 1996
Project No. 1696012.00

Mr. Larry Harrell
Manager, Air Programs
Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079
(713) 870-7630

Subject: New Source Performance Standards
Tier 2 Sampling and Analysis Report for the
[redacted]
Brewton, Alabama

Dear Mr. Harrell:

SCS Engineers (SCS) is pleased to provide our summary report on New Source Performance Standards (NSPS) Tier 2 sampling and analysis activities at the subject Browning-Ferris Industries (BFI) landfill (Site). A summary of field sampling activities and laboratory analysis results are provided below.

SUMMARY OF FIELD SAMPLING ACTIVITIES

Field sampling activities were conducted at the Site on October 19, 1996. Present at the Site were Mr. Larry Harrell of BFI, Mr. Jason Estes of SCS, and a representative from our landfill gas (LFG) sampling subcontractor, Transglobal Environmental Geochemistry, Inc. (TEG).

LFG samples were obtained from six sampling locations at depths ranging from 9 to 12 feet below the landfill surface using TEG's geoprobe. The LFG samples were composited into two summa canisters per SCS' modified Method 25C, as approved by the U.S. Environmental Protection Agency (U.S. EPA). The two summa canisters, each containing LFG samples from three sampling locations, were shipped by BFI to AtmAA, Inc. (AtmAA), BFI's approved laboratory, for subsequent analysis.

SUMMARY OF LABORATORY ANALYSIS RESULTS

All laboratory analyses were performed by AtmAA. Measured Non-Methane Organic Compound (NMOC) concentrations from the two canisters were utilized in the calculation of the Site's average NMOC concentration. Based on laboratory results, a Site-average NMOC concentration of 511 parts per million by volume (ppmv), as hexane, is indicated. This site-specific NMOC concentration can be used in evaluating the Site's NMOC emissions.

CLOSING

It was a pleasure working with you on this project, and we thank you for the opportunity to provide Browning-Ferris Gas Services, Inc. our services. Should you have any questions or comments, please contact Lon Albert or Steve Hamilton at (512) 480-8557.

Sincerely,

Lon Albert, P.E.
Senior Project Engineer

Steven M. Hamilton, R.E.P.
Vice President
SCS ENGINEERS

SMH/RLA:la

Attachment

1. Laboratory Analysis Results

ATTACHMENT 1

LABORATORY ANALYSIS RESULTS

AtmAA Inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Total Gaseous Non-Methane Organics (TGNMO) and Nitrogen
Analysis in SUMMA Canister Samples

Report Date: October 23, 1996
Client: BFI / SCS Engineers
Site: [redacted]
Project No.: 1696012 . 00
Date Received: October 21, 1996
Date Analyzed: October 22, 1996

ANALYSIS DESCRIPTION

Total gaseous non-methane organics in SUMMA canisters was measured by flame ionization detection/ total combustion analysis (FID/TCA), EPA Method 25c. Nitrogen was measured by thermal conductivity detection/ gas chromatography (TCD/GC), EPA Method 3c.

AtmAA Lab No.	Sample ID	Nitrogen (%,v)	TGNMO (ppmv)
92956-1	J-11	2.83	2572
92956-2	J-12	1.90	3560

TGNMO is total gaseous non-methane organics measured and reported as ppm methane.

Note: A barometric pressure of 29.92 inches Hg is assumed for TGNMO calculation. No site barometric pressure was recorded on the field sampling data sheet submitted.

Michael L. Porter
Laboratory Director

ATTACHMENT 1

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

Fountain, CO

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

11/19/96

Assumption: For this landfill, it has been assumed that the annual MSW acceptance rate is unknown.

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

where,

M_{NMOC}	=	Mass emission rate of NMOC	**Mg/yr**
L_0	=	Refuse methane generation potential	170 **m^3/Mg**
R	=	Average annual acceptance rate	120980 **Mg/yr**
k	=	Methane generation rate constant	0.05 **1/yr**
c	=	Years since closure (c=0 for active and/or new landfills)	0 **yrs**
t	=	Age of landfill	30.46 **yrs**
C_{NMOC}	=	Concentration of NMOC	897.5 **ppm**
Conversion factor	=		3.595×10^{-9}

Using the values from above,

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

= 103.78 **Mg/yr**

ATTACHMENT 2

U.S. EPA LANDFILL GAS GENERATION MODEL

OUTPUT

[redacted]

Model Parameters

Lo : 6000.000000 ft^3 / Mg
k : 0.050000 1/yr

NMOC : 898.000000 ppmv ***** Note : Default value not used ****
Methane : 50.000000 % volume
Carbon Dioxide : 50.000000 % volume

Landfill Parameters

Year Opened : 1966 Current Year : 1996 Year Closed: 2036
Capacity : 8400000.000000 Mg
Average Acceptance Rate : 120980.000000 Mg/year
Average Acceptance Rate Required from
Current Year to Closure Year : 119265.000000 Mg/year

Year	Refuse In Place (Mg)	NMOC Emission Rate (Mg/yr)	NMOC Emission Rate (as Hexane) (Cubic Ft/yr)
1967	1.210E+005	6.616E+000	6.518E+004
1968	2.420E+005	1.291E+001	1.272E+005
1969	3.629E+005	1.890E+001	1.862E+005
1970	4.839E+005	2.459E+001	2.423E+005
1971	6.049E+005	3.001E+001	2.956E+005
1972	7.259E+005	3.516E+001	3.464E+005
1973	8.469E+005	4.006E+001	3.947E+005
1974	9.678E+005	4.472E+001	4.406E+005
1975	1.089E+006	4.916E+001	4.843E+005
1976	1.210E+006	5.338E+001	5.259E+005
1977	1.331E+006	5.739E+001	5.654E+005
1978	1.452E+006	6.121E+001	6.030E+005
1979	1.573E+006	6.484E+001	6.388E+005
1980	1.694E+006	6.829E+001	6.728E+005
1981	1.815E+006	7.158E+001	7.052E+005
1982	1.936E+006	7.470E+001	7.360E+005
1983	2.057E+006	7.768E+001	7.653E+005
1984	2.178E+006	8.050E+001	7.931E+005
1985	2.299E+006	8.319E+001	8.196E+005
1986	2.420E+006	8.575E+001	8.449E+005
1987	2.541E+006	8.819E+001	8.688E+005
1988	2.662E+006	9.050E+001	8.916E+005
1989	2.783E+006	9.271E+001	9.133E+005
1990	2.904E+006	9.480E+001	9.340E+005
1991	3.025E+006	9.679E+001	9.536E+005
1992	3.145E+006	9.869E+001	9.723E+005
1993	3.266E+006	1.005E+002	9.901E+005
1994	3.387E+006	1.022E+002	1.007E+006
1995	3.508E+006	1.038E+002	1.023E+006
1996	3.629E+006	1.054E+002	1.038E+006
1997	3.749E+006	1.068E+002	1.052E+006
1998	3.868E+006	1.081E+002	1.065E+006
1999	3.987E+006	1.093E+002	1.077E+006
2000	4.106E+006	1.105E+002	1.089E+006
2001	4.226E+006	1.117E+002	1.100E+006
2002	4.345E+006	1.127E+002	1.111E+006
2003	4.464E+006	1.138E+002	1.121E+006
2004	4.584E+006	1.147E+002	1.130E+006
2005	4.703E+006	1.157E+002	1.140E+006

2006	4.822E+006	1.165E+002	1.148E+006
2007	4.941E+006	1.174E+002	1.156E+006
2008	5.061E+006	1.182E+002	1.164E+006
2009	5.180E+006	1.189E+002	1.172E+006
2010	5.299E+006	1.197E+002	1.179E+006
2011	5.418E+006	1.203E+002	1.186E+006
2012	5.538E+006	1.210E+002	1.192E+006
2013	5.657E+006	1.216E+002	1.198E+006
2014	5.776E+006	1.222E+002	1.204E+006
2015	5.895E+006	1.228E+002	1.210E+006
2016	6.015E+006	1.233E+002	1.215E+006
2017	6.134E+006	1.238E+002	1.220E+006
2018	6.253E+006	1.243E+002	1.225E+006
2019	6.372E+006	1.248E+002	1.229E+006
2020	6.492E+006	1.252E+002	1.233E+006
2021	6.611E+006	1.256E+002	1.238E+006
2022	6.730E+006	1.260E+002	1.241E+006
2023	6.850E+006	1.264E+002	1.245E+006
2024	6.969E+006	1.267E+002	1.249E+006
2025	7.088E+006	1.271E+002	1.252E+006
2026	7.207E+006	1.274E+002	1.255E+006
2027	7.327E+006	1.277E+002	1.258E+006
2028	7.446E+006	1.280E+002	1.261E+006
2029	7.565E+006	1.283E+002	1.264E+006
2030	7.684E+006	1.286E+002	1.267E+006
2031	7.804E+006	1.288E+002	1.269E+006
2032	7.923E+006	1.291E+002	1.271E+006
2033	8.042E+006	1.293E+002	1.274E+006
2034	8.161E+006	1.295E+002	1.276E+006
2035	8.281E+006	1.297E+002	1.278E+006
2036	8.400E+006	1.299E+002	1.280E+006
2037	8.400E+006	1.236E+002	1.217E+006
2038	8.400E+006	1.175E+002	1.158E+006
2039	8.400E+006	1.118E+002	1.102E+006
2040	8.400E+006	1.064E+002	1.048E+006
2041	8.400E+006	1.012E+002	9.967E+005
2042	8.400E+006	9.623E+001	9.481E+005
2043	8.400E+006	9.154E+001	9.019E+005
2044	8.400E+006	8.708E+001	8.579E+005
2045	8.400E+006	8.283E+001	8.160E+005
2046	8.400E+006	7.879E+001	7.762E+005
2047	8.400E+006	7.495E+001	7.384E+005
2048	8.400E+006	7.129E+001	7.024E+005
2049	8.400E+006	6.781E+001	6.681E+005
2050	8.400E+006	6.451E+001	6.355E+005
2051	8.400E+006	6.136E+001	6.045E+005
2052	8.400E+006	5.837E+001	5.751E+005
2053	8.400E+006	5.552E+001	5.470E+005
2054	8.400E+006	5.281E+001	5.203E+005
2055	8.400E+006	5.024E+001	4.950E+005
2056	8.400E+006	4.779E+001	4.708E+005
2057	8.400E+006	4.546E+001	4.479E+005
2058	8.400E+006	4.324E+001	4.260E+005
2059	8.400E+006	4.113E+001	4.052E+005
2060	8.400E+006	3.913E+001	3.855E+005
2061	8.400E+006	3.722E+001	3.667E+005
2062	8.400E+006	3.540E+001	3.488E+005
2063	8.400E+006	3.368E+001	3.318E+005
2064	8.400E+006	3.203E+001	3.156E+005
2065	8.400E+006	3.047E+001	3.002E+005

2066	8.400E+006	2.898E+001	2.856E+005
2067	8.400E+006	2.757E+001	2.716E+005
2068	8.400E+006	2.623E+001	2.584E+005
2069	8.400E+006	2.495E+001	2.458E+005
2070	8.400E+006	2.373E+001	2.338E+005
2071	8.400E+006	2.257E+001	2.224E+005
2072	8.400E+006	2.147E+001	2.115E+005
2073	8.400E+006	2.043E+001	2.012E+005
2074	8.400E+006	1.943E+001	1.914E+005
2075	8.400E+006	1.848E+001	1.821E+005
2076	8.400E+006	1.758E+001	1.732E+005
2077	8.400E+006	1.672E+001	1.648E+005
2078	8.400E+006	1.591E+001	1.567E+005
2079	8.400E+006	1.513E+001	1.491E+005
2080	8.400E+006	1.439E+001	1.418E+005
2081	8.400E+006	1.369E+001	1.349E+005
2082	8.400E+006	1.302E+001	1.283E+005
2083	8.400E+006	1.239E+001	1.221E+005
2084	8.400E+006	1.178E+001	1.161E+005
2085	8.400E+006	1.121E+001	1.104E+005
2086	8.400E+006	1.066E+001	1.051E+005

ATTACHMENT 3

NSPS TIER 2 SAMPLING AND ANALYSIS SUMMARY REPORT

[redacted]

New Source Performance Standards
Tier 2 Sampling and Analysis Summary Report
for the
[redacted]
Fountain, Colorado

Presented to:

Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079

Presented by:

SCS ENGINEERS
701 Brazos, Suite 500
Austin, Texas 78701
(512) 480-8557

File No. 1696012.00
November 26, 1996

Environmental Consultants

701 Brazos Street
Suite 500
Austin, Texas 78701

512 480-8557
FAX 512 320-5722

SCS ENGINEERS

November 26, 1996
Project No. 1696012.00

Mr. Larry Harrell
Manager, Air Programs
Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079
(713) 870-7630

Subject: New Source Performance Standards
Tier 2 Sampling and Analysis Report for the
[redacted]
Fountain, Colorado

Dear Mr. Harrell:

SCS Engineers (SCS) is pleased to provide our summary report on New Source Performance Standards (NSPS) Tier 2 sampling and analysis activities at the subject Browning-Ferris Industries (BFI) landfill (Site). A summary of field sampling activities and laboratory analysis results are provided below.

SUMMARY OF FIELD SAMPLING ACTIVITIES

Field sampling activities were conducted at the Site during the period from October 16, 1996 through October 19, 1996. Present at the Site were Messrs. Rick Moran and Bart Viner of BFI, Mr. Kevin Barnes of SCS, and a representative from our landfill gas (LFG) sampling subcontractor, Transglobal Environmental Geochemistry, Inc. (TEG). Mr. Tom Levell of the Colorado Department of Health was on site on October 17, 1996 to witness the collection of two samples.

LFG samples were obtained from 32 sampling locations at depths ranging from 9 to 15 feet below the landfill surface using TEG's geoprobe. The LFG samples were composited into eight summa canisters per SCS' modified Method 25C, as approved by the U.S. Environmental Protection Agency (U.S. EPA). The eight summa canisters, each containing LFG samples from four sampling locations, were shipped by BFI to AtmAA, Inc. (AtmAA), BFI's approved laboratory, for subsequent analysis.

SUMMARY OF LABORATORY ANALYSIS RESULTS

All laboratory analyses were performed by AtmAA. Upon measurement of nitrogen concentrations in each of the canisters, two canisters, K-3 and K-6, were found to contain greater than 20 percent nitrogen by volume, and thus are not included in the calculation of the Site's average Non-Methane Organic Compound (NMOC) concentration. Laboratory analysis results are included in Attachment 1.

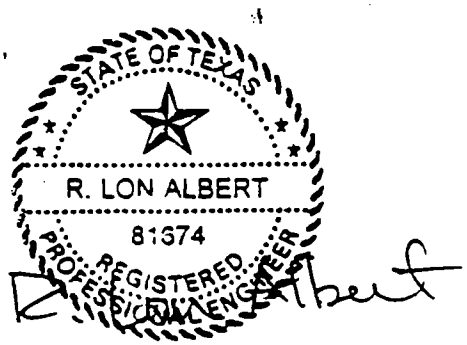
Measured NMOC concentrations from the six remaining canisters were utilized in the calculation of the Site's average NMOC concentration. Based on laboratory results, a Site-

average NMOC concentration of 898 parts per million by volume (ppmv), as hexane, is indicated. This site-specific NMOC concentration can be used in evaluating the Site's NMOC emissions.

CLOSING

It was a pleasure working with you on this project, and we thank you for the opportunity to provide Browning-Ferris Gas Services, Inc. our services. Should you have any questions or comments, please contact Lon Albert or Steve Hamilton at (512) 480-8557.

Sincerely,



Lon Albert, P.E.
Senior Project Engineer

Steven M. Hamilton, R.E.P.
Vice President
SCS ENGINEERS

SMH/RLA:la

Attachment

1. Laboratory Analysis Results

ATTACHMENT 1

LABORATORY ANALYSIS RESULTS

AtmAA Inc.
23917 Craftsman Rd.. Calabasas. CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Total Gaseous Non-Methane Organics (TGNMO) and Nitrogen Analysis in SUMMA Canister Samples

Report Date: November 12, 1996
Client: BFI / SCS Engineers
Site: [redacted]
Project No.: 1696012 . 00
Date Received: October 22, 1996
Date Analyzed: October 23, 1996

ANALYSIS DESCRIPTION

Total gaseous non-methane organics in SUMMA canisters was measured by flame ionization detection/ total combustion analysis (FID/TCA), EPA Method 25c. Nitrogen was measured by thermal conductivity detection/ gas chromatography (TCD/GC), EPA Method 3c.

AtmAA Lab No.	Sample ID	Nitrogen (%,v)	TGNMO (ppmv)
92966-9	K-1	15.4	2229
92966-10	K-2	14.7	4585
92966-11	K-3	22.4	3050
92966-12	K-4	18.2	6055
92966-13	K-5	18.3	5603
92966-14	K-6	20.4	5296
92966-15	K-7	13.9	7963
92966-16	K-8	17.7	5876

TGNMO is total gaseous non-methane organics measured and reported as ppm methane.

Note: A barometric pressure of 23.8 inches Hg is used for TGNMO calculations, per Kevin Barnes.

Michael L. Porter
Laboratory Director

ATTACHMENT 1

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

Conley, GA

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

11/19/96

Assumption: For this landfill, it has been assumed that the annual MSW acceptance rate is unknown.

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

where,

M_{NMOC}	=	Mass emission rate of NMOC	**Mg/yr**
L_0	=	Refuse methane generation potential	170 **m^3/Mg**
R	=	Average annual acceptance rate	286000 **Mg/yr**
k	=	Methane generation rate constant	0.05 **1/yr**
c	=	Years since closure (c=0 for active and/or new landfills)	0 **yrs**
t	=	Age of landfill	3.03 **yrs**
C_{NMOC}	=	Concentration of NMOC	294.8 **ppm**
Conversion factor	=		3.595×10^{-9}

Using the values from above,

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

= **14.48 Mg/yr**

ATTACHMENT 2

U.S. EPA LANDFILL GAS GENERATION MODEL

OUTPUT

[redacted]

Model Parameters

Lo : 6000.000000 ft^3 / Mg
k : 0.050000 1/yr

NMOC : 295.000000 ppmv ***** Note : Default value not used ****
Methane : 50.000000 % volume
Carbon Dioxide : 50.000000 % volume

Landfill Parameters

Year Opened : 1993 Current Year : 1996 Year Closed: 2009
Capacity : 4300000.000000 Mg
Average Acceptance Rate : 286000.000000 Mg/year
Average Acceptance Rate Required from
Current Year to Closure Year : 264769.230769 Mg/year

Year	Refuse In Place (Mg)	NMOC Emission Rate (as Hexane) (Mg/yr)	(Cubic Ft/yr)
1994	2.860E+005	5.138E+000	5.062E+004
1995	5.720E+005	1.003E+001	9.878E+004
1996	8.580E+005	1.467E+001	1.446E+005
1997	1.123E+006	1.872E+001	1.844E+005
1998	1.388E+006	2.256E+001	2.223E+005
1999	1.652E+006	2.622E+001	2.583E+005
2000	1.917E+006	2.969E+001	2.926E+005
2001	2.182E+006	3.300E+001	3.252E+005
2002	2.447E+006	3.615E+001	3.562E+005
2003	2.711E+006	3.914E+001	3.857E+005
2004	2.976E+006	4.199E+001	4.137E+005
2005	3.241E+006	4.470E+001	4.404E+005
2006	3.506E+006	4.728E+001	4.658E+005
2007	3.770E+006	4.973E+001	4.899E+005
2008	4.035E+006	5.206E+001	5.129E+005
2009	4.300E+006	5.428E+001	5.347E+005
2010	4.300E+006	5.163E+001	5.087E+005
2011	4.300E+006	4.911E+001	4.839E+005
2012	4.300E+006	4.672E+001	4.603E+005
2013	4.300E+006	4.444E+001	4.378E+005
2014	4.300E+006	4.227E+001	4.165E+005
2015	4.300E+006	4.021E+001	3.962E+005
2016	4.300E+006	3.825E+001	3.768E+005
2017	4.300E+006	3.638E+001	3.585E+005
2018	4.300E+006	3.461E+001	3.410E+005
2019	4.300E+006	3.292E+001	3.243E+005
2020	4.300E+006	3.132E+001	3.085E+005
2021	4.300E+006	2.979E+001	2.935E+005
2022	4.300E+006	2.834E+001	2.792E+005
2023	4.300E+006	2.695E+001	2.655E+005
2024	4.300E+006	2.564E+001	2.526E+005
2025	4.300E+006	2.439E+001	2.403E+005
2026	4.300E+006	2.320E+001	2.286E+005
2027	4.300E+006	2.207E+001	2.174E+005
2028	4.300E+006	2.099E+001	2.068E+005
2029	4.300E+006	1.997E+001	1.967E+005
2030	4.300E+006	1.899E+001	1.871E+005
2031	4.300E+006	1.807E+001	1.780E+005
2032	4.300E+006	1.719E+001	1.693E+005

2033	4.300E+006	1.635E+001	1.611E+005
2034	4.300E+006	1.555E+001	1.532E+005
2035	4.300E+006	1.479E+001	1.457E+005
2036	4.300E+006	1.407E+001	1.386E+005
2037	4.300E+006	1.338E+001	1.319E+005
2038	4.300E+006	1.273E+001	1.254E+005
2039	4.300E+006	1.211E+001	1.193E+005
2040	4.300E+006	1.152E+001	1.135E+005
2041	4.300E+006	1.096E+001	1.080E+005
2042	4.300E+006	1.042E+001	1.027E+005
2043	4.300E+006	9.916E+000	9.769E+004
2044	4.300E+006	9.432E+000	9.293E+004
2045	4.300E+006	8.972E+000	8.839E+004
2046	4.300E+006	8.534E+000	8.408E+004
2047	4.300E+006	8.118E+000	7.998E+004
2048	4.300E+006	7.722E+000	7.608E+004
2049	4.300E+006	7.346E+000	7.237E+004
2050	4.300E+006	6.987E+000	6.884E+004
2051	4.300E+006	6.647E+000	6.548E+004
2052	4.300E+006	6.322E+000	6.229E+004
2053	4.300E+006	6.014E+000	5.925E+004
2054	4.300E+006	5.721E+000	5.636E+004
2055	4.300E+006	5.442E+000	5.361E+004
2056	4.300E+006	5.176E+000	5.100E+004
2057	4.300E+006	4.924E+000	4.851E+004
2058	4.300E+006	4.684E+000	4.615E+004
2059	4.300E+006	4.455E+000	4.389E+004

ATTACHMENT 3

NSPS TIER 2 SAMPLING AND ANALYSIS SUMMARY REPORT

[redacted]

New Source Performance Standards
Tier 2 Sampling and Analysis Summary Report
for the
[redacted]
Conley, Georgia

Presented to:

Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079

Presented by:

SCS ENGINEERS
701 Brazos, Suite 500
Austin, Texas 78701
(512) 480-8557

File No. 1696012.00
November 26, 1996

Environmental Consultants

701 Brazos Street
Suite 500
Austin, Texas 78701

512 480-8557
FAX 512 320-5722

SCS ENGINEERS

November 26, 1996
Project No. 1696012.00

Mr. Larry Harrell
Manager, Air Programs
Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079
(713) 870-7630

Subject: New Source Performance Standards
Tier 2 Sampling and Analysis Report for the
[redacted]
Conley, Georgia

Dear Mr. Harrell:

SCS Engineers (SCS) is pleased to provide our summary report on New Source Performance Standards (NSPS) Tier 2 sampling and analysis activities at the subject Browning-Ferris Industries (BFI) landfill (Site). A summary of field sampling activities and laboratory analysis results are provided below.

SUMMARY OF FIELD SAMPLING ACTIVITIES

Field sampling activities were conducted at the Site on October 15, 1996. Present at the Site were Mr. Larry Harrell of BFI, Mr. Jason Estes of SCS, and a representative from our landfill gas (LFG) sampling subcontractor, Transglobal Environmental Geochemistry, Inc. (TEG).

LFG samples were obtained from 16 sampling locations at depths ranging from 6 to 9 feet below the landfill surface using TEG's geoprobe. The LFG samples were composited into four summa canisters per SCS' modified Method 25C, as approved by the U.S. Environmental Protection Agency (U.S. EPA). The four summa canisters, each containing LFG samples from four sampling locations, were shipped by BFI to AtmAA, Inc. (AtmAA), BFI's approved laboratory, for subsequent analysis.

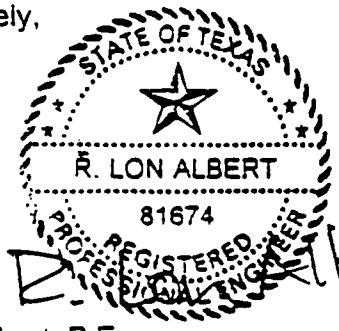
SUMMARY OF LABORATORY ANALYSIS RESULTS

All laboratory analyses were performed by AtmAA. Measured Non-Methane Organic Compound (NMOC) concentrations from the four canisters were utilized in the calculation of the Site's average NMOC concentration. Based on laboratory results, a Site-average NMOC concentration of 295 parts per million by volume (ppmv), as hexane, is indicated. This site-specific NMOC concentration can be used in evaluating the Site's NMOC emissions.

CLOSING

It was a pleasure working with you on this project, and we thank you for the opportunity to provide Browning-Ferris Gas Services, Inc. our services. Should you have any questions or comments, please contact Lon Albert or Steve Hamilton at (512) 480-8557.

Sincerely,



Lon Albert, P.E.
Senior Project Engineer

Steven M. Hamilton, R.E.P.
Vice President
SCS ENGINEERS

SMH/RLA:la

Attachment

1. Laboratory Analysis Results

ATTACHMENT 1

LABORATORY ANALYSIS RESULTS

AtmAA Inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Total Gaseous Non-Methane Organics (TGNMO) and Nitrogen
Analysis in SUMMA Canister Samples

Report Date: November 12, 1996
Client: BFI / SCS Engineers
Site: [redacted]
Project No.: 1696012 . 00
Date Received: October 16, 1996
Date Analyzed: October 16, 1996

ANALYSIS DESCRIPTION

Total gaseous non-methane organics in SUMMA canisters was measured by flame ionization detection/ total combustion analysis (FID/TCA), EPA Method 25c. Nitrogen was measured by thermal conductivity detection/ gas chromatography (TCD/GC), EPA Method 3c.

AtmAA Lab No.	Sample ID	Nitrogen (%,v)	TGNMO (ppmv)
92906-1	J-1	3.21	2480
92906-2	J-2	6.93	2693
92906-3	J-3	11.3	869
92906-4	J-4	7.32	1034

TGNMO is total gaseous non-methane organics measured and reported as ppm methane.

Note: A barometric pressure of 29 inches Hg is assumed for TGNMO calculation.
No site barometric pressure was recorded on the field sampling data sheet submitted.

Michael L. Porter
Laboratory Director

ATTACHMENT 1

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

Milan, Illinois

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

12/4/96

Assumption: For this landfill, it has been assumed that the annual MSW acceptance rate is unknown.

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

where,

M_{NMOC}	=	Mass emission rate of NMOC	**Mg/yr**
L_0	=	Refuse methane generation potential	170 **m^3/Mg**
R	=	Average annual acceptance rate	155096 **Mg/yr**
k	=	Methane generation rate constant	0.05 **1/yr**
c	=	Years since closure (c=0 for active and/or new landfills)	0 **yrs**
t	=	Age of landfill	13.29 **yrs**
C_{NMOC}	=	Concentration of NMOC	296 **ppm**
Conversion factor	=		3.595×10^{-9}

Using the values from above,

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

$= 27.24$ **Mg/yr**

ATTACHMENT 2

U.S. EPA LANDFILL GAS GENERATION MODEL

OUTPUT

[redacted]

Model Parameters

Lo : 6000.000000 ft^3 / Mg
k : 0.050000 1/yr

NMOC : 296.000000 ppmv ***** Note : Default value not used ****
Methane : 50.000000 % volume
Carbon Dioxide : 50.000000 % volume

Landfill Parameters

Year Opened : 1983 Current Year : 1996 Year Closed: 2002
Capacity : 2900000.000000 Mg
Average Acceptance Rate : 155096.000000 Mg/year
Average Acceptance Rate Required from
Current Year to Closure Year : 147292.000000 Mg/year

Year	Refuse In Place (Mg)	NMOC Emission Rate (as Hexane) (Mg/yr)	(Cubic Ft/yr)
1984	1.551E+005	2.796E+000	2.755E+004
1985	3.102E+005	5.455E+000	5.375E+004
1986	4.653E+005	7.985E+000	7.867E+004
1987	6.204E+005	1.039E+001	1.024E+005
1988	7.755E+005	1.268E+001	1.249E+005
1989	9.306E+005	1.486E+001	1.464E+005
1990	1.086E+006	1.693E+001	1.668E+005
1991	1.241E+006	1.890E+001	1.862E+005
1992	1.396E+006	2.077E+001	2.047E+005
1993	1.551E+006	2.256E+001	2.222E+005
1994	1.706E+006	2.425E+001	2.389E+005
1995	1.861E+006	2.587E+001	2.548E+005
1996	2.016E+006	2.740E+001	2.699E+005
1997	2.164E+006	2.872E+001	2.829E+005
1998	2.311E+006	2.997E+001	2.953E+005
1999	2.458E+006	3.117E+001	3.071E+005
2000	2.605E+006	3.230E+001	3.182E+005
2001	2.753E+006	3.338E+001	3.289E+005
2002	2.900E+006	3.441E+001	3.390E+005
2003	2.900E+006	3.273E+001	3.225E+005
2004	2.900E+006	3.113E+001	3.067E+005
2005	2.900E+006	2.962E+001	2.918E+005
2006	2.900E+006	2.817E+001	2.775E+005
2007	2.900E+006	2.680E+001	2.640E+005
2008	2.900E+006	2.549E+001	2.511E+005
2009	2.900E+006	2.425E+001	2.389E+005
2010	2.900E+006	2.306E+001	2.272E+005
2011	2.900E+006	2.194E+001	2.162E+005
2012	2.900E+006	2.087E+001	2.056E+005
2013	2.900E+006	1.985E+001	1.956E+005
2014	2.900E+006	1.888E+001	1.860E+005
2015	2.900E+006	1.796E+001	1.770E+005
2016	2.900E+006	1.709E+001	1.683E+005
2017	2.900E+006	1.625E+001	1.601E+005
2018	2.900E+006	1.546E+001	1.523E+005
2019	2.900E+006	1.471E+001	1.449E+005
2020	2.900E+006	1.399E+001	1.378E+005
2021	2.900E+006	1.331E+001	1.311E+005
2022	2.900E+006	1.266E+001	1.247E+005

2023	2.900E+006	1.204E+001	1.186E+005
2024	2.900E+006	1.145E+001	1.128E+005
2025	2.900E+006	1.089E+001	1.073E+005
2026	2.900E+006	1.036E+001	1.021E+005
2027	2.900E+006	9.858E+000	9.712E+004
2028	2.900E+006	9.377E+000	9.239E+004
2029	2.900E+006	8.920E+000	8.788E+004
2030	2.900E+006	8.485E+000	8.360E+004
2031	2.900E+006	8.071E+000	7.952E+004
2032	2.900E+006	7.678E+000	7.564E+004
2033	2.900E+006	7.303E+000	7.195E+004
2034	2.900E+006	6.947E+000	6.844E+004
2035	2.900E+006	6.608E+000	6.510E+004
2036	2.900E+006	6.286E+000	6.193E+004
2037	2.900E+006	5.979E+000	5.891E+004
2038	2.900E+006	5.688E+000	5.604E+004
2039	2.900E+006	5.410E+000	5.330E+004
2040	2.900E+006	5.146E+000	5.070E+004
2041	2.900E+006	4.895E+000	4.823E+004
2042	2.900E+006	4.657E+000	4.588E+004
2043	2.900E+006	4.430E+000	4.364E+004
2044	2.900E+006	4.214E+000	4.151E+004
2045	2.900E+006	4.008E+000	3.949E+004
2046	2.900E+006	3.813E+000	3.756E+004
2047	2.900E+006	3.627E+000	3.573E+004
2048	2.900E+006	3.450E+000	3.399E+004
2049	2.900E+006	3.281E+000	3.233E+004
2050	2.900E+006	3.121E+000	3.075E+004
2051	2.900E+006	2.969E+000	2.925E+004
2052	2.900E+006	2.824E+000	2.783E+004

ATTACHMENT 3

NSPS TIER 2 SAMPLING AND ANALYSIS SUMMARY REPORT

[redacted]

New Source Performance Standards
Tier 2 Sampling and Analysis Summary Report
for the
[redacted]
Milan, Illinois

Presented to:

Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079

Presented by:

SCS ENGINEERS
701 Brazos, Suite 500
Austin, Texas 78701
(512) 480-8557

File No. 1696012.00
December 4, 1996

Environmental Consultants

[illegible] Brazos Street
Suite 300
Austin, Texas 7870[illegible]

512 480-8557
FAX 512 320-5722

SCS ENGINEERS

December 4, 1996
Project No. 1696012.00

Mr. Larry Harrell
Manager, Air Programs
Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079
(713) 870-7630

Subject: New Source Performance Standards
Tier 2 Sampling and Analysis Report for the
[redacted]
Milan, Illinois

Dear Mr. Harrell:

SCS Engineers (SCS) is pleased to provide our summary report on New Source Performance Standards (NSPS) Tier 2 sampling and analysis activities at the subject Browning-Ferris Industries (BFI) landfill (Site). A summary of field sampling activities and laboratory analysis results are provided below.

SUMMARY OF FIELD SAMPLING ACTIVITIES

Field sampling activities were conducted at the Site from November 14, 1996 through November 17, 1996. Present at the Site were Larry Harrell of BFI, Wayne Weber of SCS, and a representative from our landfill gas (LFG) sampling subcontractor, Transglobal Environmental Geochemistry, Inc. (TEG).

LFG samples were obtained from seventeen sampling locations at depths ranging from nine to twelve feet below the landfill surface using TEG's geoprobe. The LFG samples were composited into four summa canisters per SCS' modified Method 25C, as approved by the U.S. Environmental Protection Agency (U.S. EPA). The four summa canisters (one containing LFG samples from three sampling locations, one containing LFG samples from four sampling locations, and two containing LFG samples from five sampling locations) were shipped by BFI to AtmAA, Inc. (AtmAA), BFI's approved laboratory, for subsequent analysis.

SUMMARY OF LABORATORY ANALYSIS RESULTS

All laboratory analyses were performed by AtmAA. Upon measurement of nitrogen concentrations in each of the canisters, three of the canisters (QC-1, QC-2, and QC-4) were found to contain greater than 20 percent nitrogen by volume. Due to the extensive sampling efforts taken (41 sampling location attempts, 17 actual samples collected), and the depth of the sampling probes (nine to twelve feet below land surface), the observed nitrogen was assumed to be in-situ nitrogen (i.e., nitrogen inherent to the waste matrix), and consequently

the analysis results for all four summa canisters were used in the calculation of the Site's average Non-Methane Organic Compound (NMOC) concentration. Laboratory analysis results are included in Attachment 1.

Based on laboratory results, a Site-average NMOC concentration of 296 parts per million by volume (ppmv), as hexane, is indicated. This site-specific NMOC concentration can be used in evaluating the Site's NMOC emissions.

CLOSING

It was a pleasure working with you on this project, and we thank you for the opportunity to provide Browning-Ferris Gas Services, Inc. our services. Should you have any questions or comments, please contact Lon Albert or Steve Hamilton at (512) 480-8557.

Sincerely,

12/4/96

David E. Poe, P.E.[1]
Project Manager

for Steven M. Hamilton, R.E.P.
Vice President
SCS ENGINEERS

SMH/DEP/RLA:kb

Attachment

1. Laboratory Analysis Results

[1]State of Texas P.E. License Application Accepted as Complete for Processing, Issuance of Number Pending

ATTACHMENT 1

LABORATORY ANALYSIS RESULTS

AtmAA Inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Total Gaseous Non-Methane Organics (TGNMO) and Nitrogen
Analysis in SUMMA Canister Samples

Report Date: November 26, 1996
Client: BFI / SCS Engineers
Site: [redacted]
Project No.: 1696012 . 00
Date Received: November 19, 1996
Date Analyzed: November 22, 1996

ANALYSIS DESCRIPTION

Total gaseous non-methane organics in SUMMA canisters was measured by flame ionization detection/ total combustion analysis (FID/TCA), EPA Method 25c. Nitrogen was measured by thermal conductivity detection/ gas chromatography (TCD/GC), EPA Method 3c.

AtmAA Lab No.	Sample ID	Nitrogen (%,v)	TGNMO (ppmv)
93246-2	QC-1	20.4	1400
93246-3	QC-2	23.0	2324
93246-4	QC-3	13.7	1666
93246-5	QC-4	21.4	1715

TGNMO is total gaseous non-methane organics measured and reported as ppm methane.

Note: A site barometric pressure of 29.9 inches Hg, and a site temperature of 35° F is used for the calculation of TGNMO, per Wayne Weber.

Michael L. Porter
Laboratory Director

ATTACHMENT 1

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

Leland, MS

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

11/19/96

Assumption: For this landfill, it has been assumed that the annual MSW acceptance rate is unknown.

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

where,

M_{NMOC}	=	Mass emission rate of NMOC	**Mg/yr**
L_0	=	Refuse methane generation potential	170 **m^3/Mg**
R	=	Average annual acceptance rate	144444 **Mg/yr**
k	=	Methane generation rate constant	0.05 **1/yr**
c	=	Years since closure (c=0 for active and/or new landfills)	0 **yrs**
t	=	Age of landfill	9.45 **yrs**
C_{NMOC}	=	Concentration of NMOC	238.5 **ppm**
Conversion factor	=		3.595×10^{-9}

Using the values from above,

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

$= 15.85$ **Mg/yr**

ATTACHMENT 2

U.S. EPA LANDFILL GAS GENERATION MODEL

OUTPUT

[redacted]

Model Parameters

Lo : 6000.000000 ft^3 / Mg
k : 0.050000 1/yr

NMOC : 239.000000 ppmv ***** Note : Default value not used ****
Methane : 50.000000 % volume
Carbon Dioxide : 50.000000 % volume

Landfill Parameters

Year Opened : 1987 Current Year : 1996 Year Closed: 2033
Capacity : 6500000.000000 Mg
Average Acceptance Rate : 144444.000000 Mg/year
Average Acceptance Rate Required from
Current Year to Closure Year : 140540.648649 Mg/year

Year	Refuse In Place (Mg)	NMOC Emission Rate (Mg/yr)	NMOC Emission Rate (as Hexane) (Cubic Ft/yr)
1988	1.444E+005	2.102E+000	2.071E+004
1989	2.889E+005	4.102E+000	4.042E+004
1990	4.333E+005	6.005E+000	5.916E+004
1991	5.778E+005	7.814E+000	7.699E+004
1992	7.222E+005	9.536E+000	9.395E+004
1993	8.667E+005	1.117E+001	1.101E+005
1994	1.011E+006	1.273E+001	1.254E+005
1995	1.156E+006	1.421E+001	1.400E+005
1996	1.300E+006	1.562E+001	1.539E+005
1997	1.441E+006	1.690E+001	1.665E+005
1998	1.581E+006	1.813E+001	1.786E+005
1999	1.722E+006	1.929E+001	1.900E+005
2000	1.862E+006	2.039E+001	2.009E+005
2001	2.003E+006	2.144E+001	2.113E+005
2002	2.143E+006	2.244E+001	2.211E+005
2003	2.284E+006	2.339E+001	2.305E+005
2004	2.424E+006	2.430E+001	2.394E+005
2005	2.565E+006	2.516E+001	2.479E+005
2006	2.705E+006	2.598E+001	2.559E+005
2007	2.846E+006	2.676E+001	2.636E+005
2008	2.986E+006	2.750E+001	2.709E+005
2009	3.127E+006	2.820E+001	2.778E+005
2010	3.268E+006	2.887E+001	2.845E+005
2011	3.408E+006	2.951E+001	2.907E+005
2012	3.549E+006	3.012E+001	2.967E+005
2013	3.689E+006	3.069E+001	3.024E+005
2014	3.830E+006	3.124E+001	3.078E+005
2015	3.970E+006	3.176E+001	3.129E+005
2016	4.111E+006	3.226E+001	3.178E+005
2017	4.251E+006	3.273E+001	3.225E+005
2018	4.392E+006	3.318E+001	3.269E+005
2019	4.532E+006	3.361E+001	3.311E+005
2020	4.673E+006	3.402E+001	3.351E+005
2021	4.814E+006	3.440E+001	3.389E+005
2022	4.954E+006	3.477E+001	3.426E+005
2023	5.095E+006	3.512E+001	3.460E+005
2024	5.235E+006	3.545E+001	3.493E+005
2025	5.376E+006	3.577E+001	3.524E+005
2026	5.516E+006	3.607E+001	3.554E+005

2027	5.657E+006	3.636E+001	3.582E+005
2028	5.797E+006	3.663E+001	3.609E+005
2029	5.938E+006	3.689E+001	3.634E+005
2030	6.078E+006	3.713E+001	3.659E+005
2031	6.219E+006	3.737E+001	3.682E+005
2032	6.359E+006	3.759E+001	3.704E+005
2033	6.500E+006	3.780E+001	3.725E+005
2034	6.500E+006	3.596E+001	3.543E+005
2035	6.500E+006	3.421E+001	3.370E+005
2036	6.500E+006	3.254E+001	3.206E+005
2037	6.500E+006	3.095E+001	3.049E+005
2038	6.500E+006	2.944E+001	2.901E+005
2039	6.500E+006	2.801E+001	2.759E+005
2040	6.500E+006	2.664E+001	2.625E+005
2041	6.500E+006	2.534E+001	2.497E+005
2042	6.500E+006	2.411E+001	2.375E+005
2043	6.500E+006	2.293E+001	2.259E+005
2044	6.500E+006	2.181E+001	2.149E+005
2045	6.500E+006	2.075E+001	2.044E+005
2046	6.500E+006	1.974E+001	1.944E+005
2047	6.500E+006	1.877E+001	1.850E+005
2048	6.500E+006	1.786E+001	1.759E+005
2049	6.500E+006	1.699E+001	1.674E+005
2050	6.500E+006	1.616E+001	1.592E+005
2051	6.500E+006	1.537E+001	1.514E+005
2052	6.500E+006	1.462E+001	1.440E+005
2053	6.500E+006	1.391E+001	1.370E+005
2054	6.500E+006	1.323E+001	1.303E+005
2055	6.500E+006	1.258E+001	1.240E+005
2056	6.500E+006	1.197E+001	1.179E+005
2057	6.500E+006	1.139E+001	1.122E+005
2058	6.500E+006	1.083E+001	1.067E+005
2059	6.500E+006	1.030E+001	1.015E+005
2060	6.500E+006	9.800E+000	9.656E+004
2061	6.500E+006	9.322E+000	9.185E+004
2062	6.500E+006	8.868E+000	8.737E+004
2063	6.500E+006	8.435E+000	8.311E+004
2064	6.500E+006	8.024E+000	7.905E+004
2065	6.500E+006	7.633E+000	7.520E+004
2066	6.500E+006	7.260E+000	7.153E+004
2067	6.500E+006	6.906E+000	6.804E+004
2068	6.500E+006	6.569E+000	6.472E+004
2069	6.500E+006	6.249E+000	6.157E+004
2070	6.500E+006	5.944E+000	5.856E+004
2071	6.500E+006	5.654E+000	5.571E+004
2072	6.500E+006	5.379E+000	5.299E+004
2073	6.500E+006	5.116E+000	5.041E+004
2074	6.500E+006	4.867E+000	4.795E+004
2075	6.500E+006	4.629E+000	4.561E+004
2076	6.500E+006	4.404E+000	4.339E+004
2077	6.500E+006	4.189E+000	4.127E+004
2078	6.500E+006	3.985E+000	3.926E+004
2079	6.500E+006	3.790E+000	3.734E+004
2080	6.500E+006	3.605E+000	3.552E+004
2081	6.500E+006	3.430E+000	3.379E+004
2082	6.500E+006	3.262E+000	3.214E+004
2083	6.500E+006	3.103E+000	3.057E+004

ATTACHMENT 3

NSPS TIER 2 SAMPLING AND ANALYSIS SUMMARY REPORT

[redacted]

New Source Performance Standards
Tier 2 Sampling and Analysis Summary Report
for the
[redacted]
Leland, Mississippi

Presented to:

Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079

Presented by:

SCS ENGINEERS
701 Brazos, Suite 500
Austin, Texas 78701
(512) 480-8557

File No. 1696012.00
November 26, 1996

Environmental Consultants

701 Brazos Street
Suite 500
Austin, Texas 78701

512 480-8557
FAX 512 320-5722

SCS ENGINEERS

November 26, 1996
Project No. 1696012.00

Mr. Larry Harrell
Manager, Air Programs
Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079
(713) 870-7630

Subject: New Source Performance Standards
Tier 2 Sampling and Analysis Report for the
[redacted]
Leland, Mississippi

Dear Mr. Harrell:

SCS Engineers (SCS) is pleased to provide our summary report on New Source Performance Standards (NSPS) Tier 2 sampling and analysis activities at the subject Browning-Ferris Industries (BFI) landfill (Site). A summary of field sampling activities and laboratory analysis results are provided below.

SUMMARY OF FIELD SAMPLING ACTIVITIES

Field sampling activities were conducted at the Site from October 21, 1996 through October 22, 1996. Present at the Site were Mr. Jason Estes of SCS, and a representative from our landfill gas (LFG) sampling subcontractor, Transglobal Environmental Geochemistry, Inc. (TEG).

LFG samples were obtained from 24 sampling locations at depths ranging from 6 to 9 feet below the landfill surface using TEG's geoprobe. The LFG samples were composited into five summa canisters per SCS' modified Method 25C, as approved by the U.S. Environmental Protection Agency (U.S. EPA). The five summa canisters (four containing LFG samples from five sampling locations, and one containing LFG samples from four sampling locations) were shipped by BFI to AtmAA, Inc. (AtmAA), BFI's approved laboratory, for subsequent analysis.

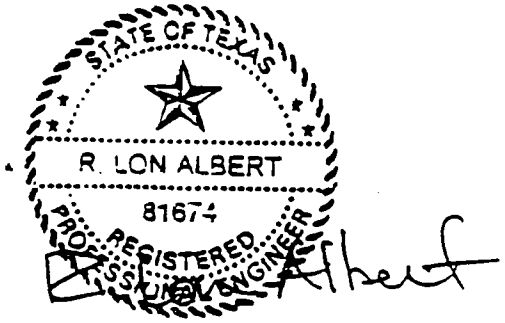
SUMMARY OF LABORATORY ANALYSIS RESULTS

All laboratory analyses were performed by AtmAA. Measured Non-Methane Organic Compound (NMOC) concentrations from the five canisters were utilized in the calculation of the Site's average NMOC concentration. Based on laboratory results, a Site-average NMOC concentration of 239 parts per million by volume (ppmv), as hexane, is indicated. This site-specific NMOC concentration can be used in evaluating the Site's NMOC emissions.

CLOSING

It was a pleasure working with you on this project, and we thank you for the opportunity to provide Browning-Ferris Gas Services, Inc. our services. Should you have any questions or comments, please contact Lon Albert or Steve Hamilton at (512) 480-8557.

Sincerely,



Lon Albert, P.E.
Senior Project Engineer

Steven M. Hamilton, R.E.P.
Vice President
SCS ENGINEERS

SMH/RLA/la

Attachment

1. Laboratory Analysis Results

ATTACHMENT 1

LABORATORY ANALYSIS RESULTS

AtmAA Inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Total Gaseous Non-Methane Organics (TGNMO) and Nitrogen
Analysis in SUMMA Canister Sample

Report Date: November 12, 1996
Client: BFI / SCS Engineers
Site: [redacted]
Project No.: 1696012 . 00
Date Received: October 24, 1996
Date Analyzed: October 25, 1996

ANALYSIS DESCRIPTION

Total gaseous non-methane organics in SUMMA canisters was measured by flame ionization detection/ total combustion analysis (FID/TCA), EPA Method 25c. Nitrogen was measured by thermal conductivity detection/ gas chromatography (TCD/GC), EPA Method 3c.

AtmAA Lab No.	Sample ID	Nitrogen (%,v)	TGNMO (ppmv)
92986-10	J-13	3.24	1631

TGNMO is total gaseous non-methane organics measured and reported as ppm methane.

Note: A barometric pressure of 29.92 inches Hg is assumed for TGNMO calculation.
No site barometric pressure was recorded on the field sampling data sheet submitted.

Michael L. Porter
Laboratory Director

AtmAA Inc.
23917 Craftsman Rd.. Calabasas. CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Total Gaseous Non-Methane Organics (TGNMO) and Nitrogen
Analysis in SUMMA Canister Samples

Report Date: November 12, 1996
Client: BFI / SCS Engineers
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ANALYSIS DESCRIPTION

Total gaseous non-methane organics in SUMMA canisters was measured by flame ionization detection/ total combustion analysis (FID/TCA), EPA Method 25c. Nitrogen was measured by thermal conductivity detection/ gas chromatography (TCD/GC), EPA Method 3c.

AtmAA Lab No.	Sample ID	Nitrogen (%,v)	TGNMO (ppmv)
92986-6	J-14	4.57	3113
92986-7	J-15	3.75	1004
92986-8	J-16	10.6	727
92986-9	J-17	1.03	682

TGNMO is total gaseous non-methane organics measured and reported as ppm methane.

Note: A barometric pressure of 29.92 inches Hg is assumed for TGNMO calculation. No site barometric pressure was recorded on the field sampling data sheet submitted.

Michael L. Porter
Laboratory Director

ATTACHMENT 1

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

Missoula, MT

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

12/2/96

Assumption: For this landfill, it has been assumed that the annual MSW acceptance rate is unknown.

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

where,

M_{NMOC}	=	Mass emission rate of NMOC	**Mg/yr**
L_0	=	Refuse methane generation potential	170 **m^3/Mg**
R	=	Average annual acceptance rate	109515 **Mg/yr**
k	=	Methane generation rate constant	0.05 **1/yr**
c	=	Years since closure (c=0 for active and/or new landfills)	0 **yrs**
t	=	Age of landfill	27.62 **yrs**
C_{NMOC}	=	Concentration of NMOC	553 **ppm**
Conversion factor	=		3.595×10^{-9}

Using the values from above,

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

= **55.42 Mg/yr**

ATTACHMENT 2

U.S. EPA LANDFILL GAS GENERATION MODEL

OUTPUT

[redacted]

Model Parameters

Lo : 6000.000000 ft^3 / Mg
k : 0.050000 1/yr

NMOC : 553.000000 ppmv ***** Note : Default value not used ****
Methane : 50.000000 % volume
Carbon Dioxide : 50.000000 % volume

Landfill Parameters

Year Opened : 1968 Current Year : 1996 Year Closed: 2008
Capacity : 4300000.000000 Mg
Average Acceptance Rate : 109515.000000 Mg/year
Average Acceptance Rate Required from
Current Year to Closure Year : 102798.333333 Mg/year

Year	Refuse In Place (Mg)	NMOC Emission Rate (as Hexane) (Mg/yr)	(Cubic Ft/yr)
1969	1.095E+005	3.688E+000	3.634E+004
1970	2.190E+005	7.197E+000	7.090E+004
1971	3.285E+005	1.053E+001	1.038E+005
1972	4.381E+005	1.371E+001	1.351E+005
1973	5.476E+005	1.673E+001	1.648E+005
1974	6.571E+005	1.960E+001	1.931E+005
1975	7.666E+005	2.233E+001	2.200E+005
1976	8.761E+005	2.493E+001	2.456E+005
1977	9.856E+005	2.740E+001	2.700E+005
1978	1.095E+006	2.976E+001	2.932E+005
1979	1.205E+006	3.199E+001	3.152E+005
1980	1.314E+006	3.412E+001	3.362E+005
1981	1.424E+006	3.614E+001	3.561E+005
1982	1.533E+006	3.807E+001	3.751E+005
1983	1.643E+006	3.990E+001	3.931E+005
1984	1.752E+006	4.164E+001	4.103E+005
1985	1.862E+006	4.330E+001	4.266E+005
1986	1.971E+006	4.488E+001	4.421E+005
1987	2.081E+006	4.638E+001	4.569E+005
1988	2.190E+006	4.780E+001	4.710E+005
1989	2.289E+006	4.879E+001	4.807E+005
1990	2.409E+006	5.047E+001	4.972E+005
1991	2.519E+006	5.170E+001	5.093E+005
1992	2.628E+006	5.286E+001	5.208E+005
1993	2.738E+006	5.397E+001	5.318E+005
1994	2.847E+006	5.503E+001	5.422E+005
1995	2.957E+006	5.603E+001	5.521E+005
1996	3.066E+006	5.699E+001	5.615E+005
1997	3.169E+006	5.767E+001	5.682E+005
1998	3.272E+006	5.832E+001	5.746E+005
1999	3.375E+006	5.894E+001	5.807E+005
2000	3.478E+006	5.953E+001	5.865E+005
2001	3.580E+006	6.009E+001	5.920E+005
2002	3.683E+006	6.062E+001	5.972E+005
2003	3.786E+006	6.112E+001	6.022E+005
2004	3.889E+006	6.160E+001	6.069E+005
2005	3.992E+006	6.206E+001	6.114E+005
2006	4.094E+006	6.250E+001	6.157E+005
2007	4.197E+006	6.291E+001	6.198E+005

2008	4.300E+006	6.330E+001	6.237E+005
2009	4.300E+006	6.022E+001	5.933E+005
2010	4.300E+006	5.728E+001	5.643E+005
2011	4.300E+006	5.449E+001	5.368E+005
2012	4.300E+006	5.183E+001	5.106E+005
2013	4.300E+006	4.930E+001	4.857E+005
2014	4.300E+006	4.690E+001	4.620E+005
2015	4.300E+006	4.461E+001	4.395E+005
2016	4.300E+006	4.243E+001	4.181E+005
2017	4.300E+006	4.036E+001	3.977E+005
2018	4.300E+006	3.840E+001	3.783E+005
2019	4.300E+006	3.652E+001	3.598E+005
2020	4.300E+006	3.474E+001	3.423E+005
2021	4.300E+006	3.305E+001	3.256E+005
2022	4.300E+006	3.144E+001	3.097E+005
2023	4.300E+006	2.990E+001	2.946E+005
2024	4.300E+006	2.844E+001	2.802E+005
2025	4.300E+006	2.706E+001	2.666E+005
2026	4.300E+006	2.574E+001	2.536E+005
2027	4.300E+006	2.448E+001	2.412E+005
2028	4.300E+006	2.329E+001	2.294E+005
2029	4.300E+006	2.215E+001	2.183E+005
2030	4.300E+006	2.107E+001	2.076E+005
2031	4.300E+006	2.004E+001	1.975E+005
2032	4.300E+006	1.907E+001	1.878E+005
2033	4.300E+006	1.814E+001	1.787E+005
2034	4.300E+006	1.725E+001	1.700E+005
2035	4.300E+006	1.641E+001	1.617E+005
2036	4.300E+006	1.561E+001	1.538E+005
2037	4.300E+006	1.485E+001	1.463E+005
2038	4.300E+006	1.413E+001	1.392E+005
2039	4.300E+006	1.344E+001	1.324E+005
2040	4.300E+006	1.278E+001	1.259E+005
2041	4.300E+006	1.216E+001	1.198E+005
2042	4.300E+006	1.156E+001	1.139E+005
2043	4.300E+006	1.100E+001	1.084E+005
2044	4.300E+006	1.046E+001	1.031E+005
2045	4.300E+006	9.954E+000	9.807E+004
2046	4.300E+006	9.468E+000	9.328E+004
2047	4.300E+006	9.007E+000	8.873E+004
2048	4.300E+006	8.567E+000	8.441E+004
2049	4.300E+006	8.149E+000	8.029E+004
2050	4.300E+006	7.752E+000	7.637E+004
2051	4.300E+006	7.374E+000	7.265E+004
2052	4.300E+006	7.014E+000	6.911E+004
2053	4.300E+006	6.672E+000	6.574E+004
2054	4.300E+006	6.347E+000	6.253E+004
2055	4.300E+006	6.037E+000	5.948E+004
2056	4.300E+006	5.743E+000	5.658E+004
2057	4.300E+006	5.463E+000	5.382E+004
2058	4.300E+006	5.196E+000	5.120E+004

ATTACHMENT 3

NSPS TIER 2 SAMPLING AND ANALYSIS SUMMARY REPORT

[redacted]

New Source Performance Standards
Tier 2 Sampling and Analysis Summary Report
for the
[redacted]
Missoula, Montana

Presented to:

Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079

Presented by:

SCS ENGINEERS
701 Brazos, Suite 500
Austin, Texas 78701
(512) 480-8557

File No. 1696012.00
December 3, 1996

Environmental Consultants

701 Brazos Street
Suite 500
Austin, Texas 78701

512 480-8557
FAX 512 320-5722

SCS ENGINEERS

December 3, 1996
Project No. 1696012.00

Mr. Larry Harrell
Manager, Air Programs
Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079
(713) 870-7630

Subject: New Source Performance Standards
Tier 2 Sampling and Analysis Report for the
[redacted]
Missoula, Montana

Dear Mr. Harrell:

SCS Engineers (SCS) is pleased to provide our summary report on New Source Performance Standards (NSPS) Tier 2 sampling and analysis activities at the subject Browning-Ferris Industries (BFI) landfill (Site). A summary of field sampling activities and laboratory analysis results are provided below.

SUMMARY OF FIELD SAMPLING ACTIVITIES

Field sampling activities were conducted at the Site on November 18, 1996. Present at the Site were Jim Leiter of BFI, Pat Hartshorne of SCS, and a representative from our landfill gas (LFG) sampling subcontractor, Transglobal Environmental Geochemistry, Inc. (TEG).

LFG samples were obtained from five sampling locations at a depth of nine feet below the landfill surface using TEG's geoprobe. Two non-composite samples were also collected from the existing LFG collection system flare. The field LFG samples were composited into two summa canisters per SCS' modified Method 25C, as approved by the U.S. Environmental Protection Agency (U.S. EPA). The two summa canisters (one containing LFG samples from three sampling locations, and one containing LFG samples from two sampling locations), along with the two summa canisters from the flare samples, were shipped by BFI to AtmAA, Inc. (AtmAA), BFI's approved laboratory, for subsequent analysis.

SUMMARY OF LABORATORY ANALYSIS RESULTS

All laboratory analyses were performed by AtmAA. Upon measurement of nitrogen concentrations in each of the canisters, one canister, P-3, was found to contain greater than 20 percent nitrogen by volume, and thus is not included in the calculation of the Site's average Non-Methane Organic Compound (NMOC) concentration. Laboratory analysis results are included in Attachment 1.

Measured NMOC concentrations from the three remaining canisters were utilized in the calculation of the Site's average NMOC concentration. Based on laboratory results, a Site-average NMOC concentration of 553 parts per million by volume (ppmv), as hexane, is indicated. This site-specific NMOC concentration can be used in evaluating the Site's NMOC emissions.

CLOSING

It was a pleasure working with you on this project, and we thank you for the opportunity to provide Browning-Ferris Gas Services, Inc. our services. Should you have any questions or comments, please contact Lon Albert or Steve Hamilton at (512) 480-8557.

Sincerely,

12/3/96

David E. Poe, P.E.[1]
Project Manager

for Steven M. Hamilton, R.E.P.
Vice President
SCS ENGINEERS

SMH/DEP/RLA:kb

Attachment

1. Laboratory Analysis Results

[1]State of Texas P.E. License Application Accepted as Complete for Processing, Issuance of Number Pending

ATTACHMENT 1

LABORATORY ANALYSIS RESULTS

AtmAA inc.
23917 Craftsman Rd.. Calabasas. CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Total Gaseous Non-Methane Organics (TGNMO) and Nitrogen
Analysis in SUMMA Canister Samples

Report Date: November 25, 1996
Client: BFI / SCS Engineers
Site: [redacted]
Project No.: 1696012 . 00
Date Received: November 21, 1996
Date Analyzed: November 25, 1996

ANALYSIS DESCRIPTION

Total gaseous non-methane organics in SUMMA canisters was measured by flame ionization detection/ total combustion analysis (FID/TCA), EPA Method 25c. Nitrogen was measured by thermal conductivity detection/ gas chromatography (TCD/GC), EPA Method 3c.

AtmAA Lab No.	Sample ID	Nitrogen (%,v)	TGNMO (ppmv)
93266-5	P-1	13.9	4268
93266-6	P-2	7.18	2959
93266-7	P-3	42.5	2270
93266-8	P-4	16.6	2719

TGNMO is total gaseous non-methane organics measured and reported as ppm methane.

Note: A site barometric pressure of 26.1 inches Hg, and a site temperature of 30° F is used for the calculation of TGNMO, per Kevin Barnes.

Michael L. Porter
Laboratory Director

ATTACHMENT 1

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

Harrisburg, NC

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

12/3/96

Assumption: For this landfill, it has been assumed that the annual MSW acceptance rate is unknown.

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

where,

M_{NMOC}	=	Mass emission rate of NMOC	**Mg/yr**
L_0	=	Refuse methane generation potential	170 **m^3/Mg**
R	=	Average annual acceptance rate	650000 **Mg/yr**
k	=	Methane generation rate constant	0.05 **1/yr**
c	=	Years since closure (c=0 for active and/or new landfills)	**0 yrs**
t	=	Age of landfill	**4.28 yrs**
C_{NMOC}	=	Concentration of NMOC	**1485 ppm**
Conversion factor	=		3.595×10^{-9}

Using the values from above,

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

= **227.27 Mg/yr**

ATTACHMENT 2

U.S. EPA LANDFILL GAS GENERATION MODEL

OUTPUT

Model Parameters

Lo : 6000.000000 ft^3 / Mg
k : 0.050000 1/yr

NMOC : 1485.000000 ppmv ***** Note : Default value not used ****
Methane : 50.000000 % volume
Carbon Dioxide : 50.000000 % volume

Landfill Parameters

Year Opened : 1992 Current Year : 1996 Year Closed: 2006
Capacity : 8000000.000000 Mg
Average Acceptance Rate : 625000.000000 Mg/year
Average Acceptance Rate Required from
Current Year to Closure Year : 550000.000000 Mg/year

Year	Refuse In Place (Mg)	NMOC Emission Rate (Mg/yr)	(as Hexane) (Cubic Ft/yr)
1993	6.500E+005	5.878E+001	5.792E+005
1994	1.300E+006	1.147E+002	1.130E+006
1995	1.950E+006	1.679E+002	1.654E+006
1996	2.500E+006	2.094E+002	2.063E+006
1997	3.050E+006	2.490E+002	2.453E+006
1998	3.600E+006	2.866E+002	2.823E+006
1999	4.150E+006	3.223E+002	3.176E+006
2000	4.700E+006	3.564E+002	3.511E+006
2001	5.250E+006	3.887E+002	3.830E+006
2002	5.800E+006	4.195E+002	4.133E+006
2003	6.350E+006	4.488E+002	4.421E+006
2004	6.900E+006	4.766E+002	4.696E+006
2005	7.450E+006	5.031E+002	4.957E+006
2006	8.000E+006	5.283E+002	5.205E+006
2007	8.000E+006	5.026E+002	4.951E+006
2008	8.000E+006	4.781E+002	4.710E+006
2009	8.000E+006	4.547E+002	4.480E+006
2010	8.000E+006	4.326E+002	4.262E+006
2011	8.000E+006	4.115E+002	4.054E+006
2012	8.000E+006	3.914E+002	3.856E+006
2013	8.000E+006	3.723E+002	3.668E+006
2014	8.000E+006	3.541E+002	3.489E+006
2015	8.000E+006	3.369E+002	3.319E+006
2016	8.000E+006	3.204E+002	3.157E+006
2017	8.000E+006	3.048E+002	3.003E+006
2018	8.000E+006	2.900E+002	2.857E+006
2019	8.000E+006	2.758E+002	2.717E+006
2020	8.000E+006	2.624E+002	2.585E+006
2021	8.000E+006	2.496E+002	2.459E+006
2022	8.000E+006	2.374E+002	2.339E+006
2023	8.000E+006	2.258E+002	2.225E+006
2024	8.000E+006	2.148E+002	2.116E+006
2025	8.000E+006	2.043E+002	2.013E+006
2026	8.000E+006	1.944E+002	1.915E+006
2027	8.000E+006	1.849E+002	1.821E+006
2028	8.000E+006	1.759E+002	1.733E+006
2029	8.000E+006	1.673E+002	1.648E+006
2030	8.000E+006	1.591E+002	1.568E+006
2031		1.514E+002	1.491E+006

2032	8.000E+006	1.440E+002	1.419E+006
2033	8.000E+006	1.370E+002	1.349E+006
2034	8.000E+006	1.303E+002	1.284E+006
2035	8.000E+006	1.239E+002	1.221E+006
2036	8.000E+006	1.179E+002	1.161E+006
2037	8.000E+006	1.121E+002	1.105E+006
2038	8.000E+006	1.067E+002	1.051E+006
2039	8.000E+006	1.015E+002	9.997E+005
2040	8.000E+006	9.652E+001	9.509E+005
2041	8.000E+006	9.181E+001	9.045E+005
2042	8.000E+006	8.733E+001	8.604E+005
2043	8.000E+006	8.307E+001	8.184E+005
2044	8.000E+006	7.902E+001	7.785E+005
2045	8.000E+006	7.517E+001	7.406E+005
2046	8.000E+006	7.150E+001	7.044E+005
2047	8.000E+006	6.801E+001	6.701E+005
2048	8.000E+006	6.470E+001	6.374E+005
2049	8.000E+006	6.154E+001	6.063E+005
2050	8.000E+006	5.854E+001	5.767E+005
2051	8.000E+006	5.569E+001	5.486E+005
2052	8.000E+006	5.297E+001	5.219E+005
2053	8.000E+006	5.039E+001	4.964E+005
2054	8.000E+006	4.793E+001	4.722E+005
2055	8.000E+006	4.559E+001	4.492E+005
2056	8.000E+006	4.337E+001	4.273E+005

ATTACHMENT 3

NSPS TIER 2 SAMPLING AND ANALYSIS SUMMARY REPORT

[redacted]

New Source Performance Standards
Tier 2 Sampling and Analysis Summary Report
for the
[redacted]
Harrisburg, North Carolina

Presented to:

Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079

Presented by:

SCS ENGINEERS
701 Brazos, Suite 500
Austin, Texas 78701
(512) 480-8557

File No. 1696012.00
December 3, 1996

Environmental Consultants

701 Brazos Street
Suite 500
Austin, Texas 78701

512 480-8557
FAX 512 320-5722

SCS ENGINEERS

December 3, 1996
Project No. 1696012.00

Mr. Larry Harrell
Manager, Air Programs
Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079
(713) 870-7630

Subject: New Source Performance Standards
Tier 2 Sampling and Analysis Report for the
[redacted]
Harrisburg, North Carolina

Dear Mr. Harrell:

SCS Engineers (SCS) is pleased to provide our summary report on New Source Performance Standards (NSPS) Tier 2 sampling and analysis activities at the subject Browning-Ferris Industries (BFI) landfill (Site). A summary of field sampling activities and laboratory analysis results are provided below.

SUMMARY OF FIELD SAMPLING ACTIVITIES

Field sampling activities were conducted at the Site on November 22, 1996. Present at the Site were Larry Harrell of BFI, David Penoyer of SCS.

A LFG sample was obtained from a sampling port located at the landfill gas (LFG) collection system flare. The LFG sample was collected into a summa canister per SCS' modified Method 25C, as approved by the U.S. Environmental Protection Agency (U.S. EPA). The summa canister (containing a 5 liter sample of LFG) was shipped by BFI to AtmAA, Inc. (AtmAA), BFI's approved laboratory, for subsequent analysis.

SUMMARY OF LABORATORY ANALYSIS RESULTS

All laboratory analyses were performed by AtmAA. A measured Non-Methane Organic Compound (NMOC) concentration from the canister was utilized in the calculation of the Site's average NMOC concentration. Based on laboratory results, a Site-average NMOC concentration of 1485 parts per million by volume (ppmv), as hexane, is indicated. This site-specific NMOC concentration can be used in evaluating the Site's NMOC emissions.

CLOSING

It was a pleasure working with you on this project, and we thank you for the opportunity to provide Browning-Ferris Gas Services, Inc. our services. Should you have any questions or comments, please contact Lon Albert or Steve Hamilton at (512) 480-8557.

Sincerely,

12/3/96

David E. Poe, P.E.[1]
Project Manager

Steven M. Hamilton, R.E.P.
Vice President
SCS ENGINEERS

SMH/DEP/PLA:kb

Attachment

1. Laboratory Analysis Results

[1]State of Texas P.E. License Application Accepted as Complete for Processing, Issuance of Number Pending

ATTACHMENT 1

LABORATORY ANALYSIS RESULTS

AtmAA Inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Total Gaseous Non-Methane Organics (TGNMO) and Nitrogen Analysis in SUMMA Canister Sample

Report Date: December 3, 1996
Client: BFI / SCS Engineers
Site: [redacted]
Project No.: 1696012 . 00
Date Received: November 26, 1996
Date Analyzed: November 29, 1996

ANALYSIS DESCRIPTION

Total gaseous non-methane organics in SUMMA canisters was measured by flame ionization detection/ total combustion analysis (FID/TCA), EPA Method 25c. Nitrogen was measured by thermal conductivity detection/ gas chromatography (TCD/GC), EPA Method 3c.

AtmAA Lab No.	Sample ID	Nitrogen (%,v)	TGNMO (ppmv)
93316-27	CMS-5-112296-01	13.6	8909

TGNMO is total gaseous non-methane organics measured and reported as ppm methane.

Note: A site barometric pressure of 29.9 inches Hg, and a site temperature of 80° F is used for the calculation of TGNMO, per Kevin Barnes.

Michael L. Porter
Laboratory Director

ATTACHMENT 1

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

Beaumont, TX

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

12/3/96

Assumption: For this landfill, it has been assumed that the annual MSW acceptance rate is unknown.

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

where,

M_{NMOC}	=	Mass emission rate of NMOC	**Mg/yr**
L_0	=	Refuse methane generation potential	170 **m^3/Mg**
R	=	Average annual acceptance rate	311220 **Mg/yr**
k	=	Methane generation rate constant	0.05 **1/yr**
c	=	Years since closure (c=0 for active and/or new landfills)	0 **yrs**
t	=	Age of landfill	2.67 **yrs**
C_{NMOC}	=	Concentration of NMOC	691 **ppm**
Conversion factor	=		3.595×10^{-9}

Using the values from above,

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

= **32.80 Mg/yr**

ATTACHMENT 2

U.S. EPA LANDFILL GAS GENERATION MODEL

OUTPUT

[redacted]

Model Parameters

Lo : 6000.000000 ft^3 / Mg
k : 0.050000 1/yr

NMOC : 691.000000 ppmv ***** Note : Default value not used ****
Methane : 50.000000 % volume
Carbon Dioxide : 50.000000 % volume

Landfill Parameters

Year Opened : 1993 Current Year : 1996 Year Closed: 2015
Capacity : 6600000.000000 Mg
Average Acceptance Rate : 311220.000000 Mg/year
Average Acceptance Rate Required from
Current Year to Closure Year : 298228.421053 Mg/year

Year	Refuse In Place (Mg)	NMOC Emission Rate (as Hexane) (Mg/yr)	(Cubic Ft/yr)
1994	3.112E+005	1.310E+001	1.290E+005
1995	6.224E+005	2.555E+001	2.518E+005
1996	9.337E+005	3.741E+001	3.685E+005
1997	1.232E+006	4.813E+001	4.742E+005
1998	1.530E+006	5.833E+001	5.747E+005
1999	1.828E+006	6.804E+001	6.703E+005
2000	2.127E+006	7.727E+001	7.613E+005
2001	2.425E+006	8.605E+001	8.478E+005
2002	2.723E+006	9.441E+001	9.301E+005
2003	3.021E+006	1.024E+002	1.008E+006
2004	3.319E+006	1.099E+002	1.083E+006
2005	3.618E+006	1.171E+002	1.154E+006
2006	3.916E+006	1.239E+002	1.221E+006
2007	4.214E+006	1.304E+002	1.285E+006
2008	4.512E+006	1.366E+002	1.346E+006
2009	4.811E+006	1.425E+002	1.404E+006
2010	5.109E+006	1.481E+002	1.459E+006
2011	5.407E+006	1.534E+002	1.512E+006
2012	5.705E+006	1.585E+002	1.562E+006
2013	6.004E+006	1.633E+002	1.609E+006
2014	6.302E+006	1.679E+002	1.654E+006
2015	6.600E+006	1.723E+002	1.697E+006
2016	6.600E+006	1.639E+002	1.615E+006
2017	6.600E+006	1.559E+002	1.536E+006
2018	6.600E+006	1.483E+002	1.461E+006
2019	6.600E+006	1.410E+002	1.390E+006
2020	6.600E+006	1.342E+002	1.322E+006
2021	6.600E+006	1.276E+002	1.257E+006
2022	6.600E+006	1.214E+002	1.196E+006
2023	6.600E+006	1.155E+002	1.138E+006
2024	6.600E+006	1.098E+002	1.082E+006
2025	6.600E+006	1.045E+002	1.029E+006
2026	6.600E+006	9.939E+001	9.792E+005
2027	6.600E+006	9.455E+001	9.315E+005
2028	6.600E+006	8.994E+001	8.861E+005
2029	6.600E+006	8.555E+001	8.428E+005
2030	6.600E+006	8.138E+001	8.017E+005
2031	6.600E+006	7.741E+001	7.626E+005
2032	6.600E+006	7.363E+001	7.254E+005

2033	6.600E+006	7.004E+001	6.901E+005
2034	6.600E+006	6.663E+001	6.564E+005
2035	6.600E+006	6.338E+001	6.244E+005
2036	6.600E+006	6.029E+001	5.939E+005
2037	6.600E+006	5.735E+001	5.650E+005
2038	6.600E+006	5.455E+001	5.374E+005
2039	6.600E+006	5.189E+001	5.112E+005
2040	6.600E+006	4.936E+001	4.863E+005
2041	6.600E+006	4.695E+001	4.626E+005
2042	6.600E+006	4.466E+001	4.400E+005
2043	6.600E+006	4.248E+001	4.185E+005
2044	6.600E+006	4.041E+001	3.981E+005
2045	6.600E+006	3.844E+001	3.787E+005
2046	6.600E+006	3.657E+001	3.602E+005
2047	6.600E+006	3.478E+001	3.427E+005
2048	6.600E+006	3.309E+001	3.260E+005
2049	6.600E+006	3.147E+001	3.101E+005
2050	6.600E+006	2.994E+001	2.949E+005
2051	6.600E+006	2.848E+001	2.806E+005
2052	6.600E+006	2.709E+001	2.669E+005
2053	6.600E+006	2.577E+001	2.539E+005
2054	6.600E+006	2.451E+001	2.415E+005
2055	6.600E+006	2.332E+001	2.297E+005
2056	6.600E+006	2.218E+001	2.185E+005
2057	6.600E+006	2.110E+001	2.078E+005
2058	6.600E+006	2.007E+001	1.977E+005
2059	6.600E+006	1.909E+001	1.881E+005
2060	6.600E+006	1.816E+001	1.789E+005
2061	6.600E+006	1.727E+001	1.702E+005
2062	6.600E+006	1.643E+001	1.619E+005
2063	6.600E+006	1.563E+001	1.540E+005
2064	6.600E+006	1.487E+001	1.465E+005
2065	6.600E+006	1.414E+001	1.393E+005

ATTACHMENT 3

NSPS TIER 2 SAMPLING AND ANALYSIS SUMMARY REPORT

[redacted]

New Source Performance Standards
Tier 2 Sampling and Analysis Summary Report
for the
[redacted]
Beaumont, Texas

Presented to:

Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079

Presented by:

SCS ENGINEERS
701 Brazos, Suite 500
Austin, Texas 78701
(512) 480-8557

File No. 1696012.00
December 3, 1996

Environmental Consultants
[redacted] Brazos Street
Suite 500
Austin, Texas [redacted]
512 480-8557
FAX 512 320-5722

SCS ENGINEERS

December 3, 1996
Project No. 1696012.00

Mr. Larry Harrell
Manager, Air Programs
Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079
(713) 870-7630

Subject: New Source Performance Standards
Tier 2 Sampling and Analysis Report for the
[redacted]
Beaumont, Texas

Dear Mr. Harrell:

SCS Engineers (SCS) is pleased to provide our summary report on New Source Performance Standards (NSPS) Tier 2 sampling and analysis activities at the subject Browning-Ferris Industries (BFI) landfill (Site). A summary of field sampling activities and laboratory analysis results are provided below.

SUMMARY OF FIELD SAMPLING ACTIVITIES

Field sampling activities were conducted at the Site on November 25, 1996. Present at the Site were Larry Harrell of BFI, Brian Lindenlaub of SCS, and a representative from our landfill gas (LFG) sampling subcontractor, Transglobal Environmental Geochemistry, Inc. (TEG).

LFG samples were obtained from five sampling locations at depths ranging from six to nine feet below the landfill surface using TEG's geoprobe. The LFG samples were composited into two summa canisters per SCS' modified Method 25C, as approved by the U.S. Environmental Protection Agency (U.S. EPA). The two summa canisters (one containing LFG samples from three sampling locations, and one containing LFG samples from two sampling locations) were shipped by BFI to AtmAA, Inc. (AtmAA), BFI's approved laboratory, for subsequent analysis.

SUMMARY OF LABORATORY ANALYSIS RESULTS

All laboratory analyses were performed by AtmAA. Measured Non-Methane Organic Compound (NMOC) concentrations from the two canisters were utilized in the calculation of the Site's average NMOC concentration. Based on laboratory results, a Site-average NMOC concentration of 691 parts per million by volume (ppmv), as hexane, is indicated. This site-specific NMOC concentration can be used in evaluating the Site's NMOC emissions.

CLOSING

It was a pleasure working with you on this project, and we thank you for the opportunity to provide Browning-Ferris Gas Services, Inc. our services. Should you have any questions or comments, please contact Lon Albert or Steve Hamilton at (512) 480-8557.

Sincerely,

12/3/96

David E. Poe, P.E.[1]
Project Manager

for Steven M. Hamilton, R.E.P.
Vice President
SCS ENGINEERS

SMH/DEP/RLA:kb

Attachment

1. Laboratory Analysis Results

[1]State of Texas P.E. License Application Accepted as Complete for Processing, Issuance of Number Pending

ATTACHMENT 1

LABORATORY ANALYSIS RESULTS

AtmAA inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Total Gaseous Non-Methane Organics (TGNMO) and Nitrogen
Analysis in SUMMA Canister Samples

Report Date: December 3, 1996
Client: BFI / SCS Engineers
Site: [redacted]
Project No.: 1696012 . 00
Date Received: November 26, 1996
Date Analyzed: November 27, 1996

ANALYSIS DESCRIPTION

Total gaseous non-methane organics in SUMMA canisters was measured by flame ionization detection/ total combustion analysis (FID/TCA), EPA Method 25c. Nitrogen was measured by thermal conductivity detection/ gas chromatography (TCD/GC), EPA Method 3c.

AtmAA Lab No.	Sample ID	Nitrogen (%,v)	TGNMO (ppmv)
93316-15	GT-1	1.93	2285
93316-16	GT-2	1.86	6012

TGNMO is total gaseous non-methane organics measured and reported as ppm methane.

Note: A site barometric pressure of 30.18 inches Hg, and a site temperature of 40° F is used for the calculation of TGNMO, per Kevin Barnes.

Michael L. Porter
Laboratory Director

ATTACHMENT 1

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

Canyon, TX

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

11/19/96

Assumption: For this landfill, it has been assumed that the annual MSW acceptance rate is unknown.

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

where,

M_{NMOC}	=	Mass emission rate of NMOC	**Mg/yr**
L_0	=	Refuse methane generation potential	170 **m^3/Mg**
R	=	Average annual acceptance rate	126360 **Mg/yr**
k	=	Methane generation rate constant	0.05 **1/yr**
c	=	Years since closure (c=0 for active and/or new landfills)	0 **yrs**
t	=	Age of landfill	11.36 **yrs**
C_{NMOC}	=	Concentration of NMOC	290 **ppm**
Conversion factor	=		3.595×10^{-9}

Using the values from above,

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

= 19.41 **Mg/yr**

ATTACHMENT 2

U.S. EPA LANDFILL GAS GENERATION MODEL

OUTPUT

Model Parameters

Lo : 6000.000000 ft^3 / Mg
k : 0.050000 1/yr

NMOC : 290.000000 ppmv ***** Note : Default value not used ****
Methane : 50.000000 % volume
Carbon Dioxide : 50.000000 % volume

Landfill Parameters

Year Opened : 1985 Current Year : 1996 Year Closed: 2009
Capacity : 3000000.000000 Mg
Average Acceptance Rate : 126360.000000 Mg/year
Average Acceptance Rate Required from
Current Year to Closure Year : 123849.230769 Mg/year

Year	Refuse In Place (Mg)	NMOC Emission Rate (as Hexane) (Mg/yr)	(Cubic Ft/yr)
1986	1.264E+005	2.232E+000	2.199E+004
1987	2.527E+005	4.354E+000	4.290E+004
1988	3.791E+005	6.374E+000	6.280E+004
1989	5.054E+005	8.295E+000	8.172E+004
1990	6.318E+005	1.012E+001	9.972E+004
1991	7.582E+005	1.186E+001	1.168E+005
1992	8.845E+005	1.351E+001	1.331E+005
1993	1.011E+006	1.509E+001	1.486E+005
1994	1.137E+006	1.658E+001	1.634E+005
1995	1.264E+006	1.800E+001	1.774E+005
1996	1.390E+006	1.936E+001	1.907E+005
1997	1.514E+006	2.060E+001	2.030E+005
1998	1.638E+006	2.178E+001	2.146E+005
1999	1.762E+006	2.291E+001	2.257E+005
2000	1.885E+006	2.398E+001	2.362E+005
2001	2.009E+006	2.500E+001	2.463E+005
2002	2.133E+006	2.596E+001	2.558E+005
2003	2.257E+006	2.689E+001	2.649E+005
2004	2.381E+006	2.776E+001	2.735E+005
2005	2.505E+006	2.860E+001	2.817E+005
2006	2.628E+006	2.939E+001	2.895E+005
2007	2.752E+006	3.014E+001	2.970E+005
2008	2.876E+006	3.086E+001	3.040E+005
2009	3.000E+006	3.154E+001	3.108E+005
2010	3.000E+006	3.000E+001	2.956E+005
2011	3.000E+006	2.854E+001	2.812E+005
2012	3.000E+006	2.715E+001	2.675E+005
2013	3.000E+006	2.582E+001	2.544E+005
2014	3.000E+006	2.456E+001	2.420E+005
2015	3.000E+006	2.337E+001	2.302E+005
2016	3.000E+006	2.223E+001	2.190E+005
2017	3.000E+006	2.114E+001	2.083E+005
2018	3.000E+006	2.011E+001	1.981E+005
2019	3.000E+006	1.913E+001	1.885E+005
2020	3.000E+006	1.820E+001	1.793E+005
2021	3.000E+006	1.731E+001	1.705E+005
2022	3.000E+006	1.647E+001	1.622E+005
2023	3.000E+006	1.566E+001	1.543E+005
2024	3.000E+006	1.490E+001	1.468E+005

2025	3.000E+006	1.417E+001	1.396E+005
2026	3.000E+006	1.348E+001	1.328E+005
2027	3.000E+006	1.282E+001	1.263E+005
2028	3.000E+006	1.220E+001	1.202E+005
2029	3.000E+006	1.160E+001	1.143E+005
2030	3.000E+006	1.104E+001	1.087E+005
2031	3.000E+006	1.050E+001	1.034E+005
2032	3.000E+006	9.987E+000	9.840E+004
2033	3.000E+006	9.500E+000	9.360E+004
2034	3.000E+006	9.037E+000	8.903E+004
2035	3.000E+006	8.596E+000	8.469E+004
2036	3.000E+006	8.177E+000	8.056E+004
2037	3.000E+006	7.778E+000	7.663E+004
2038	3.000E+006	7.399E+000	7.289E+004
2039	3.000E+006	7.038E+000	6.934E+004
2040	3.000E+006	6.695E+000	6.596E+004
2041	3.000E+006	6.368E+000	6.274E+004
2042	3.000E+006	6.058E+000	5.968E+004
2043	3.000E+006	5.762E+000	5.677E+004
2044	3.000E+006	5.481E+000	5.400E+004
2045	3.000E+006	5.214E+000	5.137E+004
2046	3.000E+006	4.960E+000	4.886E+004
2047	3.000E+006	4.718E+000	4.648E+004
2048	3.000E+006	4.488E+000	4.421E+004
2049	3.000E+006	4.269E+000	4.206E+004
2050	3.000E+006	4.061E+000	4.000E+004
2051	3.000E+006	3.862E+000	3.805E+004
2052	3.000E+006	3.674E+000	3.620E+004
2053	3.000E+006	3.495E+000	3.443E+004
2054	3.000E+006	3.324E+000	3.275E+004
2055	3.000E+006	3.162E+000	3.116E+004
2056	3.000E+006	3.008E+000	2.964E+004
2057	3.000E+006	2.861E+000	2.819E+004
2058	3.000E+006	2.722E+000	2.682E+004
2059	3.000E+006	2.589E+000	2.551E+004

ATTACHMENT 3

NSPS TIER 2 SAMPLING AND ANALYSIS SUMMARY REPORT

[redacted]

New Source Performance Standards
Tier 2 Sampling and Analysis Summary Report
for the
[redacted]
Canyon, Texas

Presented to:

Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079

Presented by:

SCS ENGINEERS
701 Brazos, Suite 500
Austin, Texas 78701
(512) 480-8557

File No. 1696012.00
November 26, 1996

Environmental Consultants

701 Brazos Street
Suite 500
Austin Texas 78701

512 480-8557
FAX 512 320-5722

SCS ENGINEERS

November 26, 1996
Project No. 1696012.00

Mr. Larry Harrell
Manager, Air Programs
Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079
(713) 870-7630

Subject: New Source Performance Standards
Tier 2 Sampling and Analysis Report for the
[redacted]
, Canyon, Texas

Dear Mr. Harrell:

SCS Engineers (SCS) is pleased to provide our summary report on New Source Performance Standards (NSPS) Tier 2 sampling and analysis activities at the subject Browning-Ferris Industries (BFI) landfill (Site). A summary of field sampling activities and laboratory analysis results are provided below.

SUMMARY OF FIELD SAMPLING ACTIVITIES

Field sampling activities were conducted at the Site on October 22, 1996. Present at the Site were Ms. Renee Voyt of BFI, Mr. Kevin Barnes of SCS, and a representative from our landfill gas (LFG) sampling subcontractor, Transglobal Environmental Geochemistry, Inc. (TEG).

LFG samples were obtained from three sampling locations at depths of approximately 12 feet below the landfill surface using TEG's geoprobe. The LFG samples were composited into one summa canister per SCS' modified Method 25C, as approved by the U.S. Environmental Protection Agency (U.S. EPA). The summa canister, containing LFG samples from three sampling locations, was shipped by BFI to AtmAA, Inc. (AtmAA), BFI's approved laboratory, for subsequent analysis.

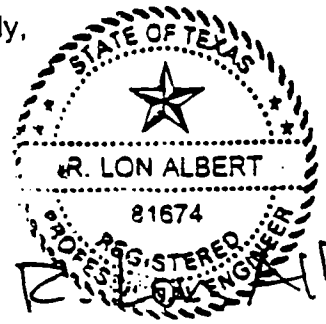
SUMMARY OF LABORATORY ANALYSIS RESULTS

All laboratory analyses were performed by AtmAA. The measured Non-Methane Organic Compound (NMOC) concentration from the canister was utilized in the calculation of the Site's average NMOC concentration. Based on laboratory results, a Site-average NMOC concentration of 290 parts per million by volume (ppmv), as hexane, is indicated. This site-specific NMOC concentration can be used in evaluating the Site's NMOC emissions.

CLOSING

It was a pleasure working with you on this project, and we thank you for the opportunity to provide Browning-Ferris Gas Services, Inc. our services. Should you have any questions or comments, please contact Lon Albert or Steve Hamilton at (512) 480-8557.

Sincerely,



Lon Albert, P.E.
Senior Project Engineer

Steven M. Hamilton, R.E.P.
Vice President
SCS ENGINEERS

SMH/RLA:la

Attachment

1. Laboratory Analysis Results

ATTACHMENT 1

LABORATORY ANALYSIS RESULTS

AtmAA Inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Total Gaseous Non-Methane Organics (TGNMO) and Nitrogen
Analysis in SUMMA Canister Sample

Report Date: November 12, 1996
Client: BFI / SCS Engineers
Site: [redacted]
Project No.: 1696012 . 00
Date Received: October 23, 1996
Date Analyzed: November 1 & 4, 1996

ANALYSIS DESCRIPTION

Total gaseous non-methane organics in SUMMA canisters was measured by flame ionization detection/ total combustion analysis (FID/TCA), EPA Method 25c. Nitrogen was measured by thermal conductivity detection/ gas chromatography (TCD/GC), EPA Method 3c.

AtmAA Lab No.	Sample ID	Nitrogen (%,v)	TGNMO (ppmv)
93066-38	K-9	9.36	1740

TGNMO is total gaseous non-methane organics measured and reported as ppm methane.

Note: A barometric pressure of 27 inches Hg is assumed for TGNMO calculation.
No site barometric pressure was recorded on the field sampling data sheet submitted.

Michael L. Porter
Laboratory Director

ATTACHMENT 1

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

Fresno, TX

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

12/2/96

Assumption: For this landfill, it has been assumed that the annual MSW acceptance rate is unknown.

$M_{NMOC} = 2L_0R(e^{-k\alpha} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

where,

M_{NMOC}	=	Mass emission rate of NMOC	**Mg/yr**
L_0	=	Refuse methane generation potential	170 **m^3/Mg**
R	=	Average annual acceptance rate	248625 **Mg/yr**
k	=	Methane generation rate constant	0.05 **1/yr**
c	=	Years since closure (c=0 for active and/or new landfills)	0 **yrs**
t	=	Age of landfill	2.95 **yrs**
C_{NMOC}	=	Concentration of NMOC	324 **ppm**
Conversion factor	=		3.595×10^{-9}

Using the values from above,

$M_{NMOC} = 2L_0R(e^{-k\alpha} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

$= 13.52$ **Mg/yr**

ATTACHMENT 2

U.S. EPA LANDFILL GAS GENERATION MODEL

OUTPUT

[redacted]

Model Parameters

Lo : 6000.000000 ft^3 / Mg
k : 0.050000 1/yr

NMOC : 324.000000 ppmv ***** Note : Default value not used ****
Methane : 50.000000 % volume
Carbon Dioxide : 50.000000 % volume

Landfill Parameters

Year Opened : 1993 Current Year : 1996 Year Closed: 2045
Capacity : 12900000.000000 Mg
Average Acceptance Rate : 248625.000000 Mg/year
Average Acceptance Rate Required from
Current Year to Closure Year : 248043.367347 Mg/year

Year	Refuse In Place (Mg)	NMOC Emission Rate (as Hexane) (Mg/yr)	(Cubic Ft/yr)
1994	2.486E+005	4.906E+000	4.833E+004
1995	4.973E+005	9.572E+000	9.431E+004
1996	7.459E+005	1.401E+001	1.380E+005
1997	9.939E+005	1.822E+001	1.795E+005
1998	1.242E+006	2.223E+001	2.190E+005
1999	1.490E+006	2.604E+001	2.565E+005
2000	1.738E+006	2.966E+001	2.922E+005
2001	1.986E+006	3.311E+001	3.262E+005
2002	2.234E+006	3.639E+001	3.585E+005
2003	2.482E+006	3.951E+001	3.893E+005
2004	2.730E+006	4.248E+001	4.185E+005
2005	2.978E+006	4.530E+001	4.463E+005
2006	3.226E+006	4.798E+001	4.728E+005
2007	3.474E+006	5.054E+001	4.979E+005
2008	3.722E+006	5.297E+001	5.219E+005
2009	3.970E+006	5.528E+001	5.446E+005
2010	4.218E+006	5.748E+001	5.663E+005
2011	4.467E+006	5.957E+001	5.869E+005
2012	4.715E+006	6.156E+001	6.065E+005
2013	4.963E+006	6.345E+001	6.251E+005
2014	5.211E+006	6.525E+001	6.429E+005
2015	5.459E+006	6.696E+001	6.597E+005
2016	5.707E+006	6.859E+001	6.758E+005
2017	5.955E+006	7.014E+001	6.910E+005
2018	6.203E+006	7.161E+001	7.055E+005
2019	6.451E+006	7.301E+001	7.194E+005
2020	6.699E+006	7.435E+001	7.325E+005
2021	6.947E+006	7.562E+001	7.450E+005
2022	7.195E+006	7.682E+001	7.569E+005
2023	7.443E+006	7.797E+001	7.682E+005
2024	7.691E+006	7.906E+001	7.789E+005
2025	7.939E+006	8.010E+001	7.892E+005
2026	8.187E+006	8.109E+001	7.989E+005
2027	8.435E+006	8.203E+001	8.082E+005
2028	8.683E+006	8.292E+001	8.170E+005
2029	8.931E+006	8.377E+001	8.253E+005
2030	9.179E+006	8.458E+001	8.333E+005
2031	9.427E+006	8.535E+001	8.409E+005
2032	9.675E+006	8.608E+001	8.481E+005

2033	9.923E+006	8.678E+001	3.549E+005
2034	1.017E+007	8.744E+001	8.615E+005
2035	1.042E+007	8.807E+001	8.677E+005
2036	1.067E+007	8.867E+001	8.736E+005
2037	1.092E+007	8.924E+001	8.792E+005
2038	1.116E+007	8.978E+001	8.845E+005
2039	1.141E+007	9.030E+001	8.896E+005
2040	1.166E+007	9.079E+001	8.944E+005
2041	1.191E+007	9.125E+001	8.990E+005
2042	1.216E+007	9.170E+001	9.034E+005
2043	1.240E+007	9.212E+001	9.076E+005
2044	1.265E+007	9.252E+001	9.115E+005
2045	1.290E+007	9.290E+001	9.153E+005
2046	1.290E+007	8.837E+001	8.707E+005
2047	1.290E+007	8.406E+001	8.282E+005
2048	1.290E+007	7.996E+001	7.878E+005
2049	1.290E+007	7.606E+001	7.494E+005
2050	1.290E+007	7.235E+001	7.128E+005
2051	1.290E+007	6.882E+001	6.781E+005
2052	1.290E+007	6.547E+001	6.450E+005
2053	1.290E+007	6.227E+001	6.135E+005
2054	1.290E+007	5.924E+001	5.836E+005
2055	1.290E+007	5.635E+001	5.552E+005
2056	1.290E+007	5.360E+001	5.281E+005
2057	1.290E+007	5.099E+001	5.023E+005
2058	1.290E+007	4.850E+001	4.778E+005
2059	1.290E+007	4.613E+001	4.545E+005
2060	1.290E+007	4.388E+001	4.324E+005
2061	1.290E+007	4.174E+001	4.113E+005
2062	1.290E+007	3.971E+001	3.912E+005
2063	1.290E+007	3.777E+001	3.721E+005
2064	1.290E+007	3.593E+001	3.540E+005
2065	1.290E+007	3.418E+001	3.367E+005
2066	1.290E+007	3.251E+001	3.203E+005
2067	1.290E+007	3.092E+001	3.047E+005
2068	1.290E+007	2.942E+001	2.898E+005
2069	1.290E+007	2.798E+001	2.757E+005
2070	1.290E+007	2.662E+001	2.622E+005
2071	1.290E+007	2.532E+001	2.494E+005
2072	1.290E+007	2.408E+001	2.373E+005
2073	1.290E+007	2.291E+001	2.257E+005
2074	1.290E+007	2.179E+001	2.147E+005
2075	1.290E+007	2.073E+001	2.042E+005
2076	1.290E+007	1.972E+001	1.943E+005
2077	1.290E+007	1.876E+001	1.848E+005
2078	1.290E+007	1.784E+001	1.758E+005
2079	1.290E+007	1.697E+001	1.672E+005
2080	1.290E+007	1.614E+001	1.591E+005
2081	1.290E+007	1.536E+001	1.513E+005
2082	1.290E+007	1.461E+001	1.439E+005
2083	1.290E+007	1.390E+001	1.369E+005
2084	1.290E+007	1.322E+001	1.302E+005
2085	1.290E+007	1.257E+001	1.239E+005
2086	1.290E+007	1.196E+001	1.178E+005
2087	1.290E+007	1.138E+001	1.121E+005
2088	1.290E+007	1.082E+001	1.066E+005
2089	1.290E+007	1.029E+001	1.014E+005
2090	1.290E+007	9.792E+000	9.647E+004
2091	1.290E+007	9.314E+000	9.177E+004
2092	1.290E+007	8.860E+000	8.729E+004

2093	1.290E+007	8.428E+000	8.303E+004
2094	1.290E+007	8.017E+000	7.898E+004
2095	1.290E+007	7.626E+000	7.513E+004

ATTACHMENT 3

NSPS TIER 2 SAMPLING AND ANALYSIS SUMMARY REPORT

[redacted]

New Source Performance Standards
Tier 2 Sampling and Analysis Summary Report
for the
[redacted]
Fresno, Texas

Presented to:

Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079

Presented by:

SCS ENGINEERS
701 Brazos, Suite 500
Austin, Texas 78701
(512) 480-8557

File No. 1696012.00
December 3, 1996

Environmental Consultants

[illegible] Braker Lane
Suite 300
Austin, Texas [illegible]

512 480-8557
FAX 512 320-5722

SCS ENGINEERS

December 3, 1996
Project No. 1696012.00

Mr. Larry Harrell
Manager, Air Programs
Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079
(713) 870-7630

Subject: New Source Performance Standards
Tier 2 Sampling and Analysis Report for the
[redacted]
Fresno, Texas

Dear Mr. Harrell:

SCS Engineers (SCS) is pleased to provide our summary report on New Source Performance Standards (NSPS) Tier 2 sampling and analysis activities at the subject Browning-Ferris Industries (BFI) landfill (Site). A summary of field sampling activities and laboratory analysis results are provided below.

SUMMARY OF FIELD SAMPLING ACTIVITIES

Field sampling activities were conducted at the Site from November 4, 1996 through November 5, 1996. Present at the Site were Renee Voight of BFI, Jason Estes of SCS, and a representative from our landfill gas (LFG) sampling subcontractor, Transglobal Environmental Geochemistry, Inc. (TEG).

LFG samples were obtained from fifteen sampling locations at depths ranging from six to nine feet below the landfill surface using TEG's geoprobe. The LFG samples were composited into three summa canisters per SCS' modified Method 25C, as approved by the U.S. Environmental Protection Agency (U.S. EPA). The three summa canisters (all containing LFG samples from five sampling locations) were shipped by BFI to AtmAA, Inc. (AtmAA), BFI's approved laboratory, for subsequent analysis.

SUMMARY OF LABORATORY ANALYSIS RESULTS

All laboratory analyses were performed by AtmAA. Measured Non-Methane Organic Compound (NMOC) concentrations from the three canisters were utilized in the calculation of the Site's average NMOC concentration. Based on laboratory results, a Site-average NMOC concentration of 324 parts per million by volume (ppmv), as hexane, is indicated. This site-specific NMOC concentration can be used in evaluating the Site's NMOC emissions.

CLOSING

It was a pleasure working with you on this project, and we thank you for the opportunity to provide Browning-Ferris Gas Services, Inc. our services. Should you have any questions or comments, please contact Lon Albert or Steve Hamilton at (512) 480-8557.

Sincerely,

12/3/96

Davic E. Poe. P.E.[1]
Project Manager

For Steven M. Hamilton, R.E.P.
Vice President
SCS ENGINEERS

SMH/DEP/RLA:kb

Attachment

1. Laboratory Analysis Results

[1]State of Texas P.E. License Application Accepted as Complete for Processing, Issuance of Number Pending

ATTACHMENT 1

LABORATORY ANALYSIS RESULTS

AtmAA, Inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Total Gaseous Non-Methane Organics (TGNMO) and Nitrogen
Analysis in SUMMA Canister Samples

Report Date: November 15, 1996
Client: BFI / SCS Engineers
Site: [redacted]
Project No.: 1696012 . 00
Date Received: November 6, 1996
Date Analyzed: November 6, 1996

ANALYSIS DESCRIPTION

Total gaseous non-methane organics in SUMMA canisters was measured by flame ionization detection/ total combustion analysis (FID/TCA), EPA Method 25c. Nitrogen was measured by thermal conductivity detection/ gas chromatography (TCD/GC), EPA Method 3c.

AtmAA Lab No.	Sample ID	Nitrogen (%,v)	TGNMO (ppmv)
93116-6	E-1	13.9	1663
93116-7	E-2	2.49	2534
93116-8	E-3	2.35	1630

TGNMO is total gaseous non-methane organics measured and reported as ppm methane.

Note: A site barometric pressure of 29.1 inches Hg, and a laboratory temperature of 77° F is used for the calculation of TGNMO, per Kevin Barnes.

Michael L. Porter
Laboratory Director

ATTACHMENT 1

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

Mexia, TX

TIER 2 NMOC EMISSION RATE CALCULATIONS

[redacted]

12/3/96

Assumption: For this landfill, it has been assumed that the annual MSW acceptance rate is unknown.

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

where,

M_{NMOC}	=	Mass emission rate of NMOC	**Mg/yr**
L_0	=	Refuse methane generation potential	170 **m^3/Mg**
R	=	Average annual acceptance rate	29640 **Mg/yr**
k	=	Methane generation rate constant	0.05 **1/yr**
c	=	Years since closure (c=0 for active and/or new landfills)	0 **yrs**
t	=	Age of landfill	13.20 **yrs**
C_{NMOC}	=	Concentration of NMOC	541 **ppm**
Conversion factor	=		3.595×10^{-9}

Using the values from above,

$M_{NMOC} = 2L_0R(e^{-kc} - e^{-kt})(C_{NMOC})(3.595 \times 10^{-9})$

= **9.47 Mg/yr**

ATTACHMENT 2

U.S. EPA LANDFILL GAS GENERATION MODEL

OUTPUT

Model Parameters

Lo : 6000.000000 ft^3 / Mg
k : 0.050000 1/yr

NMOC : 541.000000 ppmv ***** Note : Default value not used ****
Methane : 50.000000 % volume
Carbon Dioxide : 50.000000 % volume

Landfill Parameters

Year Opened : 1983 Current Year : 1996 Year Closed: 2098
Capacity : 3400000.000000 Mg
Average Acceptance Rate : 29640.000000 Mg/year
Average Acceptance Rate Required from
Current Year to Closure Year : 29555.686275 Mg/year

Year	Refuse In Place (Mg)	NMOC Emission Rate (as Hexane) (Mg/yr)	(Cubic Ft/yr)
1984	2.964E+004	9.766E-001	9.621E+003
1985	5.928E+004	1.905E+000	1.877E+004
1986	8.892E+004	2.789E+000	2.748E+004
1987	1.186E+005	3.630E+000	3.576E+004
1988	1.482E+005	4.429E+000	4.364E+004
1989	1.778E+005	5.190E+000	5.113E+004
1990	2.075E+005	5.913E+000	5.826E+004
1991	2.371E+005	6.601E+000	6.504E+004
1992	2.668E+005	7.256E+000	7.149E+004
1993	2.964E+005	7.879E+000	7.762E+004
1994	3.260E+005	8.471E+000	8.346E+004
1995	3.557E+005	9.034E+000	8.901E+004
1996	3.853E+005	9.570E+000	9.429E+004
1997	4.149E+005	1.008E+001	9.928E+004
1998	4.444E+005	1.056E+001	1.040E+005
1999	4.740E+005	1.102E+001	1.086E+005
2000	5.035E+005	1.145E+001	1.129E+005
2001	5.331E+005	1.187E+001	1.169E+005
2002	5.627E+005	1.226E+001	1.208E+005
2003	5.922E+005	1.264E+001	1.245E+005
2004	6.218E+005	1.300E+001	1.281E+005
2005	6.513E+005	1.334E+001	1.314E+005
2006	6.809E+005	1.366E+001	1.346E+005
2007	7.104E+005	1.397E+001	1.376E+005
2008	7.400E+005	1.426E+001	1.405E+005
2009	7.695E+005	1.454E+001	1.432E+005
2010	7.991E+005	1.480E+001	1.458E+005
2011	8.287E+005	1.506E+001	1.483E+005
2012	8.582E+005	1.530E+001	1.507E+005
2013	8.878E+005	1.552E+001	1.529E+005
2014	9.173E+005	1.574E+001	1.551E+005
2015	9.469E+005	1.595E+001	1.571E+005
2016	9.764E+005	1.614E+001	1.590E+005
2017	1.006E+006	1.633E+001	1.609E+005
2018	1.036E+006	1.651E+001	1.626E+005
2019	1.065E+006	1.667E+001	1.643E+005
2020	1.095E+006	1.684E+001	1.659E+005
2021	1.124E+006	1.699E+001	1.674E+005
2022	1.154E+006	1.713E+001	1.688E+005

2023	1.183E+006	1.727E+001	1.702E+005
2024	1.213E+006	1.740E+001	1.715E+005
2025	1.242E+006	1.753E+001	1.727E+005
2026	1.272E+006	1.765E+001	1.739E+005
2027	1.302E+006	1.776E+001	1.750E+005
2028	1.331E+006	1.787E+001	1.760E+005
2029	1.361E+006	1.797E+001	1.770E+005
2030	1.390E+006	1.807E+001	1.780E+005
2031	1.420E+006	1.816E+001	1.789E+005
2032	1.449E+006	1.825E+001	1.798E+005
2033	1.479E+006	1.833E+001	1.806E+005
2034	1.508E+006	1.841E+001	1.814E+005
2035	1.538E+006	1.849E+001	1.821E+005
2036	1.568E+006	1.856E+001	1.829E+005
2037	1.597E+006	1.863E+001	1.835E+005
2038	1.627E+006	1.869E+001	1.842E+005
2039	1.656E+006	1.876E+001	1.848E+005
2040	1.686E+006	1.881E+001	1.854E+005
2041	1.715E+006	1.887E+001	1.859E+005
2042	1.745E+006	1.892E+001	1.864E+005
2043	1.774E+006	1.897E+001	1.869E+005
2044	1.804E+006	1.902E+001	1.874E+005
2045	1.834E+006	1.907E+001	1.879E+005
2046	1.863E+006	1.911E+001	1.883E+005
2047	1.893E+006	1.915E+001	1.887E+005
2048	1.922E+006	1.919E+001	1.891E+005
2049	1.952E+006	1.923E+001	1.895E+005
2050	1.981E+006	1.927E+001	1.898E+005
2051	2.011E+006	1.930E+001	1.902E+005
2052	2.040E+006	1.933E+001	1.905E+005
2053	2.070E+006	1.937E+001	1.908E+005
2054	2.100E+006	1.939E+001	1.911E+005
2055	2.129E+006	1.942E+001	1.914E+005
2056	2.159E+006	1.945E+001	1.916E+005
2057	2.188E+006	1.947E+001	1.919E+005
2058	2.218E+006	1.950E+001	1.921E+005
2059	2.247E+006	1.952E+001	1.923E+005
2060	2.277E+006	1.954E+001	1.925E+005
2061	2.306E+006	1.956E+001	1.927E+005
2062	2.336E+006	1.958E+001	1.929E+005
2063	2.366E+006	1.960E+001	1.931E+005
2064	2.395E+006	1.962E+001	1.933E+005
2065	2.425E+006	1.964E+001	1.935E+005
2066	2.454E+006	1.965E+001	1.936E+005
2067	2.484E+006	1.967E+001	1.938E+005
2068	2.513E+006	1.968E+001	1.939E+005
2069	2.543E+006	1.970E+001	1.941E+005
2070	2.572E+006	1.971E+001	1.942E+005
2071	2.602E+006	1.972E+001	1.943E+005
2072	2.632E+006	1.973E+001	1.944E+005
2073	2.661E+006	1.975E+001	1.945E+005
2074	2.691E+006	1.976E+001	1.946E+005
2075	2.720E+006	1.977E+001	1.947E+005
2076	2.750E+006	1.978E+001	1.948E+005
2077	2.779E+006	1.979E+001	1.949E+005
2078	2.809E+006	1.979E+001	1.950E+005
2079	2.838E+006	1.980E+001	1.951E+005
2080	2.868E+006	1.981E+001	1.952E+005
2081	2.898E+006	1.982E+001	1.953E+005
2082	2.927E+006	1.983E+001	1.953E+005

2083	2.957E+006	1.983E+001	1.954E+005
2084	2.986E+006	1.984E+001	1.955E+005
2085	3.016E+006	1.985E+001	1.955E+005
2086	3.045E+006	1.985E+001	1.956E+005
2087	3.075E+006	1.986E+001	1.956E+005
2088	3.104E+006	1.986E+001	1.957E+005
2089	3.134E+006	1.987E+001	1.957E+005
2090	3.164E+006	1.987E+001	1.958E+005
2091	3.193E+006	1.988E+001	1.958E+005
2092	3.223E+006	1.988E+001	1.959E+005
2093	3.252E+006	1.989E+001	1.959E+005
2094	3.282E+006	1.989E+001	1.959E+005
2095	3.311E+006	1.989E+001	1.960E+005
2096	3.341E+006	1.990E+001	1.960E+005
2097	3.370E+006	1.990E+001	1.961E+005
2098	3.400E+006	1.990E+001	1.961E+005
2099	3.400E+006	1.893E+001	1.865E+005
2100	3.400E+006	1.801E+001	1.774E+005
2101	3.400E+006	1.713E+001	1.688E+005
2102	3.400E+006	1.630E+001	1.605E+005
2103	3.400E+006	1.550E+001	1.527E+005
2104	3.400E+006	1.474E+001	1.453E+005
2105	3.400E+006	1.403E+001	1.382E+005
2106	3.400E+006	1.334E+001	1.314E+005
2107	3.400E+006	1.269E+001	1.250E+005
2108	3.400E+006	1.207E+001	1.189E+005
2109	3.400E+006	1.148E+001	1.131E+005
2110	3.400E+006	1.092E+001	1.076E+005
2111	3.400E+006	1.039E+001	1.024E+005
2112	3.400E+006	9.884E+000	9.737E+004
2113	3.400E+006	9.402E+000	9.263E+004
2114	3.400E+006	8.943E+000	8.811E+004
2115	3.400E+006	8.507E+000	8.381E+004
2116	3.400E+006	8.092E+000	7.972E+004
2117	3.400E+006	7.697E+000	7.584E+004
2118	3.400E+006	7.322E+000	7.214E+004
2119	3.400E+006	6.965E+000	6.862E+004
2120	3.400E+006	6.625E+000	6.527E+004
2121	3.400E+006	6.302E+000	6.209E+004
2122	3.400E+006	5.995E+000	5.906E+004
2123	3.400E+006	5.702E+000	5.618E+004
2124	3.400E+006	5.424E+000	5.344E+004
2125	3.400E+006	5.160E+000	5.083E+004
2126	3.400E+006	4.908E+000	4.835E+004
2127	3.400E+006	4.669E+000	4.600E+004
2128	3.400E+006	4.441E+000	4.375E+004
2129	3.400E+006	4.224E+000	4.162E+004
2130	3.400E+006	4.018E+000	3.959E+004
2131	3.400E+006	3.822E+000	3.766E+004
2132	3.400E+006	3.636E+000	3.582E+004
2133	3.400E+006	3.459E+000	3.407E+004
2134	3.400E+006	3.290E+000	3.241E+004
2135	3.400E+006	3.130E+000	3.083E+004
2136	3.400E+006	2.977E+000	2.933E+004
2137	3.400E+006	2.832E+000	2.790E+004
2138	3.400E+006	2.694E+000	2.654E+004
2139	3.400E+006	2.562E+000	2.524E+004
2140	3.400E+006	2.437E+000	2.401E+004
2141	3.400E+006	2.318E+000	2.284E+004
2142	3.400E+006	2.205E+000	2.173E+004

2143	3.400E+006	2.098E+000	2.067E+004
2144	3.400E+006	1.995E+000	1.966E+004
2145	3.400E+006	1.898E+000	1.870E+004
2146	3.400E+006	1.806E+000	1.779E+004
2147	3.400E+006	1.718E+000	1.692E+004
2148	3.400E+006	1.634E+000	1.610E+004

ATTACHMENT 3

NSPS TIER 2 SAMPLING AND ANALYSIS SUMMARY REPORT

[redacted]

New Source Performance Standards
Tier 2 Sampling and Analysis Summary Report
for the
[redacted]
Mexia, Texas

Presented to:

Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079

Presented by:

SCS ENGINEERS
701 Brazos, Suite 500
Austin, Texas 78701
(512) 480-8557

File No. 1696012.00
December 4, 1996

Environmental Consultants

701 Brazos Street
Suite 500
Austin Texas 78701

512 480-8557
FAX 512 320-5722

SCS ENGINEERS

December 4, 1996
Project No. 1696012.00

Mr. Larry Harrell
Manager, Air Programs
Browning-Ferris Gas Services, Inc.
757 North Eldridge
Houston, Texas 77079
(713) 870-7630

Subject: New Source Performance Standards
Tier 2 Sampling and Analysis Report for the
[redacted]
Mexia, Texas

Dear Mr. Harrell:

SCS Engineers (SCS) is pleased to provide our summary report on New Source Performance Standards (NSPS) Tier 2 sampling and analysis activities at the subject Browning-Ferris Industries (BFI) landfill (Site). A summary of field sampling activities and laboratory analysis results are provided below.

SUMMARY OF FIELD SAMPLING ACTIVITIES

Field sampling activities were conducted at the Site on November 22, 1996. Present at the Site were Diane Massey of BFI and Kevin Barnes of SCS.

LFG samples were obtained from sampling ports located at the landfill gas (LFG) collection system flare. The LFG samples were collected into two summa canisters per SCS' modified Method 25C, as approved by the U.S. Environmental Protection Agency (U.S. EPA). The two summa canisters (each containing a 5 liter sample of LFG) were shipped by BFI to AtmAA, Inc. (AtmAA), BFI's approved laboratory, for subsequent analysis.

SUMMARY OF LABORATORY ANALYSIS RESULTS

All laboratory analyses were performed by AtmAA. Upon measurement of nitrogen concentrations in each of the canisters, both canisters were found to contain greater than 20 percent nitrogen by volume. Due to the oxygen content of the samples, and knowing that ambient air has an approximate four to one ratio of nitrogen to oxygen, the nitrogen was assumed to be in-situ nitrogen (i.e., nitrogen inherent to the waste matrix) and analysis results were used in the calculation of the Site's average Non-Methane Organic Compound (NMOC) concentration. Laboratory analysis results are included in Attachment 1.

Based on laboratory results, a Site-average NMOC concentration of 541 parts per million by volume (ppmv), as hexane, is indicated. This site-specific NMOC concentration can be used in evaluating the Site's NMOC emissions.

CLOSING

It was a pleasure working with you on this project, and we thank you for the opportunity to provide Browning-Ferris Gas Services, Inc. our services. Should you have any questions or comments, please contact Lon Albert or Steve Hamilton at (512) 480-8557.

Sincerely,

12/4/96

David E. Poe, P.E.[1]
Project Manager

for Steven M. Hamilton, R.E.P.
Vice President
SCS ENGINEERS

SMH/DEP/RLA:kb

Attachment

1. Laboratory Analysis Results

[1]State of Texas P.E. License Application Accepted as Complete for Processing, Issuance of Number Pending

ATTACHMENT 1

LABORATORY ANALYSIS RESULTS

AtmAA, Inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Total Gaseous Non-Methane Organics (TGNMO) and Nitrogen
Analysis in SUMMA Canister Samples

Report Date: December 3, 1996
Client: BFI / SCS Engineers
Site: [redacted]
Project No.: 1696012 . 00
Date Received: November 29, 1996
Date Analyzed: December 2, 1996

ANALYSIS DESCRIPTION

Total gaseous non-methane organics in SUMMA canisters was measured by flame ionization detection/ total combustion analysis (FID/TCA), EPA Method 25c. Nitrogen was measured by thermal conductivity detection/ gas chromatography (TCD/GC), EPA Method 3c.

AtmAA Lab No.	Sample ID	Nitrogen (%,v)	TGNMO (ppmv)
93346-8	M-1	32.1	3304
93346-9	M-2	34.2	3185

TGNMO is total gaseous non-methane organics measured and reported as ppm methane.

Note: A site barometric pressure of 28.5 inches Hg, and a site temperature of 86° F is used for the calculation of TGNMO, per Kevin Barnes.

Michael L. Porter
Laboratory Director

AtmAA Inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Oxygen Analysis in SUMMA Canister Samples

Report Date: December 4, 1996
Client: BFI / SCS Engineers
Site: [redacted]
Project No.: 1696012 . 00
Date Received: November 29, 1996
Date Analyzed: December 2, 1996

ANALYSIS DESCRIPTION

Oxygen in SUMMA canisters was measured by thermal conductivity detection / gas chromatography (TCD/GC), EPA Method 3c.

AtmAA Lab No.	Sample ID	Oxygen (%,v)
93346-8	M-1	2.87
93346-9	M-2	3.30

The reported oxygen concentration includes any argon present in the sample, calibration is based on a standard atmosphere containing 20.95% oxygen and 0.93% argon.

Note: A site barometric pressure of 28.5 inches Hg, and a site temperature of 86° F is used for the calculations, per Kevin Barnes.

Michael L. Porter
Laboratory Director