Department of Environmental Protection

Jeb Bush
Governor

Southeast District
400 N. Congress Ave. Suite 200
West Palm Beach, Florida 33401

Colleen M. Castille
Secretary

JUN 28 2006

CERTIFIED MAIL #7005 1160 0000 9017 5628

Mr. David McConnell, Area Vice President—Florida
Waste Management, Inc. of Florida
WM Southern Group
Suite 1600
2859 Paces Ferry Rd.
Atlanta, GA 30339

AV—Okeechobee Landfill, Inc.
Okeechobee County

Subject: Settlement by First Amended Order in the Case of State of Florida Department of Environmental Protection vs. Okeechobee Landfill, Inc.
Facility ID No.: 0930104
OGC File No.: 04-0094A

Dear Mr. McConnell:

Enclosed for your implementation is a copy of the fully executed and filed First Amended Order in the above-styled case. Please ensure that the compliance dates and terms of the First Amended Order are accomplished in the specified timeframes.

If you have any questions concerning the terms of the First Amended Order, please contact Allen Rainey at 561-681-6623. Your cooperation is appreciated.

Sincerely,

Kevin R. Neal 6/28/06

Kevin R. Neal Date
District Director
Southeast District

KRN/DG/ar

Enclosure: Executed First Amended Order, OGC File No. 04-0094A

cc: Air Enforcement Files, DEP, West Palm Beach
Dianne Spingler, DARM, Tallahassee (Dianne.Spingler@dep.state.fl.us)
Larry Morgan, Office of General Counsel, DEP, Tallahassee, Mail Station #35
Joe Lurix, Waste Program Administrator, DEP, West Palm Beach (Joe.Lurix@dep.state.fl.us)

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION, Complainant, vs. OKEECHOBEE LANDFILL, INC., Respondent.	IN THE OFFICE OF THE SOUTHEAST DISTRICT OGC FILE NO. 04-0094A

FIRST AMENDED ORDER

The State of Florida Department of Environmental Protection ("Department") and Okeechobee Landfill, Inc. ("Respondent") executed a Settlement Agreement in OGC Case No. 04-0094 (Original Agreement) on March 10, 2004. This First Amended Order is entered into between the Department and the Respondent and it is hereby mutually agreed that this First Amended Order shall amend the Original Agreement only to the extent specifically stated herein, and that all provisions of the Original Agreement not addressed herein shall remain in full force and effect.

The Department finds the following:

1. Based on continued receipt of citizen complaints, objectionable odors from the Okeechobee Landfill continue to impact local citizens since the effective date of the Original Agreement.

2. The implementation of landfill gas management and the odor control procedures identified in paragraph 7(d) of the Original Agreement have reduced the impacts

of objectionable odors on near-by citizens but have not eliminated the impacts or reduced them to levels acceptable to the Department .

3. The Respondent has been cited for six (6) violations of the Objectionable Odor Rule in accordance with paragraph 9 of the Original Agreement. These violations have resulted in the following Demand Letters issued for stipulated penalties:

   a. April 28, 2005, in the amount of five hundred dollars ($500) for an odor violation occurring on April 1, 2005.

   b. May 31, 2005, in the amount of five hundred dollars ($500) for an odor violation occurring on April 30, 2005.

   c. August 22, 2005, in the amount of one thousand dollars ($1,000) for separate odor violations occurring on June 27, 2005, and June 29, 2005.

   d. January 3, 2006, in the amount of one thousand dollars ($1,000) for separate odor violations occurring on November 28, 2005, and December 15, 2005.

4. Paragraph 7(d)(i) of the Original Agreement allows the use of the existing active gas collection and control system to capture and destroy landfill gas that could result in objectionable odors emanating from the Okeechobee Landfill facility. The existing gas collection and control system has consumed the capacity of the system and immediate additional capacity is needed in order for the Respondent to comply with the Original Agreement.

5. The Department agrees to amend the Original Agreement to include use of a temporary flare connected to an active landfill gas collection system to control

emissions associated with the odor control wells. Having reached a resolution of the matter the Department and the Respondent mutually agree and it is

ORDERED:

6. Paragraph 7(d) of the Original Agreement shall be amended to include subparagraphs iv, v, vi, and vii. as follows:

iv. Respondent may install and operate a temporary odor control flare connected to a landfill gas collection system meeting the provisions of 40 Code of Federal Regulation ("CFR") Part 60, Subpart WWW and 40 CFR Part 63, Subpart AAAA. The temporary flare shall be utilized to burn only landfill gas collected from the landfill's odor control wells. Individual odor control wells may be connected to the temporary flare for no more than 180 days after such time the wells must be connected to the permanent gas collection and control system. The Respondent shall maintain a record of: 1). the dates odor control wells are installed, 2). the total amount of gas collected from these wells, and 3). the amount of gas burned in the temporary flare.

v. Within 30 days of the effective date of this Amended Order, Respondent shall submit a PSD permit application addressing the temporary flare and the installation of additional flare capacity as needed for the long-term landfill gas issues of the current footprint.

vi. The Department recognizes the need for the immediate installation and operation of the temporary flare for purposes of odor control and the

Department will utilize its enforcement discretion for operation of the temporary flare provided the terms of this Amended Order are followed.

vii. Despite the use of enforcement discretion identified above, the Department reserves all rights regarding Prevention of Significant Deterioration (PSD) applicability or Best Available Control Technology (BACT) determinations and reserves its rights regarding: any future emissions limitations, control technologies, and future operation of the temporary flare including its removal.

7. Persons who are not parties to this Consent Order but whose substantial interests are affected by this Consent Order have a right, pursuant to Sections 120.569 and 120.57, Florida Statutes, to petition for an administrative hearing on it. The petition must contain the information set forth below and must be filed (received) at the Department's Office of General Counsel, 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, within 21 days of receipt of this notice. A copy of the petition must also be mailed at the time of filing to the Department's Bureau of Invasive Plant Management, 3900 Commonwealth Boulevard, Mail Station 705, Tallahassee, Florida 32399-3000. Failure to file a petition within the 21 days constitutes a waiver of any right such person has to an administrative hearing pursuant to Sections 120.569 and 120.57, Florida Statutes. The petition shall contain the following information:

(a) The name, address, and telephone number of each petitioner; the Department's Consent Order identification number and the county in

which the subject matter or activity is located; (b) A statement of how and when each petitioner received notice of the Consent Order; (c) A statement of how each petitioner's substantial interests are affected by the Consent Order; (d) A statement of the material facts disputed by petitioner, if any; (e) A statement of facts which petitioner contends warrant reversal or modification of the Consent Order; (f) A statement of which rules or statutes petitioner contends require reversal or modification of the Consent Order; and (g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Consent Order.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this Notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the subject Consent Order have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within twenty-one (21) days of receipt of this Notice, in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Sections 120.569 and 120.57, Florida Statutes, and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-106.205, Florida Administrative Code.

A person whose substantial interests are affected by the Consent Order may file a timely petition for an administrative hearing under Sections 120.569 and 120.57, Florida Statutes, or may chose to pursue mediation as an alternative remedy under Section 120.573 before the deadline for filing a petition. Choosing mediation will not adversely affect the right to a hearing if mediation does not result in a settlement. The procedures for pursuing mediation are set forth below. Mediation may only take place if the Department and all the parties to the proceeding agree that mediation is appropriate. A person may pursue mediation by reaching a mediation agreement with all parties to the proceeding (which include the Respondents, the Department, and any person who has filed a timely and sufficient petition for a hearing) and by showing how the substantial interests of each mediating party are affected by the Consent Order. The agreement must be filed in (received by) the Office of General Counsel of the Department, 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, by the same deadline as set forth above for the filing of a petition.

The agreement to mediate must include the following:

(a) The names, addresses, and telephone numbers of any persons who may attend the mediation;

(b) The name, address, telephone number of the mediator selected by the parties, or a provision for selecting a mediator within a specified time;

(c) The agreed allocation of the costs and fees associated with the mediation;

(d) The agreement of the parties on the confidentiality of discussions and documents introduced during mediation;

(e) The date, time, and place of the first mediation session, or a deadline for holding the first session, if no mediator has yet been chosen;

(f) The name of each party's representative who shall have authority to settle or recommend settlement;

(g) Either an explanation of how the substantial interests of each mediating party will be affected by the action or proposed action addressed in this notice of intent or a statement clearly identifying the petition for hearing that each party has already filed, and incorporating it by reference; and

(h) The signatures of all parties or their authorized representatives.

As provided in Section 120.573, Florida Statutes, the timely agreement of all parties to mediate will toll the time limitations imposed by Sections 120.569 and 120.57, Florida Statutes, for requesting and holding an administrative hearing. Unless otherwise agreed by the parties, the mediation must be concluded within sixty (60) days of the execution of the agreement. If mediation results in settlement of the administrative dispute, the Department must enter a final order incorporating the agreement of the parties. Persons whose substantial interests will be affected by such a modified final decision of the Department have a right to petition for a hearing only in accordance with the requirements for such petitions set forth above, and must therefore file their petitions within 21 days of receipt of this notice. If mediation terminates without settlement of the dispute, the Department shall notify all parties in writing that the administrative hearing process under Sections 120.569 and 120.57, Florida Statutes, remain available for disposition of the dispute, and the notice will specify the deadlines that then will

apply for challenging the agency action and electing remedies under those two statutes.

8. As to its remaining terms and provisions, the Original Agreement remains in full force and effect.

9. No modifications of the terms of this First Amended Order shall be effective until reduced to writing and executed by both Respondent and the Department.

10. Respondent acknowledges but waives its right to an administrative hearing pursuant to Sections 120.569 and 120.57, Fla. Stat., on the terms of this First Amended Order. Respondent acknowledges its right to appeal the terms of this First Amended Order pursuant to Section 120.68, Fla. Stat., but waives that right upon signing this First Amended Order.

11. This First Amended Order is a final order of the Department pursuant to Section 120.52(7), Fla. Stat., and it is final and effective on the date filed with the Clerk of the Department unless a Petition for Administrative Hearing is filed in accordance with Chapter 120, Fla. Stat. Upon the timely filing of a petition, this First Amended Order will not be effective until further order of the Department.

[REMANDER OF PAGE INTENTIONALY BLANK]

FOR THE RESPONDENT

6-21-06
DATE

David McConnell
Area Vice President—Florida

DONE AND ORDERED this 28th day of June, 2006, in Palm Beach County, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Kevin R. Neal
District Director

FILED, on this date, pursuant to §120.52 Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Clerk

06/28/06
Date

Copies furnished to:

Larry Morgan, DEP, OGC
Joe Lurix, Waste Program Administrator, DEP, West Palm Beach (Joe.Lurix@dep.state.fl.us)
Dianne Spingler, DARM, DEP, Tallahassee (Dianne.Spingler@dep.state.fl.us)

Department of Environmental Protection

Jeb Bush
Governor

Southeast District
400 N. Congress Ave. Suite 200
West Palm Beach, Florida 33401

Colleen M. Castille
Secretary

JUN 28 2006

CERTIFIED MAIL #7005 1160 0000 9017 5628

Mr. David McConnell, Area Vice President—Florida
Waste Management, Inc. of Florida
WM Southern Group
Suite 1600
2859 Paces Ferry Rd.
Atlanta, GA 30339

AV—Okeechobee Landfill, Inc.
Okeechobee County

Subject: Settlement by First Amended Order in the Case of State of Florida Department of Environmental Protection vs. Okeechobee Landfill, Inc.
Facility ID No.: 0930104
OGC File No.: 04-0094A

Dear Mr. McConnell:

Enclosed for your implementation is a copy of the fully executed and filed First Amended Order in the above-styled case. Please ensure that the compliance dates and terms of the First Amended Order are accomplished in the specified timeframes.

If you have any questions concerning the terms of the First Amended Order, please contact Allen Rainey at 561-681-6623. Your cooperation is appreciated.

Sincerely,

Kevin R. Neal 6/28/06

Kevin R. Neal Date
District Director
Southeast District

KRN/DG/ar

Enclosure: Executed First Amended Order, OGC File No. 04-0094A

cc: Air Enforcement Files, DEP, West Palm Beach
Dianne Spingler, DARM, Tallahassee (Dianne.Spingler@dep.state.fl.us)
Larry Morgan, Office of General Counsel, DEP, Tallahassee, Mail Station #35
Joe Lurix, Waste Program Administrator, DEP, West Palm Beach (Joe.Lurix@dep.state.fl.us)

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION, Complainant, vs. OKEECHOBEE LANDFILL, INC., Respondent.	IN THE OFFICE OF THE SOUTHEAST DISTRICT OGC FILE NO. 04-0094A

FIRST AMENDED ORDER

The State of Florida Department of Environmental Protection ("Department") and Okeechobee Landfill, Inc. ("Respondent") executed a Settlement Agreement in OGC Case No. 04-0094 (Original Agreement) on March 10, 2004. This First Amended Order is entered into between the Department and the Respondent and it is hereby mutually agreed that this First Amended Order shall amend the Original Agreement only to the extent specifically stated herein, and that all provisions of the Original Agreement not addressed herein shall remain in full force and effect.

The Department finds the following:

1. Based on continued receipt of citizen complaints, objectionable odors from the Okeechobee Landfill continue to impact local citizens since the effective date of the Original Agreement.

2. The implementation of landfill gas management and the odor control procedures identified in paragraph 7(d) of the Original Agreement have reduced the impacts

of objectionable odors on near-by citizens but have not eliminated the impacts or reduced them to levels acceptable to the Department .

3. The Respondent has been cited for six (6) violations of the Objectionable Odor Rule in accordance with paragraph 9 of the Original Agreement. These violations have resulted in the following Demand Letters issued for stipulated penalties:

   a. April 28, 2005, in the amount of five hundred dollars ($500) for an odor violation occurring on April 1, 2005.

   b. May 31, 2005, in the amount of five hundred dollars ($500) for an odor violation occurring on April 30, 2005.

   c. August 22, 2005, in the amount of one thousand dollars ($1,000) for separate odor violations occurring on June 27, 2005, and June 29, 2005.

   d. January 3, 2006, in the amount of one thousand dollars ($1,000) for separate odor violations occurring on November 28, 2005, and December 15, 2005.

4. Paragraph 7(d)(i) of the Original Agreement allows the use of the existing active gas collection and control system to capture and destroy landfill gas that could result in objectionable odors emanating from the Okeechobee Landfill facility. The existing gas collection and control system has consumed the capacity of the system and immediate additional capacity is needed in order for the Respondent to comply with the Original Agreement.

5. The Department agrees to amend the Original Agreement to include use of a temporary flare connected to an active landfill gas collection system to control

emissions associated with the odor control wells. Having reached a resolution of the matter the Department and the Respondent mutually agree and it is

ORDERED:

6. Paragraph 7(d) of the Original Agreement shall be amended to include subparagraphs iv, v, vi, and vii. as follows:

iv. Respondent may install and operate a temporary odor control flare connected to a landfill gas collection system meeting the provisions of 40 Code of Federal Regulation ("CFR") Part 60, Subpart WWW and 40 CFR Part 63, Subpart AAAA. The temporary flare shall be utilized to burn only landfill gas collected from the landfill's odor control wells. Individual odor control wells may be connected to the temporary flare for no more than 180 days after such time the wells must be connected to the permanent gas collection and control system. The Respondent shall maintain a record of: 1). the dates odor control wells are installed, 2). the total amount of gas collected from these wells, and 3). the amount of gas burned in the temporary flare.

v. Within 30 days of the effective date of this Amended Order, Respondent shall submit a PSD permit application addressing the temporary flare and the installation of additional flare capacity as needed for the long-term landfill gas issues of the current footprint.

vi. The Department recognizes the need for the immediate installation and operation of the temporary flare for purposes of odor control and the

Department will utilize its enforcement discretion for operation of the temporary flare provided the terms of this Amended Order are followed.

vii. Despite the use of enforcement discretion identified above, the Department reserves all rights regarding Prevention of Significant Deterioration (PSD) applicability or Best Available Control Technology (BACT) determinations and reserves its rights regarding: any future emissions limitations, control technologies, and future operation of the temporary flare including its removal. for how long.

7. Persons who are not parties to this Consent Order but whose substantial interests are affected by this Consent Order have a right, pursuant to Sections 120.569 and 120.57, Florida Statutes, to petition for an administrative hearing on it. The petition must contain the information set forth below and must be filed (received) at the Department's Office of General Counsel, 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, within 21 days of receipt of this notice. A copy of the petition must also be mailed at the time of filing to the Department's Bureau of Invasive Plant Management, 3900 Commonwealth Boulevard, Mail Station 705, Tallahassee, Florida 32399-3000. Failure to file a petition within the 21 days constitutes a waiver of any right such person has to an administrative hearing pursuant to Sections 120.569 and 120.57, Florida Statutes. The petition shall contain the following information:

(a) The name, address, and telephone number of each petitioner; the Department's Consent Order identification number and the county in

which the subject matter or activity is located; (b) A statement of how and when each petitioner received notice of the Consent Order; (c) A statement of how each petitioner's substantial interests are affected by the Consent Order; (d) A statement of the material facts disputed by petitioner, if any; (e) A statement of facts which petitioner contends warrant reversal or modification of the Consent Order; (f) A statement of which rules or statutes petitioner contends require reversal or modification of the Consent Order; and (g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Consent Order.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this Notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the subject Consent Order have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within twenty-one (21) days of receipt of this Notice, in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Sections 120.569 and 120.57, Florida Statutes, and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-106.205, Florida Administrative Code.

A person whose substantial interests are affected by the Consent Order may file a timely petition for an administrative hearing under Sections 120.569 and 120.57, Florida Statutes, or may chose to pursue mediation as an alternative remedy under Section 120.573 before the deadline for filing a petition. Choosing mediation will not adversely affect the right to a hearing if mediation does not result in a settlement. The procedures for pursuing mediation are set forth below. Mediation may only take place if the Department and all the parties to the proceeding agree that mediation is appropriate. A person may pursue mediation by reaching a mediation agreement with all parties to the proceeding (which include the Respondents, the Department, and any person who has filed a timely and sufficient petition for a hearing) and by showing how the substantial interests of each mediating party are affected by the Consent Order. The agreement must be filed in (received by) the Office of General Counsel of the Department, 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, by the same deadline as set forth above for the filing of a petition.

The agreement to mediate must include the following:

(a) The names, addresses, and telephone numbers of any persons who may attend the mediation;

(b) The name, address, telephone number of the mediator selected by the parties, or a provision for selecting a mediator within a specified time;

(c) The agreed allocation of the costs and fees associated with the mediation;

(d) The agreement of the parties on the confidentiality of discussions and documents introduced during mediation;

(e) The date, time, and place of the first mediation session, or a deadline for holding the first session, if no mediator has yet been chosen;

(f) The name of each party's representative who shall have authority to settle or recommend settlement;

(g) Either an explanation of how the substantial interests of each mediating party will be affected by the action or proposed action addressed in this notice of intent or a statement clearly identifying the petition for hearing that each party has already filed, and incorporating it by reference; and

(h) The signatures of all parties or their authorized representatives.

As provided in Section 120.573, Florida Statutes, the timely agreement of all parties to mediate will toll the time limitations imposed by Sections 120.569 and 120.57, Florida Statutes, for requesting and holding an administrative hearing. Unless otherwise agreed by the parties, the mediation must be concluded within sixty (60) days of the execution of the agreement. If mediation results in settlement of the administrative dispute, the Department must enter a final order incorporating the agreement of the parties. Persons whose substantial interests will be affected by such a modified final decision of the Department have a right to petition for a hearing only in accordance with the requirements for such petitions set forth above, and must therefore file their petitions within 21 days of receipt of this notice. If mediation terminates without settlement of the dispute, the Department shall notify all parties in writing that the administrative hearing process under Sections 120.569 and 120.57, Florida Statutes, remain available for disposition of the dispute, and the notice will specify the deadlines that then will

apply for challenging the agency action and electing remedies under those two statutes.

8. As to its remaining terms and provisions, the Original Agreement remains in full force and effect.

9. No modifications of the terms of this First Amended Order shall be effective until reduced to writing and executed by both Respondent and the Department.

10. Respondent acknowledges but waives its right to an administrative hearing pursuant to Sections 120.569 and 120.57, Fla. Stat., on the terms of this First Amended Order. Respondent acknowledges its right to appeal the terms of this First Amended Order pursuant to Section 120.68, Fla. Stat., but waives that right upon signing this First Amended Order.

11. This First Amended Order is a final order of the Department pursuant to Section 120.52(7), Fla. Stat., and it is final and effective on the date filed with the Clerk of the Department unless a Petition for Administrative Hearing is filed in accordance with Chapter 120, Fla. Stat. Upon the timely filing of a petition, this First Amended Order will not be effective until further order of the Department.

[REMANDER OF PAGE INTENTIONALY BLANK]

FOR THE RESPONDENT

6-21-06

DATE

David McConnell
Area Vice President—Florida

DONE AND ORDERED this 28th day of June, 2006, in Palm Beach County, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Kevin R. Neal
District Director

FILED, on this date, pursuant to §120.52 Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Clerk

06/28/06
Date

Copies furnished to:

Larry Morgan, DEP, OGC
Joe Lurix, Waste Program Administrator , DEP, West Palm Beach (Joe.Lurix@dep.state.fl.us)
Dianne Spingler, DARM, DEP, Tallahassee (Dianne.Spingler@dep.state.fl.us)

FILE COPY

Department of Environmental Protection

Jeb Bush
Governor

Southeast District
400 N. Congress Ave. Suite 200
West Palm Beach, Florida 33401

Colleen M. Castille
Secretary

MAR 10 2005

CERTIFIED MAIL 7002 0860 0006 8780 5951
RETURN RECEIPT REQUESTED

Mr. Charles J. Campagna, V.P.
Waste Management Inc., of Florida
d.b.a. Okeechobee Landfill, Inc.
10800 N.E. 128th Avenue
Okeechobee, Florida 34972

Okeechobee County
SW-Okeechobee Landfill, Inc.
Enforcement Files

RE: Settlement of Department of Environmental Protection vs Okeechobee Landfill, Inc.
OGC Case No. 04-0094

Dear Mr. Campagna:

Enclosed for your implementation is a copy of the fully executed and filed Settlement Agreement in the above styled case. Please familiarize yourself with the compliance dates and terms of the Settlement Agreement so the complete and timely performance of those obligations are accomplished.

Thank you for your cooperation in this matter. If you have any questions concerning this matter please contact Mr. William F. Forrest at (561) 681-6669.

Sincerely,

Kevin R. Neal 3/7/05

Kevin R. Neal Date
District Director
Southeast District Office

KRN/JRP/JL/wff

cc: Larry Morgan, OGC via electronically
Peter L. Breton, Esq., via electronically – pbreton@moylelaw.com
Jason Sherman, OGC via electronically
Greg Kennedy, SED via electronically
Mr. T. J. Cannon
Russell Rowland, Okeechobee County, via electronically - rrowland@co.okeechobee.fl.us

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION,

Complainant,

vs.

OKEECHOBEE LANDFILL, INC.,

Respondent.
_____/

IN THE OFFICE OF THE SOUTHEAST DISTRICT

OGC FILE NO. 04-0094

MAR 10 2005

SETTLEMENT AGREEMENT

This Settlement Agreement is entered into between the State of Florida Department of Environmental Protection ("Department") and Okeechobee Landfill, Inc., a Florida corporation ("Respondent") to reach settlement of certain matters at issue between the Department and Respondent.

The Department finds and, the Respondent neither admits nor denies the following:

1. The Department is the administrative agency of the State of Florida having the power and duty to administer and enforce the provisions of Chapter 403, Florida Statutes ("F.S."), and the rules promulgated thereunder, Title 62, Florida Administrative Code ("F.A.C."). The Department has jurisdiction over the matters addressed in this Settlement Agreement.

2. Respondent is a person within the meaning of Section 403.031(5), F.S. Respondent is the owner and operator of a Class I landfill ("Facility"), as classified under Rule 62-701.340 (3)(a) F.A.C. The Facility is located at 10800 N.E. 128th Avenue, Okeechobee, Florida 34972. Respondent operates the Facility under Department permit No. 040842-010-SC,

Air Operating Permit No. 09030104-006-AV and Environmental Resource Permit No. EI 47-0131315-001.

3. Warning Letter #WL03-0184SW47SED was issued to Respondent on October 20, 2003 stating that the Respondent may be in violation of Chapter 403, F.S. and Chapter 62-701 F.A.C. for disposal of whole waste tires in the Facility, allowing leachate to mix with stormwater that discharged into the stormwater management system, gas pressure interfering with the liner system, leachate ponds filled to capacity, and objectionable odors detected offsite of the Facility. Warning Letter #WL04-0010AS47SED was issued to Respondent on February 19, 2004 stating that the Respondent may be in violation of Chapter 403, F.S. and Chapter 62-296 F.A.C. for allowing objectionable odors offsite of the Facility.

4. Personnel from the Department conducted inspections of the Facility and responded to odor complaints that were received on October 1, 2003, November 4, 2003, November 10, 2003 and January 28, 2004. During each of these inspections, objectionable landfill odors were detected off-site by Department personnel.

5. The Department finds that the following violations occurred on October 01, 2003:

a. Respondent disposed of 15 to 20 whole waste tires in the landfill.

b. Respondent allowed leachate to mix with stormwater in the stormwater management system.

c. Respondent did not notify the Department and propose a correction schedule for erosion which occurred and that could not be corrected within seven days of occurrence. Respondent specifically denies this alleged violation.

d. Respondent allowed gas pressure in the landfill gas management system to interfere with the landfill liner. Respondent specifically denies this alleged violation.

e. Respondent allowed objectionable odors to occur outside the Facility (on October 1, 2003, November 4, 2003, November 10, 2003 and January 28, 2004). Respondent specifically denies that the odor detected by Department personnel on such dates satisfied the legal definition of "objectionable odor" as defined in Rule 62-210.200 F.A.C.

6. Having reached a resolution of the matter Department and the Respondent mutually agree as follows:

7. Respondent shall implement the following corrective measures within the stated time periods:

a. Within thirty (30) days of the effective date of this Settlement Agreement, Respondent shall revise the Facility Operation Plan to institute the following whole waste tire management procedures:

i. Equipment operators responsible for waste placement and compaction of waste shall collect whole waste tires inadvertently delivered to the landfill active area. The trained equipment operators are certified spotters (in accordance with Rule 62-701.320(15), F.A.C.) and are trained to identify prohibited waste, including whole waste tires. Due to safety issues in the active area, equipment operators are discouraged from being on foot in the landfill active area. A whole waste tire,

when spotted from the equipment cab, shall be picked up using the equipment blade and moved to the edge of the active area for removal. The whole waste tires placed at the edge of the active area shall be removed by laborers using a pick up truck to transport whole waste tires to the appropriate stockpile area.

ii. The laborer (or the person authorized) shall report to the District Manager the number of whole waste tires collected from the active area when transported to the stockpile area. The number of collected whole waste tires shall be recorded daily and maintained at the Facility. A monthly summary of the number of whole waste tires collected from the landfill active area shall be reported to FDEP as part of the monthly reporting (Specific Condition 16 of the Facility operating permit number 040842-010-SC).

iii. The District Manager shall be responsible to monitor removal rate of whole waste tires based on the daily-recorded values. In the event, based on the records or operator(s)' observation, a significant increase in the whole waste tire collection is identified, the District Manager shall determine the source of the waste that contains excessive whole waste tires. The District Manager shall contact responsible officials to prompt the removal of the tires at the determined source(s). In the event the records indicate a significant reduction in the removal rate, the matter shall be investigated by the District Manager and actions

shall be taken on an as needed basis to ensure the removal of any identified prohibited material.

b. Within thirty (30) days of the effective date of this Settlement Agreement, Respondent shall revise the Facility Operation Plan to institute the following landfill slope grading and erosion protection measures: Respondent will grade the landfill exterior slopes to 3 horizontal to 1 vertical (3H:1V) during waste placement in the active area. The slope will be covered with intermediate cover in accordance with Chapter 62-701 after achieving the proper grades and sod will be installed over the intermediate cover to reduce the potential for erosion during storm events.

c. Within thirty (30) days of the effective date of this Settlement Agreement, Respondent shall revise the Facility Operation Plan to institute the leachate disposal and storage procedures set forth in subparagraphs ii, iii and iv below:

   i. Background. In accordance with the Facility operating permit, leachate is disposed of at two leachate evaporator units identified as Units #3016 and #3004IM. The leachate evaporators operate in conjunction with the gas collection system established at the Facility. The landfill gas collected through the gas extraction wells are routed to two permitted 3,000 scfm-enclosed flares for disposal. A portion of the gas is routed through each evaporator, combusted inside the evaporator combustion chamber within the evaporator tank, and the resultant heat is used to evaporate leachate contained therein. Each unit evaporates

approximately 20,000 gallons per day of leachate with a total daily rate of 40,000 gallons per day. Details of the construction timeline of the units are discussed below. Respondent had previously installed a 1,500 scfm enclosed flare (Unit #1424) with a leachate evaporator (Unit #3004) in 1998. These units had been in service for five years. In 2002, to increase leachate disposal capacity the Facility, Respondent signed a contract to install a new evaporator (Unit #3016) at the Facility. Installation of this unit was completed in March 2003. The unit has been in service at the rate of 20,000 gallons per day of leachate evaporation since March 2003. Unit #3016 is attached to a 3000 scfm flare (Unit #1776). In 2001, Respondent had planned to upgrade Unit #1424 to a 3,000 scfm enclosed flare (Replacement Unit #1698). With this improvement, Unit #3004 was also scheduled to be upgraded to Unit #3004IM (herein referred to as the Replacement Unit 3004IM). Respondent had initially planned to begin construction of the Replacement Unit #3004IM in November 2002 to increase its leachate disposal capacity to 40,000 gallons per day (including the new Unit #3016 and the Replacement Unit #3004IM) before the wet season in 2003. The construction schedule was delayed from January 2003 to August 2003, so as not to be in violation of air construction and operating permits. Construction of the Replacement Unit #1698 and Replacement Unit #3004IM began in September 2003. In accordance

with the Title V renewal permit, Unit #3004 was taken out of service following placement of the new Unit #3016 in March 2003. Therefore, Respondent had only 20,000 gallons per day on-site leachate disposal capacity through the wet season in 2003. However, this situation did not affect the normal leachate management procedures at the Facility. Respondent, using the new operating Unit #3016 and transporting leachate to an off-site disposal facility, managed leachate generated at the Facility through the wet season of 2003. The Replacement Unit #3004IM was placed in service April 30, 2004. Respondent anticipates reaching the full on-site disposal capacity of 40,000 gallons per day by June 10, 2004. In addition to onsite leachate evaporation, Respondent has the availability of offsite treatment/disposal through contractual arrangements. Respondent has an industrial waste operating permit with Miami/Dade Department of Environmental Resource Management (DERM) to discharge its leachate at a publicly owned wastewater treatment facility in Miami/Dade County, Florida. Further, Waste Management Inc. of Florida (WMIF) has a contract with a publicly owned wastewater treatment facility in Broward County, under which Respondent is authorized to dispose of the leachate generated at the Facility. Any excess leachate generated at the Facility is transported to these facilities on an as-needed basis. In addition to the above disposal

means, Respondent has two leachate ponds with a total storage capacity of approximately 4,600,000 gallons. The ponds are covered with floating covers to keep rainwater out of the ponds. Further, it should be noted that the current operating permit of the Facility allows use of two covered leachate ponds to the full capacity of the ponds (4,600,000 gallons) without required freeboard. FDEP, in the 1 October 2003 inspection report, raised an issue with the leachate level in the ponds and insufficiency of one leachate evaporator to dispose of leachate generated from the Facility. FDEP also raised an issue during the 19 November, 2003 meeting regarding gas pockets below the floating cover. Installation of the floating covers was not required by FDEP regulations; however, Respondent improved its leachate management procedures by installing the floating covers. The floating covers are entirely seamed to the bottom-lining system in the ponds to prevent leachate overflow from the ponds in the event of excess leachate routed to the ponds. The gas contained beneath the floating cover illustrates the seam integrity. Respondent has never routed excess leachate to the ponds resulting in over-filling of the ponds. Due to the complexity of the floating cover design, gas may become trapped in certain locations of the floating cover irrespective of the leachate depth in the pond. Gas pockets below the floating cover have no adverse impact on the integrity of the floating cover as baffles in the

cover are designed to allow rise and fall with the fluids levels. Additionally, the floating covers are regularly monitored for integrity and in the event repairs are required, Respondent immediately takes proper actions to remediate the situation. Transport of leachate from the leachate ponds on an as-needed basis to an off-site permitted leachate disposal facility (as discussed above) has been the norm at the Facility during wet seasons. As discussed above, Respondent managed leachate generated at the Facility by using the operating new Unit #3016 and transporting leachate to an off-site disposal facility through the 2003 wet season. At no point in time were leachate management procedures compromised and/or excess leachate stored in the leachate ponds.

ii. Any excess leachate generated at the Facility shall be transported to Dade County, Broward County or other contracted facilities on an as-needed basis.

iii. Although a freeboard is not required under the FDEP regulations, Respondent will routinely maintain a freeboard in the leachate ponds using the following procedure. Based on the recent daily records collected from the flow meters installed at existing sumps at the Facility, the daily leachate generation from the unclosed cells of the landfill, during the rainy season, is approximately 700 gallons per acre per day. The same records indicate that daily leachate removal from

the closed cells is approximately 300 gallons per acre per day. These individual values shall be multiplied by the corresponding number of acres for unclosed cells versus closed cells for calculating the total daily leachate quantity expressed in gallons per acre per day to determine the voluntary freeboard in the leachate ponds. Respondent will maintain storage for 15 days of leachate generated at the Facility for the total leachate generated at the Respondent's landfill footprint. Within sixty (60) days of the effective date of this Settlement Agreement, a metering system shall be established at each pond to monitor throughput and available storage in the pond on a daily basis. This monitoring shall ensure that the above described leachate storage capacity is available at all times. The protocol for monitoring freeboard at the leachate ponds shall be added to the Facility Operation Plan.

iv. Operators shall be trained to implement appropriate methods to prevent leachate from entering the stormwater management system.

d. Within thirty (30) days of the effective date of this Settlement Agreement, Respondent shall revise the Facility Operation Plan to institute the following landfill gas management and odor control procedures:

i. Respondent shall manage odor at the Facility by routine installation of new gas wells on the Facility exterior slopes as final grades are achieved. The depth of each gas well shall be determined based on its

location on the slope. The new gas wells shall be connected to the active gas collection system. In the event the location of the gas well is not suitable for immediate connection to the active gas collection system, solar powered passive flares shall be installed on the gas well for a limited duration until the gas well can be connected to the active gas collection system.

ii. Within sixty (60) days of the effective date of this Settlement Agreement, Respondent shall operate an odor misting system that is located on the landfill property to control objectionable odors within the landfill property.

iii. Respondent shall continually operate the odor misting system or equivalent within the landfill active area, or areas that have not received final cover and have not been certified closed. When objectionable odors are anticipated or detected in the landfill active area or areas that have not received final cover and have not been certified closed, the Respondent shall apply odor absorbent chemicals on the surface of waste received in the active area and those areas that have not received final cover and have not been certified closed.

8. Within thirty (30) days of the effective date of this Settlement Agreement, Respondent shall pay the Department $ 12,500.00 in full settlement of the matters addressed in this Settlement Agreement. The civil penalty in this case includes 4 violations of $2,000.00 or more. This amount includes $500.00 for costs and expenses incurred by the Department during

the investigation of this matter and the preparation and tracking of this Settlement Agreement. Payment shall be made by cashier's check or money order. The instrument shall be made payable to the "Department of Environmental Protection" and shall include thereon the OGC number assigned to this Settlement Agreement and the notation "Ecosystem Management and Restoration Trust Fund".

9. Respondent agrees to pay the Department stipulated penalties in the amount of $500 per day for each violation every day Respondent is found to have the following violations occur at the Facility that are confirmed by Department personnel with appropriate experience or training for a period of two years from the execution of this Settlement Agreement:

a. "Objectionable odors" as defined by the F.A.C. are confirmed offsite; or

b. Whole waste tires are observed in the working face that Respondent has not removed in accordance with paragraph 7a; or

c. Leachate mixing with stormwater that is observed discharging into the stormwater management system; or

d. Any other non-compliance with paragraph 7 above.

A separate stipulated penalty shall be assessed for each violation of this Settlement Agreement. Respondent reserves the right to request an administrative hearing if it disagrees with the Department's finding that a violation of this paragraph has occurred. Within 30 days of written demand from the Department, if Respondent has not filed a timely petition for an administrative hearing, Respondent shall make payment of the appropriate stipulated penalties to "The Department of Environmental Protection" by cashier's check or money order and shall include thereon the OGC number assigned to this Settlement Agreement and the notation "Ecosystem

Management and Restoration Trust Fund". Payment shall be sent to the Department of Environmental Protection, Solid Waste Section, 400 North Congress Avenue, Suite 200, West Palm Beach, Florida 33401. The Department may make demands for payment at any time after violations occur. Nothing in this paragraph shall prevent the Department from filing suit to specifically enforce any of the terms of this Settlement Agreement. Any penalties assessed under this paragraph shall be in addition to the settlement sum agreed to in paragraph 8 of this Settlement Agreement. If the Department is required to file a lawsuit to recover stipulated penalties under this paragraph, the Department will not be foreclosed from seeking civil penalties for violations of this Settlement Agreement in an amount greater than the stipulated penalties due under this paragraph.

10. Respondent shall (i) implement all corrective actions set forth in Paragraph 7 and (ii) pay all amounts required in Paragraphs 8 and 9 within the time periods stated therein but in no event later than June 30, 2005. Respondent shall notify the Department in writing when Respondent has satisfied both (i) and (ii). Provided that the Department concurs, the Agreement is terminated as of the date of Respondent's notice. If the Department does not concur, it shall so notify the Respondent and describe the corrective action(s) that remain to be implemented, in which event the Agreement shall remain in effect until such corrective action(s) are implemented.

11. It is agreed that neither the execution of this Settlement Agreement nor the payment of any sums hereunder by the Respondent shall be construed as an admission of any fault, liability or violation by the Respondent.

12. If any event, including administrative or judicial challenges by third parties unrelated to the Respondent, occurs which causes delay or the reasonable likelihood of delay, in complying with the requirements of this Settlement Agreement, Respondent shall have the burden of proving the delay was or will be caused by circumstances beyond the reasonable control of the Respondent and could not have been or cannot be overcome by Respondent's due diligence. Economic circumstances shall not be considered circumstances beyond the control of Respondent, nor shall the failure of a contractor, subcontractor, materialman or other agent (collectively referred to as "contractor") to whom responsibility for performance is delegated to meet contractually imposed deadlines be a cause beyond the control of Respondent, unless the cause of the contractor's late performance was also beyond the contractor's control. Upon occurrence of an event causing delay, or upon becoming aware of a potential for delay, Respondent shall notify the Department orally within 24 hours or by the next working day and shall, within seven calendar days of oral notification to the Department, notify the Department in writing of the anticipated length and cause of the delay, the measures taken or to be taken to prevent or minimize the delay and the timetable by which Respondent intends to implement these measures. If the parties can agree that the delay or anticipated delay has been or will be caused by circumstances beyond the reasonable control of Respondent, the time for performance hereunder shall be extended for a period equal to the agreed delay resulting from such circumstances. Such agreement shall adopt all reasonable measures necessary to avoid or minimize delay. Failure of Respondent to comply with the notice requirements of this Paragraph in a timely manner shall constitute a waiver of Respondent's right to request an extension of time for compliance with the requirements of this Settlement Agreement.

13. Respondent shall publish the following notice in a newspaper of daily circulation in Okeechobee County, Florida. The notice shall be published one time only within 5 days after the effective date of the Settlement Agreement by the Department.

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

NOTICE OF SETTLEMENT AGREEMENT

The Department of Environmental Protection gives notice of agency action of entering into a Settlement Agreement with Okeechobee Landfill, Inc., pursuant to Section 120.57(4), Florida Statutes. The Settlement Agreement addresses the implementation of an Odor Remediation Plan at the Okeechobee Landfill. The Settlement Agreement is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at the Department of Environmental Protection, 400 N. Congress Avenue, Suite 200, West Palm Beach, Florida. Persons who are not parties to this Settlement Agreement but whose substantial interests are affected by this Settlement Agreement have a right, pursuant to Sections 120.569 and 120.57, Florida Statutes, to petition for an administrative hearing on it. The Petition must contain the information set forth below and must be filed (received) at the Department's Office of General Counsel, 3900 Commonwealth Boulevard, MS-35, Tallahassee, Florida 32399-3000, within 21 days of receipt of this notice. A copy of the Petition must also be mailed at the time of filing to the District Office named above at the address indicated. Failure to file a petition within the 21 days constitutes a waiver of any right such person has to an administrative hearing pursuant to Sections 120.569 and 120.57, Florida Statutes.

The petition shall contain the following information:

(a) The name, address, and telephone number of each petitioner; the Department's Settlement Agreement identification number and the county in which the subject matter or activity is located;

(b) A statement of how and when each petitioner received notice of the Settlement Agreement;

(c) A statement of how each petitioner's substantial interests are affected by the Settlement Agreement;

(d) A statement of the material facts disputed by petitioner, if any;

(e) A statement of facts which petitioner contends warrant reversal or modification of the Settlement Agreement;

(f) A statement of which rules or statutes petitioner contends require reversal or modification of the Settlement Agreement;

(g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Settlement Agreement.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this Notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the subject Settlement Agreement have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 21 days of receipt of this notice in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a

waiver of any right such person has to request a hearing under Sections 120.569 and 120.57, Florida Statutes, and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-106.205, Florida Administrative Code.

A person whose substantial interests are affected by the Settlement Agreement may file a timely petition for an administrative hearing under Sections 120.569 and 120.57, Florida Statutes, or may choose to pursue mediation as an alternative remedy under Section 120.573, Florida Statutes, before the deadline for filing a petition. Choosing mediation will not adversely affect the right to a hearing if mediation does not result in a settlement. The procedures for pursuing mediation are set forth below.

Mediation may only take place if the Department and all the parties to the proceeding agree that mediation is appropriate. A person may pursue mediation by reaching a mediation agreement with all parties to the proceeding (which include the Respondent, the Department, and any person who has filed a timely and sufficient petition for a hearing) and by showing how the substantial interests of each mediating party are affected by the Settlement Agreement. The agreement must be filed in (received by) the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, within 10 days after the deadline as set forth above for the filing of a petition.

The agreement to mediate must include the following:

(a) The names, addresses, and telephone numbers of any persons who may attend the mediation;

(b) The name, address, and telephone number of the mediator selected by the parties, or a provision for selecting a mediator within a specified time;

(c) The agreed allocation of the costs and fees associated with the mediation;

(d) The agreement of the parties on the confidentiality of discussions and documents introduced during mediation;

(e) The date, time, and place of the first mediation session, or a deadline for holding the first session, if no mediator has yet been chosen;

(f) The name of each party's representative who shall have authority to settle or recommend settlement;

(g) Either an explanation of how the substantial interests of each mediating party will be affected by the action or proposed action addressed in this notice of intent or a statement clearly identifying the petition for hearing that each party has already filed, and incorporating it by reference; and

(h) The signatures of all parties or their authorized representatives.

As provided in Section 120.573, Florida Statutes, the timely agreement of all parties to mediate will toll the time limitations imposed by Sections 120.569 and 120.57, Florida Statutes, for requesting and holding an administrative hearing. Unless otherwise agreed by the parties, the mediation must be concluded within sixty days of the execution of the agreement. If mediation results in settlement of the administrative dispute, the Department must enter a final order incorporating the agreement of the parties. Persons whose substantial interests will be affected by such a modified final decision of the Department have a right to petition for a hearing only in accordance with the requirements for such petitions set forth above, and must therefore file their

petitions within 21 days of receipt of this notice. If mediation terminates without settlement of the dispute, the Department shall notify all parties in writing that the administrative hearing processes under Sections 120.569 and 120.57, Florida Statutes, remain available for disposition of the dispute, and the notice will specify the deadlines that then will apply for challenging the agency action and electing remedies under those two statutes.

14. Entry of this Settlement Agreement does not relieve Respondent of the need to comply with applicable federal, state or local laws, regulations or ordinances.

15. The terms and conditions set forth in this Settlement Agreement may be enforced in a court of competent jurisdiction pursuant to Sections 120.69 and 403.121, F.S. Failure to comply with the terms of this Settlement Agreement shall constitute a violation of Section 403.161(1)(b), F.S.

16. Respondent is fully aware that a violation of the terms of this Settlement Agreement may subject Respondent to judicial imposition of damages, civil penalties up to $10,000.00 per day per violation and criminal penalties.

17. Respondent shall allow all authorized representatives of the Department access to the property and facility at reasonable times for the purpose of determining compliance with the terms of this Settlement Agreement and the rules and statutes of the Department.

18. All submittals and payments required by this Settlement Agreement to be submitted to the Department shall be sent to the Florida Department of Environmental Protection, Southeast District, 400 N. Congress Avenue, Suite 200, West Palm Beach, FL 33401.

19. The Department hereby expressly reserves the right to initiate appropriate legal action to prevent or prohibit any violations of applicable statutes, or the rules promulgated thereunder that are not specifically addressed by the terms of this Settlement Agreement.

20. The Department, for and in consideration of the complete and timely performance by Respondent of the obligations agreed to in this Settlement Agreement, hereby waives its right to seek judicial imposition of damages or civil penalties for alleged violations outlined in this Settlement Agreement.

21. Respondent acknowledges and waives its right to an administrative hearing pursuant to Sections 120.569 and 120.57, F.S., on the terms of this Settlement Agreement. Respondent acknowledges its right to appeal the terms of this Settlement Agreement pursuant to Section 120.68, F. S., and waives that right upon signing this Settlement Agreement.

22. No modifications of the terms of this Settlement Agreement shall be effective until reduced to writing and executed by both Respondent and the Department.

23. In the event of a sale or conveyance of the facility or of the property upon which the facility is located, if all of the requirements of this Settlement Agreement have not been fully satisfied, Respondent shall, at least 30 days prior to the sale or conveyance of the property or facility, (1) notify the Department of such sale or conveyance, (2) provide the name and address of the purchaser, or operator, or person(s) in control of the facility, and (3) provide a copy of this Settlement Agreement with all attachments to the new owner. The sale or conveyance of the facility, or the property upon which the facility is located shall not relieve the Respondent of the obligations imposed in this Settlement Agreement.

24. This Settlement Agreement is a settlement of the Department's civil and administrative authority arising under Florida law to resolve the matters addressed herein. This Settlement Agreement is not a settlement of any criminal liabilities which may arise under Florida law, nor is it a settlement of any violation which may be prosecuted criminally or civilly under federal law.

25. Respondent shall use all reasonable efforts to obtain any necessary access for work to be performed in the implementation of this Settlement Agreement. If necessary access cannot be obtained, or if obtained, is revoked by owners or entities controlling access to the properties to which access is necessary, Respondent shall notify the Department within (5) business days of such refusal or revocation. The Department may at any time seek to obtain access as is necessary to implement the terms of this Settlement Agreement. The Respondent shall reimburse the Department for any damages, costs, or expenses, including expert and attorneys fees, that the Department is ordered to pay, or that the Department incurs in connection with its efforts to obtain access as is necessary to implement the terms of this Settlement Agreement. Respondent shall pay these sums to the Department or arrange a payment schedule with the Department within 30 days of written demand by the Department.

26. This Settlement Agreement is a final order of the Department pursuant to Section 120.52(7), F.S., and it is final and effective on the date filed with the Clerk of the Department unless a Petition for Administrative Hearing is filed in accordance with Chapter 120, Florida Statutes. Upon the timely filing of a petition this Settlement Agreement will not be effective until further order of the Department.

FOR THE RESPONDENT

OKEECHOBEE LANDFILL, INC.

2/24/2005
DATE

By: Charles J Campagna

Name CHARLES J CAMPAGNA

Title VICE PRESIDENT

DONE AND ORDERED this 24th day of February, 2005, in West Palm Beach, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Kevin R. Neal 3/7/05
Kevin R. Neal Date
District Director
Southeast District

KRN/JP/JL/bf

FILING AND ACKNOWLEDGEMENT FILED, on this date, pursuant to §120.52 Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Clerk

MAR 10 2005
Date

Copies furnished to:

West Palm Beach, DEP File
Peter L. Breton, Esq., via electronically - pbreton@moylelaw.com
Jason Sherman, OGC, via electronically – Jason.Sherman@dep.state.fl.us
Greg Kennedy, SED, via electronically – Greg.A.Kennedy@dep.state.fl.us
T. J. Cannon

Okeechobee

SOLID WASTE SECTION
DEC 08 2005

Department of Environmental Protection

Jeb Bush
Governor

DEC 2 - 2005

Southeast District
400 N. Congress Ave. Suite 200
West Palm Beach, Florida 33401

Colleen M. Castille
Secretary

BY ELECTRONIC MAIL
Dmcconnell@wm.com

NOTICE OF PERMIT

Mr. David McConnell, Area Vice President
Waste Management Inc., of Florida
Okeechobee Landfill Inc.
10800 N.E. 128th Avenue
Okeechobee, FL 34972

Okeechobee County
Clay Farms Landfill
Permit File

Dear Mr. McConnell:

Enclosed is Permit Number 0247963-001-SC to construct and operate a Solid Waste Management Facility.

Any party to this Order (permit) has the right to seek judicial review of the permit pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The notice of Appeal must be filed within 30 days from the date this Notice is filed with the Clerk of the Department.

If you have any questions, please contact Mr. William Forrest of this office, telephone number (561) 681-6669.

Executed in West Palm Beach this 8 day of DECEMBER, 2005.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

for Kevin R. Neal — 12/2/05
Kevin R. Neal — Date
District Director
Southeast District

KRN/JRP/LH/JL/wff

CERTIFICATE OF SERVICE

This is to certify that this **NOTICE OF PERMIT** and all copies were mailed before the close of business on to the listed persons. **FILING AND ACKNOWLEDGEMENT; FILED,** on this date, pursuant to § 120.52, Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Clerk

DEC 2 - 2005
Date

Copies furnished to:
John Abney, Chair of Okeechobee Board of County Commissioners
Richard A. Machek, House of Representatives, 78th District
J. D. Alexander, Senator, 17th District
Ali Khatami, P.E., GLOBEX
~~Richard Tedder, P.E., SW/TLH MS4565~~

Copies Furnished to (cont'd):

Tor Bejnar, SW/TLH – MS 4565
Greg Kennedy, SED/OK
Russell Rowland, Solid Waste Coordinator, Okeechobee County
Mike Stallard, Senior District Manager, OKLI
Jeff Sabin, Waste Management, Inc.
Scott McCallister, Republic Services, Inc.

Department of Environmental Protection

Jeb Bush
Governor

Southeast District
400 N. Congress Ave. Suite 200
West Palm Beach, Florida 33401

Colleen M. Castille
Secretary

PERMITTEE:

Mr. David McConnell, Area Vice President
Waste Management Inc., of Florida
Okeechobee Landfill Inc.
10800 N.E. 128th Avenue
Okeechobee, FL 34972

WACS ID. NUMBER: 00092994
PERMIT/CERTIFICATION NUMBER: 0247963-001-SC
DATE OF ISSUE: December 2, 2005
EXPIRATION DATE: December 1, 2010
COUNTY: Okeechobee
LATITUDE/LONGITUDE: 27°20'22.7"/80°41'47.6"
SECTION/TOWNSHIP/RANGE: 13, 24, 25, 36/36S/35E

This permit is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and Chapters 62-302, 62-520, 62-522, 62-701 and 62-709, Florida Administrative Code (F.A.C.). The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

Clay Farms Landfill, owned and operated by Okeechobee Landfill, Inc. is approximately 2,000 acres of Sections 13, 24, 25 and 36. Clay Farms Landfill has a total of 639 acres for solid waste disposal. Okeechobee Landfill, Inc. has a comprehensive stormwater control system for the Berman Road and Clay Farm Landfills that has been approved by the Department on October 31, 1996, DEP File No. EC-47277746.

TO CONSTRUCT/OPERATE: A 5,000 to 7,000 ton/day Class I sanitary landfill. The landfill lining systems are comprised from top to bottom of a 2 ft. thick layer of protective cover soil or approved alternative; a Leachate Collection System (LCS) geocomposite (drainage layer), which consists of a 250-mil thick geonet heat-bonded to a 6 oz/yd^2 nonwoven geotextile (filter) on top, and heat-bonded to a 6 oz/yd^2 nonwoven geotextile (friction layer) on bottom; a composite primary liner composed of a 60-mil thick textured HDPE geomembrane placed on top of a geosynthetic clay liner (GCL); a Leachate Detection System geocomposite (drainage layer), which consists of 250-mil thick geonet heatbonded to a 6 oz/yd^2 nonwoven geotextile (filter) on top and heatbonded to a 6 oz/yd^2 nonwoven geotextile (friction layer) on bottom; and a composite secondary liner composed of a 60-mil thick textured HDPE geomembrane placed on top of a GCL. An Alternate Procedure SWAP 01-01 was granted by the Department to utilize the GCL below the secondary liner in lieu of a six-inch thick prepared sub-base. Other systems will include an active gas control system, and a surface water management system. The maximum permitted elevation of the Clay Farms Landfill is 233 feet N.G.V.D.

IN ACCORDANCE WITH: An application for renewal of a permit for construction and operation of a Solid Waste Resource Recovery and Management Facility received March 11, 2005 and additional information submitted May 20, 2005. Previous documents include an application for permit received December 22, 2000, with additional information submitted on February 28, 2001, March 15, 2001 and April 27, 2001. A Notice of Application was published on January 10, 2001 with proof of publication received by the Department on January 11, 2001.

LOCATED AT: 10800 N.E. 128th Avenue, Okeechobee, FL 34972.

SUBJECT TO: General Conditions 1-15 (attached as pages 2 and 3) and Specific Conditions 1-33 (attached as pages 4 through 11).

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth herein are "Permit Conditions" and as such are binding upon the permittee and enforceable pursuant to the authority of Sections 403.161, Florida Statutes. The permittee is hereby placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of the "Permit Conditions" by the permittee, its agents, employees, servants or representatives.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in Subsections 403.087(6), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Nor does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state, or local laws or regulations. This permit does not constitute a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute state recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the state. Only the Trustees of the Internal Improvement Trust Fund may express state opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, plant or aquatic life or property and penalties therefor caused by the construction or operation of this permitted source, nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

6. The permittee shall at all times properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law, access to the premises, at reasonable times, where the permitted activity is located or conducted for the purpose of:

   a. Having access to and copying any records that must be kept under the conditions of the permit;
   b. Inspecting the facility, equipment, practices, or operations regulated or required under this permit; and
   c. Sampling or monitoring any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

   Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in the permit, the permittee shall immediately notify and provide the Department with the following information:

   a. A description of and cause of non-compliance; and
   b. The period of non-compliance, including exact dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance. The permittee shall be responsible for any and all damages, which may result and may be subject to enforcement action by the Department for penalties or revocation of this permit.

GENERAL CONDITIONS Cont'd.:

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source, which are submitted to the Department, may be used by the Department as evidence in any enforcement case arising under the Florida Statutes or Department rules, except where such use is proscribed by Sections 403.73 and 403.111, Florida Statutes.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance, provided however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

11. This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 62-4.120 and 62-730.300, as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit is required to be kept at the work site of the permitted activity during the entire period of construction or operation.

13. This permit also constitutes:

    a. Determination of Best Available Control Technology (BACT)
    b. Determination of Prevention of Significant Deterioration (PSD)
    c. Certification of Compliance with State Water Quality Standards (Section 401, PL 92-500)
    d. Compliance with New Source Performance Standards

14. The permittee shall comply with the following monitoring and record keeping requirements:

    a. Upon request, the permittee shall furnish all records and plans required under Department rules. The retention period for all records will be extended automatically, unless otherwise stipulated by the Department, during the course of any unresolved enforcement action.
    b. The permittee shall retain at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation), copies of all reports required by this permit, and records of all data used to complete the application for this permit. The time period of retention shall be at least three years from the date of the sample, measurement, report or application unless otherwise specified by Department rule.
    c. Records of monitoring information shall include:
       - the date, exact places, and time of sampling or measurements;
       - the person responsible for performing the sampling or measurements
       - the date(s) analyses were performed;
       - the person responsible for performing the analyses;
       - analytical techniques or methods used; and
       - results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law, which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be submitted or corrected promptly.

SPECIFIC CONDITIONS:

Groundwater Monitoring Network Construction/Operation and Maintenance.

1. The Water Quality Monitoring Plan, which includes the groundwater, leachate and surface-water monitoring programs for the Clay Farms Landfill submitted December 22, 2000, along with the additional information received on February 28, 2001, March 15, 2001 and April 27, 2001, and a renewal application dated March 31, 2005 is approved pursuant to Chapters 62-520, 62-522, 62-302 and 62-701, Florida Administrative Code (F.A.C.). The locations of the proposed monitoring wells, leachate and surface-water sampling points are shown on Exhibit A, with the designations and types listed on Exhibit B.

2. All new or replacement monitoring wells shall be constructed and/or abandoned in accordance with Chapter 62-532, F.A.C., and the approved water quality monitoring plan. All new monitoring wells shall be installed by a Florida certified water well contractor. Well completion reports shall be submitted to the Department within thirty (30) days of completion of installation on DEP Form 62-522.900(3).

   Pursuant to Rule 62-701.510(3)(d), F.A.C., the location of each monitoring well in degrees, minutes and seconds of latitude and longitude, the Universal Transverse Mercator (UTM), and the elevation of the top of well casing to the nearest 0.01 foot, NGVD, shall be determined by a Registered Florida Land Surveyor within fourteen (14) days of the certified completion of all new wells proposed for this permit. A drawing illustrating the surveyed information, signed and sealed by a Registered Florida Land Surveyor, shall be submitted to the Department within forty-five (45) days of each survey.

   Well development prior to sampling events and purge/sampling water discharges shall be followed pursuant to the Department's Standard Operating Procedures for Field Activities, DEP SOP-001/01 or any Department approved standard operating procedure which may be in force at the time. Any laboratory test required by this permit shall be performed by a laboratory that has been certified by the Department of Health (DOH) under Chapter 64E-1, F.A.C., where such certification is required by Rule 62-160.300, F.A.C. The laboratory must be certified for all specific method/analyte combinations that are used to comply with this permit.

   All monitoring wells shall be clearly identified and maintained in good condition to prevent or minimize sampling interferences, loss of well integrity or vandalism. All monitoring wells shall have well maintained concrete pads and be kept properly sealed and locked. Monitoring wells finished above grade shall be protected by bumper guards and steel risers. Monitoring wells finished at or below grade shall have traffic-bearing, steel-plate cover assemblies.

   The permittee shall maintain reasonable access to all of the monitoring well stations required by this permit. The permittee is responsible for maintaining the integrity of the monitoring well stations and protecting them from destruction and vandalism. Should any of these monitoring well stations be damaged or vandalized in any manner, or destroyed, the permittee shall notify the Department immediately upon discovery. The notification shall include pertinent information as to the cause, and what steps are being taken to replace the monitoring well station and prevent the recurrence of such problems in the future.

Groundwater Testing and Reporting Requirements.

3. Background water quality for the proposed Clay Farms Landfill shall be determined by analysis of at least one water sample taken from each new well that is installed, and each surface water monitoring location that is established within forty-five (45) days of certified well completion or at the next semi-annual sampling event, whichever comes first, for the parameters listed in Rule 62-701.510(8)(a), F.A.C. (Exhibit C) and Rule 62-701.510(8)(d), F.A.C. (Exhibit D).

SPECIFIC CONDITIONS cont'd.:

4. In the event of an emergency and/or discharge to ground water, the permittee shall notify the Department in person or by telephone within one business day of the discovery of the incident and shall submit a written report describing the incident to the Department within three business days of the discovery of the incident. In addition, a final written report shall be sent to the Department within two (2) weeks of the incident. The final report shall contain a complete description and discussion of the cause of the emergency and/or discharge, the anticipated time that the discharge, if any, will continue, the steps that will be taken to evaluate, reduce, eliminate, and prevent recurrence of the event, and all other information deemed necessary by the Department.

5. All groundwater monitoring wells shall be sampled and analyzed semi-annually (during the months of April and October) for the parameters listed in Rule 62-701.510(8)(a), F.A.C (Exhibit C).

   Groundwater level elevations shall be measured within 0.01 of a foot in reference to NGVD for all wells listed above, and submitted semi-annually, along with elevation references for top of casing (TOC), to the Department along with the semi-annual data. A groundwater potentiometric map, with contours no greater than one foot intervals, which indicates groundwater elevations and flow direction shall be submitted for each reporting period.

   Pursuant to Rule 62-701.510(9)(a), F.A.C., all groundwater quality parameters and analytical results, sampling and analytical methods, method detection limits, applicable water quality standards, storet codes, TOC elevation, water level measurements, groundwater elevations, monitoring well identification number, monitoring well name, monitoring well type (background, detection, compliance, etc.), sample collection date, sample analysis date, facility name and facility identification number shall be recorded and submitted certified by a professional geologist or engineer from the permittee to the Department within the timeframes required in this Condition. A report presenting a summary or trend analysis of any water quality standards or criteria that are exceeded, including elevations of parameters above background levels, shall be included with the analytical results.

   The semi-annual analytical results for ground water shall be submitted to the Department no later than the fifteenth day of the second month following each sampling event (June 15 and December 15).

   All semi-annual and annual water quality analyses reports shall be submitted as described in this condition on DEP Form 62-522.900(2) (Exhibit E), with a summary of the information, including any anomalous data or events that may affect the data, exceedances of any Department standards or criteria, confirmation sampling events, applicable charts or graphs or any information related to the water quality monitoring well network to:

   Florida Department of Environmental Protection
   Southeast District Solid Waste Section
   400 N. Congress Avenue, Suite 200
   West Palm Beach, FL 33401

   and to:

   Florida Department of Environmental Protection
   Solid Waste Administrator, MS 4565
   2600 Blair Stone Road
   Tallahassee, FL 32399-2400

SPECIFIC CONDITIONS cont'd.:

In accordance with Rule 62-701.510(9)(b), F.A.C., a technical report, prepared, signed and sealed by a professional geologist or professional engineer registered in the State of Florida with experience in hydrogeologic investigations, shall be submitted to the Department every two (2) years, and shall be updated at the time of permit renewal. The report shall summarize and interpret the water quality data and water level measurements collected during the past two years. The report shall be submitted to the addresses above and also contain the following:

(a) Tabular and graphical displays of any data, which shows that a monitoring parameter has been detected, including hydrographs for all monitoring wells;
(b) Trend analyses of any monitoring parameters detected;
(c) Comparisons between upgradient and downgradient wells;
(d) Correlations between related parameters such as total dissolved solids and specific conductance;
(e) Discussion of erratic and/or poorly correlated data;
(f) An interpretation of the ground water contour maps, including an evaluation of groundwater flow rates; and
(g) An evaluation of the adequacy of the water quality monitoring frequency and sampling locations based upon site conditions.

The Department's Southeast District office, Waste Cleanup Section, shall be notified in writing at least fourteen (14) days prior to any well installation or regular sampling event so that the Department may, if desired, observe the drilling, sampling, or collect split samples.

Compliance Monitoring Requirements

6. Pursuant to Rule 62-701.510(7), F.A.C., if indicator parameters are detected at concentrations significantly above those water quality levels established as background for the site, or which are at levels above the Department's water quality standards or criteria specified in Chapter 62-520, F.A.C., in any well, the affected well may be resampled for confirmation purposes within thirty (30) days after the permittee's receipt of the data. The Department's Waste Cleanup Section must be notified seven (7) days prior to any confirmatory resampling event at this site. Should the permittee choose not to resample, the Department will consider the water quality analysis as representative of current ground water conditions at the facility. If the data is confirmed, or the permittee chooses not to resample, the permittee shall notify the Department in writing within fourteen (14) days of this finding. The Department may require additional monitoring wells or samples to be taken if analyses indicate that groundwater contamination must be more specifically defined in extent or concentration.

Pursuant to Rule 62-701.510(7), F.A.C., evaluation monitoring and corrective actions shall be initiated within the specified time frames and requirements upon confirmation and notice to the Department of an exceedance described in this condition.

Leachate Monitoring Requirements

7. Leachate samples shall be collected annually at all active leachate collection and sampling points. Proposed leachate sampling points (L3 through L9) have been presented in Exhibit A. Samples collected should be analyzed for the parameters listed in Rule 62-701.510(8)(c), F.A.C., (Exhibit F) and Rule 62-701.510(8)(d), F.A.C. (Exhibit D). The leachate analysis reports shall be submitted concurrently with the ground water analysis reports.

SPECIFIC CONDITIONS cont'd.:

Pursuant to Rule 62-701.510(6)(b), F.A.C., if the results of annual leachate analysis indicate a contaminant listed in Title 40 Code of Federal Regulations (CFR), Part 261.24, exceeds the regulatory level, the permittee shall initiate a monthly sampling and analysis program. If the exceedance is observed in any three consecutive months, the permittee shall, within ninety (90) days, initiate a program to identify the source and reduce the contaminant level to below the regulatory level. If no listed contaminant exceeds the regulatory level in any three consecutive months, the permittee shall return to normal sampling pursuant to this condition.

Surface Water Monitoring Requirements

8. The locations of the proposed surface water sampling points (SW-4 through SW-8) for the stormwater retention ponds are shown on Exhibit A. Surface water sampling shall be conducted semi-annually (April and October) for the parameters listed in Rule 62-701.510(8)(b), F.A.C., (Exhibit G), and submitted concurrently with the groundwater monitoring reports.

   Pursuant to Rule 62-701.510(4)(c), F.A.C., each surface water monitoring location shall be marked and its position shall be determined by a registered Florida land surveyor in degrees, minutes, and seconds of latitude and longitude and Universal Transverse Mercator coordinates within sixty (60) days of permit issuance. This information shall be submitted to the Department within forty-five (45) days of the survey.

   If any surface water analytical results exceed the Department's water quality standards or criteria in Rule 62-302, F.A.C., a confirmatory sample shall be taken within fourteen (14) days of the permittee's receipt of the data. The Department's Southeast District Waste Cleanup section must be notified seven (7) days prior to any surface water resampling event. Should the permittee choose not to resample, the Department will consider the water quality analysis as representative of current surface water conditions at the facility. If the data is confirmed, or the permittee chooses not to resample, the permittee shall notify the Department in writing within fourteen (14) days of this finding.

Quality Assurance and Quality Control Requirements

9. All sampling and analysis, recording and reporting activities shall be in accordance with the Department's quality assurance and quality control requirements described in Chapter 62-160, F.A.C. All field activities including on-site tests and sample collections, whether performed by a laboratory or another organization, must follow all applicable procedures described in DEP-SOP-001/01 (January 2002). Alternate field procedures and laboratory methods may be used if they have been approved according to the requirements of Rules 62-160.220 and 62-160.330, F.A.C.

Zone of Discharge

10. The zone of discharge for this site shall be in accordance with the requirements of Chapter 62-522 and Rule 62-701.340, F.A.C., extending horizontally as shown in Exhibit A and vertically to the first continuous confining layer.

Class I Landfill Construction

11. The permittee is responsible for retaining a professional engineer registered in the State of Florida for the supervision of the construction of this project, and upon completion, the engineer shall submit a summary

SPECIFIC CONDITIONS cont'd.:

report to the Department describing substantial conformity with the plans and specifications approved by the Department. This summary report shall include record drawings, the documented control program of the liner installation, liner inspections, the quality assurance/quality control testing procedures and laboratory analyses, and engineer's certification of completion.

12. Prior to liner installation of each new phase, the subgrade shall be prepared to provide a firm, unyielding foundation. The base shall be brought up to grade by placement and compaction of fill materials as specified by the engineer of record. The upper portion of the base shall be of select materials of one-quarter inch maximum size and shall not contain shells, angular material or other materials which could damage the liner.

    The landfill subgrade shall consist of either a minimum of 6 inches of soil with a maximum saturated hydraulic conductivity of 1x10-5 cm/sec, or an approved sub-base material if authorized and approved by the Department under an Alternate Procedure issued by the Department.

13. The permittee is responsible for obtaining the services of a Florida land surveyor who shall provide a minimum second order of accuracy on: triangulation, traverse, leveling and base-line measurements of the base grade as shown on the approved engineering drawings, submitted in support of this application. The base grade shall be certified by the engineer of record and shall be approved in writing by the liner contractor and installer prior to liner placement.

14. No solid waste shall be disposed of into newly constructed areas until the engineer of record or other professional engineer registered in the State of Florida certifies completion of construction on DEP Form 62-701.900(2) (attached as Exhibit I) and contacts the Department to arrange for an inspection of the newly constructed areas in accordance with Rule 62-701.320(9)(a), F.A.C.

Class I Landfill Operation

15. On or before January 31 of each operating year, the permittee shall submit an annual elevation survey of the site that is prepared by a land surveyor registered in the State of Florida. This survey shall clearly show the horizontal and vertical dimensions of the landfilled areas. Along with this survey, the permittee shall estimate the remaining life and capacity in cubic yards of the existing constructed landfill. The annual estimate shall be based upon a summary of the heights, lengths, and widths of the solid waste disposal unit.

16. Pursuant to Rule 62-701.500(4), F.A.C., the permittee shall weigh all solid waste that is received for disposal and record the solid waste in tons per day. The amount of solid waste received shall be estimated for the types of wastes listed in Rule 62-701.500(4)(b), F.A.C. Waste reports shall be compiled monthly and submitted to the Department quarterly.

17. The permittee shall comply with waste handling and cover requirements in accordance with Rule 62-701.500(7), F.A.C. The minimum frequency for applying initial cover is daily at this landfill or as authorized with the usage of Alternative Daily Cover. A mixture of mulch and clean soils may be used as initial cover, intermediate, and final cover material.

18. Stormwater shall meet the water quality standards as established in Chapter 62-302, F.A.C., at the point of discharge from the stormwater management system into waters of the State.

SPECIFIC CONDITIONS cont'd.:

19. Leachate shall not be discharged into the stormwater management system. Stormwater or other surface water which comes into contact with or mixes with landfilled solid waste or leachate shall be considered leachate and is subject to the requirements of Rules 62-701.500(8) and 62-701.510(5), F.A.C.

20. Leachate, if treated/disposed of off-site, shall be transported to a facility permitted to receive leachate. The permittee shall provide a copy, to the Southeast District Solid Waste Section, of a written contract or agreement including amendments from any facility that accepts leachate from this landfill within 30 days of execution of the contract. Leachate is normally treated at the onsite leachate treatment system and the effluent is discharged to the landfill.

21 The permittee shall demonstrate that new leachate collection systems are water pressure cleaned or inspected by video recording after construction but prior to initial placement of wastes. The existing leachate collection systems shall be water pressure cleaned or inspected by video recording at the time of permit renewal. The survey shall provide the date, time, and location of each leachate lateral surveyed and those laterals that were not surveyed. For illustrative purposes, a labeled leachate collection systems site plan shall be clearly marked to show the results of the survey. Jet cleaning shall include the following objectives:

a. Removing any silt build up accumulated in the leachate collection system pipes;
b. Re-opening plugged holes in the lateral pipes; and
c. Locating physical damage to the pipe or closed valves.

The permittee shall provide the Department with ten (10) days notice prior to performing the subject demonstration. The demonstration results shall be submitted to the Department within 30 days of completion for new collection systems and with the permit application for renewal. The demonstration results shall include a summary report, results of the survey, findings clearly shown on the aforementioned site plan, recommendations for repairs to the leachate collection system if found to be not operating as designed, or in accordance with Chapter 62-701, F.A.C., and a timetable for repairs completion.

Class I Financial Assurance

22. The permittee shall maintain , in good standing, the financial assurance mechanisms established to demonstrate proof of financial assurance. Support documentation and evidence of inflation adjustment increases shall be submitted within the time frames specified in Rule 62-701.630, F.A.C. All submittals in response to this specific condition shall be sent to:

Florida Department of Environmental Protection
Financial Coordinator – Solid Waste Section
Twin Towers Office Building
2600 Blair Stone Road, MS 4565
Tallahassee, Florida 32399-2400

23. The permittee shall annually adjust the closure cost estimate for inflation using Form 62-701.900(28). Adjustments shall be made in accordance with Rule 62-701.630(4), F.A.C., and 40 CFR Part 264.142(a) and 264.144(a). An owner or operator using a letter of credit, guarantee bond, financial test, corporate guarantee, trust fund or insurance shall submit the adjusted cost estimate between January 1 and March 1. An owner or operator using an escrow account shall submit the adjusted estimate between July 1 and September 1. All submittals in response to this specific condition shall be sent to:

SPECIFIC CONDITIONS cont'd.:

Florida Department of Environmental Protection
Financial Coordinator – Solid Waste Section
Twin Towers Office Building
2600 Blair Stone Road, MS 4565
Tallahassee, Florida 32399-2400

Florida Department of Environmental Protection
Southeast District Solid Waste Section
400 N. Congress Avenue, Suite 200
West Palm Beach, Florida 33401

Landfill Closure

24. Clay Farms Landfill shall close in accordance with the closure plans submitted in support of the permit application. The maximum permitted elevation of the Clay Farms Landfill shall be 233 feet N.G.V.D. as shown on sheet 34 of 71, drawing no. 34.

25. The permittee shall submit a closure schedule to the Department at least one year prior to and shall apply for a closure permit at least 90 days prior to the projected date when wastes will no longer be accepted at the landfill in accordance with Rule 62-701.600 (2) and (3), F.A.C.

Gas Control and Recovery

26. Gas controls shall be operated and maintained functional as designed and as shown on the application drawings and subsequent submittals approved by the Department, and in accordance with Rules 62-701.400(10), 62-701.400(11) and 62-701.500 (9), F.A.C. The collected gas shall be flared.

27. The landfill owner or operator is not required to obtain any air construction permit unless landfill construction or any modification is subject to the prevention of significant deterioration (PSD) requirements of Chapter 62-212, F.A.C. A landfill for which construction or modification is subject to PSD requirements must make application to the Bureau of Air Regulation, Mail Station 5505, 2600 Blair Stone Road, Tallahassee, Florida, 32399-2400, for an air construction permit and must obtain such permit prior to beginning any construction or modification.

28. The landfill owner or operator is not required to obtain any air operating permit unless the landfill is required to obtain a Title V air operating permit (Title V permit) pursuant to Sec 403.0872, F.S. A landfill is required to obtain a Title V permit if the landfill (or the total facility, if the landfill is collocated or part of a larger facility) has the potential to emit 10 TPY of any hazardous air pollutant, 25 TPY of any combination of hazardous air pollutants or 100 TPY of any other regulated air pollutant. A landfill is also required to obtain a Title V permit if the maximum design capacity, as defined at 40 CFR 60, Subpart WWW, is equal to or greater than 2.5 million megagrams or 2.5 million cubic meters. Title V permits must be applied for in accordance with the timing and content requirements of Rule 62-204.800, F.A.C. and Chapter 62-213, F.A.C. Title V applications shall be submitted to the District Air Program Administrator or County Air Program Administrator with air permitting authority for the landfill location.

29. The permittee shall comply with the requirements of 40 CFR 60, Subparts WWW and CC, as adopted by reference at Rule 62-204.800, F.A.C. The permittee shall submit to the Division of Air Resources Management, Department of Environmental Protection, Mail Station 5500, 2600 Blair Stone Road,

SPECIFIC CONDITIONS cont'd.:

Tallahassee, FL 32399-2400 any amended design capacity report and any Non-Methane Organic Compound (NMOC) emission rate report, as applicable, pursuant to 40 CFR 60.757(a)(3) and (b).

Yard Trash Processing

30. The permittee shall submit an annual report on DEP Form 62-709.320(7)(b), attached as Exhibit H, to the Division Solid Waste Program Administrator with a copy to the Southeast District Solid Waste Program, no later than January 31 of the subsequent calendar year.

31. Only yard trash, as defined in Rule 62-701.200(143), F.A.C., shall be processed.

Site Conditions

32. Unless otherwise approved by the Department, the permittee shall operate the facilities in accordance with all the applicable sections of Chapters 62-701 and 62-709, F.A.C.

33. At least sixty (60) days prior to the expiration of this permit, the permittee shall make an application to the Department for renewal of the permit in a manner prescribed by the Department in order to assure conformance with all applicable Department rules.

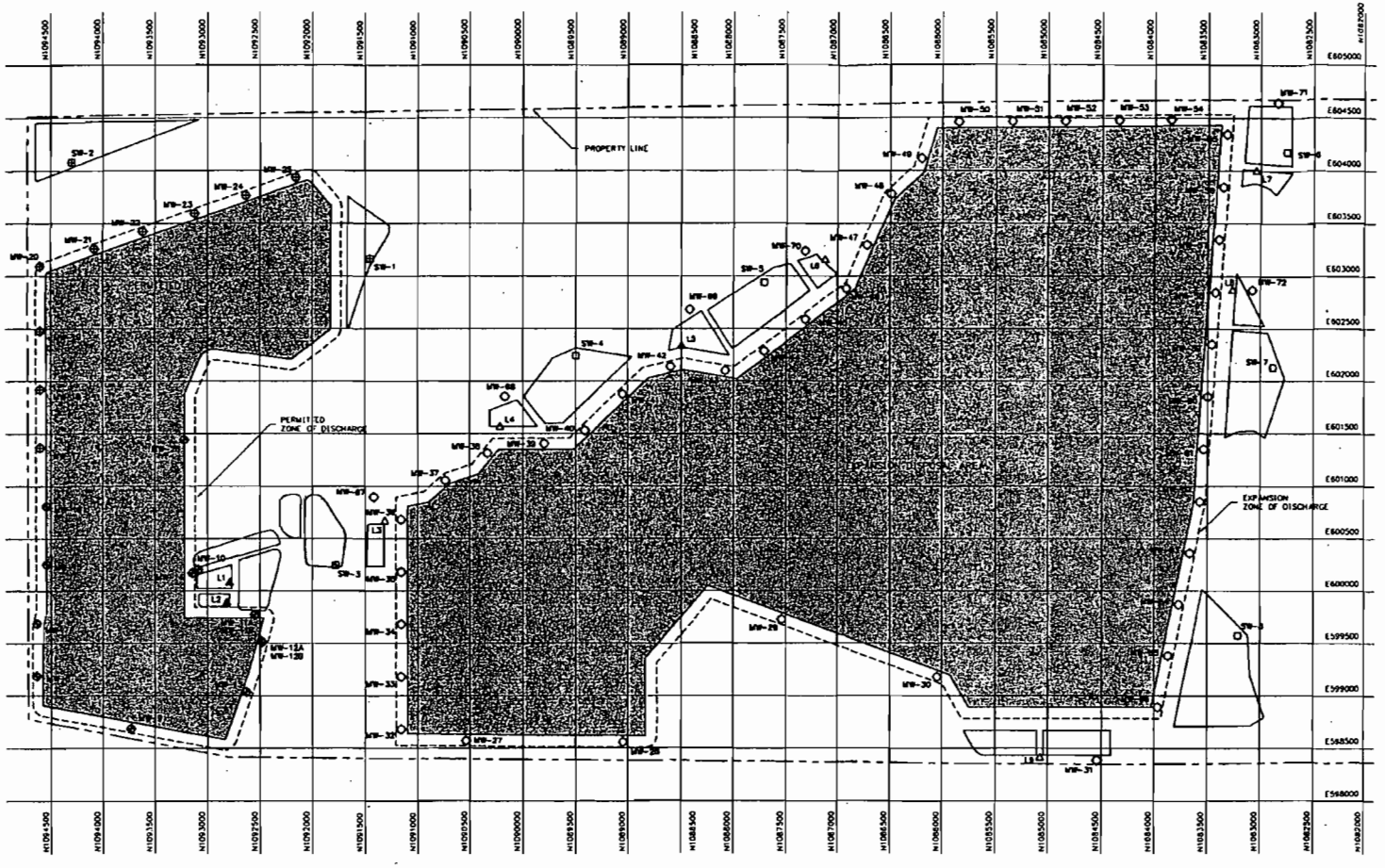
Issued this 2 day of DECEMBER, 2005

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

For Kevin R. Neal 12/2/05
Kevin R. Neal Date
District Director
Southeast District

KRN/JRP/LH/JL/wff

BEST AVAILABLE COPY



SCALE

EXHIBIT A

MONITORING WELL CONSTRUCTION PHASING

PHASE	UPGRADIENT WELL	DOWNGRADIENT WELL
1	MW27, MW28	MW35,MW38,MW37,MW67
2	-	MW36
3	-	MW68
4	-	MW39
5	-	MW40
6	-	MW41
7	-	MW42
8	MW29	MW69
9	-	-
10	-	MW43
11	-	-
12	-	MW44
13	MW30	MW45
14	-	MW70
15	-	MW46
16	-	MW47
17	-	-
18	-	MW48
19	-	MW49, MW50
20	-	-
21	-	MW51
22	-	-
23	-	MW52,MW53,MW54,MW56,MW71
24	MW31	-
25	-	MW57
26	-	-
27	-	MW58
28	-	MW59
29	-	-
30	-	MW60
31	-	-
32	-	MW61
33	-	MW62
34	-	-
35	-	MW63
36	-	MW64
37	-	-
38	-	MW65
39	-	MW66
40	-	-
41	-	-
42	-	-
43	-	-
44	-	-
45	-	-
46	-	-
47	-	-
48	-	-
49	-	-
50	-	-
51	-	-
52	-	-
53	-	-
54	-	-
55	-	-
56	-	-

LEGEND

- PROPERTY LINE
- DISPOSAL AREA EXPANSION
- SURFACE-WATER POND
- LEACHATE POND
- LIMIT OF WASTE, LEACHATE POND, AND SURFACE-WATER POND
- L1 EXISTING PERMITTED LEACHATE SAMPLING POINT
- L7 PROPOSED LEACHATE SAMPLING POINT
- MW-7 EXISTING PERMITTED GROUND-WATER MONITORING WELL
- MW-23 PERMITTED GROUND-WATER MONITORING WELL
- MW-50 PROPOSED GROUND-WATER MONITORING WELL
- SW-3 EXISTING PERMITTED SURFACE WATER SAMPLING POINT
- SW-1 PERMITTED SURFACE WATER SAMPLING POINT
- SW-5 PROPOSED SURFACE WATER SAMPLING POINT
- E598000 N1094500 GRID LINES, COORDINATES

RECEIVED
OCT 0 6 2005
DEPT OF ENV PROTECTION
WEST PALM BEACH

ali Khatami

MONITORING PLAN

GLOBEX Engineering & Development Deerfield Beach, Florida

FIGURE NO.	WC1-1
PROJECT NO.	1100
DOCUMENT NO.	
PAGE NO.	

Florida Department of
Environmental Protection
Southeast District
400 N. Congress Avenue, Suite 200
West Palm Beach, Florida 33401

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary-Designee

Appendix E

JAN 22 2007

CERTIFIED MAIL #7005 1160 0000 9017 9350

AV—Okeechobee Landfill, Inc.
Okeechobee County

Mr. David McConnell, Area Vice President—Florida
Waste Management, Inc. of Florida
WM Southern Group
Suite 1600
2859 Paces Ferry Rd.
Atlanta, GA 30339

Subject: Settlement by Second Amended Order in the Case of State of Florida Department of Environmental Protection vs. Okeechobee Landfill, Inc.
Facility ID No.: 0930104
OGC File No.: 04-0094B

Dear Mr. McConnell:

Enclosed for your implementation is a copy of the fully executed and filed Second Amended Order in the above-styled case. Please ensure that the compliance dates and terms of the Second Amended Order are accomplished in the specified timeframes.

If you have any questions concerning the terms of the Second Amended Order, please contact Allen Rainey at 561-681-6623. Your cooperation is appreciated.

Sincerely,

Timothy Rach
Acting District Director
Florida Department of Environmental Protection
Southeast District

TR/DG/ar

Enclosure: Executed Second Amended Order, OGC File No. 04-0094B

cc: Air Enforcement Files, DEP, West Palm Beach
Dianne Spingler, DARM, Tallahassee (Dianne.Spingler@dep.state.fl.us)
Larry Morgan, Office of General Counsel, DEP, Tallahassee, Mail Station #35
Joe Lurix, Waste Program Administrator, DEP, West Palm Beach (Joe.Lurix@dep.state.fl.us)

8. Respondent acknowledges but waives its right to an administrative hearing pursuant to Sections 120.569 and 120.57, Fla. Stat., on the terms of this First Amended Order. Respondent acknowledges its right to appeal the terms of this First Amended Order pursuant to Section 120.68, Fla. Stat., but waives that right upon signing this First Amended Order.

9. This First Amended Order is a final order of the Department pursuant to Section 120.52(7), Fla. Stat., and it is final and effective on the date filed with the Clerk of the Department unless a Petition for Administrative Hearing is filed in accordance with Chapter 120, Fla. Stat. Upon the timely filing of a petition, this First Amended Order will not be effective until further order of the Department.

FOR THE RESPONDENT

_____ _____

DATE David McConnell
Area Vice President—Florida

DONE AND ORDERED this ___day of _____, 2006, in Palm Beach County, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

_____
Kevin R. Neal
District Director

FILED, on this date, pursuant to §120.52 Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

_____ _____

Clerk Date

Copies furnished to:

Larry Morgan, DEP, OGC
Joe Lurix, Waste Program Administrator , DEP, West Palm Beach (Joe.Lurix@dep.state.fl.us)
Dianne Spingler, DARM, DEP, Tallahassee (Dianne.Spingler@dep.state.fl.us)

Appendix E

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION, Complainant, vs. OKEECHOBEE LANDFILL, INC., Respondent.	IN THE OFFICE OF THE SOUTHEAST DISTRICT OGC FILE NO. 04-0094B

SECOND AMENDED ORDER

The State of Florida Department of Environmental Protection ("Department") and Okeechobee Landfill, Inc. ("Respondent") executed a Settlement Agreement in OGC Case No. 04-0094 ("Original Agreement") on March 10, 2004. A First Amended Order to the Original Agreement was executed between the Department and Respondent on June 28, 2006. This Second Amended Order is entered into between the Department and the Respondent and it is hereby mutually agreed that this Second Amended Order shall amend the Original Agreement and First Amended Order only to the extent specifically stated herein, and that all provisions of the Original Agreement and First Amended Order not addressed herein shall remain in full force and effect.

The Department finds and the Respondent admits the following:

1. The Respondent has installed a single temporary odor control flare connected to a landfill gas collection system meeting the provisions of 40 Code of Federal Regulation ("CFR"), Part 60, Subpart WWW and 40 CFR, Part 63, Subpart AAAA, as provided in paragraph 6. iv. of the First Amended Order.

2. On July 28, 2006, Respondent submitted to the Department a Prevention of Significant Deterioration ("PSD") Application for the landfill gas to the Department, per Paragraph 6(v) of the First Amended Order.

3. Paragraph 6(iv) of the First Amended Order limited operation of the temporary flare in conjunction with the individual odor control wells to no more than 180 days. After the 180 day period, the wells were required to be connected to the permanent gas collection and control system.

4. On or about November 15, 2006, the Respondent requested an extension of the 180-day temporary flare operation requirement until such time as the Department issues the final PSD permit.

5. On December 18, 2006, the Respondent informed the Department that the capacity of the temporary flare to treat potential odor-generating landfill gas will be consumed on or about January 18, 2007, and, therefore, immediate additional capacity is needed in order for the Respondent to control objectionable odors in compliance with Paragraph 6 of the First Amended Order and Paragraph 7 of the Original Agreement.

Having reached a resolution of the matter, the Department and the Respondent mutually agree and it is

ORDERED:

6. Paragraph 6 of the First Amended Order, amending Paragraph 7(d) of the Original Order, shall be amended to include subparagraphs viii, ix, x, xi, xii and xiii as follows:

viii. Respondent may continue to operate the existing temporary odor control flare and is granted authority to install and operate one additional temporary odor control flare as necessary for purposes of odor control. The total number of flares on the Facility shall not exceed five (5) in operation at one time. All temporary flares shall be connected to a landfill gas collection system meeting the provisions of 40 Code of Federal Regulation ("CFR") Part 60, Subpart WWW and 40 CFR Part 63, Subpart AAAA. The temporary flare(s) shall be utilized to burn only landfill gas collected from the landfill's odor control wells. The Respondent shall maintain a record of: 1). the dates odor control wells are installed, 2). the total amount of gas collected from these wells, and 3). the amount of gas burned in the temporary flare(s).

ix. Respondent may use the existing unenclosed back-up flare as a supplement to the use of temporary flare(s) as an odor control device in accordance with the provisions of 40 CFR, Part 60, Subpart WWW and 40 CFR, Part 63, Subpart AAAA.

x. The existing temporary flare and the unenclosed back-up flare shall be tested in accordance with 40 CFR Part 60.18 for flares within 60 days of the effective date of this Second Amended Order. Any additional temporary flares installed after the effective date of this Second Amended Order shall be tested within 60 days of installation.

xi. Within 60 days of the effective date of this Second Amended Order, Respondent shall submit a revised PSD permit application addressing the temporary flare(s) and the use of the existing back-up flare. The PSD permit application shall be accompanied by a compliance plan for the installation of the final control system.

xii. The Department recognizes the need for the continued operation of the temporary flare(s) and use of the existing back-up flare for purposes of odor control. The Department will utilize its enforcement discretion until June 30, 2007, for operation of the temporary flare(s) and back-up flare, provided the terms of this Second Amended Order are followed.

xiii. Despite the use of enforcement discretion identified above, the Department reserves its rights regarding: 1). PSD applicability or Best Available Control Technology ("BACT") determinations, 2). any future emissions limitations, 3). control technologies, 4). future operation and removal of the temporary flare(s,).

xiv. Effective June 30, 2007, the Respondent shall pay fees in the amount of $25.00 per ton for each and every ton of sulfur dioxide ("SO_2") emissions emitted from the landfill gas collection and control system. Emissions shall be determined on a mass balance basis in conjunction with the monthly hydrogen sulfide ("H_2S") concentration(s) and total flow rate(s) of the landfill gas sent to the flare(s). The fees shall be paid in accordance with Condition 27 of APPENDIX TV-4, Title V CONDITIONS

(version dated 02/12/02) contained in Permit Number 0930104-001-AV. The Respondent shall continue to pay fees for SO_2 emissions under the terms of this Second Amended Order until issuance of a Title V Permit Revision/Renewal incorporating the Terms and Conditions of the PSD Permit.

7. Persons who are not parties to this Consent Order but whose substantial interests are affected by this Consent Order have a right, pursuant to Sections 120.569 and 120.57, Florida Statutes, to petition for an administrative hearing on it. The petition must contain the information set forth below and must be filed (received) at the Department's Office of General Counsel, 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, within 21 days of receipt of this notice. A copy of the petition must also be mailed at the time of filing to the Department's Bureau of Invasive Plant Management, 3900 Commonwealth Boulevard, Mail Station 705, Tallahassee, Florida 32399-3000. Failure to file a petition within the 21 days constitutes a waiver of any right such person has to an administrative hearing pursuant to Sections 120.569 and 120.57, Florida Statutes.

The petition shall contain the following information:

(a) The name, address, and telephone number of each petitioner; the Department's Consent Order identification number and the county in which the subject matter or activity is located; (b) A statement of how and when each petitioner received notice of the Consent Order; (c) A statement of how each petitioner's substantial interests are affected by the

Consent Order; (d) A statement of the material facts disputed by petitioner, if any; (e) A statement of facts which petitioner contends warrant reversal or modification of the Consent Order; (f) A statement of which rules or statutes petitioner contends require reversal or modification of the Consent Order; and (g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Consent Order.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this Notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the subject Consent Order have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within twenty-one (21) days of receipt of this Notice, in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Sections 120.569 and 120.57, Florida Statutes, and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-106.205, Florida Administrative Code.

A person whose substantial interests are affected by the Consent Order may file a timely petition for an administrative hearing under Sections 120.569 and 120.57, Florida Statutes, or may chose to pursue mediation as an alternative remedy under Section

120.573 before the deadline for filing a petition. Choosing mediation will not adversely affect the right to a hearing if mediation does not result in a settlement. The procedures for pursuing mediation are set forth below.

Mediation may only take place if the Department and all the parties to the proceeding agree that mediation is appropriate. A person may pursue mediation by reaching a mediation agreement with all parties to the proceeding (which include the Respondents, the Department, and any person who has filed a timely and sufficient petition for a hearing) and by showing how the substantial interests of each mediating party are affected by the Consent Order. The agreement must be filed in (received by) the Office of General Counsel of the Department, 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, by the same deadline as set forth above for the filing of a petition.

The agreement to mediate must include the following:

(a) The names, addresses, and telephone numbers of any persons who may attend the mediation;

(b) The name, address, telephone number of the mediator selected by the parties, or a provision for selecting a mediator within a specified time;

(c) The agreed allocation of the costs and fees associated with the mediation;

(d) The agreement of the parties on the confidentiality of discussions and documents introduced during mediation;

(e) The date, time, and place of the first mediation session, or a deadline for holding the first session, if no mediator has yet been chosen;

(f) The name of each party's representative who shall have authority to settle or recommend settlement;

(g) Either an explanation of how the substantial interests of each mediating party will be affected by the action or proposed action addressed in this notice of intent or a statement clearly identifying the petition for hearing that each party has already filed, and incorporating it by reference; and

(h) The signatures of all parties or their authorized representatives.

As provided in Section 120.573, Florida Statutes, the timely agreement of all parties to mediate will toll the time limitations imposed by Sections 120.569 and 120.57, Florida Statutes, for requesting and holding an administrative hearing. Unless otherwise agreed by the parties, the mediation must be concluded within sixty (60) days of the execution of the agreement. If mediation results in settlement of the administrative dispute, the Department must enter a final order incorporating the agreement of the parties. Persons whose substantial interests will be affected by such a modified final decision of the Department have a right to petition for a hearing only in accordance with the requirements for such petitions set forth above, and must therefore file their petitions within 21 days of receipt of this notice. If mediation terminates without settlement of the dispute, the Department shall notify all parties in writing that the administrative hearing process under Sections 120.569 and 120.57, Florida Statutes, remain available for disposition of the dispute, and the notice will specify the deadlines that then will apply for challenging the agency action and electing remedies under those two statutes.

8. As to its remaining terms and provisions, the Original Agreement remains in full force and effect.

9. No modifications of the terms of this Second Amended Order shall be effective until reduced to writing and executed by both Respondent and the Department.

10. Respondent acknowledges but waives its right to an administrative hearing pursuant to Sections 120.569 and 120.57, Fla. Stat., on the terms of this Second Amended Order. Respondent acknowledges its right to appeal the terms of this Second Amended Order pursuant to Section 120.68, Fla. Stat., but waives that right upon signing this Second Amended Order.

11. This Second Amended Order is a final order of the Department pursuant to Section 120.52(7), Fla. Stat., and it is final and effective on the date filed with the Clerk of the Department unless a Petition for Administrative Hearing is filed in accordance

THIS SPACE INTENTIONALLY LEFT BLANK

with Chapter 120, Fla. Stat. Upon the timely filing of a petition, this Second Amended Order will not be effective until further order of the Department.

FOR THE RESPONDENT

1-17-07
DATE

DR McConnell
David McConnell
Area Vice President—Florida

DONE AND ORDERED this 19 day of JANUARY, 2007, in Palm Beach County, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

for Timothy Rach
Kevin R. Neal
District Director

FILED, on this date, pursuant to §120.52 Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Maria M Lenard-Suarez
Clerk

1/22/07
Date

Copies furnished to:

Air Enforcement Files, DEP, West Palm Beach
Dianne Spingler, DARM, Tallahassee (Dianne.Spingler@dep.state.fl.us)
Joe Lurix, Waste Program Administrator, DEP, West Palm Beach (Joe.Lurix@dep.state.fl.us)
Mike Stallard, Okeechobee Landfill, Inc. (MStallard@wm.com)

Search

Cost-Effective Hydrogen Sulfide Treatment Strategies for Commercial Landfill Gas Recovery: Role of Increasing C&D (Construction and Demolition) Waste

By Doug Heguy and Jean Bogner

There are more than 350 commercial landfill gas recovery operations in the U.S. which generate electricity on-site, supply industrial gas-fired boilers, or produce substitute natural gas fuels such as CNG. Historically, very few have required H_2S treatment. However, many landfills are now accepting large quantities of construction and demolition (C&D) debris in addition to municipal solid waste (MSW), which can set in motion a number of factors that lower landfill gas quality and increase O&M (operations and maintenance) costs through the post-closure period. Gypsum wallboard in C&D debris generates hydrogen sulfide gas (H_2S). In sufficient amounts, this will result in the need

Permit File Scanning Request from Elizabeth

Priority: ☐-ASAP (Public Records Request, etc.) ☒-Place in Normal Scanning Queue

Facility ID	Project#	Type	PSD #	Submittal Date	Batch #
0930164	014	AC	382	SEP 30 2010	

☒ File Approved For Disposal ☒ Correspondence ☐ Intent ☐ Permit ☐ Draft

☐ Return File to BAR ☐ Amendment ☐ Application ☐ OGC ☐ Proposed

Document Date 9-9-07

Go ahead and Scan in a lemp. This was a controversial project this was research.

for sulfur abatement systems which can be expensive and complex. Fortunately, the technology for such systems is well-developed and has been in commercial use for the last 30+ years. In this paper we review the consequences of increased H_2S in landfill gas and discuss practical H_2S treatment options for commercial landfill gas recovery.

Hydrogen Sulfide Generation from C&D

C&D debris may include substantial percentages of gypsum ($CaSO_4.2H_2O$) in discarded wallboard, and some sites in the U.S. have historically used ground-up C&D debris as daily cover. Under anaerobic landfill conditions (absence of air), sulfate-reducing bacteria produce hydrogen sulfide (H_2S) from the sulfate (SO_4-2) in gypsum and the organic carbon in waste material as follows:

$SO_4\text{-}2 + 2CH_2O \text{ ---> } 2HCO_3\text{-}1 + H_2S$

From the above reaction, 100 tons of landfilled sulfate has the potential of producing 35 tons of H_2S. Most of this "potential" will likely be realized during the active landfill gas production phase.

Increasing concentrations of H_2S in landfill gas can have several detrimental effects: 1) onset of odor problems; 2) corrosion of gas recovery hardware; 3) increasing SOx emissions from flaring or other combustion processes; and 4) possible health consequences for workers. The odor threshold for H_2S is extremely low (0.05 to 0.1 ppmv), and levels of H_2S above 10 ppmv are considered toxic, exceeding the Threshold Limit Value (TLV). Moreover, levels of H_2S above 1000 ppmv (0.1 V%) in a breathing zone can rapidly lead to unconsciousness and death. Thus, worker health and safety issues may require special attention at sites with high H_2S.

Predicting and Measuring Hydrogen Sulfide: Developing a Quantitative Basis for a Gas Processing Decision

How high can H_2S concentrations get in landfill gas? Several landfills in different parts of the United States that have been collecting large amounts of C&D debris are installing gas processing equipment to treat H_2S concentrations in excess of 3% to 5% (30,000-50,000 ppmv) H_2S. Percentage levels of H_2S require treatment to prevent acid corrosion of gas recovery hardware, reduce odors, and minimize worker safety concerns. However, landfill operators may need to consider commercially-available treatment processes when H_2S concentrations exceed about 75 ppmv, depending on equipment specifications and warranties from gas compressor, engine or turbine vendors.

When determining H_2S concentrations in landfill gas, it is important to obtain

representative samples of the composite landfill gas, retain those samples in appropriate inert containers (lined stainless steel cylinders or black-layered Tedlar bags), and analyze them according to standard methods. For example, U.S. EPA standard methods 15 and 15A can be accessed at www.epa.gov/ttn/emc/methods.html and www.epa.gov/ttn/emc/methods.html, respectively. Because landfill gas is a complex mixture of 200 or more gases, it is not appropriate to use field analyzers or colorimetric tubes when attempting to quantify H_2S and other reduced sulfur gases.

For large sites with elevated and increasing levels of H_2S in landfill gas, the need for landfill gas modeling becomes more important. Larger treatment systems can be capital intensive, and a good model and forecast is necessary to design a system that meets treatment goals and makes efficient use of the invested capital. Modeling hydrogen sulfide generation is more complex than traditional landfill gas modeling, and is still evolving technically. It is recommended that a good consultant with a background in sulfur generation mechanisms be retained to assist in this effort. It is also important to inventory all potential sulfur sources, including sewage sludge, local soils used as cover materials, landfills developed in high sulfate geologic materials, and high sulfate groundwater contributions or recirculated leachates.

Commercial H_2S Removal Processes

Above critical levels, H_2S may need to be removed via commercially-available treatment processes. This critical level can be reached by:

- Exceeding sulfur emissions above permitted levels
- Receipt of odor and corrosion complaints from neighbors
- Need to meet inlet gas quality specifications for compressors, engines, turbines or microturbines.

For sites with relatively low sulfur concentrations and gas flow (1-2 million SCFD @ 50 ppmv H_2S), the recommended sulfur abatement would consist of a low capital investment scavenger system. (See Table 1.) Modeling expected H_2S generation for sizing scavenger systems is important but not as critical as for larger sulfur recovery systems. If and when the landfill crosses into the range where more sophisticated sulfur recovery techniques become economic, landfill modeling becomes critically important, and more extensive modeling is required for proper and efficient design.

The level at which gas quality specifications are exceeded and sulfur abatement is required will vary by application, equipment and vendor. Internal

combustion engines for landfill-gas-to-electricity projects can tolerate levels as high as 1000-1500 ppmv (total sulfur in gas). Properly specified turbine generators can tolerate in excess of 10,000 ppmv. Gas specifications for microturnbines have a very wide range depending on the manufacturer. However, the sulfur limit for gas turbine systems is often determined by the gas compressor upstream of the turbine, which may tolerate only 75-100 ppmv. This is because a highly corrosive liquid condensate can form during the higher compression required for turbines. Thus, many landfills generating electricity require sulfur limits to be restricted to 75 – 100 ppmv.

The smaller sulfur removal systems, appropriate for the great majority of landfill gas treatment applications, will typically be scavenger (non regenerable) systems, and be simple to operate. The costs of removing the sulfur, while small in total terms, can be quite large in terms of dollars per unit of sulfur removed. But these systems have low capital cost and additional units can be added easily, so extensive gas design and landfill modeling is not as critical as with much larger levels of sulfur removal.

The scavenger can be a liquid or solid system. The solid system has several advantages for landfill applications:

- No operators are needed to treat the gas (though the H_2S concentration at the outlet of the system will need to be monitored).
- Media change-out can often be done by contractors
- Disposal of spent solid media is often easier than liquid waste
- The system can easily be expanded by adding another "box" of media.

On the downside, the part of the system that is undergoing the media change-out is out of service during that time, and the media change-out process can be messy and allow noxious odors into the surrounding environment. Some systems are more susceptible to this than others.

Sizing a solid scavenger system is straightforward. The design parameters of a solid system are typically a maximum gas velocity over the media bed, minimum residence time, and an acceptable pressure drop. Once those parameters are met, the system volume can be adjusted to manage media change-out frequency. The solid media bed system scales linearly with the gas. Should gas flow double over time, one can double the number of vessels treating the gas. Should the H_2S concentration increase, the media volume can be increased, or the media can be changed out more often. The most common forms of solid scavengers used for treating landfill gas are iron sponge and iron-based solid scavenger systems like Sulfur Rite® and SulfaTreat®.

The oldest commercial process for removing H_2S is iron sponge, which has been available for over 100 years. Iron sponge consists of hydrated iron oxide impregnated onto redwood ships. The main drawback of this system is that during media changeout, the unreacted iron oxide can react exothermically with the air and catch fire. The Sulfur-Rite® and SulfaTreat® products address this problem by using an inert ceramic base. The initial cost of the Sulfur-Rite® and SulfaTreat® products is higher than the iron sponge product, but that cost is at least partially offset by easier changeout procedures and transportation and disposal costs.

The scavenger system shown in Table 1 is a pre-packaged, pre-engineered Sulfur-Rite® system suitable for landfill gas applications. This unit is well suited for 1 million SCFD landfill gas. One can easily see that a doubling of the H_2S level in the feed gas concentration doubles the consumption rate of the media, and therefore, doubles the cost per unit time. This unit can handle double the gas flow at lower H_2S concentrations, but at higher concentrations, another unit can be added and the gas flow split between the two units. At larger gas flows, equipment savings could be achieved by optimizing the vessel design, but these savings would at least be partially offset by increased engineering and vessel fabrication costs.

Optimized, large scale sulfur recovery

At large levels of sulfur removal the cost of the solid media becomes prohibitive, and it makes economic sense to invest in a system with a regenerable catalyst. These systems are capital intensive, and care must be taken to develop a site-specific design suitable for present and future operations.

An example of a large-scale H_2S removal system with a regenerable catalyst is the iron-redox process, such as LO-CAT®. A description of the LO-CAT® process, as well as cost comparisons to the solid scavenger system are shown in Table 1. The operating cost of removing 1 pound of sulfur drops from over $3.00 per pound for the scavenger to under 10¢ per pound for the regenerable system. However, the capital cost for the system is typically between $1 million and $2 million.

The economic tradeoff point between the simple scavenger systems and the more capital-intensive regenerable systems are determined by long-term comparison of projected capital vs. operating costs. Representative trade-off points are shown in Table 1. Table 1 assumes a payback requirement of 2-3 years, which occurs at about 400 pounds of sulfur removed per day. This payback requirement is quite typical of many industrial firms. Municipalities often have a longer payback investment criterion, which would make the regenerable system more attractive at lower sulfur removal levels.

Clearly, at the level of capital expenditure required for large regenerable systems such as LO-CAT®, developing the proper design basis for the gas processing system is critical to efficient capital utilization and cost effective operation. This process takes time and careful planning: initial gas analysis, modeling, design, and capital appropriation can easily take 12-18 months, with the detailed design and construction requiring another 9-11 months. Thus the complete process of data collection and modeling to start-up can take 2-3 years and must be planned for well in advance of reaching allowable sulfur limits.

Conclusions/Summary:

How can H_2S production in your landfill be anticipated and prevented? Here are some steps to follow:

1. Limit the total amount of gypsum wallboard accepted with C&D waste.
2. Do not use ground-up C&D for daily or interim cover.
3. Do a "sulfur balance" on your landfill, considering all sources of sulfur including native soils used for cover and geologic materials into which landfilling occurs.
4. Retain a qualified landfill gas consultant to quantify and model H_2S production.

If H_2S is present in the landfill gas, and if the landfill has made the business decision to accept sulfur-laden C&D debris, what steps need to be taken to the manage sulfur levels?

1. Be aware of the sulfur limitations of the downstream equipment.
2. Monitor H_2S levels in the landfill gas.
3. Model the H_2S generation mechanisms to:
   a. Be sure the incremental revenue from the sulfur generating collection stream covers the increase in operating cost.
   b. Plan ahead.

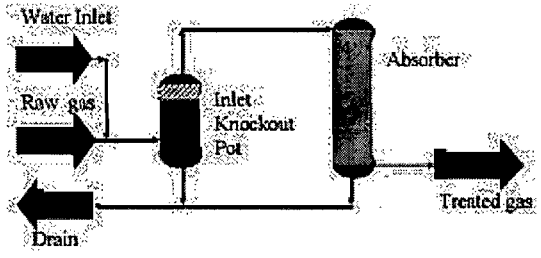
When it becomes clear that some form of sulfur abatement system will need to be installed:

1. Project sulfur gas and sulfur levels, consistent with current trends and future business strategy.

2. Establish project team to evaluate system and investment options.
3. Plan ahead if the facility will require a regenerable system for cost effective sulfur control.

Table 1. Comparison of Solid Scavenger System to Iron-Redox Regenerable System For Landfill Applications

Solid Scavenger System (Sulfur-Rite®)



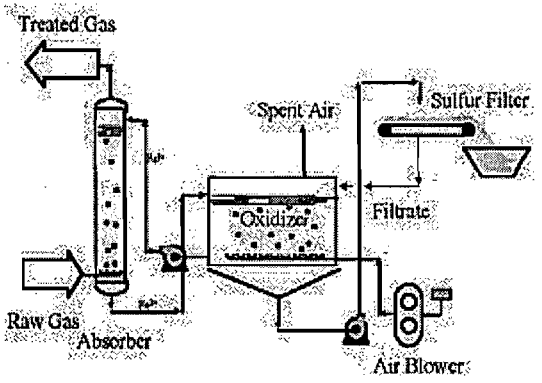
Process Description:
Hydrogen sulfide is converted to iron pyrite.

1. Raw gas is saturated with water.
2. Saturated gas passes over media bed, iron pyrite formed.
3. Treated gas exits system

System Cost: $ 41,000
Operating Cost: $ 3/ lb. Sulfur removed
Media cost @ 1 MMSCFD

50 ppm: $ 3,800/year
100 ppm: $ 8,000/year
500ppm: $40,000/year
1,000ppm: $80,000/year

Iron-Redox Regenerable System (LO-CAT®)



Process Description:
Hydrogen sulfide is converted to elemental sulfur.

1. Raw gas is "scrubbed" with catalyst solution, sulfur formed, Treated gas exits column.
2. Catalyst is regenerated using air, returned to scrubber.
3. Sulfur is separated from catalyst.

System Cost: $1 million – 2 million
Operating Cost: 10¢ / lb. Sulfur removed
Economic switching point
(Scavenger to regenerable system)

1 MMSCFD: 4,500 ppm
2 MMSCFD: 2,300 ppm
5 MMSCFD: 1,000 ppm

Cost $
Regenerable $ 5 million.

Note: Seemingly harmless disposal of sheetrock & landfilling can cause excess H_2S and odor emissions and even cause landfills to become major PSD sources of SO_2. A.A. Linero

Although C&D waste once was considered an insignificant source of landfill gas and odors, the changing nature of C&D waste makes it to the landfill is causing dangerous levels of sulfide emissions.

INVISIBLE THREAT

Circulate:
1) Teresa
2) Ed Svec

Copy: ~~Venkata~~ ~~Cindy Phillips~~ ~~Joekahn~~

Odors & Landfill Gas from C&D Waste

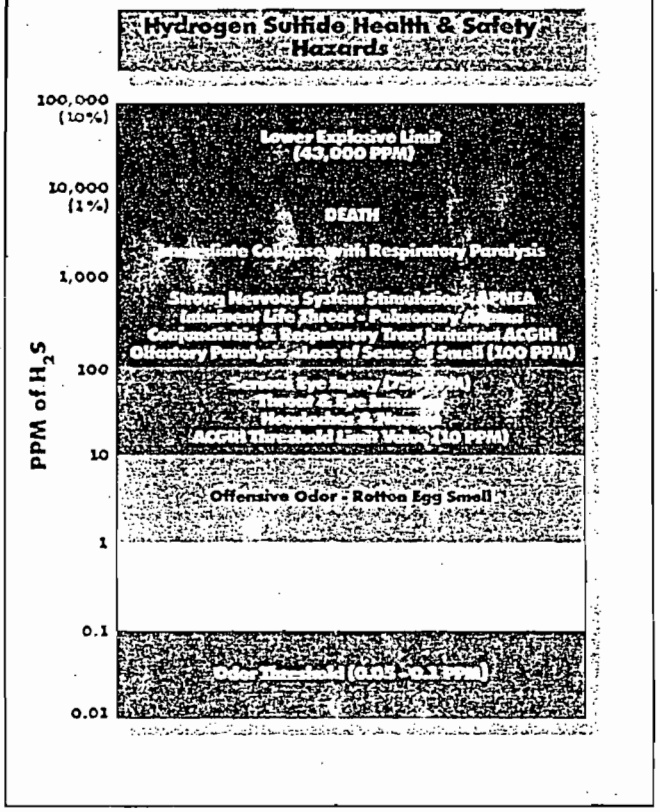
Like hurricane Andrew debris!

It once was thought that construction and demolition (C&D) waste used as clean fill and landfill cover would generate little or no gas or odors. Previous experience with municipal solid waste (MSW) traditionally generated odors of a few parts per million (ppm) up to maybe 100 ppm of hydrogen sulfide (H_2S) in the landfill gas formed. However, people are slowly becoming aware of the tremendous amount of sulfide generated by the latest C&D waste processing practices. C&D waste can generate up to 20,000-30,000 ppm (2-3%) average concentrations of H_2S. The hottest wells have been measured with as much as 8% H_2S in the landfill gas.

By Brian E. Flynn

Flynn is a private, licensed chemical engineer in the state of New York, and has been involved in the design, development, and application of air and gas treatment systems for more than 15 years.

Figure 1



But over the past 10 years, the nature of C&D waste has changed. C&D waste typically consists of wood, concrete, asphalt, brick, corrugated cardboard, metals, roofing materials, and sheet rock. The waste is now crushed and ground up to make it more compact. By compacting the waste tightly, the landfill's remaining volume is conserved and typically increases in value proportionate to compaction rates and tipping fees.

In addition, it has become profitable to recycle some C&D materials. There are now approximately 1,000 facilities recycling concrete and asphalt for use as aggregate or base material for new construction. Another 500 facilities process waste wood, and 300 facilities process mixed C&D waste for reuse.

Recycling up to 60-80% of the C&D waste generated also has changed the composition of the C&D waste that ultimately reaches the landfill. This remaining portion of the C&D waste stream is rich in organic material and sheet rock. Sheet rock, or gypsum board, consists mainly of calcium sulfate. Calcium sulfate is pure food for anaerobic microbes.

Once the landfill cell reaches the anaerobic stage, select microbes metabolize gypsum (calcium sulfate) for its bound oxygen, to form hydrogen sulfide, carbon dioxide, and water. Approximately four tons of gypsum in place will release one ton of H_2S.

$$2\ CaSO_4 + 4\ H_2O + \text{Anaerobic Microbes} + \text{Organic Matter} > 2\ H_2S + 5\ CO_2 + CH_4$$

Sulfide generation occurs faster than methane production, and can peak within six months to two years. As long as filling of processed C&D continues, the sulfide peak will be sustained for a number of years, gradually decreasing over a decade or more to concentrations in the range of a few hundred ppm. The sulfide concentrations can remain significantly hazardous for most of a landfill's lifetime.

Figure 2

Regulated Air Pollutants as per 40 CFR 52.21

Criteria Pollutants	Significance Level for Major Sources
Carbon Monoxide, CO	100 tons/year
Nitrogen Oxides, NO_x	40 tons/year
Sulfur Oxides as SO_2	40 tons/year
Particular Matter, PM/PM-10	25/15 tons/year
Ozone (VOC)	40 tons/year (of VOCs)
Lead, Pb	0.6 tons/year
Non-Criteria Pollutants	
Asbestos	0.007 tons/year
Beryllium, Be	0.0004 tons/year
Mercury, Hg	0.1 tons/year
Vinyl Choride	1 ton/year
Fluorides	3 tons/year
Sulfuric Acid Mist	7 tons/year
Hydrogen Sulfide, H_2S	10 tons/year
Total Reduced Sulfur Compounds (including H_2S)	10 tons/year
Benzene	any emission rate
Arsenic	any emission rate
Radionuclides	any emission rate
Radon-222	any emission rate
Polonium-210	any emission rate
CFCs 11, 12, 112, 114, 115	any emission rate
Halons 1211, 1301, 2402	any emission rate

The problem of toxicity

Landfill gas generated from MSW is not particularly toxic, although death can occur readily by asphyxiation. It is well established that underground migration of landfill gas can fill stagnant spaces in buildings, structures, and electrical enclosures, and has resulted in numerous fires and explosions. Hydrogen sulfide can increase the fire hazard because its explosive limit (4.3-45.5% in air) is lower and broader than methane's explosive limit of 5-15% in air.

More important, H_2S is as insidious as cyanide in that its attack on the body is acute, rapid, and not readily reversible. It can be detected by smell at levels as low as 50 ppm, but it quickly paralyzes the olfactory senses above 100 ppm, and at that point can no longer be detected by smell. With short exposures to a few hundred ppm concentrations, hydrogen sulfide can cause long-lasting health effects and quickly kills at more than 1,000 ppm.

Heavier than air, hydrogen sulfide will build up with landfill gas in low-lying or confined areas. Landfill gas containing significant amounts of hydrogen sulfide is not only more flammable with a lower LEL (lower explosive limit), but it is also poisonous and a serious health risk. There is no pharmaceutical antidote for sulfide poisoning. (See Figure 1 for a listing of the health and safety hazards posed by hydrogen sulfide.)

Regulatory problems

The summary for Title 40, Parts 51, 52 & 60 (March 12, 1996) of the Clean Air Act (CAA), Standards of Performance for New Stationary Sources and Guidelines for Control of Existing Sources: Municipal Solid Waste Landfills, defines combustion or flaring as the Best Demonstrated Technology for controlling non-methane organic compounds (NMOC) in the gas stream. This provides significant destruction of the NMOCs present, but it also converts the H_2S to sulfur dioxide and potentially sulfur trioxide. Sulfur dioxide (SO_2) is one of the six criteria pollutants (along with carbon monoxide [CO], nitrous oxide [NO_x]), particulate matter, ozone, and lead) that are subject to National Ambient Air Quality Standards for both attainment and non-attainment regulations. SO_2 also is listed as a Hazardous Air Pollutant (HAP) under Title I, Part A, Section 112, National Emission Standards for Hazardous Air Pollutants, along with hydrogen sulfide and other organic sulfides.

Generation of more than 250 tpy of SO_2 or any regulated pollutant in an attainment area (or 100 tpy of sulfur dioxide or other criteria pollutants in a non-attainment area) will result in a landfill to be listed as a major source under Title I, Parts C or D, of CAA. If the landfill is already a major source of another regulated air pollutant (both criteria and non-criteria) under Title I, then potential emissions above the significance level defined in the federal listing 40 CFR 52.21 will also have to be

Figure 3

CAA Title I-Air Pollutant Prevention & Control, Section 111, Standards of Performance for New Stationary Sources

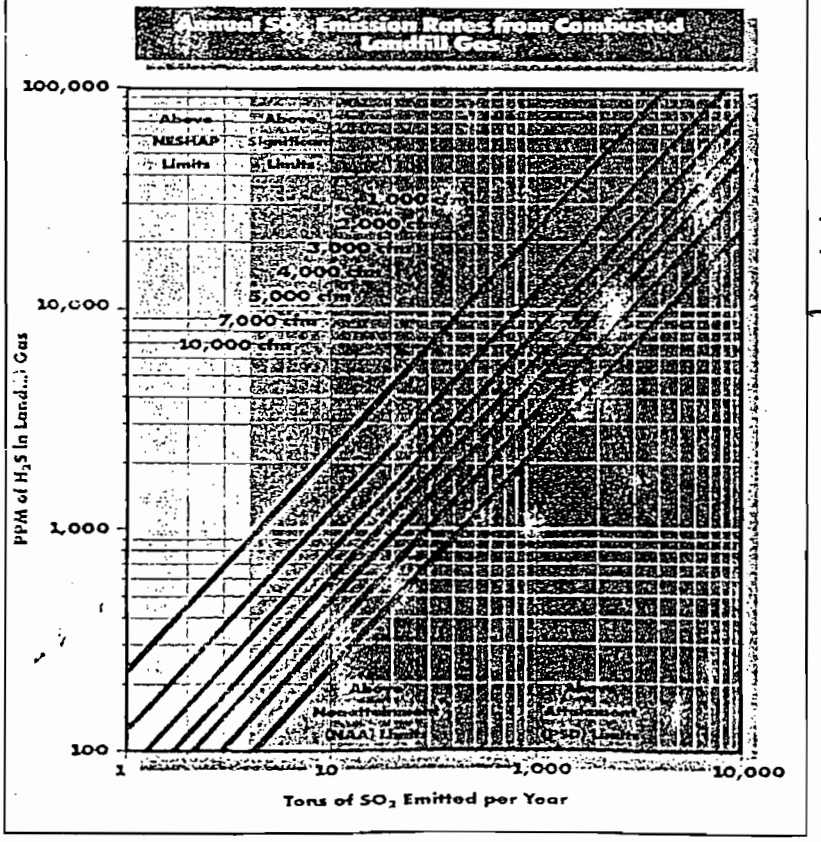
PSD Permit - Title I Part C Prevention of Significant Deterioration of Air Quality		
Regulated Criteria Pollutant		
SO_2	250 tpy	Major Source
	40 tpy	Significant Level
Regulated Non-Criteria Pollutants		
H_2S, Total Reduced Sulfur* (TRS) &	250 tpy	Major Source
Reduced Sulfur Compounds* (RDS)	10 tpy	Significant Level
*Including H_2S		
NAA Permit - Title I Part D Plan Requirements for Non-Attainment Areas (for Criteria Pollutants)		
Regulated Criteria Pollutant		
SO_2	250 tpy	Major Source
	40 tpy	Significant Level
Title I - Part A Section112, (NESHAP) National Emission Standards for Hazardous Air Pollutants (due Nov. 2000)		
CS_2, dimethyl sulfide, H_2S, methyl disulfide,	10 tpy	Single Compound
methyl mercaptan, sulfur dioxide, sulfur trioxide,	25 tpy	Mixture of Compounds
sulfuric acid		

Figure 4

Clean Air Act Title V Definitions of a Major Source for Sulfur Compounds
CAA Title V-Permits
(refers to the following sections)

Title III Section 302		
SO_2	100 tpy	Major Source
	40 tpy	Significant Level
Total Reduced Sulfur* (TRS) &	100 tpy	Major Source
Reduced Sulfur Compounds* (RDS)	40 tpy	Significant Level
*Including H_2S		
Title I Part D		
SO_2	100 tpy	Major Source
	40 tpy	Significant Level
Title I - Part A Section112, (due to be in effect by Nov. 2000)		
CS_2, dimethyl sulfide, H_2S, methyl disulfide,	10 tpy	Any Single Compound
methyl mercaptan, sulfur dioxide, sulfur trioxide,	25 tpy	Mixture of Compounds
sulfuric acid		

Figure 5



addressed in the point-source determination permit (see Figure 2). The significance level for either hydrogen sulfide or sulfide compounds is 10 tpy, and for SO_2, it is 40 tpy.

In addition, a landfill will become a major source and will be required to file a Title V operating permit, required by CAA, if it has SO_2 emissions over 100 tpy, as defined under CAA Title III Section 302. The applicable pending limits under Section 112 of CAA are even tighter, at 10 tpy for any single HAP including SO_2, and up to 25 tpy for a combination of HAPs. (See Figures 3 and 4 for various CAA definitions of a major source for sulfur compounds.)

Although gaseous, the concentrations of hydrogen sulfide present can add up quickly. One thousand cubic feet per minute (cfm) of C&D landfill gas containing 2% (20,000 ppm) hydrogen sulfide will release 462 tons of hydrogen sulfide per year to the atmosphere. If flared, 870 tons a year of SO_2 are created. Many regulators are now requiring landfill operators to monitor and list the hydrogen sulfide levels in their monthly or quarterly gas analysis to establish a base line of hydrogen sulfide for that landfill.

Flaring landfill gas containing significant levels of H_2S no longer can be considered environmentally beneficial. Combustion devices that are primarily used for the reduction of air pollutants, such as NMOCs, can be excluded from a major new source review if it is environmentally beneficial. To be environmentally beneficial, the combustion device is allowed to emit only minor amounts of regulated air pollutants. If it is emitting major quantities of criteria pollutants such as SO_2 or NO_x, it will not be eligible for the exclusion. Figure 5 shows the relationship between the amount of H_2S in landfill gas to the tons of SO_2 emitted per year.

The U.S. EPA's Landfill Methane Out-

reach Program has been instrumental in encouraging the use of landfill gas for energy recovery. Unfortunately the high sulfide concentrations have been a barrier to the widespread use of landfill gas from C&D landfills for energy recovery. The exposure to high levels of sulfur dioxide and minor amounts of sulfur trioxide formed are corrosive to the boilers, turbines, and internal combustion (IC) engines used for energy recovery.

The newer breed of IC engines can accept up to 700 ppm of hydrogen sulfide, but even at this level, significant corrosion problems are still brewing in the rest of the system.

Available control technologies

Most of the sulfide control technologies available were created for natural gas treating and synthetic gas purification in order to sweeten sour gas. In this industry, gas is considered sour when it has more than 1.5 grains of sulfide per hundred cubic feet, or 24 ppm and higher. Pipeline specifications call for hydrogen sulfide concentrations to be below 5 ppm.

The types of processes available are either purification processes or reactive processes. Purification processes separate the sulfides and CO_2 from the gas through absorption into a solvent or adsorption onto a solid adsorbent. Regeneration of the solvent or adsorbent will release a side stream rich in sulfide that requires further treatment.

Reactive processes react with the sulfides to form a byproduct that easily is separated from the gas. These processes generally involve mixing the gas with a reactive liquid or passing the gas through a porous bed which will selectively react with the sulfide. Various neutralizing processes developed over the years include several that are regenerated with air, allowing for the reuse of the chemicals.

Once treated, the gas can be utilized for energy recovery, or simply flared to meet all of the current emission standards. ■

Copy Al Marty Teresa

This is technology to reduce H_2S without increasing SO_2. Applicable to landfills and maybe TRS emissions.

Sulfide Treatment Technologies For Sour Landfill Gas

BY BRIAN E. FLYNN

Flynn is a licensed chemical engineer with the industrial group of EMTROL Corp. (Hauppauge, N.Y.).

Hydrogen sulfide (H_2S) present in sour landfill gas can subject the landfill's owners and operators to regulatory nightmares with the new permit requirements. The selection and operation of a sulfide control technology for landfill gas is quite different than common odor control systems for air treatment. The operating costs of these units are typically higher than expected. This is due to the quantity of sulfur present in the gas, as well as the actual operating conditions for the system. A number of different technologies are available to sweeten sour landfill gas, and should be examined carefully from both a capital and an operating cost.

A sour pill

Sulfur emissions have been increasingly restricted with each subsequent passage of air quality control regulations. With each regulatory action, more industries have been included and tighter restrictions are imposed. Utilities have even been offered incentives under the Clean Air Act (CAA) consisting of "Avoided Emissions" and the "Conservation and Renewable Energy Reserve." They are given credits or "allowances" for each ton of sulfur dioxide (SO_2) not emitted by reducing emissions, or by using a "clean fuel" such as landfill gas. The allowances are auctioned off every year to earn millions of dollars for those companies that earned them.

Emissions from municipal solid waste (MSW) landfills are now regulated by the recent passage of Part 60 of CAA's "New Source Performance Standards and Emission Guidelines for Municipal Solid Waste Landfills." (see *Federal Register*, March 12, 1996). Part 60 classifies landfills as a source category under CAA's priority list. The new regulation broadly defines a MSW landfill as accepting not only household waste,

but also "other types of RCRA Subtitle D wastes such as commercial solid waste, non-hazardous sludge, conditionally exempt small-quantity generator waste and industrial solid waste."

This sweeping definition includes other specialty landfills besides landfills for MSW, including private and construction and demolition debris landfills. The emissions from MSW landfills have also been added to CAA's list of pollutants now regulated, even for sites below the regulatory fill capacity cut-off point. Non-methane organic compounds (NMOC) and hazardous air pollutant (HAP) emissions will now be held to the limits of criteria pollutants—volatile organic compounds (VOCs), nitrogen oxides, SO_2, PM-10 particulate matter, and carbon monoxide—as a stationary source.

While flaring the landfill gas may solve the VOC (and NMOC) problem, it will only exacerbate the SO_2 emissions. For each ton of H_2S emitted, 1.88 tons of SO_2 are produced. This can push many facilities over the line to require operating permits (see Figure 1).

More than just odor

Landfill gas venting and collection systems were originally installed in response to underground emission migration limits required to reduce the methane concentration below its lower explosive limit (LEL) at the perimeter of the landfill. Emission controls for criteria pollutants were essentially non-existent, as they were not required. Regulations requiring liners to protect groundwater from leachate run-off deterred underground gas migration, promoting anaerobic conditions. As space in landfills has become more valuable, the disposed material is now being crushed and shredded to enhance compaction. This creates significantly greater amounts of surface area for biological activity.

During the oil shortages in the 1970s, it became apparent that landfills were untapped energy stockpiles. The anaerobic digestion of the waste materials was producing a medium-Btu gas rich in both methane and carbon dioxide. This raw gas has a heating value approximately half that of natural gas, and is suitable for heating or power generation. With purification, landfill gas from larger sites can even meet pipeline specifications for high-Btu gas.

The digestion process also produces or releases a large variety of NMOCs, many of which are listed in current regulations as both VOCs and hazardous air pollutants. The anaerobic microbes also metabolize sulfates and other sulfur compounds in the waste, primarily to H_2S and, to some degree, organic sulfides. Regulated as a HAP, sulfides produce the familiar, characteristic "rotten-egg" odor at low concentrations.

Although generally thought of as a malodorous, nuisance gas, H_2S is explosive over a much wider range than methane and is as toxic as cyanide. While H_2S can be detected by smell at as low as 50 parts per billion (ppb), at higher concentrations, it quickly paralyzes the olfactory senses to render it undetectable. With short exposure to above a few hundred parts per million (ppm) concentration, it can cause long-lasting detrimental health effects; exposure to more than 1,000 ppm can cause immediate death. There is no pharmaceutical antidote for sulfide poisoning.

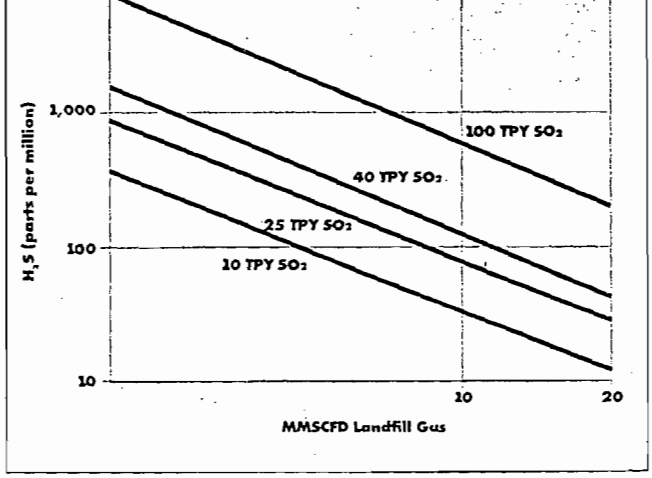
Heavier than air, H_2S and carbon dioxide will pool in stagnant areas, tunnels, trenches, and pits. Miners of old used caged birds to warn them of its presence, and many where killed by it. H_2S has been measured at concentrations up to 80,000 ppm in landfill borings and excavations. At these concentrations, it is both lethal and explosive.

The sulfides will react with the iron in any steel wastes found in landfills, creating corrosion and potential self-igniting deposits. Once burned, sulfur oxides may also corrode steel piping, concrete, and equipment. In order to meet regulatory limits, protect equipment, or meet pipeline specifications, the H_2S must be removed from the landfill gas.

Available technologies

Almost all sulfide control technologies available today were originally created for industrial gas processes,

Figure 1



Few problems are as frustrating and difficult to eliminate as offensive odor—particularly odors associated with landfills, sewage treatment plants, compost sites, and many manufacturing processes. LKB/Emtrol can help solve your odor problems.

Using an array of specialized techniques, including proprietary technologies developed by The Dow Chemical Company, LKB/Emtrol can eliminate sulfide, mercaptan, and SO_x odors.

- For high-concentration sulfide removal, we offer SulFerox®—a proprietary Dow process based on iron chelation chemistry and standard gas-scrubbing technology, which yields an end product of non-hazardous elemental sulfur.
- For lower concentrations, we offer Dow's ABATE™ batch liquid iron redox process, also yielding non-hazardous elemental sulfur.
- For nuisance odors, we offer wet and dry scrubbing technologies. All processes have been time-tested in the petrochemical, natural gas, and manufacturing industries.

The LKB/Emtrol approach to odor control offers the benefits of a cleaner environment and satisfaction of regulatory requirements, all at a lower life-cycle cost than other leading technologies. LKB/Emtrol invites you to contact us for a detailed comparison of our services with other treatment options you may be considering. We offer warranteed equipment and process design, and the Dow processes are backed by a chemical performance guarantee.

LKB/Emtrol have more than 130 years combined engineering and manufacturing experience. Lockwood, Kessler & Bartlett, Inc. has provided engineering services to government and industry for over 100 years. Emtrol Corp is a leading and diversified international manufacturer of chemical process equipment for over 20 years. Let us make this experience work for you.

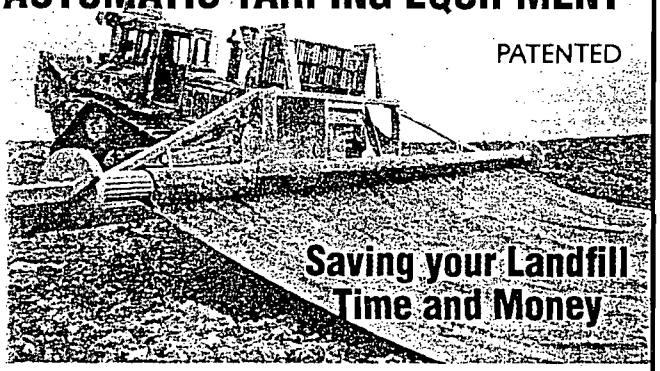
LKB/Emtrol
1 Aerial Way • Syosset, NY 11791-5501
(516) 938-0600 x 232 • Fax: (516) 931-6344

LANDFILL METHANE OUTREACH PROGRAM

SulFerox is a registered service mark of Shell Oil Company ABATE is a service mark of The Dow Chemical Company

CIRCLE NO. 125 ON READER SERVICE CARD

Introducing
AUTOMATIC TARPING EQUIPMENT



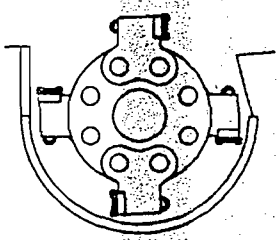
EATURES
- Modified to customers equipment
- Tarps up to 50' wide
- Tarps up to 300' long
- Self contained unit
- Weighted tarp hem lines
- Multiple uses for tarps

BENEFITS FOR LANDFILLS
- Saves air space
- Reduces costly man hours
- Fast and easy covering and uncovering
- Eliminates employees direct contact with refuse
- Extends tarp life
- Eliminates need for ballast on tarps
- Tarps can be installed to reduce leachate water
- Also may be installed as interim cover

Tarpomatic Inc.
18 - 15th Street S.W.
anton, OH 44706
00) 500-5069 • Fax (330) 453-4782

CIRCLE NO. 123 ON READER SERVICE CARD

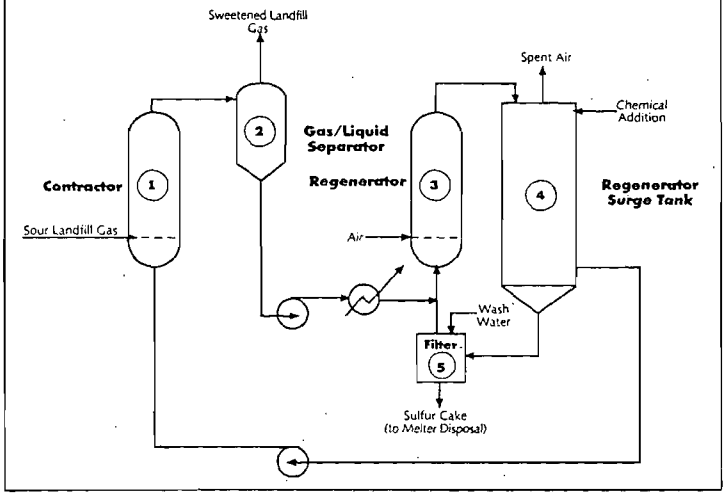
We don't make
Tub Grinders...
We make them PERFORM



U.S. MANUFACTURING INC.
USM
1-800-800-1812
515-497-5224 FAX

CIRCLE NO. 124 ON READER SERVICE CARD

Figure 2
Dow Chemical's SulFerox® Process



such as natural gas treatment and "syngas" purification in order to sweeten "sour" gas. Sour gas is defined as having more than 1.5 grains per CCF, or 24 ppm and higher. Pipeline specifications call for H_2S concentrations to be below 5 ppm. Some processes react with the sulfides to form a byproduct that is easily separated from the gas. These processes generally involve mixing the gas with a reactive liquid or passing the gas through a porous bed of material that will selectively react with the sulfide. Other processes separate the sulfides and carbon dioxide from the gas through purification, and release a side stream rich in sulfide, which requires further treatment. The numerous processes developed over the years can be categorized as throwaway liquid, throwaway solid, and regeneratable liquid.

Throwaway liquids—Caustic solutions are commonly used in conventional wet scrubbers for acid and odor control. In the absence of significant levels of carbon dioxide, H_2S may be captured with concentrated sodium hydroxide to form sodium bisulfide and sodium sulfide, but the characteristic sulfide odor is still present and the H_2S may slowly off gas:

$$NaOH + H_2S \rightarrow NaHS + H_2O$$

Sewage odor control adds sodium hypochlorite to caustic in order to completely convert the sulfide to a nonvolatile and nonodorous sulfate compound:

$$NaOH + 4\ NaOCl + H_2S \rightarrow NaHSO_4 + H_2O + 4\ NaCl$$

With high levels of carbon dioxide, the caustic is quickly converted to a carbonate, dropping the solution's pH and the sulfide capture efficiency:

$$NaOH + CO_2 \rightarrow NaHCO_3$$

Sodium nitrate also has been used, but suffers from the same loss of efficiency in the presence of higher carbon dioxide levels.

Other reactive throwaway liquids available today include triazine, which selectively reacts with H_2S to form a dithiazine. Handling is a problem, as the material is often prepared with up to 10% methanol and 1% to 5% monoethanolamine, and is rated both flammable and toxic. For moderate efficiency requirements, the solution can be sprayed directly into the gas pipes and the liquid drained off with the condensate. If higher efficiency is required, the gas is contacted by sparging, or spraying. This approach is economical for low-sulfide concentrations, but quickly becomes an operating burden at higher sulfide levels frequently encountered.

Throwaway solids—One of the earliest throwaway solid processes used to scavenge sulfides from sour natural gas or town gas is "iron sponge." Used for more than 100 years, iron sponge is made by impregnating wood chips with hydrated iron (+3) oxide. The iron oxide reacts with the H_2S to form iron sulfide and water:

$$2\ Fe_2O_3 + 6\ H_2S \rightarrow 2\ Fe_2S_3 + 6\ H_2O$$

With trace amounts of oxygen present, the iron sulfide is regenerated to iron oxide and sulfur. The sulfur eventually plugs the bed and has to be chiseled or chopped off, usually with high-pressure water lances. Once removed, the spent bed has to be spread out for one or two weeks, and kept wet and turned over frequently to allow it to fully oxidize:

$$2\ Fe_2S_3 + 3\ O_2 \rightarrow Fe_2O_3 + 6\ S$$

If the spent iron sponge is not sufficiently wetted, however, it will overheat from the oxidation with the air exposure and spontaneously ignite, potentially releasing toxic levels of sulfur dioxide. The iron sponge, consisting of mostly wood chips, will also release large amounts of odorous compounds it absorbed from the landfill gas stream. It is typically disposed of in a hazardous waste landfill.

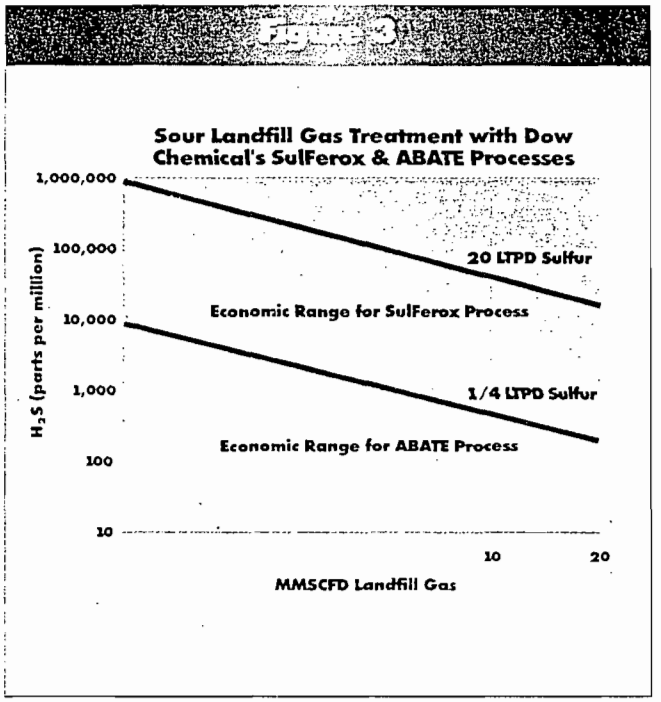
Other modern, iron-based pellet processes have eliminated the problems associated with iron sponge, includ-

ing the potential for fire. The end product is a stable iron pyrite when reacted with sulfides in oxygen-free air. However, the presence of oxygen typical in the landfill gas will create bridging between the pellets, which will eventually plug the bed. It, too, will need to be chiseled or chopped out before the vessel can be recharged.

Other types of throwaway solids include aluminas and carbons impregnated with potassium permanganate, chromium oxides, or other oxidants. These oxidants are not selective towards only sulfides, and are not present in sufficient quantities for landfill gas applications.

All solid throwaway processes are batch processes requiring significant labor and material handling to charge the vessel, and even greater effort to empty and subsequently recharge the vessel. The total cost of operation includes significant labor and disposal costs that overshadow its ease of operation.

Regenerative liquids—Many industrial gas processes contain large quantities of H_2S, which make throwaway processes undesirable or impractical. The first regenerating solutions were used to purify the gases by selectively separating carbon dioxide and H_2S by absorption. The saturated solution is recharged by stripping or releasing the captured carbon dioxide and/or H_2S into the stripping gas stream for further treatment. The stripped solution would then be recycled back to the absorber. The commercially available absorption/stripping systems include specialty amines, glycol, and hot carbonate solutions. These are typically operated under pressure to enhance the absorption step, and are economical at sulfur loads much higher than typically encountered in landfill gas streams.



Another type of regenerative solution is based on reduction/oxidation (redox) technology. It uses transition metals in solution to react with the sulfide to form sulfur. The solution is regenerated with the oxygen in the air for reuse. The "Stretford Process" is one of the older oxidizing solutions. It uses vanadium in solution, which is now listed as a hazardous material. The solution has a limited sulfide capacity, requiring large liquid flow rates for significant sulfide levels.

Most modern redox solutions use a chelated (claw-shaped) iron, which reacts quickly and selectively with H_2S, but not the carbon dioxide. H_2S in the sour gas reacts with the aqueous ferric ion, Fe(3) to form elemental sulfur. Organic ligands or chelating agents (denoted L) increase the solubility of iron in the operating solution:

$$2\ Fe(3)\ L + H_2S \rightarrow 2\ Fe(2)\ L + So + 2H^-$$

As a continuous process, the above reaction cannot be carried out indefinitely without depleting the Fe(3) in the solution. The spent iron chelate from the absorber must be regenerated by reacting the Fe(2) in solution with oxygen from an air source in a separate regenerator vessel:

$$2\ Fe(2)\ L + \tfrac{1}{2}O_2 + 2\ H^- \rightarrow 2\ Fe(3)\ L + H_2O$$

The overall process reaction is therefore:

$$H_2S + \tfrac{1}{2}O_2 \rightarrow H_2O + S^\circ$$

The redox process forms solid sulfur particles that are easily filtered from the solution by sending a slipstream to a filter system. Under the conditions of the process, there will always be some amount of chemical degradation. These systems require monitoring and makeup of the solution.

A number of patented redox solutions exists today. Some are operated at a moderately elevated pH, resulting in significant caustic consumption, due to the high carbon dioxide levels present in landfill gas. Biocides may also be required for certain types of organic chelating agents used.

In 1987, the GAS/SPEC Group of The Dow Chemical Co. (Midland, Mich.), introduced Shell Oil's SulFerox[3] process for sweetening sour natural gas (see Figure 2).

A patented improvement to the chelating agent maintains a higher concentration of the chelated iron solution then was previously possible. The chelating agent is also stable at a neutral pH range. This reduces the caustic con-

sumption for pH adjustment and reduces the operating power requirements by requiring less solution. The chelating agents used do not support bacteria, eliminating the need for biocide.

This makes the SulFerox process economical in landfill gas applications with elevated H_2S levels generally higher than 1,000 ppm, but too capital-intensive at lower sulfide concentrations (see Figure 3). It is applicable to landfills with continuously elevated H_2S levels that would rapidly deplete batch scavenger processes.

A more recent development licensed by Dow Chemical is the liquid-batch ABATE process for sulfide scavenging (see Figure 4). All previous chelated iron systems required constant circulation to prevent the sulfur from settling, and a slipstream to filter out the sulfur formed on a continuous basis. The process uses dispersants to prevent sulfur settling and clumping, which prevents fouling. With the oxygen levels present in landfill gas streams, the chelated iron is regenerated as it reacts with the sulfide. This eliminates the need for a separate regeneration vessel or on-line pumps.

Depending on the gas volume, one or more vessels are placed in parallel operation. The sour gas is simply sparged through the liquid, which adequately circulates the liquid within the vessel. When the suspended sulfur concentration reaches approximately 5% to 10% by weight, it is taken off-line for recharging. After being allowed to settle, the concentrated sulfur suspension is drained from the vessel, and the remaining solution is recharged with fresh solution. Depending on the other contaminants in the gas stream, the spent sulfur suspension is generally nonhazardous and can be landfilled.

The ABATE process is a simple and economical sulfide scavenger compared with iron sponge and other disposable solid and liquid batch processes commercially available. Oxygen present in the landfill gas does not cause plugging within the vessel, as with solid bed systems. The liquid solution is easily moved into and out of the vessel with pumps, requiring minimum material handling. Vessel clean-out is done with a low-pressure water hose for rinse-down of the interior surfaces. In addition, the spent material does not need to be spread out and aired for up to two weeks after use.

A sweet deal

Landfill gas is both a health and safety hazard, as well as a potential energy source. The U.S. EPA's Landfill Methane Outreach Program (LMOP) is organized to promote the use of landfill gas as an energy source (see *Waste Age*, August 1996, p. 89). This not only reduces emissions of a greenhouse gas (methane), but also ensures the destruction of the associated NMOCs that contribute to smog and pose significant health concerns. Use of landfill gas also reduces the consumption of coal and oil nationwide.

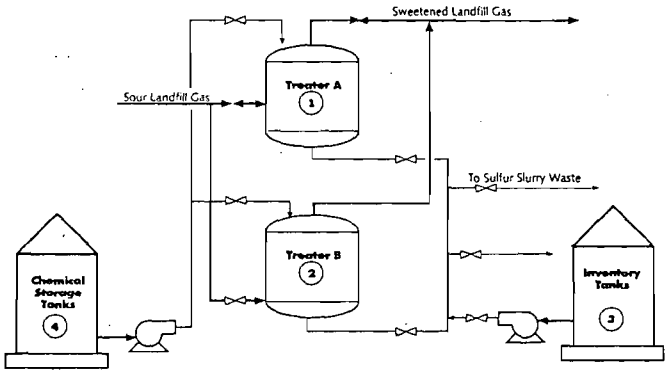
The medium-Btu landfill gas can be used directly for fuel to generate electricity through steam boilers, internal combustion engines, or fuel cells; the electricity generated can be sold to the local utility, or used on-site to offset electrical costs. Landfill gas can also be purified for sale as pipeline-quality gas.

Control of H_2S prior to combustion reduces corrosion and eliminates the need for flue-gas desulfurization (FGD) equipment. The sulfate sludge generated by FGD systems will be landfilled and is, in turn, anaerobically digested to generate H_2S again. Furthermore, generation and emission control of SO_2 is addressed by another whole layer of regulatory control.

Numerous technologies are available today for control of sulfides in landfill gas. No one system is perfect for all situations, but the liquid redox systems available offer the greatest flexibility. Aside from the limited waste generated, compared with other processes, the sulfur byproduct produced is, itself, nonhazardous and, in most instances, landfillable. Since sulfur is relatively biologically inert, it will not readily appear as more H_2S in the collected landfill gas again. ■

Figure 4

Dow Chemical's ABATE Process



Enviro-Equipment, Inc.

Leading Supplier of Quality Environmental Equipment and Supplies

1-888-274-8929

- New Accounts
- Rentals
- Equipment ▶
- Remediation ▶
- Sales
- Equipment ▶
- Remediation ▶
- Supplies ▶
- Services
- Field Services
- Do-It-Yourself Service
- Equipment Repair
- Information
- News ▶
- The EEI Shipping Advantage
- Locations
- Downloads
- List of Manufacturers
- About Us
- Contact Us

CES-LANDTEC GEM-2000 (GEM-500 & GA-90 Capabilities Com

Rent This Product

The GEM 2000 was designed by CES-LANDTEC specifically for use on landfills to mo extraction systems, flares, and migration control systems. The GEM 2000 combines the G into one faster, more accurate, intrinsically safe instrument.

The GEM 2000 samples and analyzes the methane, carbon dioxide and oxygen content of la read LCD screen shows the results as percentages of CH4, CO2, O2 and "balance" gas. Th and displays gas flow rate. It also measure and displays Btu content, temperature (w/optio atmospheric pressures and CH4 LEL (Lower Explosive Limit).

Highlights

Diverse Field Applications-monitors migration control systems, gas extraction systems, fl and more.

Gas Extraction Monitor Mode-provides automatic sampling and analysis of gas composit CO2, O2 and % balance gas, % CH4LEL, temperature (with optional probe), static pressu and barometric pressure. Also calculates gas flow rates (SCFM) as well as Btu rates.

Landfill Gas Analyzer Mode-provides automatic sampling and analysis of gas composition % O2 and % balance gas, % CH4LEL, temperature (with optional probe), barometric pressure Can be used for data logging, with user programmed intervals.

Easy To Read Display-extra large backlit LCD shows up to five gases, atmospheric and temperature, ID code-all at the same time.

Intrinsically Safe-essential for protecting personnel who work with explosive and hazardous l

On Site Calibration-rapid calibration checking or adjustment can be carried out on site.

Automatic Purge-automatically purges analyzer with clean air when a new ID is selecte turned off).

Light Weight Compact Size-easy to carry. Weighs less than five pounds.

Quick Analysis-completes sampling and displays gas analysis and flow results in less than o

Infrared Gas Analyzer- provides accurate measurements of methane (CH4) and carbon diox

Gas Temperature-read when using optional temperature probe or can be entered manually.

Durable Oxygen Sensor-provided by the galvanic cell principle, not influenced by other g

H2S)

User Friendly On-Screen Menu-in each mode the user performs most operations in just two s

PC Data Downloading-provided by RS232 interface with Data Field software (Release 3.0 or

Data Storage/Retrieval-stores prior measurements take for each monitoring point, 900 monit

Date/Time Stamp-recorded for all stored data.

Prior Data Recall-allows user to view prior data for each monitoring point.

Methane Analysis-displayed as either % CH4 by volume or CH4LEL (Landfill Gas Analyzer M

Durable Construction-Built strong, durable plastic material suitable for harsh landfill environn

All Weather Use-designed to operate in extremes from 32F to 104F. Sealed, weather-tight c

Built-in Adjustable Alarms-allows user to set alarm limits for CH4 and O2.

Rechargeable Batteries-internal, rechargeable nickel metal hydride batters are standard.

Operating Time- approximately 8 hours with normal pump usage (approximately 10 hours wit

Fast Recharge Time-approximately 2 hours from complete discharge.

Battery Check-battery life is continuously displayed.

Monitoring Point ID Codes-provides alphanumeric identification of monitoring points for data

ID Comments- allows user to answer up to 3 questions with a list of 9 potential answers each

Imperial vs. SI Units- can display measurements in Imperial (USA) or SI (metric) units.

Interfaces to CES-LANDTEC- Data Field software, which provides statistical managemer data.

Multiple Flow Meter Analysis- calculates gas flow with Accu-Flo wellheads, orifice plates an

Gold Warranty Service Program-ensures that your analyzer is properly maintained for (optional)

GEM 2000 Specifications

	Sensor Range	Resolution
Methane	0-100%	0.1%
Carbon Dioxide	0-60%	0.1%
Oxygen	0-25%	0.1%
Pressure -differential	0-10" WC	0.001" WC
Pressure -static	0.100" WC	0.1" WC

Pump Flow Rate	- 500 cc/min nominal flow
Flow Accuracy	+/-3% 50-150 SCFM
Vacuum	- up to 80" WC
UL	- Certified to Class 1, Zone 1, AEx ib IIa T4

E-mail Enviro-Equipment
Rentals | Home

Control of Odorous Gas at Massachusetts Landfills

In Support of 310 CMR 19.000, Solid Waste Management Regulations
Policy #BWP-06-?

Massachusetts Department of Environmental Protection
Bureau of Waste Prevention
June, 2006

_____
Date

_____
James C. Colman
Assistant Commissioner
BWP

This document is intended to guide parties in complying with the Solid Waste Regulations at 310 CMR 19.000 and the Air Quality Regulations at 310 CMR 7.00.

This Policy does not create any substantive or procedural rights, and is not enforceable by any party in any administrative proceeding with the Commonwealth. This Policy provides recommendations and guidance on approaches MassDEP considers acceptable for meeting the performance standards set forth in the Solid Waste Management Facility Regulations, 310 CMR 19.000, and the Air Quality Regulations, 310 CMR 7.00, and discussed in this document. Other options for demonstrating compliance with the regulations may be acceptable. The regulatory citations in this document should not be relied upon as a complete list of the applicable regulatory requirements.

Table of Contents

I. Introduction

A large number of odor complaints have been made over the past several years by people living or working near landfills, and in particular landfills that have been using construction and demolition (C&D) residuals and fines as daily cover and/or grading and shaping material. However, any landfill can experience odor problems. The Massachusetts Department of Environmental Protection (MassDEP) is concerned about emissions of hydrogen sulfide (H_2S) as well as other landfill gasses and is focusing on prevention, identification, quantification and control of H_2S emissions as a means of addressing both. By virtue of the occurrence of H_2S along with other landfill gasses, MassDEP anticipates that efforts to control H_2S emissions will have the added benefit of controlling emissions of other landfill gasses as well. This document provides guidance on recommended management practices to prevent or minimize generation of odors for landfills, and in particular, those proposing to use C&D residuals and/or fines as daily cover and/or grading and shaping material. In addition, this document provides guidance on conducting assessments and response actions to abate odorous landfill gas emissions caused by hydrogen sulfide or other malodorous landfill gas emissions. This document is not intended to address landfill soil gas migration and safety (i.e. explosion) concerns associated with methane and related corrective actions.

Hydrogen sulfide and other landfill gas emissions can be prevented or minimized by instituting proper operation and maintenance at a landfill. But, where odor problems occur, the decision about whether hydrogen sulfide and other malodorous landfill gas emissions require corrective actions depends on a number of factors such as the presence of ongoing emissions, adjacent land

uses, the presence of an exposed population, the location of the facility, and the concentration of landfill gases.

Where a problem does occur, MassDEP has established two tracks for taking actions at facilities. The first is triggered by the presence of odors at or in the vicinity of a facility. The second is triggered by the presence of hydrogen sulfide at a concentration exceeding the action level at a facility compliance point, usually at or near the property line, regardless of whether odors have impacted anyone near the facility. These two tracks are the primary tools for making decisions on when landfill gas emissions are at concentrations that would require additional assessment and corrective actions. This document is intended to assist regulators and the regulated community in making decisions that are both consistent from landfill to landfill and protective of public health, safety and the environment. Additionally, this document includes Recommended Management Practices ("RMPs") for landfill operations that will reduce the potential for generation of landfill gas odors and the production of hydrogen sulfide gas.

The regulatory citations provided throughout this document are not meant to be a complete list of all the regulatory requirements concerning landfill gas emissions, air quality requirements and risk characterization at Massachusetts's landfills. In addition, there is uncertainty with regard to whether the RMPs will reduce or eliminate landfill gas odors and H_2S emissions to acceptable levels due to site-specific considerations. Therefore, the list of actions to be taken by landfill operators in Table 1 and the RMPs suggested by MassDEP should be considered minimum management practices to be instituted should there be a problem at a landfill. If these measures are not successful in reducing H_2S emissions and eliminating odor problems MassDEP may require other measures to be taken until the H_2S emissions and/or odor problems are resolved in accordance with 310 CMR 19.117, 19.130, 7.01 and 7.09.

II. Regulatory Background

The general landfill design standards and operational standards related to air quality are established within the Solid Waste Management Regulations at 310 CMR 19.117 (Air Quality Protection Systems) and 310 CMR 19.130 (Operation and Maintenance Requirements). MassDEP's regulations at 310 CMR 19.117 state, in part, that owners, operators and permittees of solid waste facilities have a duty to:

> *control the concentration levels of explosive and malodorous gases and other air pollutants as necessary in order to maintain air quality and to prevent the occurrence of nuisance conditions or public health or safety problems.*

MassDEP's regulations at 310 CMR 19.130(16) Vector, Dust and Odor Control, state in part, that:

> *The operator shall prevent vectors, dust, odors and other nuisance conditions from developing at the landfill and any other areas related to the general facility operations.*

The general air quality standards related to landfills are set forth in 310 CMR 7.00. MassDEP's Air Quality regulations at 310 CMR 7.00 define Air Pollution as:

> *the presence in the ambient air space of one or more air contaminants or combination thereof in such concentrations and of such duration as to:*

a) cause a nuisance;
b) be injurious, or be on the basis of current information, potentially injurious to human or animal life, to vegetation or to property; or
c) unreasonably interfere with the comfortable enjoyment of life and property or the conduct of business.

The Air Quality regulations at 310 CMR 7.01(1) state:

No person owning, leasing, or controlling the operation of any air contamination source shall willfully, negligently, or through failure to provide necessary equipment or to take necessary precautions, permit any emission from said air contamination source or sources of such quantities of air contaminants which will cause, by themselves or in conjunction with other air contaminants, a condition of air pollution.

The Air Quality regulations at 310 CMR 7.02(1)(b) state, in part, that:

A plan approval is required prior to any construction, substantial reconstruction, alteration, or subsequent operation of a facility that may emit contaminants to the ambient air.

The Air Quality regulations at 310 CMR 7.09(1) state, in part, that:

No person having control of any dust or odor generating operations such as, but not limited to...dump operations...shall permit emissions therefrom which cause or contribute to a condition of air pollution.

This document provides guidance for meeting the general requirements set forth in the Solid Waste Management Regulations at Massachusetts landfills to protect public health, safety and the environment. Persons using this Policy should be aware that there may be other acceptable alternatives to specific actions required by this guidance for achieving compliance with the regulations.

III. Permitting Considerations

The most important consideration in preventing the generation of odors is to properly design and operate a landfill to minimize the potential for generation of odors and H_2S. Landfill gas collection and control systems need to be properly designed and operated so that H_2S and other odorous gasses are adequately controlled and secondary problems are not created, such as overloading a landfill flare with H_2S, which causes emissions of SO_2 from the flare to exceed permitted levels.

This document provides a number of Recommended Management Practices (RMPs) in Table 2 that landfill owners/operators should include in the operation of their facility, particularly in applications where C&D residuals and fines are to be used for daily cover or as grading and shaping material in the closure of a landfill. Where landfills will use C&D residuals and/or fines MassDEP will require applicants to provide:

- adequate designs for gas collection and treatment systems, including pre-treatment systems to reduce H_2S
- adequate monitoring and maintenance of gas collection and treatment systems;

- a financial assurance mechanism (refer to 310 CMR 19.051: Financial Assurance Requirements) that includes monitoring and maintenance of gas collection and treatment systems through closure and post-closure and to address contingencies for remedial activities.

IV. Action Levels for Odorous Landfill Gas Emissions and Hydrogen Sulfide

This Policy establishes both an odor Action Level and a hydrogen sulfide Action Level as the primary tools for making decisions about when landfill gas emissions are serious enough to require assessment, monitoring and/or corrective actions. Please note, a landfill may be required to take action to address a condition of air pollution pursuant to 310 CMR 7.01 or 7.09(1) even where action levels are not exceeded.

This Policy establishes two Action Levels for implementing measures to address the release of odorous gases from landfills. The Odor Action Level is not based on a specific hydrogen sulfide concentration, but on the detection of odors from emissions of any landfill gasses and the presence of odors at nuisance levels offsite (indicated by odor complaints from the public and/or local Board of Health, landfill personnel or MassDEP observation). The H_2S Action Level is based on measured hydrogen sulfide levels in ambient air at the point of compliance established in a permit, plan or approval or the property boundary over specific time periods. Table 1 lists the two Action Levels along with information on what constitutes an exceedance of an Action Level and subsequent response actions.

An exceedance of the Action Levels triggers immediate investigation, monitoring and corrective actions by landfill owners/operators to abate the odorous gas emissions. Each owner/operator at an affected landfill will be required to have a site-specific Hydrogen Sulfide and Odorous Landfill Gas Response Plan (see Section V.) that is to be followed when assessing and implementing response actions. This additional assessment and/or monitoring is necessary to determine the extent and severity of the emissions of hydrogen sulfide/landfill gas and ensure that the public is not exposed to hydrogen sulfide concentrations that may cause a nuisance condition or pose a potential risk to public health and/or safety.

The Action Levels listed in Table 1 are based on a review of monitoring data from Massachusetts landfills, review of exposure limits for hydrogen sulfide from various sources, and experience gained by MassDEP staff at landfills with odors and/or hydrogen sulfide emissions. The H_2S Action Level is a two-part level based upon either exceeding 15 ppb over an 8-hour period or 30 ppb over a 1-hour period. These levels were selected in order to capture both longer term, low level releases of H_2S, as well as shorter term spikes of H_2S. These thresholds were selected as a trigger for taking further actions at the landfill to abate potential odor problems before they begin, where there has not already been an exceedance of the odor threshold, and to require the landfill operator to take actions before a condition arises that could impact public health.

Hydrogen sulfide is one of the most common compounds responsible for landfill odors and can have an extremely low odor threshold (the lowest reported value is 0.5 ppb in Ruth, 1986 cited in

ATSDR, 2004[1]), but levels at which odors become apparent may vary significantly. While hydrogen sulfide can be odorous and irritating at very low concentrations for some people and can create a nuisance off-site, MassDEP established a hydrogen sulfide Action Level in addition to the Odor Action Level to cover situations where odors are not detected. The hydrogen sulfide Action Level is set at a greater concentration than the lowest reported odor threshold for hydrogen sulfide. Therefore, at most landfills with hydrogen sulfide emissions, landfill operators may need to begin assessing and mitigating hydrogen sulfide concentrations as a result of odor complaints and not as a result of an exceedance of the H_2S Action Level. The H_2S Action Level will cover those situations where no one lives near the landfill or where people are not as sensitive to H_2S odors.

[1] Ruth, JH. 1986. Odor thresholds and irritation levels of several chemical substances – A review. Am Ind Hyg Assoc J 47142-51. Cited in Agency for Toxics Substances and Disease Registry. 2004. Draft Toxicological Profile for Hydrogen Sulfide. Atlanta, GA.

Table 1: Minimum Response Actions for Odorous Gas Emissions[1]

Action Level	Averaging Time	Frequency of Exceedances Triggering Action	Defined Exceedance	Sampler/ MDL Required	Action(s) To Be Taken by Landfill Operators
Odor Action Level	Any	Any	Detection of odor (Investigate and verify)	Public complaints, Board of Health, landfill personnel[2], MassDEP personnel, ambient air sampling	Landfill operators will be required to have a site-specific Hydrogen Sulfide & Odorous Landfill Gas Response Plan (Response Plan) that will be followed in investigating and addressing all odor complaints. The Plan will address the following activities: 1. Log the complaint/detection of odors and contact local health officials and the Department within 24 hours. 2. Investigate the complaint to determine the source and extent of the odors to determine the severity of the odor problem (see Appendices). 3. Implement corrective actions, if necessary, including, but not limited to: a. cease acceptance of any material that has the potential to contribute to odorous landfill gas emissions, on at least a temporary basis; and b. place additional daily or intermediate cover soils or apply other cover technologies to reduce odorous landfill gas emissions to ambient air. 4. Conduct landfill gas monitoring if verified odors have not been traced to a particular source and remedied. 5. Conduct other activities as necessary and/or as directed by MassDEP to control nuisance odors (see 6, 7, and 8 below).
H_2S Action Level (The action level is based upon either exceeding 15 ppb averaged over an 8 hour period or 30 ppb averaged over a 1 hour period)	8-hour	1	15 ppb or greater averaged over any 8-hour period[3]	Continuous monitoring devices (e.g. Jerome Meter) sampling every ten minutes at a detection limit of 3 ppb	1. Log the detection of any exceedances and contact local health officials and the Department within 4 hours for exceedances of the H_2S Action Level. 2. Investigate and determine the source and extent of the exceedance following the protocols in the appendices. 3. Immediately: a. cease acceptance of any material that has the potential to contribute to hydrogen sulfide emissions, on at least a temporary basis; and b. place additional daily and intermediate cover soils or apply other cover technologies to reduce hydrogen sulfide emissions to ambient air. 4. Conduct additional ambient air monitoring off-site or evaluate need for additional off-site monitoring. 5. Implement 24-hour continuous air monitoring for hydrogen sulfide in ambient air, and daily near surface monitoring on the landfill. 6. In addition, the following actions may be required if directed by MassDEP: a. install an active landfill gas control system with landfill gas treatment (combustion and/or non-combustion technologies); b. evaluate the need for the installation of a final cover system with an active landfill gas control system on an expedited schedule. 7. Implement a Community Communications Plan, providing notification to the community and local medical/emergency response personnel that hydrogen sulfide concentrations, if they were to migrate off-site, may create an odor nuisance condition. Conduct additional ambient air monitoring off-site to determine the hydrogen sulfide concentration at receptor locations.
	1 hour	1	30 ppb or greater averaged over any 1 hour period[3]		

[1] In response to an odor problem or H_2S problem at a landfill, MassDEP may require any and all actions necessary to resolve odor and H_2S problems and to protect public health, safety and the environment.

[2] Landfill personnel should investigate complaints by following *"Recommended Protocol for the Assessment of Offsite Landfill Odors" (refer to Appendix E)*

[3] Result based on a rolling average

V. Hydrogen Sulfide and Odorous Landfill Gas Response Plan

A. General

Due to the potential threat of nuisance odors and potential risk to public health associated with hydrogen sulfide emissions, MassDEP will require investigations and response actions on an expedited schedule in response to an exceedance of an Action Level. The expedited schedule will be made possible, in part, by the advance preparation of a Hydrogen Sulfide and Odorous Landfill Gas Response Plan (the "Plan") (see Appendix C) by the landfill owner/operator prior to: operation of a new landfill; any new expansion of an existing landfill; closure of an unlined landfill that will accept any C&D fines and residuals for grading and shaping material to achieve closure grades; or as otherwise required by MassDEP. Also, MassDEP may require a facility to develop a Plan as part of corrective actions at an existing landfill experiencing odor problems. The development of this Plan is crucial to enable a quick assessment and abatement of hydrogen sulfide and other landfill gas emissions.[4] The Plan must include, at a minimum, information regarding receptors, communication, monitoring and response actions to be taken in response to odor nuisances or hydrogen sulfide in ambient air at concentrations equal to or greater than the H_2S Action Level.

Some landfills in Massachusetts already have established procedures for responding to complaints, including odor complaints. These procedures are designed to allow the facility owners/operators to quickly investigate the potential cause of the odor leading to a complaint and immediately implement corrective actions. A Plan will formalize and build upon those procedures already in place at these landfills. Each landfill owner/operator that is required to submit a Plan shall submit their site-specific Plan as part of the Authorization to Operate application, Major or Minor Permit Modification application, or Corrective Action Design application, dependent upon the site-specific circumstances. Additional guidance regarding the preparation of the Plan is provided in Appendix C.

The Plan should include an Odor Survey Plan that identifies locations in the vicinity of the landfill that personnel assigned to investigate an odor complaint shall visit and determine if odors are present. These locations shall be selected based upon, but not limited to, the following criteria: the proximity to the landfill, receptors, topography, meteorology, predominant wind direction, and other potential sources of odors and emissions. The landfill owner/operator will develop procedures and protocols for logging a complaint, investigating a complaint, conducting landfill gas emissions monitoring and implementing corrective actions. These procedures should be incorporated in the Hydrogen Sulfide and Odorous Landfill Gas Response Plan for the site. Refer to Appendix C, Appendix E and Table 1 for additional guidance for the preparation of Hydrogen Sulfide and Odorous Landfill Gas Response Plan.

[4] Additional information regarding when landfill owner/operators will have to prepare a Plan is included in Appendix H, Frequently Asked Questions.

B. Assessment, Monitoring and Response Actions for Odor Action Level Events

Odor Action Level Event investigations and response actions are required upon the receipt of a complaint or detection of odors off-site at nuisance levels. In addition to off-site odors, landfill personnel should be cognizant of odors that exist on-site that have the intensity and duration to potentially migrate off-site. Therefore, each landfill owner/operator should take all necessary actions as soon as possible when an odor is detected on site, even before a complaint is placed.

In general, MassDEP expects the following assessment, monitoring and response actions to be implemented in response to an Odor Action Level Event.

1. The landfill owner/operator will immediately log the complaint/detection of odors and contact local health officials and MassDEP within 24 hours.
2. The landfill owner/operator will investigate the complaint to determine the source and extent of the odors following their Response Plan.
3. The landfill owner/operator will implement the recommended management practices, if necessary, including, but not limited to:
    a. cease acceptance of any material that has the potential to contribute to odorous landfill gas emissions, on at least a temporary basis; and
    b. place additional daily or intermediate cover soils or apply other cover technologies to reduce odorous landfill gas emissions to ambient air.
4. The landfill owner/operator will conduct landfill gas monitoring if verified odors have not been traced to a particular source and remedied.
5. The owner/operator shall conduct additional investigations including, but not limited to, landfill gas characterization, emission monitoring, near-surface landfill gas monitoring and ambient air monitoring (refer to Appendix B, Landfill Gas Monitoring). This monitoring shall be performed to determine the nature, source and extent of the emissions ongoing at the landfill site.

The owner/operator shall implement progressively more comprehensive corrective actions as necessary to resolve nuisance odor conditions at the site. Please refer to the H_2S Action Level for possible additional response actions. Also, persistent nuisance odor conditions that result in non-compliance with the regulations may result in MassDEP taking enforcement.

C. Assessment, Monitoring and Response Actions for H_2S Action Level Events

The H_2S Action Level for hydrogen sulfide is listed in Table 1, along with information on recommended sampling equipment, averaging times, what constitutes an exceedance of the Action Level and associated response actions. In order to determine if a hydrogen sulfide Action Level has been exceeded, air monitoring equipment must be employed. MassDEP recommends that continuous monitoring devices be used with the detection limits in the range of single parts per billion. Most continuous monitoring devices can be adjusted to collect readings on a set time interval (every few minutes-hours). MassDEP recommends that the meter initially be set to collect hydrogen sulfide readings every 10-15 minutes. Appendix B –Landfill Gas Monitoring - includes basic information about the design and implementation of ambient air monitoring at landfills. However, this document does not focus on how to conduct air monitoring and

MassDEP recommends that professionals experienced with ambient air monitoring procedures and protocols be consulted.

The landfill owner/operator will implement assessment, monitoring and response actions in accordance with this policy and an approved site-specific Response Plan when hydrogen sulfide concentrations in ambient air are greater than or equal to the H_2S Action Level to comply with 310 CMR 19.117, 19.130, 7.01 and 7.09.

D. General Conditions for the H_2S Action Level

1. In order to have an exceedance of the H_2S Action Level, the following two criteria must be satisfied:
    a. Hydrogen sulfide must be detected in ambient air at or beyond the point of compliance (POC) established in a permit, plan or approval or the property boundary; and
    b. The average concentration of hydrogen sulfide measured in ambient air at this location must be greater than or equal to 15 ppm averaged over 8 hours or 30 ppb averaged over one hour once over a 24-hour period.

2. MassDEP expects the following initial response, assessment and monitoring activities will be implemented by the landfill owner/operator when hydrogen sulfide concentrations in ambient air are greater than the H_2S Action Level:
    a. Immediately log the detection of any exceedances and contact local health officials and the Department within 4hours for exceedances of the H_2S Action Level.
    b. Investigate and determine the source of the exceedance following the protocols in the Response Plan.
    c. Immediately:
        i. cease acceptance of any material that has the potential to contribute to hydrogen sulfide emissions, on at least a temporary basis.
        ii. place additional daily and intermediate cover soils or apply other cover technologies to reduce hydrogen sulfide emissions to ambient air.
    d. Implement 24-hour continuous air monitoring for hydrogen sulfide in ambient air and daily near surface monitoring on the landfill.
    e. Conduct additional ambient air monitoring off-site or evaluate need for additional off-site monitoring.

3. The following Corrective Actions will be implemented by the landfill owner/operator when hydrogen sulfide concentrations in ambient air are greater than the H_2S Action Level as directed by MassDEP on a case-by-case basis depending on site-specific factors:
    a. Install a passive landfill gas control system (passive vents) that can be retrofitted to become an active gas collection and control system (combustion and/or non combustion technologies).

b. Evaluate the need for the installation of a final cover system with an active landfill gas collection and control system on an expedited schedule.
c. Implement a Community Communication plan, providing notification to the Community and local medical/emergency response personnel that hydrogen sulfide concentrations, if they were to migrate off-site, may create an odor nuisance condition.

4. In addition to the activities required above, the landfill owner/operator will implement the additional Assessment and Monitoring and Corrective Actions specified below when directed by MassDEP.
    a. Install a cap with an active landfill gas collection and control system.

VI. Recommended Management Practices

MassDEP requires that landfill operators incorporate procedures and practices that will prevent potential impacts to air quality and nuisance conditions from developing at the facility. MassDEP refers to these procedures and practices as Recommended Management Practices ("RMPs"). In the context of this Policy, a RMP is a preventive technology or measure that is implemented to limit potential impact to air quality by a landfill and to address nuisance and public health concerns. The RMPs discussed in this guidance are designed to prevent and/or reduce the potential impact from hydrogen sulfide and odorous landfill gas emissions. These RMPs may evolve over time and the landfill owner/operator may be required to take further actions beyond the RMPs to resolve persistent odor problems or H_2S problems at a landfill. The RMPs discussed below are summarized in Table 2.

A. Active Face and Cover Materials

1. **Active Face**

The operator should carefully evaluate the size of the active face, generally trying to keep it as small as possible as this will limit the surface area of exposed waste, both reducing the potential for odor as well as limiting the area needing cover soils.

2. **Cover Materials**

The type and quantity of cover materials should be selected with odor control in mind. Soil daily cover materials may need to be placed more frequently than once a day and the effective quantity to control odor may be more than the minimum 6 inches required by regulation.

Some synthetic spray-on cover materials may both create a more gas tight surface as well as have components that can act as odor neutralizing agents, such as lime-based products.

Intermediate cover may prove to be an effective odor control method and its use should be considered on a more frequent basis than the minimum regulatory requirement of placing intermediate cover when waste will be left exposed for more than 30 days.

Table 2. Recommended Management Practices	
BMP	**Suggested Practice**
Active Face	• Evaluate size of active face • Keep as small as possible to limit surface area exposed and need for cover material • Provide good compaction and proper grading to reduce infiltration of storm water into waste
Cover Materials	• Select the type and quantity of cover material to control odors • Evaluate the need to place cover material more than once per day • Evaluate the need to apply greater than 6 inches of cover material • Provide good compaction of cover material to reduce chances of odor "breakouts" • Consider use of synthetic spray-on materials to help control odors more effectively • Consider use of lime-based products, which can neutralize odors • Evaluate the frequent use of intermediate cover, which can be effective for controlling odors
Sequencing Plan	• Plan carefully for the location, sizing and timing of placement of waste and cover materials • Bring active areas to grade quickly, then place final cover and gas controls on newly completed areas
Gas Collection and Control Systems	• Develop a contingency plan for installing an active gas collection and control system, including, where necessary, hydrogen sulfide pre-treatment systems that are appropriately sized to pre-treat the volume of gas generated • Install gas control system during active landfilling where possible: o Include sacrificial, horizontal, perforated gas collection pipes o Gas extraction wells can be installed prior to placement of final cover • Passive system should be designed to be retrofitted and operated as an active system within short period of time • Include sufficient funding in the facility's Financial Assurance Mechanism to ensure proper operation and maintenance of the gas collection and control systems during the life of the facility and the post-closure period
Gas Collection and Control System Operations	• Provide proper training for all landfill operators • Provide routine balancing of the active gas collection and control system well-field • Provide routine monitoring and maintenance, including monitoring of and change-out of media in sulfur pre-treatment systems as needed • Conduct routine inspections for settlement, leaks and condensate levels and water levels to ensure well screens are not blocked
Gypsum Removal	• If using C&D Fines or C&D Residuals at the landfill, only accept C&D materials from facilities that remove gypsum materials from the C&D • Gypsum should be removed from the C&D material prior to any processing of the remaining C&D materials • C&D processing facility should provide landfill with certification that gypsum has been removed
Mixing Ratios: Soil and C&D Debris Fines and Residuals	• Mix soils with fines or residuals to reduce the generation of hydrogen sulfide o Consider the use of coal ash and wood ash to reduce odors • Mix C&D residuals and fines with soils at a 1:1 ratio, or greater, of soils to residuals and fines by volume • Cover all C&D fines or residuals at the end of the working day

B. Sequencing Plan

Attention to the landfill's sequencing plan – the location, sizing and timing of placing waste and cover materials – can help control landfill gas emissions by bringing active areas up to grade quickly and placing final cover and landfill gas controls on newly completed sections of the landfill.

C. Gas Collection and Control Systems[5]

Consideration should be given to evaluating the use of a gas collection and control system that can be installed during active landfilling (sacrificial active gas systems, candle stick flares, etc.) instead of just implementing landfill gas controls as part of the final cover system. At a minimum, a contingency plan for installing a landfill gas collection and control system should be part of a landfill's approved operating permit. Please note that any passive gas system should be designed to be retrofitted and operated as an active gas collection and treatment system within a short period of time to address odors or H_2S exceedances.

Sufficient resources to ensure the proper operation of a landfill gas collection and treatment system can also be a critical factor in the successful operation of a landfill gas and odor control system.

D. Gypsum Removal

The landfill owner/operator should only accept construction and demolition (C&D) materials from C&D processing facilities that have implemented an aggressive program for the separation and removal of gypsum materials from the C&D. The gypsum removal should occur prior to processing. The C&D processing facility should furnish the landfill owners/operators with certification that gypsum has been removed prior to acceptance of this material either for disposal or grading and shaping.

E. Mixing Ratios: Soil and Construction and Demolition Debris Fines and Residuals

MassDEP recommends that soil be mixed at a minimum rate of one part soil to one part construction and demolition debris ("C&D") fines and residuals, measured by volume. MassDEP has reviewed different methods to accomplish this mixing, taking into consideration operations at both active landfills and at closure operations at unlined landfills. The method that was most successful consisted of placing and spreading C&D fines and/or residuals within the active area, approximately one foot thick. Then soil, a minimum of one foot thick, is placed and spread over the C&D fines/residuals, followed by "tracking" with a bulldozer to thoroughly mix the soil into the C&D fines/residuals. Finally, the area is compacted and covered with other cover materials as may be necessary to control odors or other nuisance conditions. In addition,

[5] Landfills subject to NSPS Subpart WWW (have a design capacity greater than 2.5 million Mg (2.75 million tons)) and with NMOC emissions greater than 50 Mg/yr are required to have a gas collection and treatment system (refer to Appendix F).

other materials may be useful in reducing odors when mixed with fines and residuals, including coal ash and wood ash.

VII. Appendices

The appendices listed below are intended to facilitate the development of the hydrogen sulfide and odor management plans and components.

Appendix A - Basics of Landfill Gas (Methane, Carbon Dioxide, Hydrogen Sulfide and Sulfides)
Appendix B - Landfill Gas Monitoring
Appendix C - Checklist for Hydrogen Sulfide and Odorous Landfill Gas Response Plans
Appendix D - Action Level – Data Collection and Action Level Exceedance Examples
Appendix E - Recommended Protocol for the Assessment of Off-Site Landfill Odors
Appendix F - Landfill Gas Control Technologies
Appendix G - Health, Safety & Welfare (Nuisance) Issues Associated with Hydrogen Sulfide and Odorous Landfill Gas
Appendix H - Frequently Asked Questions

Mention of trade names or commercial sources in this guidance document is for identification purposes only and does not imply endorsement or recommendation by MassDEP.

prior BACT's

United States Environmental Protection Agency - Region IX

Technical Support Document
Second New Source Review Permit Extension
Campo Solid Waste Landfill Project
August, 2002

Introduction

On December 1, 2000, U.S. EPA Region IX (EPA) received an application for a second extension of a New Source Review (NSR) permit for the construction and operation of a municipal solid waste (MSW) landfill on the reservation of the Campo Band of Mission Indians. The permit for this proposed facility was originally issued by EPA to Mid-American Waste Systems on October 18, 1996, with the condition that construction of the project begin within 18 months of the issuance date. On May 2, 1999, EPA granted an extension of this permit for an additional 18 months, and at the same time, transferred the ownership of this project to Muht Hei, Inc. After reviewing the new application, EPA has decided that there is justification for granting a second 18-month extension of this permit. The permit extension will be issued with the same conditions as the October 1996 permit.

In 1988, EPA Region IX revised its policy memo, entitled, "EPA Region IX Policy on PSD Permit Extensions." The decision to approve the extension for the Campo landfill permit was based on EPA's determination that the requirements outlined in this policy had been satisfied. A copy of this policy is included as an attachment to this document. This Technical Support Document (TSD) lists the requirements contained in the permit extension policy and provides a discussion of how the applicant satisfied each of these requirements.

Background

On October 18, 1996, EPA issued a NSR permit to Mid-American Waste Systems for the construction and operation of a MSW landfill on the reservation of the Campo Band of Mission Indians. The reservation, which consists of 15,580 acres in the southeastern corner of San Diego County, California, lies just north of the US/Mexico border and approximately 45 miles inland from the Pacific Ocean. As proposed, the landfill will accept up to 3,000 tons per day of nonhazardous solid wastes, with a final design capacity of just over 29 million tons over the 30 plus year operational life. The proposed landfill will be constructed as 19 separate, but contiguous cells, each approximately 20 acres in size.

The proposed landfill project is located in the western portion of San Diego County, which was designated as an ozone non-attainment area prior to the 1990 Amendments and is now designated as serious non-attainment area for ozone. The VOC emissions (which are a precursor in ground level ozone formation) from the proposed project are subject to regulation under Part D of Title I of the Act, since, if left uncontrolled, these VOC emissions would exceed the major source threshold for serious ozone non-attainment areas.

application states that Muht-Hei is currently in negotiations with potential vendors, and requires additional time to sign a binding agreement. The application also states that Muht-Hei expects to sign such an agreement and commence construction of the project within the requested 18 months. EPA is, therefore, granting this extension in order to provide Muht-Hei additional time to secure a new vendor for this project.

3. Certification

Requirement: The extension request must be signed by a responsible representative of the company proposing the project.

Discussion: The current owner of this project is Muht-Hei, Inc. The application for extension was signed by Brian Connolly, the president of Muht-Hei.

II. Technical requirements

1. BACT/LAER Analysis

Requirement: A BACT reanalysis is required in all permit extension requests, as in an application for a new PSD permit. It should also be noted that, according to a recent EPA policy, any new BACT determination being prescribed for any regulated pollutant must also consider the impact of the proposed BACT on the emissions of unregulated or toxic pollutants.

Discussion: The proposed landfill is subject to PSD review for emissions of PM-10, and for non-attainment NSR review for emissions of VOC. Thus, PM-10 emissions must be controlled by the Best Available Control Technology (BACT), and VOC emissions must be controlled to the Lowest Achievable Emissions Rate (LAER). A re-evaluation of BACT and LAER was done for this project in 1999, in support of the first permit extension request. Muht-Hei has investigated several information sources to determine whether the emission controls and operating conditions determined to be BACT and LAER in 1999 are still current.

The new application includes the results of searches on the EPA RACT/BACT/LAER Clearinghouse (RBLC), the California Air Resources Board BACT Clearinghouse, and the South Coast Air Quality Management District BACT Guidelines. In addition, Muht-Hei contacted the San Diego County Air Pollution Control District regarding any changes that may have occurred in that agency's BACT requirements for landfills. Based on information obtained from these sources, Muht-Hei has proposed that the controls and conditions required in the 1999 permit extension still represent BACT for emissions of PM-10 and LAER for

emissions of VOC. EPA has performed a similar search to confirm these findings, and agrees that the 1999 permit represents current BACT for emissions of PM-10 and current LAER for emissions of VOC, for landfills.

Furthermore, the conditions of the permit issued by EPA require that the owner/operator of the landfill must review previous BACT and LAER determinations no later than 18 months prior to commencement of construction of each phase of this project. This will ensure that the controls required of this landfill will continue to meet current BACT and LAER in the future.

2. Additional PSD/NSR Review Requirements

Requirement: A reanalysis of the PSD increment consumption and air quality impacts is required. Interim source growth in the area may have occurred and caused significant degradation of air quality. Therefore, the review agency is responsible for ensuring that the source requesting an extension would not cause or contribute to a PSD increment or NAAQS exceedance.

Discussion: The Air Pollution Control Districts for both San Diego County and Imperial County were contacted for information on source growth since the last PSD analysis for this proposed facility. Previous modelling showed that these Districts are the two areas whose ambient air could be affected by emissions from the proposed landfill.

Both agencies reported that no emissions increases in areas of concern for this landfill have occurred since the last PSD analysis. In fact, overall, emissions from stationary sources have decreased in recent years. Thus, the modelling analyses previously submitted to demonstrate that the proposed facility will not cause or contribute to a PSD increment or NAAQS exceedance are still valid.

During the public comment period, however, various commenters raised the issue of a new source of air pollution, the Four Eagles Material Extraction Facility which is located outside the jurisdiction of the above mentioned Air Pollution Control Districts on the neighboring La Posta Indian Reservation. In light of this information EPA asked the applicant to consider this facility's emissions in its re-evaluation of the ambient air impacts from surrounding sources. Based on a screening level air quality modeling analysis performed by the applicant, EPA has determined that the Four Eagles facility will not affect the consumption of the PSD increment and thus its original exclusion from the PSD increment analysis was appropriate.

3. Extensions of later units in phased multi-unit projects

Requirement: Determinations for phased multi-unit projects are very complex involving the independence or dependence of a project and often different construction dates. Therefore, please consult with EPA regarding any questions addressing phased construction projects.

Discussion: This project does have multiple phases, each with separate requirements in the construction permit. EPA believes that phasing will not present additional issues, in this case, because the timing of each phase is measured from the date that construction commences. There are no fixed dates in the permit that require revision as a result of the permit extension.

Also, as noted above, the conditions of the permit issued by EPA require that the owner/operator of the landfill must review previous BACT and LAER determinations no later than 18 months prior to commencement of construction of each phase of this project. This will ensure that the controls required of this landfill will continue to meet current BACT and LAER in the future, regardless of when each phase is constructed.

G. New Source Performance Standards

The project must comply with all requirements of the proposed federal regulations entitled Standards of Performance for New Stationary Sources (40 CFR 60, Subparts A and WWW).

H. Prevention of Significant Deterioration for Emissions of PM_{10}, NO_2 and CO

PSD BACT

1. Emissions from the enclosed ground flares shall not exceed the following limits based on a three hour rolling average:

   a) 0.005 pounds of PM_{10} per million British Thermal Units of landfill gas (0.005 lbs/mmBtu);

   b) 0.06 pounds of oxides of nitrogen (measured as NO_2) per million British Thermal Units of landfill gas (0.06 lbs/mmBtu);

   c) 0.15 pounds of carbon monoxide (CO) per million British Thermal Units of landfill gas (0.15 lbs/mmBtu).

2. The owner/operator shall ensure that all permanent roads and the perimeter road around the landfill are paved. The unpaved portion of any road at the landfill site shall not exceed 300 feet in length, and the gravel portion of any road shall not exceed 2,000 feet in length.

3. The owner/operator shall provide a gravel base road to within 300 feet of the active face for truck traffic. Truck traffic shall not be allowed to travel on any unpaved non-gravel base road except within 300 feet of the active base.

4. The owner/operator shall prohibit vehicles from travelling at speeds greater than 15 miles per hour (mph) on any gravel surface at the landfill, or 5 mph on any unpaved non-gravel base (dirt) surface at the landfill. The owner/operator shall post signs to ensure that all vehicle drivers are aware of these speed limits.

5. The owner/operator shall meet the following conditions unless there has been greater than 0.01 inches of precipitation on the site that working day:

rise above 1800°F.

14. Prior to the date of blowers/flare startup, the owner/operator shall install, maintain, and operate the following safety/control instruments at all times that the landfill gas is being fed to the flare: temperature controller, flame detector, inlet oxygen monitor, inlet oxygen shut-off, flame-out shut-off, high temperature shut-off, feed gas flow meter/recorder, exhaust temperature monitor/recorder, auxiliary fuel plumbing, pilot and start-up fuel supply, and burners.

15. The owner/operator shall not deposit more than 84,000 tons of waste in the landfill during any four week (28 day) period. In no event shall the average annual waste acceptance rate, calculated on a 12 month rolling average, exceed 945,000 tons of waste per year.

PTE Capacity

Waste disposed of per phase shall be limited as follows:

Phase	Cells	Area (Acres)	% of Total Area	Waste Capacity (~~1000 tons~~)	% of. Total Volume	Est. Life of Cells (Years)
1	1 - 3	55.4	14.5	2,865	9.8	3.0
2	4 - 8	88.3	23.0	7,076	24.3	7.5
3	9 - 15	128.2	33.5	9,178	31.5	9.7
4	16 - 19	111.1	29.0	10,000	34.4	10.6
Total		382.96	100	29,119	100	30.8

16. [REMOVED] 29 million

17. The owner/operator shall provide daily cover, consisting of six (6) inches of compacted soil. The owner/operator may use alternative cover methods if the specific alternative methods are approved in advance, in writing, by EPA, with respect to impacts on air emissions, and meet the requirements of 40 CFR Part 258.

18. The owner/operator shall individually cover and seal each cell once it has been filled to capacity. The owner/operator shall ensure that the cover for each cell includes, at a minimum, the following:

    a) A layer of low-permeability compacted soil at least 12 inches thick, with a permeability not greater than 10^{-7} cm/sec, and

all tests. The tests for VOC destruction efficiency shall be conducted on an annual basis and at the maximum firing capacity achievable for the landfill gas generation rate at the time of testing. Upon written request from the owner/operator, EPA may approve the conducting of performance tests at a lower specified production rate. EPA may waive the requirement for a particular test, or the frequency thereof, upon request.

2. The owner/operator shall submit a protocol, at least 30 days prior to testing, to allow time for the development of an approvable performance test plan and to arrange for an EPA observer to be present at the test. Performance tests shall be conducted, but not limited to the following EPA Methods:

   a) EPA Methods 1, 2, 3, 4, 16, 25 and 25A at the flare inlet; and

   b) EPA Methods 1, 2, 3, 4, 5, 6C, 7E, 10, 16, and 25A at the flare outlet.

   The owner/operator may propose other applicable test methods.

3. The owner/operator shall analyze the composition of the gas at the flare inlet and flare exhaust. In making such analysis, the owner/operator shall:

   a) Determine for the inlet gas the flowrate, Btu content, and concentrations of oxygen, carbon dioxide, methane, non-methane organic and inorganic vapors, hydrogen sulfide (H_2S), total reduced sulfur (including H_2S), reduced sulfur compounds (including H_2S), and any other substances deemed appropriate by EPA;

   b) Determine for the exhaust gas the flowrate and concentrations of oxygen, nitrogen oxides, sulfur oxides, carbon dioxide, carbon monoxide, methane, total organic vapors, hydrogen sulfide (H_2S), total reduced sulfur (including H_2S), reduced sulfur compounds (including H_2S), particulate matter, and any other substances deemed appropriate by EPA; and

   c) Include in the test report the flare exhaust temperature at the time of the test.

MSW Management
The Journal for Municipal Solid Waste Professionals

Feature

Hydrogen Sulfide From Landfilled Construction-and-Demolition Debris: When and How

It is particularly important to realistically model landfill gas generation rates inclusive of the hydrogen sulfide generation potential in order to design a cost-effective H_2S treatment system.

By Jean Bogner and Doug Heguy

Many landfills now accept large quantities of construction-and-demolition (C&D) debris in addition to municipal solid waste. The strategic decision to obtain incremental revenue from C&D wastes can set in motion a number of factors that lower landfill gas (LFG) quality and increase operations-and-maintenance costs through the postclosure period. Gypsum wallboard in C&D debris can result in the generation of highly toxic hydrogen sulfide gas (H_2S). In sufficient amounts, this will result in the need for sulfur abatement systems, which can be expensive and complex. Fortunately the technology for such systems is well developed and has been in commercial use for the last 30-plus years. In this article we review the consequences of increased H_2S in LFG and discuss practical H_2S treatment options for LFG recovery operations ranging from 0.5 to more than 5.0 million scfd (standard cubic feet per day).

Hydrogen Sulfide Generation From C&D

C&D debris may include substantial percentages of gypsum

($CaSO_4 \cdot 2H_2O$) in discarded wallboard materials. Also, some sites in the United Stateshistorically have used ground-up C&D debris as daily cover. Under anaerobic landfill conditions (absence of air), sulfate-reducing bacteria produce H_2S from the sulfate (SO_4^{-2}) in gypsum and the organic carbon in waste material as follows:

$$SO_4^{-2} + 2CH_2O = 2HCO_3^{-1} + H_2S$$

From the above reaction, 100 tons of landfilled sulfate has the potential of producing 35 tons of H_2S. Most of this "potential" likely will be realized during the active LFG production phase. Furthermore, since the sulfate-reducing microorganisms tend to outcompete the methane-producing microorganisms (methanogens) until substantial sulfate depletion occurs, methane production for commercial gas recovery - especially during the first few years - may be reduced at sites with high H_2S production.

Increasing concentrations of H_2S in LFG can have several detrimental effects: (1) the onset of odor problems, (2) acid gas corrosion of gas recovery hardware, (3) increased SO_x emissions from flaring or other combustion processes, and (4) possible health consequences for workers. The odor threshold for H_2S is extremely low (0.05 to 0.10 parts per million by volume, or ppmv), and levels of H_2S above 10 ppmv are considered toxic, exceeding the threshold limit value. Moreover, levels of H_2S above 1,000 ppmv in a breathing zone can rapidly lead to unconsciousness and death. Thus, worker health and safety issues might require special attention at sites with high H_2S. It should perhaps be pointed out that there are other odorous reduced sulfur gases that might be present in LFG, including dimethyl sulfide, ethyl mercaptan, i-propyl mercaptan, t-butyl mercaptan, methyl n-propyl disulfide, dimethyl trisulfide, and thiophene; these typically are found in lower concentrations than H_2S but are also generated under anaerobic conditions.

Historically, concentrations of H_2S in LFG have tended to be less than 100 ppmv. Indeed, a recent compilation by the Waste Industry Air Coalition, an ad hoc waste industry group, indicated that the average H_2S from 40 sites across the US was 23.6 ppmv (Huitric et al., 2000). The current AP-42 default value for H_2S in LFG from the US Environmental Protection Agency is similar at 35.5 ppmv. At sites that have taken large volumes of

C&D debris with municipal waste, however, H_2S concentrations above 100 ppmv are beginning to be measured. Some sites have noticed increased H_2S within a few months of accepting C&D debris on an emergency basis; for example, after a major hurricane. Recent experience at nine US sites showed H_2S ranging from 0.4 to 116 ppmv. A similar range (7-100 ppmv) was found, based on data from several southern California landfills.

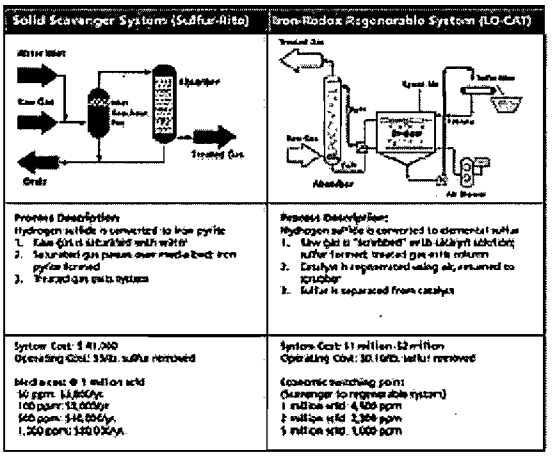
Developing a Quantitative Basis for a Gas Processing Decision

How high can H_2S concentrations get in LFG? Several landfills in different parts of the US that have been collecting large amounts of C&D debris have installed, or are installing, gas processing equipment to treat H_2S concentrations in excess of 3-5% (30,000-50,000 ppmv). Percentage levels of H_2S will require treatment to prevent acid corrosion of gas recovery hardware, reduce odors, and minimize worker safety concerns. Landfill operators, however, might need to consider commercially available treatment processes when H_2S concentrations exceed about 75 ppmv, depending on equipment specifications and warranties from gas compressor, engine, or turbine vendors. When needed, treatment can achieve compliance with gas recovery hardware specifications, environmental regulations regarding combustion emissions, and local planning guidelines with respect to nuisance odor issues.

When determining H_2S concentrations in LFG, it is important to obtain representative samples of the composite LFG, retain those samples in appropriate inert containers (lined stainless steel cylinders or black-layered Tedlar bags), and analyze them according to standard methods. For example, EPA Methods 15 and 15A can be accessed at www.epa.gov/ttn/emc/promgate.html. There are other standard methods recommended by the American Society of Testing and Materials, the American Gas Association, and other industry or governmental agencies, including the South Coast Air Quality Management District in California. Because LFG is a complex mixture of 200 or more gases, it is not appropriate to use field analyzers or colorimetric tubes when attempting to quantify H_2S and other reduced sulfur gases.

For large sites with elevated and increasing levels of H_2S in LFG, it is critically important and challenging to predict

Comparison of Solid Scavenger System to Iron-Redox Regenerable System for Landfill Applications



Solid Scavenger System (Sulfur-Rite)	Iron-Redox Regenerable System (LO-CAT)
Process Description Hydrogen sulfide is converted to iron pyrite 1. Raw gas is saturated with water 2. Saturated gas passes over media bed; iron oxide formed 3. Treated gas goes to system	Process Description: Hydrogen sulfide is converted to elemental sulfur 1. Raw gas is "scrubbed" with LO-CAT® solution; sulfur formed; treated gas exits column 2. Catalyst is regenerated using air; returned to scrubber 3. Sulfur is separated from catalyst
System Cost: $ 41,000 Operating Cost: $5/lb. sulfur removed Media cost @ 1 million scfd 10 ppm: $4,800/yr. 100 ppm: $48,000/yr. 500 ppm: $240,000/yr. 1,000 ppm: $480,000/yr.	System Cost: $1 million-$2 million Operating Cost: $0.10/lb. sulfur removed Economic switching point (Scavenger to regenerable system) 1 million scfd: 4,500 ppm 3 million scfd: 2,300 ppm 5 million scfd: 1,000 ppm

Click here for larger view

H_2S generation in the context of routine LFG-generation modeling. These systems can be capital-intensive, and a good model and forecast are necessary to design a system that meets the facility[1]s requirements and makes efficient use of the invested capital. Modeling H_2S generation is more complex than traditional LFG modeling and still is evolving technically. It is common practice in the LFG industry to apply a first-order kinetic model for methane generation using annual waste quantity and composition data for a specific landfill cell or site. For predicting H_2S generation, the same kinetic model is not likely to be appropriate because the timing and rates for H_2S generation differ from methane. Thus it is recommended that a good consultant be retained to assist in this effort. It also is important to inventory all potential sulfur sources, including sewage sludge, local soils used as cover materials, landfills developed in high-sulfate geologic materials, high-sulfate groundwater contributions, and - at bioreactor sites - recirculation of high-sulfate groundwaters, surface waters, or leachates. This inventory will require site-specific data that then can be used to develop a sulfur mass balance for a particular site; for example, summing the input mass and form of various materials in order to more realistically predict H_2S production rates. Historical data on H_2S generation rates and yields over time can be used to fine-tune preliminary predictive models. In some cases, supporting laboratory studies might be needed to determine kinetics of specific waste fractions. In the future, we might well have standard models for H_2S generation that can be matched to potential gas treatment options at sites with high-sulfate inputs, but these models do not currently exist.

Commercial H_2S Removal Processes

Above critical levels, H_2S might need to be removed via commercially available treatment processes. This critical level can be reached by:

- exceeding sulfur emissions above permitted levels,

- receipt of odor and corrosion complaints from neighbors,
- the need to meet inlet gas-quality specifications for compressors, engines, turbines, or microturbines.

For sites with relatively low sulfur concentrations and gas flow (1 million-2 million scfd @ 50 ppmv H_2S), the recommended sulfur abatement would consist of a low capital investment scavenger system (see table). Modeling expected H_2S generation for sizing scavenger systems is important but not as critical as for larger sulfur recovery systems. If and when the landfill crosses into the range where more sophisticated sulfur recovery techniques become economic, landfill modeling becomes critically important, and more extensive modeling is required for proper and efficient design.

The level at which gas-quality specifications are exceeded and sulfur abatement is required will vary by application, equipment, and vendor. Internal combustion engines for LFG-to-electricity projects can tolerate levels as high as 1,000-1,500 ppmv (total sulfur in gas). Properly specified turbine generators can tolerate in excess of 10,000 ppmv. Gas specifications for microturbines have a very wide range, depending on the manufacturer. The sulfur limit for gas turbine systems, however, often is determined by the gas compressor upstream of the turbine, which might tolerate only 75-100 ppmv. This is because a highly corrosive liquid condensate can form during the higher compression required for turbines. Thus, many landfills generating electricity require sulfur limits to be restricted to 75-100 ppmv.

Removal of H_2S from gas streams has been an issue in the energy industry for years, so currently there are a number of commercial processes to remove H_2S from LFG, including solid and liquid scavengers (e.g., triazine, Sulfur-Rite, SulfaTreat) and regenerable catalyst processes, such as iron-redox systems (e.g., LO-CAT). These products/processes are in use treating LFG and removing H_2S in concentrations of less than 100 ppm to 50,000-plus ppm, in gas flows of less than 1 million scfd to more than 5 million scfd. Sulfur removal rates range from a few pounds per day to greater than 5 tpd.

The smaller systems, appropriate for the great majority of LFG treatment applications, typically will be scavenger (nonregenerable) systems and will be simple to operate. The costs of removing the sulfur, while small in total terms, can be quite large in terms of dollars per unit of sulfur removed. But these systems have low capital cost, and more units can be added easily, so extensive gas design and landfill modeling are not as critical as with much larger levels of sulfur removal.

The scavenger can be a liquid or solid system. The solid system has several advantages for landfill applications:

- No operators are needed to treat the gas (though the H_2S concentration at the outlet of the system will need to be monitored).
- Media change-out often can be done by contractors.
- Disposal of spent solid media is often easier than liquid waste.
- The system can expand easily by adding another "box" of media.

On the downside, the part of the system that is undergoing the media change-out is out of service during that time, and the media change-out process can be messy and allow noxious odors into the surrounding environment. Some systems are more susceptible to this than others are.

The liquid scavenger requires more operator attention to make sure the gas is being treated appropriately but has the advantage that the liquid is generally easier to handle than the solid media, and the system can be designed so that showdowns for media change-out are not required. Triazine-based liquid scavengers will efficiently treat several of the sulfur compounds in LFG, including H_2S and some mercaptans. Ease of disposal of the liquid is a site-specific issue, however, and might be more difficult than the solid media. Caustic treatment systems, commonly used to remove sulfur in the energy industry, usually are not a good choice for LFG because of the relatively high amount of carbon dioxide in the gas. The carbon dioxide consumes caustic and creates sodium carbonate. So this is an inefficient treatment system for LFG. In general, cost, ease of operation, and disposal options favor the solid scavenger over the liquid scavenger for landfill applications.

Solid Scavenger

Sizing a solid scavenger system is straightforward. The design parameters of a solid system are typically a maximum gas velocity over the media bed, minimum residence time, and an acceptable pressure drop. Once those parameters are met, the system volume can be adjusted to manage media change-out frequency. The solid media-bed system scales linearly with the gas. Should gas flow double over time, one can double the number of vessels treating the gas. Should the H_2S concentration increase, the media volume can be increased or the media can be changed out more often. The most common forms of solid scavengers used for treating LFG are iron sponge, iron-based solid scavenger systems like Sulfur-Rite and

SulfaTreat, and activated carbon.

The oldest commercial process for removing H_2S is iron sponge, which has been available for more than 100 years. Iron sponge has a relatively low initial cost. The iron sponge concept is quite simple: Hydrated iron oxide is impregnated onto redwood chips. The wood chips are placed in a vessel where the gas flows over the wood chips. The H_2S reacts with the iron oxide to form iron sulfide, and the treated gas exists the vessel. The iron sponge system has one significant drawback: During media change-out, a highly exothermic oxidation reaction can take place, causing the media to spontaneously catch fire. To control the oxidation reaction and make the spent iron sponge suitable for transportation and disposal, the spent iron sponge is spread out on a concrete pad and kept moist for eight to 10 days. This material allows the spent material to oxidize slowly. As iron sponge itself can absorb odors from the LFG being treated, odorous compounds can be released to the atmosphere during this process, resulting in complaints if this is being done in a high-population-density area. So the change-out process can be messy, last for a number of days, and generate the very complaints the system was installed to prevent.

A newer, though well-established, form of solid media - SulfaTreat and Sulfur-Rite - uses iron-based chemistry but a different media base to address the change-out issues associated with iron sponge. In these systems, the solid medium is an inorganic, ceramic material coated with an iron oxide. The iron oxide reacts with H_2S to form iron pyrite. This product is more expensive than iron sponge but has the following advantages:

- More uniform particle size for better controlled gas flow
- Nonflammable
- Easier change-out
- Easier transportation and disposal

For these reasons, the acceptance of these products is better than iron sponge and the savings in change-out and disposal should, at least partially, offset the higher media cost.

The scavenger system shown in the preceding table is a prepackaged, preengineered system appropriate for LFG applications. This unit is well suited for 1 million scfd LFG. One can easily see that a doubling of the H_2S level in the feed-gas concentration doubles the consumption rate of the media and therefore doubles the cost per unit time. This unit can handle double the gas flow at lower H_2S concentrations, but at higher

concentrations another unit can be added and the gas flow split between the two units. At larger gas flows, equipment savings could be achieved by optimizing the vessel design, but these savings would at least be partially offset by increased engineering and vessel fabrication costs.

Activated carbon can be used to treat LFG by itself or in combination with other systems. Activated carbon adsorbs most types of sulfur compounds onto the carbon, not just H_2S, so the carbon does a more thorough job of treating LFG odor. Since the spent activated carbon is classified as a hazardous waste, however, disposal cost, landfill location, and logistics will play a key role in the total cost of using carbon to treat LFG. For this reason, activated carbon often is used in combination with the previously mentioned products/technologies. The iron-based product is used to remove the H_2S (the largest portion of the sulfur compounds - and the most dangerous). In many cases this is sufficient treatment of the gas odor. If an additional remedy is required, a carbon canister can be added to further treat the LFG. The combined system is characteristically more cost-effective than the carbon system alone.

Optimized, Large-Scale Sulfur Recovery

At large levels of sulfur removal the cost of the solid media becomes prohibitive, and it makes economic sense to invest in a system with a regenerable catalyst. These systems are capital-intensive, and care must be taken to develop a design basis suited to the landfill for both present and future operations.

An example of a large-scale H_2S removal system with a regenerable catalyst is the iron-redox process, such as LO-CAT. A description of the LO-CAT process, as well as cost comparisons to the solid scavenger system, is shown in the table. The operating cost of removing 1 lb. of sulfur falls from more than $3/lb. for the scavenger to less than $0.10/lb. for the regenerable system. The capital cost for the system, however, can run between $1 million and $2 million.

The economic tradeoff point between the simple scavenger systems and the more capital-intensive regenerable systems is determined by capital/operating cost tradeoffs of the owner firm. Representative tradeoff points are shown in the table, which assumes a payback requirement of two to three years, which occurs at about 400 lb. of sulfur removed per day. This payback requirement is quite typical of many industrial firms. Municipalities often have a longer payback investment criterion, which would make the regenerable system more attractive at lower sulfur removal levels.

Clearly at this level of capital expenditure, developing the proper design basis for the gas processing system is critical to efficient capital utilization and cost-effective operation. The process takes a lot of time and careful planning. The gas analysis, modeling, design and option analysis, and capital appropriation can easily take 12-18 months. The detailed design and construction can take another nine to 11 months. Therefore the complete process of data collection and modeling to start-up of the unit can take two to three years. Obviously this is not an overnight project and must be planned for before reaching the allowable sulfur limits.

Conclusions/Summary

How can H_2S production in your landfill be anticipated and prevented? Here are some guidelines:

- Limit the total amount of gypsum wallboard accepted with C&D waste.
- Do not used ground-up C&D for daily or interim cover; this fine-grained material promotes rapid sulfate reduction with H_2S production in landfill environments.
- Do a "sulfur balance" on your landfill, considering all sources of sulfur, including native soils used for cover and geologic materials into which landfilling occurs.
- Retain a qualified LFG consultant to quantify and model H_2S production.

If H_2S is present in the LFG, and if the landfill has made the business decision to accept sulfur-laden C&D debris, what steps need to be taken to the manage sulfur levels?

- Be aware of the sulfur limitations of the downstream equipment.Monitor H_2S levels in the LFG.
- Model the H_2S generation mechanisms to be sure the incremental revenue from the sulfur-generating collection stream covers the increase in operating cost.
- Plan ahead.

When it becomes clear that some form of sulfur abatement system will need to be installed, follow these steps:

- Project sulfur gas and sulfur levels, consistent with current trends and future business strategy.
- Establish a project team to evaluate system and investment options.
- Plan ahead if the facility will require a regenerable system for cost-effective sulfur control.

In summary, landfill operators should pay attention to the quantity of gypsum board in the C&D waste coming into their sites. H_2S is odorous, toxic, and corrosive. Once H_2S production is initiated, it must be managed, and we anticipate that treatment of H_2S in LFG will become necessary at more sites in the future. H_2S can be removed from LFG to avoid corrosion of gas recovery hardware and minimize emissions and odors. The application of treatment processes requires periodic gas testing and cost-efficient designs based on the total daily sulfur quantity. Landfill operators should consider developing a sulfur balance for their sites, considering both waste sources and natural materials.

Reference

Huitric, R., P. Sullivan, and A. Tinker. *Waste Industry Air Coalition Comparison of Recent Landfill Gas Analyses with Historic AP-42 Values*, Draft Report. October 2000.

Jean Bogner is president of Landfills + Inc. in Wheaton, IL, and an adjunct associate professor with the Department of Earth and Environmental Sciences at the University of Illinois in Chicago. Doug Heguy is sales and marketing manager with Gas Technology Products LLC in Schaumburg, IL. Table 1. Comparison of Solid Scavenger System to Iron-Redox Regenerable System for Landfill Applications

MSW - March/April 2004

Return to Table of Contents

Search | Subscribe | About | News | Advertise | Register | Services | Calendar
Glossary | Contact Us | Current Issues | Back Issues | Other Forester Publications |
Forester*Press*

Article

Return to News & Community Home

Cost-Effective Hydrogen Sulfide Treatment Strategies For C Recovery: Role Of Increasing C&D (Construction and Demo

11/1/2004

By Doug Heguy and Jean Bogner

There are more than 350 commercial landfill gas recovery operations in the U.S. which generate electricity on-site, supply industrial gas-fired boilers, or produce substitute natural gas fuels such as CNG. Historically, very few have required H_2S treatment. However, many landfills are now accepting large quantities of construction and demolition (C&D) debris in addition to municipal solid waste (MSW), which can set in motion a number of factors that lower landfill gas quality and increase O&M (operatior through the post-closure period. Gypsum wallboard in C&D debris generates sufficient amounts, this will result in the need for sulfur abatement systems w complex. Fortunately, the technology for such systems is well-developed anc the last 30+ years. In this paper we review the consequences of increased H- practical H_2S treatment options for commercial landfill gas recovery.

Hydrogen Sulfide Generation from C&D

C&D debris may include substantial percentages of gypsum ($CaSO_4.2H_2O$) some sites in the U.S. have historically used ground-up C&D debris as daily conditions (absence of air), sulfate-reducing bacteria produce hydrogen sulfi 2) in gypsum and the organic carbon in waste material as follows:

$$SO_4\text{-}2 + 2CH_2O \text{ ---> } 2HCO_3\text{-}1 + H_2S$$

From the above reaction, 100 tons of landfilled sulfate has the potential of pr this "potential" will likely be realized during the active landfill gas production p

Increasing concentrations of H_2S in landfill gas can have several detrimental problems; 2) corrosion of gas recovery hardware; 3) increasing SOx emissio combustion processes; and 4) possible health consequences for workers. Th extremely low (0.05 to 0.1 ppmv), and levels of H2S above 10 ppmv are con Threshold Limit Value (TLV). Moreover, levels of H_2S above 1000 ppmv (0.1 rapidly lead to unconsciousness and death. Thus, worker health and safety i attention at sites with high H_2S.

Predicting and Measuring Hydrogen Sulfide: Developing a Quantitative Decision

How high can H_2S concentrations get in landfill gas? Several landfills in diffe that have been collecting large amounts of C&D debris are installing gas pro concentrations in excess of 3% to 5% (30,000-50,000 ppmv) H2S. Percenta treatment to prevent acid corrosion of gas recovery hardware, reduce odors, concerns. However, landfill operators may need to consider commercially-av when H_2S concentrations exceed about 75 ppmv, depending on equipment s from gas compressor, engine or turbine vendors.

When determining H_2S concentrations in landfill gas, it is important to obtain composite landfill gas, retain those samples in appropriate inert containers (I black-layered Tedlar bags), and analyze them according to standard method standard methods 15 and 15A can be accessed at www.epa.gov/ttn/emc/me www.epa.gov/ttn/emc/methods.html, respectively. Because landfill gas is a c gases, it is not appropriate to use field analyzers or colorimetric tubes when other reduced sulfur gases.

For large sites with elevated and increasing levels of H_2S in landfill gas, the i becomes more important. Larger treatment systems can be capital intensive is necessary to design a system that meets treatment goals and makes effici Modeling hydrogen sulfide generation is more complex than traditional landfi evolving technically. It is recommended that a good consultant with a backgr mechanisms be retained to assist in this effort. It is also important to inventor including sewage sludge, local soils used as cover materials, landfills develo materials, and high sulfate groundwater contributions or recirculated leachat

Commercial H_2S Removal Processes

Above critical levels, H_2S may need to be removed via commercially-availab critical level can be reached by:

- Exceeding sulfur emissions above permitted levels
- Receipt of odor and corrosion complaints from neighbors
- Need to meet inlet gas quality specifications for compressors, engines

For sites with relatively low sulfur concentrations and gas flow (1-2 million SC recommended sulfur abatement would consist of a low capital investment sc Modeling expected H_2S generation for sizing scavenger systems is importan sulfur recovery systems. If and when the landfill crosses into the range wher recovery techniques become economic, landfill modeling becomes critically i modeling is required for proper and efficient design.

The level at which gas quality specifications are exceeded and sulfur abater

application, equipment and vendor. Internal combustion engines for landfill-g tolerate levels as high as 1000-1500 ppmv (total sulfur in gas). Properly spec tolerate in excess of 10,000 ppmv. Gas specifications for microturnbines hav on the manufacturer. However, the sulfur limit for gas turbine systems is ofte compressor upstream of the turbine, which may tolerate only 75-100 ppmv. corrosive liquid condensate can form during the higher compression require landfills generating electricity require sulfur limits to be restricted to 75 – 100

The smaller sulfur removal systems, appropriate for the great majority of lan will typically be scavenger (non regenerable) systems, and be simple to ope sulfur, while small in total terms, can be quite large in terms of dollars per un systems have low capital cost and additional units can be added easily, so e modeling is not as critical as with much larger levels of sulfur removal.

The scavenger can be a liquid or solid system. The solid system has several applications:

- No operators are needed to treat the gas (though the H_2S concentrati need to be monitored).
- Media change-out can often be done by contractors
- Disposal of spent solid media is often easier than liquid waste
- The system can easily be expanded by adding another "box" of medi

On the downside, the part of the system that is undergoing the media chang time, and the media change-out process can be messy and allow noxious oc environment. Some systems are more susceptible to this than others.

Sizing a solid scavenger system is straightforward. The design parameters c maximum gas velocity over the media bed, minimum residence time, and an those parameters are met, the system volume can be adjusted to manage m solid media bed system scales linearly with the gas. Should gas flow double number of vessels treating the gas. Should the H_2S concentration increase, increased, or the media can be changed out more often. The most common for treating landfill gas are iron sponge and iron-based solid scavenger syste SulfaTreat®.

The oldest commercial process for removing H_2S is iron sponge, which has l years. Iron sponge consists of hydrated iron oxide impregnated onto redwoo this system is that during media changeout, the unreacted iron oxide can rea and catch fire. The Sulfur-Rite® and SulfaTreat® products address this prob base. The initial cost of the Sulfur-Rite® and SulfaTreat® products is higher but that cost is at least partially offset by easier changeout procedures and t

The scavenger system shown in Table 1 is a pre-packaged, pre-engineered landfill gas applications. This unit is well suited for 1 million SCFD landfill ga doubling of the H_2S level in the feed gas concentration doubles the consum therefore, doubles the cost per unit time. This unit can handle double the ga concentrations, but at higher concentrations, another unit can be added and two units. At larger gas flows, equipment savings could be achieved by optin these savings would at least be partially offset by increased engineering and

Optimized, large scale sulfur recovery

At large levels of sulfur removal the cost of the solid media becomes prohibit sense to invest in a system with a regenerable catalyst. These systems are be taken to develop a site-specific design suitable for present and future ope

An example of a large-scale H_2S removal system with a regenerable catalys as LO-CAT®. A description of the LO-CAT® process, as well as cost compa system are shown in Table 1. The operating cost of removing 1 pound of sul pound for the scavenger to under 10¢ per pound for the regenerable system the system is typically between $1 million and $2 million.

The economic tradeoff point between the simple scavenger systems and the regenerable systems are determined by long-term comparison of projected c Representative trade-off points are shown in Table 1. Table 1 assumes a pa which occurs at about 400 pounds of sulfur removed per day. This payback i many industrial firms. Municipalities often have a longer payback investment regenerable system more attractive at lower sulfur removal levels.

Clearly, at the level of capital expenditure required for large regenerable sys developing the proper design basis for the gas processing system is critical t cost effective operation. This process takes time and careful planning: initial and capital appropriation can easily take 12-18 months, with the detailed des another 9-11 months. Thus the complete process of data collection and mod years and must be planned for well in advance of reaching allowable sulfur li

Conclusions/Summary:
How can H_2S production in your landfill be anticipated and prevented? Here

1. Limit the total amount of gypsum wallboard accepted with C&D waste
2. Do not use ground-up C&D for daily or interim cover.
3. Do a "sulfur balance" on your landfill, considering all sources of sulfur cover and geologic materials into which landfilling occurs.
4. Retain a qualified landfill gas consultant to quantify and model H_2S pr

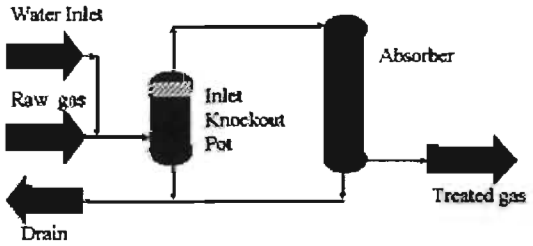
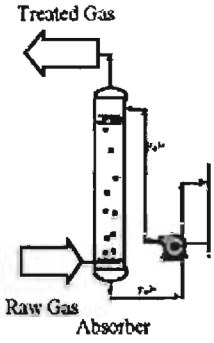
If H_2S is present in the landfill gas, and if the landfill has made the business C&D debris, what steps need to be taken to the manage sulfur levels?

1. Be aware of the sulfur limitations of the downstream equipment.
2. Monitor H_2S levels in the landfill gas.
3. Model the H_2S generation mechanisms to:
   a. Be sure the incremental revenue from the sulfur generating colle in operating cost.
   b. Plan ahead.

When it becomes clear that some form of sulfur abatement system will need

1. Project sulfur gas and sulfur levels, consistent with current trends and
2. Establish project team to evaluate system and investment options.
3. Plan ahead if the facility will require a regenerable system for cost eff

Table 1. Comparison of Solid Scavenger System to Iron-Redox Reg Landfill Applications

Solid Scavenger System (Sulfur-Rite®)	Iron-Redox (
	
Process Description: Hydrogen sulfide is converted to iron pyrite. 1. Raw gas is saturated with water. 2. Saturated gas passes over media bed, iron pyrite formed. 3. Treated gas exits system	Process Description Hydrogen sulfide is sulfur. 1. Raw gas is "sc sulfur formed. 2. Catalyst is rec scrubber. 3. Sulfur is sepa
System Cost: $ 41,000 Operating Cost: $ 3/ lb. Sulfur removed Media cost @ 1 MMSCFD 50 ppm: $ 3,800/year 100 ppm: $ 8,000/year 500ppm: $40,000/year 1,000ppm: $80,000/year	System Cost: $1 m Operating Cost: 1 Economic switching (Scavenger to rege 1 MMSCFD: 4,500 p 2 MMSCFD: 2,300 p 5 MMSCFD: 1,000 p

Forward This Article To An Associate

REQUEST FREE INFORMATION

Enter all or part of a topic name in the form

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

CONTENTS

RELATED RESOURCES

A-Z INDEX

September 2004

Public Health Statement for Hydrogen Sulfide

Draft for Public Comment

CAS# 7783-06-4

This Public Health Statement is the summary chapter from the Toxicological Profile for hydrogen sulfide. It is one in a series of Public Health Statements about hazardous substances and their health effects. A shorter version, the ToxFAQs™, is also available. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present. For more information, call the ATSDR Information Center at 1-888-422-8737.

This public health statement tells you about hydrogen sulfide and the effects of exposure to it.

The Environmental Protection Agency (EPA) identifies the most serious hazardous waste sites in the nation. EPA then places these sites on the National Priorities List (NPL) and targets them for federal long-term cleanup activities. Hydrogen sulfide has been found in at least 35 of the 1,647 current or former NPL sites. Although the total number of NPL sites evaluated for this substance is not known, the number of sites at which hydrogen sulfide is found could increase as more sites are evaluated. This information is important because these sites may be sources of exposure, and exposure to this substance can harm you.

When a substance is released either from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment. Such a release does not always lead to exposure. You can be exposed to a substance only when you contact it-by breathing, eating, or drinking the substance or by skin contact.

Many factors will determine whether exposure to hydrogen sulfide will harm you. These factors include the dose (how much), the duration (how long), and the way you contact it. You also must consider any other chemicals to which you are exposed and your age, sex, diet, family traits, lifestyle, and state of health.

V W X Y Z
ATSDR RESOURCES
ToxFAQs™
ToxFAQs™ en Español
Public Health Statements
Toxicological Profiles
Minimum Risk Levels
MMGs
MHMIs
Interaction Profiles
Priority List of Hazardous Substances
Division of Toxicology

1.1 What is hydrogen sulfide?

Hydrogen sulfide (H2S) is a poisonous, flammable, colorless gas with a characteristic odor of rotten eggs. Other names for hydrogen sulfide include hydrosulfuric acid, sewer gas, hydrogen sulphide, and stink damp. People usually can smell hydrogen sulfide at low concentrations in air, ranging from 0.0005 to 0.3 parts per million (ppm) (0.0005-0.3 parts of hydrogen sulfide in 1 million parts of air); however, at high concentrations, a person might lose their ability to smell it. This can make hydrogen sulfide very dangerous.

Hydrogen sulfide occurs both naturally and from human-made processes. It is in the gases from volcanoes, sulfur springs, undersea vents, swamps, and stagnant bodies of water and in crude petroleum and natural gas. Hydrogen sulfide also is associated with municipal sewers and sewage treatment plants, swine containment and manure-handling operations, and pulp and paper operations. Industrial sources of hydrogen sulfide include petroleum refineries, natural gas plants, petrochemical plants, coke oven plants, food processing plants, and tanneries. Bacteria found in your mouth and gastrointestinal tract produce hydrogen sulfide from bacteria decomposing in materials that contain vegetable or animal proteins. Hydrogen sulfide is one of the principal components in the natural sulfur cycle.

back to top

1.2 What happens to hydrogen sulfide when it enters the environment?

Hydrogen sulfide is released primarily as a gas and spreads in the air. However, in some instances, it may be released in the liquid waste of an industrial facility or as the result of a natural event. When hydrogen sulfide is released as a gas, it remains in the atmosphere for an average of 18 hours. During this time, hydrogen sulfide can change into sulfur dioxide and sulfuric acid. Hydrogen sulfide is soluble in water, and is a weak acid in water.

back to top

1.3 How might I be exposed to hydrogen sulfide?

Your body makes small amounts of hydrogen sulfide. Hydrogen sulfide is produced by the natural bacteria in your mouth and is a component of bad breath (halitosis). Breakdown of sulfur-containing proteins by bacteria in the human intestinal tract also produces hydrogen sulfide. The levels of hydrogen sulfide in air and water are typically low. The amount of hydrogen sulfide in the air in the United States is 0.11-0.33 parts per billion (ppb) (one thousandth of a ppm). In undeveloped areas of the United States, concentrations have been reported at 0.02-0.07 ppb. The amount of hydrogen sulfide in surface water is low because hydrogen sulfide readily evaporates from water. Groundwater concentrations of hydrogen sulfide generally are less than 1 ppm; however, measured sulfur concentrations in surface and waste waters have

ranged from slightly less than 1 to 5 ppm. Household exposures to hydrogen sulfide can occur through misuse of drain cleaning materials. Hydrogen sulfide can be found in well water and formed in hot water heaters, giving tap water a rotten egg odor. Cigarette smoke and emissions from gasoline vehicles contain hydrogen sulfide. The general population can be exposed to lower levels from accidental or deliberate release of emissions from pulp and paper mills; from natural gas drilling and refining operations; and from areas high geothermal activity, such as hot springs.

People who work in certain industries can be exposed to higher levels of hydrogen sulfide than the general population. These industries include rayon textiles manufacturing, pulp and paper mills, petroleum and natural gas drilling operations, and waste water treatment plants. Workers on farms with manure storage pits or landfills can be exposed to higher levels of hydrogen sulfide than the general population. As a member of the general public, you might be exposed to higher-than-normal levels of hydrogen sulfide if you live near a waste water treatment plant, a gas and oil drilling operation, a farm with manure storage or livestock confinement facilities, or a landfill. Exposure from these sources is mainly from breathing air that contains hydrogen sulfide.

back to top

1.4 How can hydrogen sulfide enter and leave my body?

Hydrogen sulfide enters your body primarily through the air you breathe. It also can enter your body through the skin. Hydrogen sulfide is a gas, so you would not likely be exposed to it by ingestion. When you breathe air containing hydrogen sulfide or when hydrogen sulfide comes into contact with skin, it is absorbed into the blood stream and distributed throughout the body. In the body, hydrogen sulfide is primarily converted to sulfate and is excreted in the urine.

back to top

1.5 How can hydrogen sulfide affect my health?

Scientists use many tests to protect the public from harmful effects of toxic chemicals and to find ways to treat people who have been harmed.

One way to learn whether a chemical will harm people is to determine how the body absorbs, uses, and releases the chemical. For some chemicals, animal testing may be necessary. Animal testing can help identify health problems, such as cancer or birth defects. Without laboratory animals, scientists would lose a basic method for getting information needed to make wise decisions that protect public health. Scientists have the responsibility to treat research animals with care and compassion. Scientists must comply with strict animal-care guidelines because laws today protect the welfare of research animals.

Exposure to low concentrations of hydrogen sulfide may cause irritation to the eyes, nose, or throat. It may also cause difficulty in breathing for some asthmatics. Brief exposures to high concentrations of hydrogen sulfide (greater than 500 ppm) can cause a loss of consciousness. In most cases, the person appears to regain consciousness without any other effects. However, in many individuals, there may be permanent or long-term effects such as headaches, poor attention span, poor memory, and poor motor function. No health effects have been found in humans exposed to typical environmental concentrations of hydrogen sulfide (0.00011-0.00033 ppm). Deaths due to breathing in large amounts of hydrogen sulfide have been reported in a variety of different work settings, including sewers, animal processing plants, waste dumps, sludge plants, oil and gas well drilling sites, and tanks and cesspools.

Very little information is available about health problems that could occur from drinking or eating something with hydrogen sulfide in it. Scientists have no reports of people poisoned by such exposures. Pigs that ate feed containing hydrogen sulfide experienced diarrhea for a few days and lost weight after about 105 days.

Scientists have little information about what happens when you are exposed to hydrogen sulfide by getting it on your skin, although they know that care must be taken with the compressed liquefied product to avoid frostbite. Hydrogen sulfide will irritate your eyes if you are exposed to the gas. These types of exposures are more common in certain kinds of jobs.

Hydrogen sulfide has not been shown to cause cancer in humans, and its possible ability to cause cancer in animals has not been studied thoroughly. Hydrogen sulfide has not been classified for its ability to cause or not cause cancer. Scientist have some evidence that exposure to hydrogen sulfide can increase miscarriages in people, but the studies where this was reported were complicated by exposures to other chemicals and lack of information about the amount of exposure to hydrogen sulfide.

back to top

1.6 How can hydrogen sulfide affect children?

This section discusses potential health problems in people from exposures during conception to maturity (18 years of age).

Children are likely to be exposed to hydrogen sulfide in the same manner as adults, except for adults at work. However, because hydrogen sulfide is heavier than air and because children are shorter than adults, children sometimes are exposed to more hydrogen sulfide than adults. Health problems in children who have been exposed to hydrogen sulfide have not been studied much. Exposed children probably will experience effects similar to

those experienced by exposed adults. Whether children are more sensitive to hydrogen sulfide exposure than adults or whether hydrogen sulfide causes birth defects in people is not known.

back to top

1.7 How can families reduce the risk of exposure to hydrogen sulfide?

If your doctor finds you (or a family member) have been exposed to substantial amounts of hydrogen sulfide, ask whether your children also might have been exposed. Your doctor might need to ask your state health department to investigate.

Families can be exposed to more hydrogen sulfide than the general population if they live near natural or industrial sources of hydrogen sulfide, such as hot springs, manure holding tanks, or pulp and paper mills. However, their exposure levels are unlikely to approach those that sicken people exposed at work.

back to top

1.8 Is there a medical test to determine whether I have been exposed to hydrogen sulfide?

Hydrogen sulfide can be measured in exhaled air, but samples must be taken within 2 hours after exposure to be useful. A more reliable test to determine if you have been exposed to hydrogen sulfide is the measurement of thiosulfate levels in urine. This test must be done within 12 hours of exposure. Both tests require special equipment, which is not routinely available in a doctor's office. Samples can be sent to a special laboratory for the tests. These tests can tell whether you have been exposed to hydrogen sulfide, but they cannot determine exactly how much hydrogen sulfide you have been exposed to or whether harmful effects will occur.

back to top

1.9 What recommendations has the federal government made to protect human health?

The federal government develops regulations and recommendations to protect public health. Regulations can be enforced by law. EPA, the Occupational Safety and Health Administration (OSHA), and the Food and Drug Administration (FDA) are some federal agencies that develop regulations for toxic substances. Recommendations provide valuable guidelines to protect public health but cannot be enforced by law. The Agency for Toxic Substances and Disease Registry (ATSDR) and the National Institute for Occupational Safety and Health (NIOSH) of the Centers for Disease Control and Prevention (CDC) are two federal organizations that develop recommendations for toxic substances.

Regulations and recommendations can be expressed as "not-to-exceed" levels-in other words, levels of a toxic substance in air,

water, soil, or food that do not exceed critical levels that usually are based on levels that affect animals; they are then adjusted to levels that will help protect people. Sometimes these not-to-exceed levels differ among federal agencies because the agencies used different exposure times (for example, an 8-hour workday or a 24-hour day), different animal studies, or other factors.

Recommendations and regulations are updated periodically as more information becomes available. For the most current information, check with the federal agency that provides it.

OSHA has established an acceptable ceiling concentration of 20 ppm for hydrogen sulfide in the workplace, with a maximum level of 50 ppm allowed for 10 minutes maximum duration if no other measurable exposure occurs. NIOSH has set a maximum Recommended Exposure Limit (REL) ceiling value of 10 ppm for 10 minutes maximum duration.

back to top

1.10 Where can I get more information?

If you have any more questions or concerns, please contact your community or state health or environmental quality department or:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road NE, Mailstop F-32
Atlanta, GA 30333

Information line and technical assistance:

Phone: 888-422-8737
FAX: (770)-488-4178

ATSDR can also tell you the location of occupational and environmental health clinics. These clinics specialize in recognizing, evaluating, and treating illnesses resulting from exposure to hazardous substances.

To order toxicological profiles, contact:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Phone: 800-553-6847 or 703-605-6000

back to top

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2004. Toxicological profile for hydrogen sulfide (*Draft for Public Comment*). Atlanta, GA: U.S. Department of Health and Human

Services, Public Health Service.

back to top

ATSDR Information Center / ATSDRIC@cdc.gov / 1-888-422-8737

This page was updated on

ATSDR Home | Search | Index | Glossary | Contact Us
About ATSDR | News Archive | ToxFAQs | HazDat | Public Health Assessments
Privacy Policy | External Links Disclaimer | Accessibility
U.S. Department of Health and Human Services

Approval and Promulgation of Air Quality Implementation Plans; Virginia; NO_X RACT Determinations for Prince William County Lan

[Federal Register: September 9, 2004 (Volume 69, Number 174)]
[Rules and Regulations]
[Page 54578-54581]
From the Federal Register Online via GPO Access [wais.access.gpo.g
[DOCID:fr09se04-8]

ENVIRONMENTAL PROTECTION AGENCY
40 CFR Part 52
[VA156-5082a; FRL-7809-7]

Approval and Promulgation of Air Quality Implementation Plans; Virginia; NO_X RACT Determinations for Prince William County Landfill

AGENCY: Environmental Protection Agency (EPA).
ACTION: Direct final rule.

SUMMARY: EPA is taking direct final action to approve revisions tc Virginia State Implementation Plan (SIP). The revision consists of reasonably available control technology (RACT) determination, cont in an operating permit for the control of nitrogen oxides (NO_X) from Prince William County Landfill, Registration No. 72340, located in Prince William County, Virginia. EPA is approvir

[[Page 54579]]

these revisions in accordance with the requirements of the Clean A

DATES: This rule is effective on November 8, 2004, without further notice, unless EPA receives adverse written comment by October 12, 2004. If EPA receives such comments, it will publish a timely withdrawal of the direct final rule in the Federal Register and in the public that the rule will not take effect.

ADDRESSES: Submit your comments, identified by VA156-5082 by one c following methods:

A. Federal eRulemaking Portal: http://www.regulations.gov. EXT

Follow the on-line instructions for submitting comments.

B. E-mail: morris.makeba@epa.gov.

C. Mail: Makeba Morris, Chief, Air Quality Planning Branch, Mailcode 3AP21, U.S. Environmental Protection Agency, Region III, Arch Street, Philadelphia, Pennsylvania 19103.

D. Hand Delivery: At the previously-listed EPA Region III addr Such deliveries are only accepted during the Docket's normal hours operation, and special arrangements should be made for deliveries boxed information.

Instructions: Direct your comments to Docket ID No. VA156-5082 EPA's policy is that all comments received will be included in the public docket without change, including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Do not submit information tha consider to be CBI or otherwise protected through regulations.gov mail. The Federal regulations.gov Web site is an ``anonymous acces system, which means EPA will not know your identity or contact information unless you provide it in the body of your comment. If send an e-mail comment directly to EPA without going through regulations.gov, your e-mail address will be automatically capture included as part of the comment that is placed in the public docke made available on the Internet. If you submit an electronic commer EPA recommends that you include your name and other contact inform in the body of your comment and with any disk or CD-ROM you submit EPA cannot read your comment due to technical difficulties and car contact you for clarification, EPA may not be able to consider you comment. Electronic files should avoid the use of special characte any form of encryption, and be free of any defects or viruses.

Copies of the documents relevant to this action are available public inspection during normal business hours at the Air Protecti Division, U.S. Environmental Protection Agency, Region III, 1650 A Street, Philadelphia, Pennsylvania 19103; and Commonwealth of Virg Department of Environmental Quality, 629 East Main Street, Richmor Virginia 23219.

FOR FURTHER INFORMATION CONTACT: Betty Harris, (215) 814-2168, or mail at harris.betty@epa.gov.

SUPPLEMENTARY INFORMATION:

I. Background

On April 23, 2004, the Commonwealth of Virginia submitted a fc revision to its State Implementation Plan (SIP). The SIP revision consists of a RACT determination, contained in a permit to operate the control of NO_x from Prince William County Landfill, Registration No. 72340, located in Prince William County, Virginia

II. Summary of SIP Revision

Prince William County Landfill, Registration No. 72340

Prince William County Landfill, located in Prince William Cour Virginia operates a municipal solid waste landfill. The Virginia Department of Environmental Quality (VADEQ) submitted a permit to operate for the landfill. This permit implements RACT requirements the following: (a) Two (2) Caterpillar Model 3516 Inter-cooled Tur Charged Lean Burn Engines with Air-to-Fuel Controllers, each rated 1340 BHp and (b) One (1) LFG Specialties Model EF8.545I10 Enclosed

Flare rated at 2000 scfm. The landfill equipment shall be construc so as to allow for emissions testing upon reasonable notice at any time, using appropriate methods. Test ports shall be provided wher requested in accordance with the applicable performance specificat in 40 CFR part 60, Appendix A.

Emission Controls

Emissions of NO_X from the two Caterpillar engines shall be controlled through the use of spark-ignited, inter-cooled, turb charged lean burn internal combustion engines with automatic air t fuel ratio control. Emissions of NO_X from the LFG Specialties enclosed flare shall be controlled by maintaining a retention time of at least 0.6 seconds, a minimum temperature of 1 [deg]F, auto combustion air control, automatic shutoff gas valve, automatic re-start system. All control devices shall be provided v adequate access for inspection and shall be in operation when the engines and flare are operating.

Monitoring Devices

The Caterpillar engines shall be equipped with a device to continuously measure and record the temperature in the exhaust manifold. The enclosed flare shall be equipped with a device to continuously measure and record the combustion temperature in the flare. Each monitoring device shall be installed, maintained, calibrated and operated in accordance with approved procedures whi shall include, as a minimum, the manufacturer's written requiremer recommendations. Each monitoring device shall be provided with ade access for inspection and shall be in operation when the engines a the enclosed flare are operating.

Emission Limits

NO_X emissions from the operation of each of the two Caterpillar engines shall not exceed 1.2 g/Bhp-hr. NO_X emissions from the operation of the LFG Specialties enclosed flare shall not exceed 0.06 lb/MMBtu.

Compliance Demonstration

Initial performance tests shall be conducted for NO_X on each of the Caterpillar engines and the enclosed flare to determir compliance with the emission limits. The facility shall demonstrat compliance by November 1, 2005. Tests shall be conducted and repor and data reduced as set forth in 9 VAC 5-50-30, and the test methc and procedures contained in each applicable section or subpart lis in 9 VAC 5-50-410.

On Site Records

The landfill shall maintain records of emission data and opera parameters as necessary to demonstrate compliance with this permit These records shall include, but not limited to: (a) The total amc of NO_2, emitted from the facility, calculated monthly as the sum of each consecutive 12 month period, (b) annual throughput of landfill gas to the engines and the flare, calculated monthly as t sum of each consecutive 12 month period, (c) monthly hours of oper

and maintenance performed upon each of the engines and the flare, the manufacturer's documentation for the operation, maintenance ar specifications as required. These records shall be available for inspection by VADEQ and shall be current for the most recent 5 yea

[[Page 54580]]

III. EPA's Evaluation of the SIP Revisions

EPA is approving this SIP submittal because the Commonwealth established and imposed requirements in accordance with the criter set forth in SIP-approved regulations for imposing RACT. The Commonwealth has also imposed recordkeeping, monitoring, and testi requirements on these sources sufficient to determine compliance v these requirements.

IV. General Information Pertaining to SIP Submittals From the Commonwealth of Virginia

In 1995, Virginia adopted legislation that provides, subject t certain conditions, for an environmental assessment (audit) ``privilege'' for voluntary compliance evaluations performed by a regulated entity. The legislation further addresses the relative b of proof for parties either asserting the privilege or seeking disclosure of documents for which the privilege is claimed. Virgir legislation also provides, subject to certain conditions, for a pe waiver for violations of environmental laws when a regulated entit discovers such violations pursuant to a voluntary compliance evalu and voluntarily discloses such violations to the Commonwealth and prompt and appropriate measures to remedy the violations. Virginia Voluntary Environmental Assessment Privilege Law, Va. Code Sec. 10 1198, provides a privilege that protects from disclosure documents information about the content of those documents that are the prod of a voluntary environmental assessment. The Privilege Law does nc extend to documents or information: (1) That are generated or deve before the commencement of a voluntary environmental assessment; (that are prepared independently of the assessment process; (3) tha demonstrate a clear, imminent and substantial danger to the public health or environment; or (4) that are required by law.

On January 12, 1998, the Commonwealth of Virginia Office of th Attorney General provided a legal opinion that states that the Privilege law, Va. Code Sec. 10.1-1198, precludes granting a privi to documents and information ``required by law,'' including docume and information ``required by Federal law to maintain program delegation, authorization or approval,'' since Virginia must ``enf Federally authorized environmental programs in a manner that is nc stringent than their Federal counterparts. * * *'' The opinion concludes that ``[r]egarding Sec. 10.1-1198, therefore, documents other information needed for civil or criminal enforcement under c these programs could not be privileged because such documents and information are essential to pursuing enforcement in a manner requ by Federal law to maintain program delegation, authorization or ap

Virginia's Immunity law, Va. Code Sec. 10.1-1199, provides tha ``[t]o the extent consistent with requirements imposed by Federal law,'' any person making a voluntary disclosure of information to State agency regarding a violation of an environmental statute, regulation, permit, or administrative order is granted immunity fr administrative or civil penalty. The Attorney General's January 12 1998 opinion states that the quoted language renders this statute inapplicable to enforcement of any federally authorized programs,

``no immunity could be afforded from administrative, civil, or cri penalties because granting such immunity would not be consistent v Federal law, which is one of the criteria for immunity.''

Therefore, EPA has determined that Virginia's Privilege and Immunity statutes will not preclude the Commonwealth from enforcir program consistent with the Federal requirements. In any event, be EPA has also determined that a state audit privilege and immunity can affect only State enforcement and cannot have any impact on Fe enforcement authorities, EPA may at any time invoke its authority the Clean Air Act, including, for example, sections 113, 167, 205, or 213, to enforce the requirements or prohibitions of the State p independently of any State enforcement effort. In addition, citize enforcement under section 304 of the Clean Air Act is likewise unaffected by this, or any, State audit privilege or immunity law.

V. Final Action

EPA is approving revisions to the Commonwealth of Virginia's S which establish and require NO_x RACT for Prince William County Landfill. EPA is publishing this rule without prior proposa because the Agency views this as a noncontroversial amendment and anticipates no adverse comment. However, in the ``Proposed Rules'' section of today's Federal Register, EPA is publishing a separate document that will serve as the proposal to approve the SIP revisi adverse comments are filed. This rule will be effective on Novembe 2004, without further notice unless EPA receives adverse comment b October 12, 2004. If EPA receives adverse comment, EPA will publis timely withdrawal in the Federal Register informing the public tha rule will not take effect. EPA will address all public comments ir subsequent final rule based on the proposed rule. EPA will not institute a second comment period on this action. Any parties interested in commenting must do so at this time.

VI. Statutory and Executive Order Reviews

A. General Requirements

Under Executive Order 12866 (58 FR 51735, October 4, 1993), th action is not a ``significant regulatory action'' and therefore is subject to review by the Office of Management and Budget. For this reason, this action is also not subject to Executive Order 13211, ``Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use'' (66 FR 28355, May 22, 2001). This a merely approves State law as meeting Federal requirements and impc no additional requirements beyond those imposed by State law. Accordingly, the Administrator certifies that this rule will not h significant economic impact on a substantial number of small entit under the Regulatory Flexibility Act (5 U.S.C. 601 et seq.). Becau this rule approves pre-existing requirements under State law and d not impose any additional enforceable duty beyond that required by State law, it does not contain any unfunded mandate or significant uniquely affect small governments, as described in the Unfunded Mandates Reform Act of 1995 (Pub. L. 104-4). This rule also does n have tribal implications because it will not have a substantial di effect on one or more Indian tribes, on the relationship between t Federal government and Indian tribes, or on the distribution of pc and responsibilities between the Federal government and Indian tri as specified by Executive Order 13175 (59 FR 22951, November 9, 2(This action also does not have federalism implications because it not have substantial direct effects on the States, on the relatior

between the national government and the States, or on the distribu of power and responsibilities among the various levels of governme as specified in Executive Order 13132 (64 FR 43255, August 10, 19 This action merely approves a State rule implementing a Federal standard, and does not alter the relationship or the distribution

[[Page 54581]]

and responsibilities established in the Clean Air Act. This rule a is not subject to Executive Order 13045 ``Protection of Children f Environmental Health Risks and Safety Risks'' (62 FR 19885, April 1997), because it is not economically significant.

In reviewing SIP submissions, EPA's role is to approve State choices, provided that they meet the criteria of the Clean Air Act this context, in the absence of a prior existing requirement for t State to use voluntary consensus standards (VCS), EPA has no authc to disapprove a SIP submission for failure to use VCS. It would th inconsistent with applicable law for EPA, when it reviews a SIP submission, to use VCS in place of a SIP submission that otherwise satisfies the provisions of the Clean Air Act. Thus, the requireme of section 12(d) of the National Technology Transfer and Advanceme Act of 1995 (15 U.S.C. 272 note) do not apply. This rule does not impose an information collection burden under the provisions of th Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.).

B. Submission to Congress and the Comptroller General

The Congressional Review Act, 5 U.S.C. 801 et seq., as added b Small Business Regulatory Enforcement Fairness Act of 1996, genera provides that before a rule may take effect, the agency promulgati the rule must submit a rule report, which includes a copy of the r to each House of the Congress and to the Comptroller General of th United States. Section 804 exempts from section 801 the following of rules: (1) Rules of particular applicability; (2) rules relatir agency management or personnel; and (3) rules of agency organizati procedure, or practice that do not substantially affect the rights obligations of non-agency parties. 5 U.S.C. 804(3). EPA is not rec to submit a rule report regarding today's action under section 801 because this is a rule of particular applicability establishing sc specific requirements for Prince William County Landfill located i Prince William County, Virginia.

C. Petitions for Judicial Review

Under section 307(b)(1) of the Clean Air Act, petitions for judicial review of this action must be filed in the United States of Appeals for the appropriate circuit by November 8, 2004. Filing petition for reconsideration by the Administrator of this final ru does not affect the finality of this rule for the purposes of judi review nor does it extend the time within which a petition for juc review may be filed, and shall not postpone the effectiveness of s rule or action. This action may not be challenged later in proceed to enforce its requirements. (See section 307(b)(2).)

List of Subjects in 40 CFR Part 52

Environmental protection, Air pollution control, Nitrogen dio> Ozone, Reporting and recordkeeping requirements.

Dated: August 26, 2004.

Richard J. Kampf,
Acting Regional Administrator, Region III.

• 40 CFR part 52 is amended as follows:

PART 52--[AMENDED]

• 1. The authority citation for part 52 continues to read as follc

Authority: 42 U.S.C. 7401 et seq.

Subpart VV--Virginia

• 2. Section 52.2420, the table in paragraph (d) is amended by adc entry for Prince William County Landfill at the end of the table t read as follows:

Sec. 52.2420 Identification of plan.

* * * * *
(d) * * *

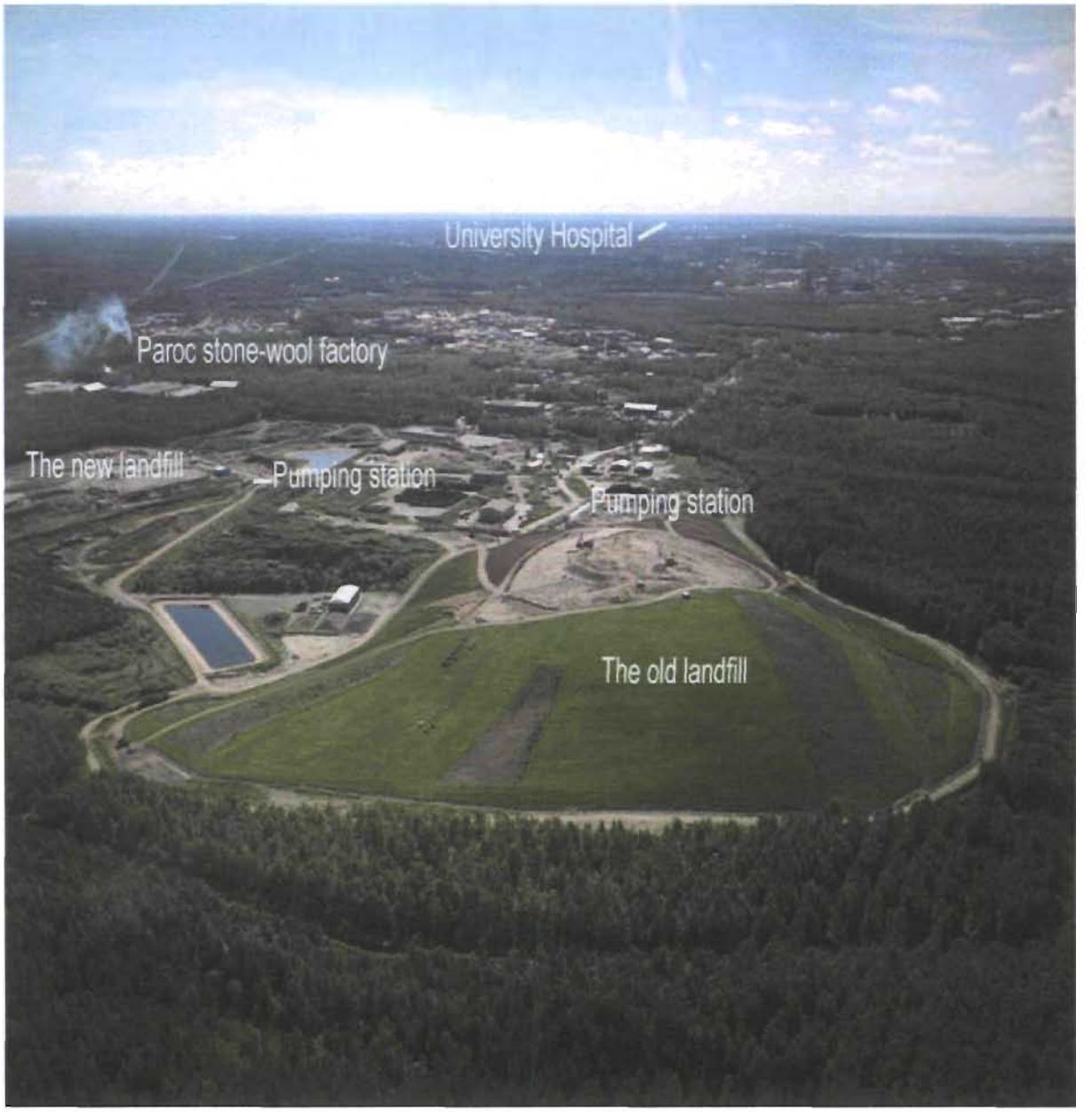
EPA-Approved Virginia Source-Specific F

Source name	Permit/order or registration number	State effective date
* * * * * * *		
Prince William County Landfill...	Registration No. 72340.	04/16/(

[FR Doc. 04-20130 Filed 9-8-04; 8:45 am]
BILLING CODE 6560-50-P

Oulu Municipal Solid Waste Management's Landfill Gas (LFG) Utilization Project: Converting a Liability into an Asset.

Rusko Landfill



Prepared by Charles Hayles

Oulu Municipal Solid Waste Management (Oulun Jätehuolto)
Ruskonniityntie 10
90630 OULU
FINLAND

Tel.: +358 8 5584 3952
E-mail: jatehuolto@ouka.fi
Internet: http://www.ouka.fi/jatehuolto

Introduction

As municipal solid waste is being generated in increasing amounts, there is a greater need to reduce waste volumes heading for landfills. By 2020, substantial amount of organic waste materials in Europe will be diverted from landfills and recycled or recovered as energy, this in consistent with the European Union's Directive on landfill. For waste management, the ban on disposal of biodegradable organic waste at landfills will be the most important driving force in the near-future, requiring greater capacity in waste-to-energy (WTE) facilities.

One of the main objectives for such strict targets for reducing the quantity of biodegradable municipal waste (BMW) disposed of at landfills is to reduce the amount of greenhouse gases (methane, in this case) caused by the decomposition of organic wastes interred at landfills, being emitted into the atmosphere. This means that for landfills receiving biodegradable municipal waste, measures must be taken to control the accumulation and migration of landfill gas (LFG). Landfill gas must be collected, treated and, to the extent possible, used.

This has much significance from both an environmental and energy point of view. The utilization of landfill gas, a renewable form of energy, presents an opportunity for municipal solid waste operators to not only earn venue, but also to become self-reliant in energy. The control and use of landfill gas reduces the emissions of methane (CH_4) into the atmosphere. Methane is a potent greenhouse gas (GHG) having 21 times the global warming potential of carbon dioxide (CO_2). Landfills are one of the greatest sources of anthropogenic methane. The utilization of landfill gas also helps to control odour, an intrinsic problem at landfills.

This article highlights Oulu Solid Waste Management's landfill gas to energy (LFGTE) programme at its Rusko landfill site in Oulu, where since 1997 landfill gas has been collected and utilized, converting, so to speak, a liability into an asset. Also presented is an overview of LFG generation and collection at landfill.

Oulu Municipal Solid Waste Management (Oulun Jätehuolto)

Oulu Municipal Solid Waste Management is a statutory body under the jurisdiction of the City of Oulu; it has functioned as such since 1995. Situated in Rusko, 7 kilometres to the northeast of the City, Oulu Municipal Solid Waste Management has for the past 25 years operated the only municipal landfill in Oulu. The total area of its Rusko landfill site, including a green belt, is 93 hectares; it is one of the biggest landfills in Finland. The Rusko landfill site, where landfill operation began in the 1960's, is a land mark in its own right: at 52 meters (about 170.60 feet) above sea level it is the highest point in Oulu.

Oulu Municipal Solid Waste Management, which handles waste from 14 municipalities with a population of over 220 000, operates a modern municipal solid waste (MSW) facility, adhering strictly to environmental procedures and regulations: in October 2005, Oulu Municipal Solid waste Management was accredited with an ISO 14001-Standard certificate by ***SP Sveriges Provnings- och Forskningsinstitut AB*** of Sweden.

Landfilling is Oulu Solid Waste Management's main operation, however it also undertakes composting, recycling, and hazardous waste treatment operations. Public relation work relating to issues such as waste reduction and collection within these municipalities are also integral part of the service provided by Oulu Municipal Solid Waste Management.

In line with present municipal solid waste management regulations, Oulu Municipal Solid Waste Management's operations are not subsidized. Its revenue comes solely from municipal solid waste services provided such as gate fee for tipping at landfill and the sale of landfill gas. Total revenue earned in 2005 amounted to €8,004,584, of which landfill gas sale accounted for €476,141. During the same period, €2,910,071 was paid as landfill tax.

Constructions, industrial, hazardous, and residual wastes, along with bio-waste are the main types of wastes handled. About 60,000 tonne of residual waste and 30,000 tonne of construction waste are handled yearly.

The collecting and pumping of landfill gas is an integral part of Oulu Municipal Solid Waste Management's operations at Rusko. The Rusko landfill site, which holds the second largest reserve of landfill gas

(LFG) in Finland, began collecting and pumping landfill gas in 1997. Presently, there are two pumping stations in operation with a production rate of 6,700,000 Nm^3 per year. All the gas collected is presently utilized in generating process steam at Oulu University Hospital, industrial heat at the nearby Paroc factory which manufactures stone-wool insulation, and space heating at the waste management site in Rusko.

Presently, contract has been signed for the installation of a microturbine plant comprising of three (3) Capstone CR-65kW microturbines to generate 195 - 200kW of electricity and 300kW of heat using landfill gas. The plant, which will begin operation at the end of September 2006, will be linked to the local electricity grid, providing the possibility to sell any excess electricity that may be generated.

The rehabilitation of closed landfill sites is an integral part of solid waste management operations. In 2005, the old landfill site, now closed and having an area of 12 hectares and containing 2 million cubic metre of waste, has been landscaped. It's planned to facilitate during winter free-time sporting activities such as skiing, and in summer, hiking and bird-watching, among other things

Municipal Solid Waste Management is an integral part of any modern society, providing an important service to the community. This service, unfortunately, is grossly undervalued and even taken for granted. Operations at landfills, in particular, are still stigmatised and grossly misunderstood by a substantial percentage of the general public. Towards this end, Oulu Municipal Solid Waste Management through its public relation campaigns has been working to bridge this gap, to reduce misunderstanding and long-held prejudices regarding municipal solid waste operations, in general, and landfill, in particular.

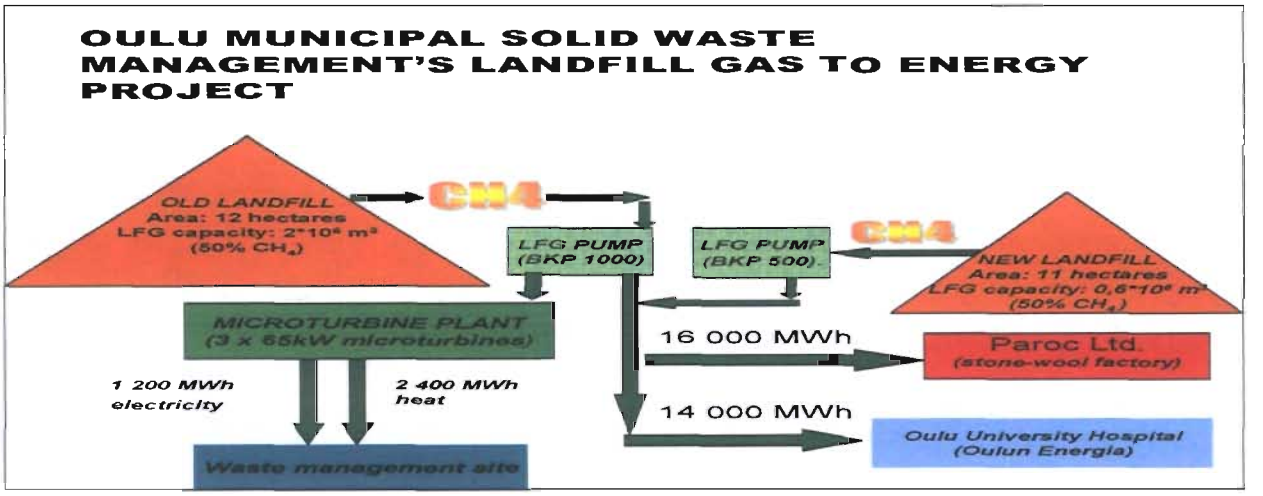


Figure 1: Scheme of Oulu Municipal Solid Waste Management's LFGTE Project. *As of fall 2006, Oulu Municipal Solid Waste Management will utilize landfill gas to generate electricity and heat at its Rusko landfill site. A plant, consisting of three (3) Capstone 65kW microturbines and costing €400,000, will generate 195-200kW$_e$ and 300kW$_{th}$, enough energy to heat and light 60 single-family homes yearly. The plant will also be connected to the local electricity grid, providing the possibility to sell excess electricity generated.*

Landfill Gas (LFG) Generation

A driving force in the development, operation and closure of a landfill is the waste decomposition process. Present municipal solid waste (MSW) stream contains a large proportion of organic materials that naturally decompose when landfilled generating what is commonly know as landfill gas (LFG). The decomposition process initially is aerobic, however after the oxygen within the waste profile is consumed, it switches over to anaerobic processes. In the aerobic process, the main gaseous product is carbon dioxide (CO_2). In the anaerobic process, carbon dioxide and methane (CH_4) are produced in a 50-50 ratio.

Bacterial decomposition, volatilisation, and chemical reactions, are the processes responsible for the formation of landfill gas. Most landfill gas is produced by bacterial

decomposition, which occurs when organic waste is broken down by bacteria naturally present in the waste and the soil used to cover the landfill. Bacteria decompose organic waste in four phases, and the composition of the gas changes during each phase (Figure 2). Landfill gases can also be formed when certain waste, particular organic compounds, change from a liquid or solid into vapour. This process is known as volatilisation. Non-methane organic compounds (NMOCs) in landfill gas may be the result of volatilisation of certain chemicals disposed of in the landfill. Finally, landfill gas, including NMOCs, can also be formed by the reactions of certain chemicals present in the waste.

By volume, landfill gas typically contains 45% to 60% methane (CH_4) and 40% to 60% carbon dioxide (CO_2); these are the two most important components of the gaseous mixture. Landfill gas also includes small amounts of nitrogen, hydrogen, carbon monoxide (all odourless, colourless gasses), along with ammonia, sulphides and non-methane organic compounds (NMOCs). Sulphides and NMOCs, while proportionally small, are mainly responsible for odour problem at landfills. Sulphides, mainly hydrogen sulphide, along with mercaptans, are naturally occurring gases that give the landfill gas mixture its rotten-egg smell. Non-methane organic compounds occur naturally or may be formed by synthetic chemical processes. NMOCs most commonly found in landfills include benzene, hexane, dichloromethane, toluene, methyl ethyl ketone and xylenes.

Factors Affecting Landfill Gas Production

The rate and volume of LFG produced at landfill sites depend on the characteristics of the waste (e.g. composition and age of the refuse) and a number of environmental factors such as presence of oxygen in the landfill, moisture content, pH and temperature. Under optimum conditions, one tonne of waste can produce up to 150-200m^3 of gas. The greater the amount of organic waste present in a landfill, the more landfill gas (i.e. methane, carbon dioxide, nitrogen, and hydrogen sulphide) is produced by the bacteria during decomposition. The more chemicals disposed of in landfill, the more likely NMOCs and other gases will be produced either through volatilisation or chemical reactions. Generally, more recently buried waste produces more landfill gas through decomposition, volatilisation, and chemical reactions than older waste (waste buried more than 10 years). Landfill gas may begin generating at landfills half year after the interment of the waste, with peak gas production usually occurring from 5 to 7 years after the waste is interred.

Only when the oxygen is used up by the aerobic bacteria will anaerobic bacteria begin to produce methane. Consequently, if waste is loosely buried or frequently disturbed, more oxygen is available, so oxygen-dependent bacteria (aerobic bacteria) live longer and produce carbon dioxide and water for longer periods. However, if the waste is highly compacted, methane production will begin earlier as the aerobic bacteria are replaced by methane reducing bacteria.

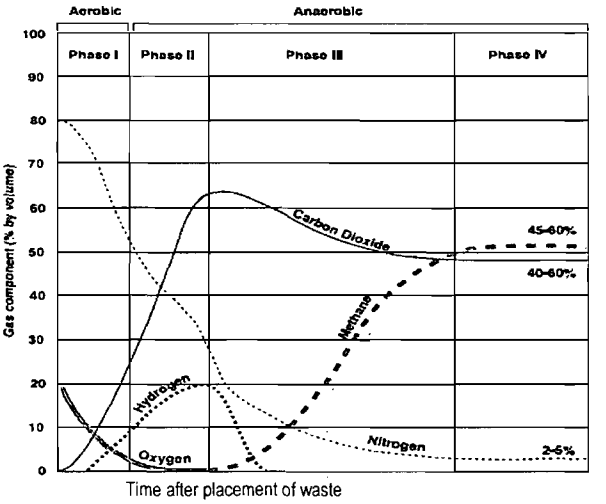


***Figure 2**: Production Phases of Typical Landfill Gas (EPA 1997). Only when oxygen is used up by the aerobic bacteria will anaerobic bacteria begin to produce methane in the landfill.*

The rise in the landfill's temperature increases bacterial activity resulting in increased gas production. Colder temperatures inhibit bacterial activity. Typically, bacterial activity drops off dramatically below 10°C. Weather changes have a far greater effect on gas production in shallow landfills. Temperature increases also promote volatilisation and chemical reactions.

Other important factors affecting the production of landfill gas are pH and moisture. Optimum pH value for

anaerobic digestion range from 6,4 to 7,4. The pH value in landfills may be influenced by industrial waste discharge, alkalinity, and clear water infiltration. The average pH in a landfill doesn't drop below 6,2 when methane is produced.

Landfill Gas Control and Extraction Systems

The movement of landfill gas in a landfill occurs by two basic processes: convention (movement in response to pressure gradient and diffusion (movement from areas of high concentration to regions of lower concentration). Methane is lighter than air and so tends to move vertically and escape to the atmosphere. However, cover material on a landfill causes enough resistance to encourage lateral movement of the landfill gas. Migration control is necessary. If migration control is the only consideration, then collection wells are normally located around the boundary of the landfill. In most cases, however, the gas is routed to one or more locations to be vented, flared or recovered for energy application. It may be necessary to have two separate collection system; one for migration control and another for gas recovery and utilization.

The drilling and installing of extraction wells is one of the first steps in the construction of a new gas recovery system. Extraction wells can be designed to permit gas recovery at selected depth intervals. The gas withdrawn at each well is collected at a central point by means of a pipe network. A compressor unit is normally the source of the applied suction and the central point to which gas is collected. The gas recovered from a landfill is normally saturated with moisture, which has to be removed. Depending on the final use of the gas, other contaminants in the gas such as siloxanes, carbon dioxide and hydrogen sulphide may also have to be removed.

The presence of moisture in a landfill increases gas production because it encourages bacterial decomposition. Moisture promotes chemical reactions that produce gases.

Presently, with the increasing application of microturbine at landfill sites to generate energy, the problem of siloxanes in LFG is being given much attention. Siloxanes are a family of man-made organic compounds containing silicon, oxygen, and methyl groups used in the manufacture of personal hygiene, health care, and industrial products. As a consequence of siloxanes widespread use they are found in landfills, where low molecular weight siloxanes volatile into landfill gas.

To prevent damage to the turbine, siloxanes must be filtered from landfill gas. When landfill gas is combusted to generate energy, siloxanes are converted to silicon dioxide (SiO_2), i.e., silica. In the microturbine, silica particles travel with the exhaust gases at high speed through the nozzle vanes into the turbine wheel, exiting through the recuperator and heat exchanger. Over time, the abrasive particles cause erosion of some of the metal surfaces they contact. Silica may also plug the very small passage of the recuperator.

Collecting and Pumping LFG at Rusko Landfill Site

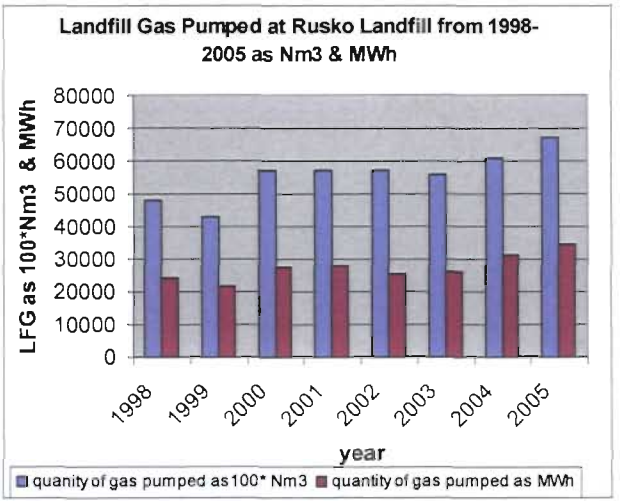
The collecting and pumping of landfill at Rusko landfill site began in 1997. Presently, there are two landfill sites: the old-landfill, now closed, and an extended area, or new-landfill, with a total of 35 vertically drilled collection wells feeding two pumping stations, one situated on the old-landfill site, the other on the extended or new-landfill site. There are 25 collection wells at varying depths of 10-20 meters on the old-landfill site. On the new landfill site, from which collection and pumping began in 2003, there are ten (10) wells; a further four new wells will be constructed in summer 2006.

The collection rate of methane from the old-landfill site is 800m^3/h. The rate of methane being emitted into the atmosphere is estimated at 200m^3/h. From the new-landfill, methane collection rate is about 200m^3/h, with an estimated atmospheric emission rate of 60m^3/h.

In 2005, 6,7million Nm^3 of methane was pumped at Rusko landfill. This is equivalent to 34440MWh of energy of which 33566MWh was sold to Paroc Ltd (heat) and Oulu Energia (process steam); 874MWh was used for

space heating at the landfill site. The quantity of landfill gas collected has progressively increased from year to year at Rusko: presently, leachate is being regularly pumped back into the landfill, providing moisture and increasing decomposition and, significantly, landfill gas production.

Table1: *Quantity of LFG Pumped at Rusko Landfill from 1998 to 2005. The average proportion of CH_4 in the gas is about 50%.*



Pumping installations at Rusko landfill site, which consist of equipment for pumping and conditioning – moisture removal, drying and filtering – the gas, are unmanned and fully automated. The operation of the plants, which includes the monitoring of all important measurements and variables, is followed using PC monitors, by which data may be checked graphically and numerically. Operation maybe checked remotely.

Figure 3: *PC monitor by which the functioning of the plant can be followed both graphically and numerically. The plants are unmanned and fully automated.*

The basic equipment of the plants consist of compressors (rotary piston blower), water chillers (moisture remover), water separators, and gas filters. The objective of the plants, basically, is to maintain safely, enough low pressure in the input (suction) pipes so that the gas will flow controllable through the system.

Figure 4: *Gas Measurement Lines (20 lines). CH_4, CO_2, and O_2 flow and composition measurements are taken from each line once or twice a month.*

A major problem with landfill gas is that it saturated with water - conditioning of the gas is necessary. Water is separated from the gas in the water separator. After which the gas flows up into measurement lines (20 lines), from which the composition and flow rate of the landfill gas (CH_4, CO_2, O_2) are measured. Measurements are taken once or twice per month, or as is necessary, from each line. By means of these data, the pumping power is tuned so as to obtain optimum fuel power from the gas.

Figure 5: *Water chiller unit, utilizing refrigeration principles, used for drying the gas. The picture shows the housing for the pumping plant on the new-landfill site. The plant has a capacity of 500Nm^3/h.*

From the measurement lines the gas flows into a central collection line and unto a second water separator, where the objective here is to remove as much moisture and large solid particles as possible. The gas then flows through a filter and a self-sealing value unto the pump – a rotary piston blower. The pressurized gas flows to the water chiller unit, which operates on refrigeration principles, where it is dried.

After conditioning, the gas is pumped to customers at Paroc stone–wool insulation plant, 1.2 kilometres away, where it is used as industrial heat and space heating, and to Oulu University Hospital, a further seven (7) kilometres away, where is it used as process steam for sterilization purposes.

Timeline of Oulu Municipal Solid Waste Management's LFGTE Project

1995: Sarlin-Hydor Ltd. is contracted to carry out landfill gas (LFG) tests at Rusko landfill site. Results showed that there is significant formation of LFG.

1996: Utilizing five (5) collection wells, test pumping is carried out. Landfill gas potential capacity at Rusko is estimated at 9 million m^3 per year, of which over 6 million m^3 is collectable.

Oulu Municipal Solid Waste Management begins negotiations with Paroc Ltd., an adjacent stone-wool insulation factory, situated just over a kilometre away, for the sale of landfill gas.

Figure 6: *Oulu Municipal Solid Waste Management's Rusko landfill site 250kW central heating unit. In 2005, 874MWh of LFG was used for space heating at Rusko landfill site.*

1997: Contract is signed with Sarlin-Hydor Ltd. to construct a LFG collecting and pumping plant – gas wells, pumping station and a flare unit.

Both flare and pumping station began operation in the fall. Capacities of the pumping station and flare unit are 1000 Nm^3 /h and 700 - 3750 kW, respectively.

One thousand two hundred meters (i.e. a 1200m pipeline with diameter varying between 160-200mm) of gas pipeline is laid by Sarlin-Hydor Ltd. to transfer LFG (CH_4) to Paroc factory.

Pumping of landfill gas from Rusko begins officially.

Figure 7: Paroc Ltd. Space Heating Unit*. Paroc stone-wool factory, an intensive energy user, utilizes LFG as the main fuel in its operation - stone is smelted in manufacturing insulation used for construction purposes.*

1998: Paroc stone-wool factory, using refitted burners, commenced firing LFG (methane) as its main fuel, with oil as spare fuel.

Oulu Municipal Solid Waste Management installed a new 250kW central heating unit utilizing LFG as fuel to provide energy for space heating.

1999: Paroc Ltd. started using LFG for all its energy needs – including space heating.

Contract is negotiated with Oulun Energia for the sale of LFG to be used as process steam in sterilization processes at Oulu University Hospital.

Seven kilometres (7km) of 160mm diameter gas pipeline from Paroc Ltd. to Oulu University Hospital is laid by Oulun Energia.

In October Oulun Energia started firing on a continuous basis LFG in its 5MW boiler at Oulu University Hospital; heavy fuel oil and LFG are used in the same proportion.

Figure 8: *Oulun Energia's 5MW Boiler at Oulu University Hospital where LFG is used to provide process steam for sterilization purposes. Oulun Energia produces electricity and heat.*

2003: A second pumping plant with a capacity of 500Nm^3/h is constructed on the new-landfill site. Five gas lines (about 100 metres), laid 2002, and collecting LFG from the new-landfill are connected to the new plant.

2004: Five (5) new vertical collection wells are constructed on the extended or new-landfill site.

2005: The laying of gas collection lines from the five (5) new wells to the new pumping station began in December. (Due to the low methane composition in the gas, 10% CH_4, these new lines aren't yet taken into use.)

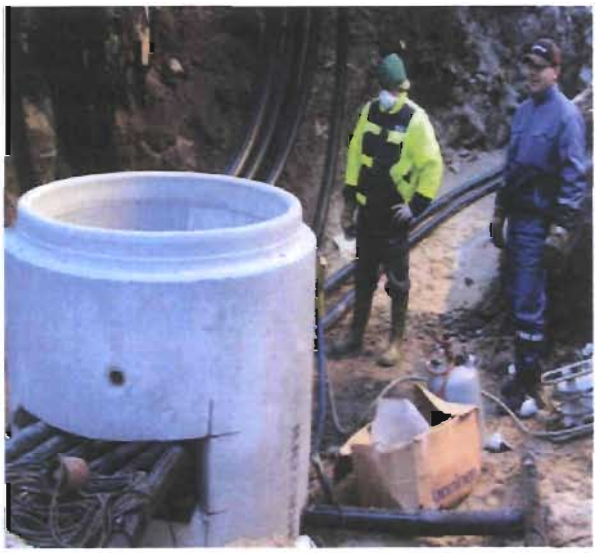


Figure 9: *The laying of gas collection lines (at the new-landfill site) to convey LGF to the pumping station (winter 2005-2006).*

2006: Oulu Municipal Solid Waste Management signed contract with Sarlin-Hydor Ltd. to construct a microturbine plant. The plant will consist of three (3) Capstone CR-65 microturbines and produce 195-200kW$_e$ and 300kW$_{th}$ firing landfill gas.

Five new collection wells are opened and connected to the second pumping station.

Four (4) new vertical wells are drilled on the new-landfill site.

Sheplak, Scott

Tues fyi: please return S.A

From: Waste Age Wire [wasteage@pbinews.com]
Sent: Monday, June 11, 2007 4:29 PM
To: Sheplak, Scott
Subject: Giant Landfill Gas-to-Energy Project Opens on Rumpke Landfill

Waste Age WIRE™

Subscribe
Unsubscribe
Preferences

From Waste Age | A Penton Media Publication

June 11, 2007 |

Content:

News

Giant Landfill Gas-to-Energy Project Opens on Rumpke Landfill
Montauk Energy Capital has opened a new landfill gas-to-energy facility at Rumpke's Sanitary Landfill in Colerain Township, Ohio. The new facility will combine with existing landfill gas (LFG) recovery infrastructure at the landfill to process up to 15 million standard cubic feet of LFG each day into natural gas.

into natural gas?

The processing capacity is the largest in the world, according to Rumpke and Montauk officials. The natural gas will be used by customers of Duke Energy.

According to statistics from the U.S. Environmental Protection Agency, the facility's gas recovery will provide annual benefits equivalent to displacing use of 135.9 million gallons of gasoline, preventing the use of 2.9 million barrels of oil, removing emissions from about 238,000 vehicles or planting roughly 339,000 acres of forest.

Connecticut Trash Executive Pleads Guilty in Federal Probe
Alan Ferraro, the owner of Tri-County Disposal in New Canaan, Conn., has pled guilty to federal racketeering charges. According to the Danbury News Times, Ferraro pleaded guilty to violating the federal Racketeer Influenced and Corrupt Organizations Act, and he could receive up to 20 years in prison when sentenced in late August. He also could be ordered to pay up to $250,000 in fines.

"Ferraro was one of 31 people arrested as a result of a wide-ranging federal probe into the garbage industry, focusing on [Danbury, Conn.-based] trash hauler James Galante," the paper says.

Advanced Disposal, Arrow Merge Alabama Operations
Jacksonville, Fla.-based Advanced Disposal Services has acquired Birmingham, Ala.-based Arrow Disposal Service Inc. The firms will combine Alabama operations, under the direction of the Advanced Disposal senior management team, into three divisions: one based in Birmingham, the other two in Montgomery, Ala., and on the Gulf Coast.

"The combination of our Alabama operations allows for greater density and market share in a high-growth area of the Southeast," said Charlie Appleby, Advanced Disposal's chairman and CEO, in a press release. "The state of Alabama has been a key marketplace for Advanced Disposal since 2001 with great opportunity for the combined operations to maximize our strengths. Arrow Disposal is a major player in the Alabama solid waste industry, and we are delighted to be joining efforts with them."

Rumpke Consolidated Companies, Inc. - Company Overview

- Rumpke is a family owned and operated company, headquartered in Cincinnati, Ohio.
- Rumpke is one of the largest privately owned waste companies in the United States providing residential, commercial, industrial and recycling services to customers in Ohio, Kentucky and Indiana.
- Brothers William and Bernard Rumpke founded the company in 1932.
- Today, Bill Rumpke, Sr. serves as the president & CEO, and Jeff Rumpke presides over Rumpke Sanitary Landfill as regional vice president.
- Rumpke employs more than 2,300 people throughout Ohio, Kentucky and Indiana, with nearly 1,500 employees in Ohio alone.
- Rumpke owns or operates nine landfills, six recycling centers and several transfer stations (facility where waste is consolidated before being hauled to landfills).

Rumpke Honors and Awards

- The Environmental Industry Association inducted Rumpke's Founders, William and Bernard, into the waste industry's Hall of Fame for their recycling efforts.
- Rumpke won the 2005 Torch Award for Marketplace Ethics from the Cincinnati Chapter of the Better Business Bureau.
- The Cincinnati Business Courier honored current President and CEO Bill Rumpke and the late Tom Rumpke as 1999 Entrepreneurs of the Year.
- Rumpke Consolidated Companies, Inc. has been recognized for its efforts as a loyal and active supporter of Keep America Beautiful organizations and several other community and organization events throughout its service area.

Contact Information:

Amanda Pratt
Corporate Communication Manager
Office: (513) 741-2637
E-mail: Amanda.Pratt@rumpke.com
Web: www.rumpke.com

We care about the environment, especially the one in your community.

RUMPKE

Fact Sheet

Rumpke Sanitary Landfill's Proposed Eastern Expansion Plans

Rumpke is proposing an eastern expansion to proactively plan for the future, low-cost waste disposal needs of the region.

Rumpke Sanitary Landfill - Current Operations

- Rumpke employs 1,160 people locally and is one of the largest employers in Colerain Township and Hamilton County.
- The landfill is open seven days a week, twenty-four hours a day. The landfill is open to residential customers Monday through Friday from 8 a.m. to 5 p.m. and Saturday 7 a.m. to Noon.
- The landfill is permitted to receive municipal solid waste (MSW) and construction demolition debris (CDD) and has a permitted waste receipt limit of 10,000 tons per day.
- The landfill operates in strict compliance with state and federal environmental regulations.
- The facility is regularly inspected or regulated by the Hamilton County General Health District, Ohio Environmental Protection Agency (EPA - Division of Solid and Infectious Waste, Division of Water and Division of Air), Ohio Department of Natural Resources (Division of Mineral Resources Management), Mine Safety Health Administration, Ohio State Fire Marshal, Occupational Safety and Health Administration and Rumpke.

Rumpke Sanitary Landfill - Site History

- The landfill has operated since 1945.
- The landfill currently operates under Ohio EPA permit 05-11554
- The current facility consists of nearly 500 acres total, with 334 acres permitted for waste disposal.
- Rumpke owns more than 800 acres at the site, much of which is used as buffer area.

footprint

Rumpke Representatives

- Jeff Rumpke, Regional Vice President
- Larry Riddle, Landfill Manager
- John Butler, Senior Site Engineer
- Jay Roberts, Director of Engineering
- Brian Krieger, Corporate Construction Manager
- Amanda Pratt, Corporate Communication Manager

The scale house and offices at RSL.

Critical Need for Landfill Expansion

- Rumpke operates the only sanitary landfills in Hamilton County. Rumpke provides waste disposal for the Greater Cincinnati region (waste from within a 50 mile radius of the landfill).
- Expansion is necessary to secure low-cost waste disposal and local and regional economic viability. Rumpke's landfill provides a vital service necessary to support the growing infrastructure of the region.
- Today, Rumpke Sanitary Landfill accepts nearly 2 million tons of waste per year. Without Rumpke Sanitary Landfill, waste hauling and disposal rates will increase and transfer stations will become necessary.
- According to research performed by Hamilton County, if Rumpke closes, residents and businesses may pay an additional $34 million a year. This will increase both business and consumer expenses.

Landfill Environmental Safeguards

- **No regional aquifer has been identified in the vicinity of the landfill.**
- The proposed eastern expansion will be constructed and operated in strict compliance with the solid waste, air and water regulations of Ohio EPA and the Hamilton County General Health District.
- The proposed landfill expansion will be constructed on competent bedrock, will employ a clay liner, as well as a geosynthetic liner system beneath all waste.
- An engineered system of leachate collection and methane gas extraction pipes and pumps operate on the landfill to remove and monitor the liquid and gas produced by the waste.
- Rumpke performs extensive ground water, surface water and gas monitoring during the life of the active landfill operation and for 30 years following its closure.
- A total of 23 surface and ground water monitoring wells surround the landfill currently.
- Once landfill cells reach their waste capacity and final grade, these cells will be capped. The landfill cap will include clay, geomembrane and a soil layer to promote vegetative cover while preventing surface erosion.
- Rumpke maintains financial assurance through bonding for the closing of the landfill and for maintaining the closed landfill for a period of 30 years after it closes.

Landfill liner system

GSF Energy operates a methane gas recovery plant at RSL. The plant provides natural gas energy for approximately 20,000 homes.

Rumpke and the Local Economy

Northwest Schools

- During 2005, the Northwest School District received more than $532,000 in local property taxes paid by Rumpke.

Colerain Township

- Rumpke paid Colerain Township nearly $655,000 during its 2005 fiscal year. Seventy-five percent of those fees were generated from landfill operations.
- In fall 2007, landfill fees will increase by 80 percent meaning Rumpke will contribute well over $1 million annually to Colerain Township.

Hamilton County

- Rumpke has a total economic impact of over $230 million dollars annually.
- Rumpke employs 1,160 people in Hamilton County producing a contribution of $53 million in household earnings annually.
- Rumpke generates $3.2 million in local government and school district revenues each year.

Rumpke in the Community

- Rumpke spends more than $100,000 annually to support non-profit, Colerain Township schools, organizations and events.
- Rumpke is a proud Partner in Education with Northwest Schools.
- Rumpke is a major sponsor of Colerain Township's Fourth of July and Taste of Colerain celebrations each year.
- Rumpke assists Keep Cincinnati Beautiful and the Colerain Township Community Association with clean-ups.
- Rumpke provides in-kind services and monetary contributions to support local organizations, such as the Colerain Police and Fire departments, the Northwest Exchange Club and the Colerain Township Business Association.
- Rumpke has teamed up with Sea World Busch Gardens to implement the Recycle Challenge program to support local school fund-raising efforts.
- Rumpke performs more than 300 landfill tours and presentations to thousands of students annually.

RUMPKE

www.rumpke.com

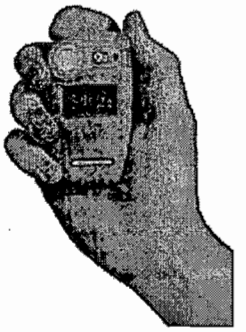
Ground water monitoring wells

Rumpke's odor control system.

Rumpke's recycling mascot, Binny welcomes grade school students to an educational session about landfills.

Rumpke and Colerain Township Fire Department team up for a training exercise.

GasMan single gas monitor



CLICK IMAGES TO ENLARGE

Single Gas Rechargeable Gas Monitor

Available for the following gases:

O2, Co, H2S, SO2, CL2, NH3, O3, NO2, HCN, F2, HF, PH3, NO, HCL, ETO

The new Gasman full function personal single gas monitor is compact and lightweight yet is fully ruggedised for the toughest of industrial environments. Featuring simple one button operation, it has a large easy to read display of gas concentration, and audible, visual and vibrating alarms.

- Versions available for combustible gas, oxygen and toxic gases
- Rechargeable versions for all gas types
- Non rechargeable versions for oxygen and toxic gases
- Ultra lightweight – just 80g for toxic versions
- Loud 95dBA audible alarm
- Dual colour visual alarm, red blue twin flashing LEDs
- Vibrating alarm
- IP65 and IP67 ingress protection
- Real time TWA and Peak display options
- Optional datalogging

Additional Info

Datasheet

Specifications

Weight	130g flammable 95g oxygen 80g toxic
Dimensions	90x48x24mm (3.5x1.9x0.95inch) HxWxD
	Flammable 0-100% LEL 20% LEL 10% LEL Oxygen 0-25% 19.5/23.5% 19.5% Hydrogen Sulphide 0-50ppm 5ppm 10ppm Carbon Monoxide 0-500ppm 30ppm 35ppm Sulphur Dioxide 0-10ppm 1ppm 2ppm Chlorine 0-5ppm 0.5ppm 0.5ppm

Available Gases and ranges	Nitrogen Dioxide 0-10ppm 1ppm 3ppm Ammonia 0-50ppm 25ppm 25ppm Ozone 0-1ppm 0,1.ppm 0.1ppm Hydrogen 0-1000ppm N/A N/A Hydrogen Cyanide 0-25ppm 5ppm 5ppm Hydrogen Chloride 0-10ppm 1ppm 1ppm Hydrogen Fluoride 0-10ppm 5ppm 5ppm Phosphine 0-5ppm 0.2ppm 0.2ppm Fluorine 0-1ppm 0.1ppm 0.1ppm Ethylene Oxide 0-10ppm 5ppm 5ppm Nitric Oxide 0-100ppm 25ppm 50ppm Other ranges and alarm levels are available on request. Each unit can have two instantaneous alarms levels set. Toxic units also have Time Weighted Average alarms. Flammable gas calibration is available for methane, propane, butane, pentane, hydrogen and ethylene as standard.
Typical response times	Flammable 20s, Toxic gas 20s, Oxygen 10s
Audible Alarms	95dBA
Visible Alarms	Dual colour red/blue flashing LEDs in gas hazard
Vibrating Alarm	Internal vibrating alarm
Display	Custom LCD with backlight, with display of gas
Display Mode	Normal display for real time gas concentration levels.
Display recall	for Peak readings and TWA.
Datalogging	Full timed datalogging with adjustable sample rate, set to 1 minute data rate. 900 hours storage at 1 minute interval. >4800 capacity event logging to record all instrument events including: Switch on/off, Battery status, Alarms activate/clear including peak values of response, Gas Test pass or fail. All events are time stamped

Gas	Qty	Price
Carbon Monoxide 0-1500 PPM	0	$330.00
Oxygen 0-25%	0	$410.00
Hydrogen Sulfide 0-100 PPM	0	$410.00
Hydrogen Sulfide 0-500 PPM	0	$330.00
Methane 0-100% LEL	0	$499.00
Propane 0-100%LEL	0	$499.00
Butane 0-100% LEL	0	$499.00
Pentane 0-100% LEL	0	$499.00
Ethylene Oxide 0-10 PPM	0	$499.00

Chlorine 0-20 PPM	0	$605.00
Flourine 0-1 PPM	0	$870.00
Hydrogen 0-100 % LEL	0	$499.00
Hydrogen Chloride 0-10 PPM	0	$870.00
Hydrogen Cyanide 0-25 PPM	0	$580.00
Hydrogen Flouride 0-10 PPM	0	$870.00
Ammonia 0-100 PPM	0	$605.00
Ammonia 0-1000 PPM	0	$605.00
Nitric Oxide 0-100 PPM	0	$510.00
Nitrogen Dioxide 0-10PPM	0	$510.00
Ozone 0-1PPM	0	$605.00
Phospine 0-5 PPM	0	$510.00
Sulfur Dioxide 0-10PPM	0	$510.00
Chlorine Dioxide 0-1PPM	0	$950.00

ADD SELECTED TO CART

SEND THIS PAGE TO A FRIEND

YOU MAY ALSO BE INTERESTED IN ...

GasAlert Extreme single gas monitor
Single Gas Monitor CO, H2S, O2, SO2, PH3, CL2, NH3, NO2, HCN, ETO, CLO2, O3, NO

Related Items in This Section

GasAlert Extreme single gas monitor
01 Series Single Gas Monitor
GasMan single gas monitor
Gas Watch single gas monitor

1900 East Golf Rd., Suite 950, Schaumburg, IL 60173
Phone: 1-877-580-3728 Fax: 630-563-4056
Email: info@jjstech.com

COMPREHENSIVE REPORT
Report Date: 07/10/2006

Facility Information

RBLC ID:	VA-0288 (final)	**Date Determination Last Updated:**	06/21/2004
Corporate/Company Name:	IDUSTRIAL POWER GENERATING CORP	**Permit Number:**	61423
Facility Name:	INGENCO	**Permit Date:**	12/17/2003 (actual)
Facility Contact:	ROBERT GREENE (804)521-3557	**FRS Number:**	110008189129
Facility Description:	THIS SOURCE IS A STATE MAJOR, ELECTRIC POWER PLANT	**SIC Code:**	4931
Permit Type:	D: Both B (Add new process to existing facility) &C (Modify process at existing facility)	**NAICS:**	221112
EPA Region:	3		
Faciliy County:	CHESAPEAKE		
Facility State:	VA		
Facility ZIP Code:	23230		
Permit Issued By:	VIRGINIA ENVIRONMENTAL QUALITY AIR DIV. (Agency Name) MR. YOGESH DOSHI (Agency Contact) (804)698-4017 YNDOSHI@DEQ.VIRGINIA.GOV		
Other Agency Contact Info:	MARGARET KEY 7705 TIMBERLAKE ROAD LYNCHBURG, VA 24502 804-582-5120		
Other Permitting Information:	SOURCE HAS REQUESTED A MODIFICATION TO THE EXISTING PERMIT FOR AN INCREASE IN YEARLY EMISSION LIMITS; THERE IS NO CHANGE TO THE EXISTING EQUIPMENT. Original permit (dated 10/16/01) is to construct and operate a dual fuel electric power plant, located at the Virginia Beach Landfill II. In case of a landfill gas treatment system malfunction, untreated landfill gas is diverted to a flare.		

Process/Pollutant Information

PROCESS NAME:	IC ENGINES, DUAL FUEL, (36)
Process Type:	17.140 (Landfill/Digester/Bio-Gas)
Primary Fuel:	LANDFILL GAS
Throughput:	550 HP
Process Notes:	36 Detroit diesel engines, arranged in 6 groups of 6 engines each. Each engine drives a 350 kW generator. Treated landfill gas input ratio is limited to < 50%, treated landfill gas input to total fuel heat input for each period of continuous dual fuel operations. Compliance with lb/mmBtu limits for PM, PM10, VOC, CO and NOx, determined by stack testing.

POLLUTANT NAME: Particulate Matter < 10 μ (PM10) **CAS Number:** PM

Emission Limit 1: 0.11 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (P) PROPER ENGINE MAINTENANCE PRACTICES

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: State regulation is basis

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 0.2020 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (P) DISTILLATE OIL FUEL SULFUR LIMITS: FOR NO. 1 OR 2 OIL: 0.2% MAX SULFUR; FOR NO. 4 OIL: 0.5% MAX SULFUR.

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: State regulation is basis

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 2.1 LB/MMBTU

Emission Limit 2:

Standard Emission: 5.05 G/B-HP-H calculated, assumes 48% efficiency

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (P) AIR-TO-FUEL RATIO CONTROL, TURBOCHARGING, CHARGE- AIR COOLING SYSTEMS, SUPPLEMENTARY INLET CHARGE- AIR WATER-TO-AIR COOLING AND OVERSIZED INLET CHARGE AND EXHAUST DUCTS.

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: State regulation is basis

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 3.2 LB/MMBTU

Emission Limit 2:

Standard Emission: 7.7 G/B-HP-H calculated, assumes 48% efficiency

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (P) FUEL LIMIT: TREATED LANDFILL GAS HEAT INPUT RATIO < 50%

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: State regulation is basis

POLLUTANT NAME: Volatile Organic Compounds (VOC) **CAS Number:** VOC

Emission Limit 1: 0.22 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (P) PROPER ENGINE MAINTENANCE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: state reg is basis

Facility Information

RBLC ID:	OH-0260 (final)	**Date Determination Last Updated:**	07/06/2005
Corporate/Company Name:	BIO-ENERGY, L.L.C.	**Permit Number:**	02-16880
Facility Name:	CARBON LIMESTONE LFG	**Permit Date:**	04/10/2003 (actual)
Facility Contact:	LESLIE M. COOK 7133003310	**FRS Number:**	110017419293
Facility Description:	16 LANDFILL GAS-FIRED (LFG) IC ENGINES, AT EXISTING LANDFILL, FOR POWER GENERATION.	**SIC Code:**	4911
Permit Type:	A: New/Greenfield Facility	**NAICS:**	221112
EPA Region:	5		
Faciliy County:	MAHONING		
Facility State:	OH		
Facility ZIP Code:	77063		
Permit Issued By:	OHIO ENVIRONMENTAL PROTECTION AGENCY (Agency Name) MS. CHERYL SUTTMAN (Agency Contact) (614)644-3617 CHERYL.SUTTMAN@EPA.STATE.OH.US		
Other Agency Contact Info:	CHERYL E. SUTTMAN 122 S. FRONT ST. COLUMBUS, OH 43215 614-644-3617		
Other Permitting Information:	THIS PTI IS A MODIFICATION TO PTI#02-14296 ISSUED 4/5/01. TESTING SHOWED THE ORIGINAL LIMITS FOR NOX AND HCL WERE TOO LOW, AND THE FACILITY WAS OUT OF COMPLIANCE. THIS ADJUSTMENT INCLUDED AN INCREASE OF 170 TONS OF NOX AND 6 TONS OF HCL. PM10, NOX, CO AND OC WERE PSD IN THE INITIAL PERMIT. THE FORMALDEHYDE LIMIT WAS REMOVED IN THIS MODIFICATION AND THE ROLLING 12-MO LIMITS WERE CHANGED TO TPY LIMITS. THE TOTAL FACILITY PM LIMIT IS 61 TONS/YR.		

Process/Pollutant Information

PROCESS NAME: IC ENGINES (16)

Process Type: 17.140 (Landfill/Digester/Bio-Gas)

Primary Fuel: LANDFILL GAS

Throughput: 14 MMBTU/H

Process Notes: SIXTEEN 14 MMBTU/H (1400 KW, 1877 HP) INTERNAL COMBUSTION ENGINES BURNING LANDFILL GAS FOR ELECTRICAL POWER. STACK TESTING WAS CONDUCTED ON ONE OF THE 16 SIMILAR UNITS, FOR NOX, CO, PM, HCL AND OCS. IT WAS FOUND THAT NOX, CO, AND HCL DID NOT MEET THE LIMITS IN THE ORIGINAL PERMIT; IT WAS MODIFIED TO INCREASE THESE LIMITS, AND RE-ISSUED ON 4/10/03. THE WAS AN INCREASE OF 170 TONS OF NOX, 79 TONS CO, AND 6 TONS OF HCL. LANDFILL GAS SHALL BE DIVERTED TO AN EXISTING LANDFILL COMBUSTOR, WHEN NOT BURNED IN THE INTERNAL COMBUSTION ENGINES. THE ALLOWABLE GAS FLOW RATE TO THE INTERNAL COMBUSTION ENGINES SHALL BE EXTABLISHED DURING THE MOST RECENT COMPLIANCE TEST; CURRENTLY THIS IS 415 SCFM.

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 4.9 LB/H

Emission Limit 2: 0.36 LB/MMBTU

Standard Emission: 0.60 G/B-HP-H

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) LEAN BURN TECHNOLOGY.

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: LIMITS ARE FOR EACH ENGINE. ANNUAL LIMIT: 21.5 T/YR. THESE LIMITS WERE CHANGED IN THE PERMIT MODIFICATION FOLLOWING THE INITIAL STACK TEST. THE ORIGINAL LIMIT COULD NOT BE MET, WAS: 2.48 LB/H AND 10.87 TPY

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 9.4 LB/H

Emission Limit 2: 0.67 LB/MMBTU

Standard Emission: 2 G/B-HP-H

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Compliance Verified: UNKNOWN
Pollutant/Compliance Notes: LIMITS ARE FOR EACH ENGINE. ANNUAL LIMIT: 41.2 T/YR.

POLLUTANT NAME: Volatile Organic Compounds (VOC) **CAS Number:** VOC

Emission Limit 1: 0.70 LB/H
Emission Limit 2: 3 T/YR
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Compliance Verified: UNKNOWN
Pollutant/Compliance Notes: LIMITS ARE FOR EACH ENGINE.

POLLUTANT NAME: Particulate Matter < 10 μ (PM10) **CAS Number:** PM

Emission Limit 1: 0.40 LB/H
Emission Limit 2: 1.7 T/YR
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Compliance Verified: UNKNOWN
Pollutant/Compliance Notes: LIMITS ARE FOR EACH ENGINE.

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 0.23 LB/H

Emission Limit 2: 1 T/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements: SIP

Control Method: (N)

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: LIMITS ARE FOR EACH ENGINE.

POLLUTANT NAME: Hydrochloric Acid **CAS Number:** 7647-01-0

Emission Limit 1: 0.13 LB/H

Emission Limit 2: 0.60 T/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements: SIP

Control Method: (N)

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: LIMITS ARE FOR EACH ENGINE.

POLLUTANT NAME: Formaldehyde **CAS Number:** 50-00-0

Emission Limit 1: LIMITATION REMOVED SEE NOTE

Emission Limit 2: LIMITATION REMOVED IN MODIFICATION

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements: N/A
Control Method: (N)
Est. % Efficiency:
Compliance Verified: UNKNOWN
Pollutant/Compliance Notes: LIMIT WAS FOR EACH ENGINE. TESTING PROVED THE LIMIT UNNECESSARY AND THIS LIMIT WAS REMOVED FROM THE PERMIT MODIFICATION.

POLLUTANT NAME: Visible Emissions (VE) **CAS Number:** VE

Emission Limit 1: 10 % OPACITY 6 minute average
Emission Limit 2:
Standard Emission: 10 % OPACITY 6 minute average
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Compliance Verified: Y
Pollutant/Compliance Notes: Limit is for each engine.

POLLUTANT NAME: Nonmethane Organic Carbon **CAS Number:** VOC

Emission Limit 1: 20 PPM @ 3% O2 as hexane
Emission Limit 2: 98 % REDUCTION
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency: 98
Compliance Verified: Y
Pollutant/Compliance Notes: Limit is for each engine.

Facility Information

RBLC ID:	CA-1022 (final)	**Date Determination Last Updated:**	01/26/2006
Corporate/Company Name:	CHINO BASIN DESALTER AUTHORITY	**Permit Number:**	388050
Facility Name:	CHINO BASIN DESALTER AUTHORITY	**Permit Date:**	06/18/2002 (actual)
Facility Contact:		**FRS Number:**	110012624972
Facility Description:		**SIC Code:**	4941
Permit Type:	A: New/Greenfield Facility	**NAICS:**	22131
EPA Region:	9		
Faciliy County:	SAN BERNARDINO		
Facility State:	CA		
Facility ZIP Code:	91710		
Permit Issued By:	SOUTH COAST AQMD, CA (Agency Name) MR. MARTIN KAY (Agency Contact) (909)396-3115 mkay@aqmd.gov		
Other Agency Contact Info:	SOUTH COAST AQMD, MARTIN KAY, (909)-396-3115, MKAY@AQMD.GOV		
Other Permitting Information:	CARB ID: 792.0, NEW CONSTR MODIFICATION: NEW CONSTRUCTION. TECH STATUS: BACT DETERMINATION. NO SOURCE TEST AVAILABLE		

Process/Pollutant Information

PROCESS NAME:	IC ENGINE, LANDFILL OR DIGESTED GAS FIRED
Process Type:	17.140 (Landfill/Digester/Bio-Gas)
Primary Fuel:	DIGESTER GAS
Throughput:	10.75 MMBTU/H
Process Notes:	ADDITIONAL THROUGHPUT: 1408 BHP. MFR: WAUKESHA, TYPE: SPARK IGINITION, 4-CYCLE, MODEL: L7042GL, FUNC EQUIP: POWER GENERATION, FUEL_TYPE: NATURAL GAS, SCHEDULE: CONTINUOUS, H/D: 24, D/W: 7, W/Y: 52.

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 0.60 G/B-HP-H 1-HR AVG

Emission Limit 2:

Standard Emission: 0.60 G/B-HP-H

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: N/A

Control Method: (P) TURBOCHARGED,INTERCOOLED,LEAN-BURN,AIR/FUEL CONTROLLER

Est. % Efficiency:

Compliance Verified: NO

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 2.5 G/B-HP-H 1-HR AVG

Emission Limit 2:

Standard Emission: 2.5 G/B-HP-H

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: N/A

Control Method: (P) TURBOCHARGED,INTERCOOLED,LEAN-BURN,AIR/FUEL CONTROLLER

Est. % Efficiency:

Compliance Verified: NO

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC) **CAS Number:** VOC

Emission Limit 1: 0.80 G/B-HP-H 1-HR AVG

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: N/A
Control Method: (P) TURBOCHARGED,INTERCOOLED,LEAN-BURN,AIR/FUEL CONTROLLER
Est. % Efficiency:
Compliance Verified: NO
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate Matter < 10 μ (PM10) **CAS Number:** PM
Emission Limit 1: 0.20 LB/H
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: N/A
Control Method: (N)
Est. % Efficiency:
Compliance Verified: NO
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Oxides (SOx) **CAS Number:** 7446
Emission Limit 1: 0.12 LB/H
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: N/A
Control Method: (N)
Est. % Efficiency:
Compliance Verified: NO
Pollutant/Compliance Notes:

Facility Information

RBLC ID:	CA-1092 (final)	**Date Determination Last Updated:**	01/04/2006
Corporate/Company Name:	MM SAN BERNARDINO ENERGY, LLC	**Permit Number:**	391009
Facility Name:	MM SAN BERNARDINO ENERGY, LLC	**Permit Date:**	05/16/2002 (actual)
Facility Contact:		**FRS Number:**	NEW, NOT FOUND
Facility Description:		**SIC Code:**	4953
Permit Type:	A: New/Greenfield Facility	**NAICS:**	562212
EPA Region:	9		
Faciliy County:	SAN BERNARDINO		
Facility State:	CA		
Facility ZIP Code:	91761		
Permit Issued By:	SOUTH COAST AQMD, CA (Agency Name) MR. MARTIN KAY (Agency Contact) (909)396-3115 mkay@aqmd.gov		
Other Agency Contact Info:	SOUTH COAST AQMD, MARTIN KAY, (909) 396-3115, MKAY@AQMD.GOV		
Other Permitting Information:	CARB ID: 795.0, OPERATING PERMIT DATE: , STARTUP DATE: NEW CONSTR MODIFICATION: NEW CONSTRUCTION TECH STATUS: BACT DETERMINATION NO SOURCE TEST AVAILABLE		

Process/Pollutant Information

PROCESS NAME:	ICE: LANDFILL OR DIGESTED GAS FIRED
Process Type:	17.140 (Landfill/Digester/Bio-Gas)
Primary Fuel:	LANDFILL GAS
Throughput:	14.70 MMBTU/H 1850 BHP
Process Notes:	EQUIP: , MFR: DUETZ, TYPE: TURBOCHARGED/INTERCOOLED, MODEL: TBG620V16K, FUNC EQUIP: POWER GENERATION, FUEL_TYPE: , SCHEDULE: CONTINUOUS, H/D: 24, D/W: 7, W/Y: 52, NOTES: PPMVD@15%O2: NOX-46, CO-360, HC-79. G/HP-HR: ROG <.02, PM-10 <.05 (BASED ON 34% (HHV) ENGINE EFFICIENCY USED BY THE MANUFACTURE IN HIS CALCULATIONS, THE PPMVD LIMITS CORRESPOND TO THE FOLLOWING G/HP-HR: NOX-0.61; CO-2.9, HC-0.36 (AS METHANE). SOURCE TEST RESULTS:

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 0.60 G/B-HP/H

Emission Limit 2:

Standard Emission: 0.60 G/B-HP/H

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: N/A

Control Method: (A) TURBOCHARGED,INTERCOOLED AIR/FUEL CONTROLLER

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 2.5 G/B-HP/H

Emission Limit 2:

Standard Emission: 2.5 G/B-HP/H

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: N/A

Control Method: (A) TURBOCHARGED,INTERCOOLED AIR/FUEL CONTROLLER

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC) **CAS Number:** VOC

Emission Limit 1: 0.80 G/B-HP/H

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: N/A
Control Method: (A) TURBOCHARGED,INTERCOOLED AIR/FUEL CONTROLLER
Est. % Efficiency:
Compliance Verified: UNKNOWN
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate Matter (PM) **CAS Number:** PM
Emission Limit 1: 0.20 LB/H
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: N/A
Control Method: (A)
Est. % Efficiency:
Compliance Verified: UNKNOWN
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Oxides (SOx) **CAS Number:** 7446
Emission Limit 1: 0.10 LB/H
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: N/A
Control Method: (N)
Est. % Efficiency:
Compliance Verified: UNKNOWN
Pollutant/Compliance Notes:

Facility Information

RBLC ID:	TX-0404 (final)	**Date Determination Last Updated:**	04/13/2005
Corporate/Company Name:	RELIANT ENERGY RENEWABLES SECURITY LP	**Permit Number:**	P791
Facility Name:	RELIANT SECURITY LFGTE	**Permit Date:**	01/31/2002 (actual)
Facility Contact:	GREG NEWMAN 7139458334	**FRS Number:**	110010496917
Facility Description:	ELECTRICITY GENERATION FROM LANDFILL GAS	**SIC Code:**	4911
Permit Type:	A: New/Greenfield Facility	**NAICS:**	221119
EPA Region:	6		
Faciliy County:	MONTGOMERY		
Facility State:	TX		
Facility ZIP Code:	77210		
Permit Issued By:	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) (Agency Name) MR. JOHNNY VERMILLION (Agency Contact) (512)239-1292 JVERMILL@TCEQ.STATE.TX.US		
Other Agency Contact Info:	JOHNNY VERMILLION TX 512-239-1292		
Other Permitting Information:	ADDITIONAL PERMIT NUMBERS: 44276, PSD-TX-971. THE ISSUED PERMIT WAS FOR THE INSTALLATION OF FOUR 1664 KW GENERATORS FIRED BY LANDFILL GAS.		

Process/Pollutant Information

PROCESS NAME: GENERATOR ENGINE, 4

Process Type: 17.140 (Landfill/Digester/Bio-Gas)

Primary Fuel: LANDFILL GAS

Throughput: 1664 KW

Process Notes: THROUGHPUT IS FOR EACH. THE ENGINES ARE JENBACHER MODEL JGS 616. LANDFILL GAS LIMITED TO 11.9 GR/100 DSCF H2S AND 13.2 GR/100 DSCF S.

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 0.60 G/BHP-H

Emission Limit 2: 3.1 T/YR EACH

Standard Emission: 0.60 G/B-HP-H

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) GOOD COMBUSTION PRACTICE

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 3 G/BHP-H

Emission Limit 2: 15.50 T/YR EACH

Standard Emission: 3 G/B-HP-H

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) GOOD COMBUSTION PRACTICE

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC) **CAS Number:** VOC

Emission Limit 1: 0.28 G/BHP-H

Emission Limit 2: 0.83 T/YR EACH

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) GOOD COMBUSTION PRACTICE

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate Matter < 10 μ (PM10) **CAS Number:** PM

Emission Limit 1: 0.84 T/YR EACH

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (P) GOOD COMBUSTION PRACTICE, LOW SULFUR FUEL

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 1.24 T/YR EACH

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: Other Case-by-Case
Other Applicable Requirements:
Control Method: (P) GOOD COMBUSTION PRACTICE, LOW SULFUR FUEL
Est. % Efficiency:
Compliance Verified: UNKNOWN
Pollutant/Compliance Notes:

POLLUTANT NAME: Visible Emissions (VE) **CAS Number:** VE
Emission Limit 1: 5 % OPACITY
Emission Limit 2:
Standard Emission: 5 % OPACITY
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: Other Case-by-Case
Other Applicable Requirements:
Control Method: (P) GOOD COMBUSTION PRACTICE
Est. % Efficiency:
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Facility Information

RBLC ID:	TX-0385 (final)	**Date Determination Last Updated:**	05/05/2005
Corporate/Company Name:	RELIANT ENERGY RENEWABLES COASTAL PLAINS LP	**Permit Number:**	NA031
Facility Name:	RELIANT ENERGY GALVESTON PLANT	**Permit Date:**	01/24/2002 (actual)
Facility Contact:		**FRS Number:**	110002345515

Facility Description:	CO-GENERATION USING LANDFILL GAS AS FUEL	**SIC Code:**	4911
Permit Type:	A: New/Greenfield Facility	**NAICS:**	221112
EPA Region:	6		
Faciliy County:	GALVESTON		
Facility State:	TX		
Facility ZIP Code:			
Permit Issued By:	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) (Agency Name) MR. JOHNNY VERMILLION (Agency Contact) (512)239-1292 JVERMILL@TCEQ.STATE.TX.US		
Other Agency Contact Info:	AARON MOON PO BOX 13087 AUSTIN, TX 78711-3087 512-238-1093		
Other Permitting Information:	CONSTRUCTION PERMIT FOR THE INSTALLATION AND OPERATION OF SEVEN JENBACHER, 2,343 HP, LANDFILL GAS-FIRED IC ENGINES FOR A TOTAL OF 12 MEGAWATTS OF ELECTRICAL POWER. A SUBSEQUENT PERMIT MODIFICATION REDUCED THE NUMBER OF IC ENGINES TO 6. THE REFERENCE DATE AND AND PERMIT NUMBERS FOR THIS MODIFICATION ARE THE SAME AS THE ORIGINAL. NOT ABLE TO FIND FRS NUMBER		

Process/Pollutant Information

PROCESS NAME: JENBACHER IC ENGINES (7)

Process Type: 17.140 (Landfill/Digester/Bio-Gas)

Primary Fuel: LANDFILL GAS

Throughput: 12 MW (TOTAL)

Process Notes: SULFUR COMPOUND LIMITED TO: 13.2 GRAINS H2S/100 DSCF 11.9 GRAINS TOTAL S/100 DSCF

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 15.50 LB/H EACH ENGINE

Emission Limit 2: 460.98 T/YR TOTAL FOR ALL

Standard Emission: 3 G/B-HP-H EACH ENGINE

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 3.1 LB/H EACH ENGINE

Emission Limit 2: 92.21 T/YR FOR ALL ENGINES

Standard Emission: 0.60 G/B-HP-H EACH ENGINE

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate Matter < 10 μ (PM10) **CAS Number:** PM

Emission Limit 1: 0.49 LB/H EACH ENGINE

Emission Limit 2: 14.16 T/YR TOTAL

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 1.27 LB/H EACH ENGINE

Emission Limit 2: 37.75 T/YR TOTAL ALL ENGINES

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (P) FUEL LIMIT ON SULFUR: 13.2 H2S AND 11.9 TOTAL SULFUR PER 100 DSCF

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrochloric Acid **CAS Number:** 7647-01-0

Emission Limit 1: 0.14 LB/H EACH

Emission Limit 2: 4.14 T/YR TOTAL

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC) **CAS Number:** VOC

Emission Limit 1: 0.83 LB/H EACH

Emission Limit 2: 24.72 T/YR TOTAL

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Small Internal Combustion Engine 17.240 LF/ Digester/ Bio-Gas	1 Facility

COMPREHENSIVE REPORT
Report Date: 07/10/2006

Facility Information

RBLC ID:	VA-0285 (final)	**Date Determination Last Updated:**	03/25/2004
Corporate/Company Name:	INGENCO	**Permit Number:**	52037
Facility Name:	INGENCO - CHESTER PLANT	**Permit Date:**	01/06/2004 (actual)
Facility Contact:	DR ROBERT GREENE 804 521 3557	**FRS Number:**	110014397287
Facility Description:	A DUAL FUEL ELECTRICAL POWER GENERATION FACILITY	**SIC Code:**	4931
Permit Type:	A: New/Greenfield Facility	**NAICS:**	221112
EPA Region:	3		
Facility County:	CHESTERFIELD		
Facility State:	VA		
Facility ZIP Code:			
Permit Issued By:	VIRGINIA ENVIRONMENTAL QUALITY AIR DIV. (Agency Name) MS. MONICA A. HARVEY (Agency Contact) (804)698-4300 MAHARVEY@DEQ.VIRGINIA.GOV		
Other Agency Contact Info:	ALISON SINCLAIR RICHMOND, VA 804-527-5155		
Other Permitting Information:			

Process/Pollutant Information

PROCESS NAME:	IC ENGINE, DIESEL, (48)
Process Type:	17.210 (Fuel Oil)
Primary Fuel:	DISTILLATE FUEL OIL
Throughput:	350 KW
Process Notes:	EMISSIONS FROM THE OPERATION OF ANY OF THE 48 DUAL FUEL ENGINES WHEN THE FACILTY IS OPERATED IN THE SINGLE OR DUAL FUEL MODE SHALL NOT EXCEED THESE LIMITS.

POLLUTANT NAME: Particulate Matter (PM) **CAS Number:** PM

Emission Limit 1: 0.30 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: N/A

Other Applicable Requirements: NSPS

Control Method: (P) GOOD COMBUSTION PRACTICES

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ONE OF 48 ENGINES

POLLUTANT NAME: Particulate Matter < 10 μ (PM10) **CAS Number:** PM

Emission Limit 1: 0.30 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: N/A

Other Applicable Requirements: NSPS

Control Method: (P) GOOD COMBUSTION PRACTICES

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ONE OF 48 ENGINES

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 0.50 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: N/A
Other Applicable Requirements: NSPS
Control Method: (P) GOOD COMBUSTION PRACTICES AND LOW SULFUR FUEL
Est. % Efficiency:
Compliance Verified: Unknown
Pollutant/Compliance Notes: ONE OF 48 ENGINES

POLLUTANT NAME: Nitrogen Dioxide (NO2) **CAS Number:** 10102-44-0

Emission Limit 1: 2.4 LB/MMBTU
Emission Limit 2:
Standard Emission: 5.77 G/B-HP-H calculated, see note
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: N/A
Other Applicable Requirements: NSPS
Control Method: (P) CONTINUAL EMISSION MONITORING DEVICES
Est. % Efficiency:
Compliance Verified: Unknown
Pollutant/Compliance Notes: ONE OF 48 ENGINES. Standardized emission limit is calculated, assuming 48% engine efficiency

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 4.3 LB/MMBTU
Emission Limit 2:
Standard Emission: 10.35 G/B-HP-H calculated, see note
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: N/A
Other Applicable Requirements: NSPS
Control Method: (P) CONTINUOUS EMISSION MONITORING DEVICES
Est. % Efficiency:
Compliance Verified: Unknown
Pollutant/Compliance Notes: ONE OF 48 ENGINES. Standardized emission limit calculated assuming 48% engine efficiency.

POLLUTANT NAME: Volatile Organic Compounds (VOC) **CAS Number:** VOC

Emission Limit 1: 0.40 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: N/A

Other Applicable Requirements: NSPS

Control Method: (P) GOOD COMBUSTION PRACTICES

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ONE OF 48 ENGINES

Process/Pollutant Information

PROCESS NAME: IC ENGINE, LANDFILL GAS, (48)

Process Type: 17.240 (Landfill/Digester/Bio-Gas)

Primary Fuel: LANDFILL GAS

Throughput: 350 KW

Process Notes: EMISSIONS FROM THE OPERATION OF ANY OF THE 48 DUAL FUEL ENGINES WHEN THE FACILTY IS OPERATED IN THE SINGLE OR DUAL FUEL MODE SHALL NOT EXCEED THESE LIMITS.

POLLUTANT NAME: Particulate Matter (PM) **CAS Number:** PM

Emission Limit 1: 0.30 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: N/A

Other Applicable Requirements: NSPS

Control Method: (P) GOOD COMBUSTION PRACTICES

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ONE OF 48

POLLUTANT NAME: Particulate Matter < 10 μ (PM10) **CAS Number:** PM

Emission Limit 1: 0.30 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: N/A

Other Applicable Requirements: NSPS

Control Method: (P) GOOD COMBUSTION PRACTICES

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ONE OF 48

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 0.50 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: N/A

Other Applicable Requirements: NSPS

Control Method: (P) GOOD COMBUSTION PRACTICES AND LOW SULFUR FUELS

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ONE OF 48

POLLUTANT NAME: Nitrogen Dioxide (NO2) **CAS Number:** 10102-44-0

Emission Limit 1: 2.4 LB/MMBTU

Emission Limit 2:

Standard Emission: 5.77 G/B-HP-H calculated, see note

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: N/A

Other Applicable Requirements: NSPS

Control Method: (A) CONTINUOUS EMISSION MONITORING DEVICES

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ONE OF 48. standardized emission limit is calculated using an assumed 48% engine efficiency.

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 4.3 LB/MMBTU

Emission Limit 2:

Standard Emission: 10.35 G/B-HP-H calculated, see note

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: N/A

Other Applicable Requirements: NSPS

Control Method: (A) CONTINUOUS EMISSION MONITORING DEVICES

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ONE OF 48. Standardized emission limit is calculated assuming 48% engine efficiency.

POLLUTANT NAME: Volatile Organic Compounds (VOC) **CAS Number:** VOC

Emission Limit 1: 0.40 LB/MMBTU

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: N/A

Other Applicable Requirements: NSPS

Control Method: (P) GOOD COMBUSTION PRACTICES

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ONE OF 48

Miscellaneous Combustion Flares	
19.320 Digester & LF Gas Flares	6 Facilities Note: (one facility is beef processing and therefore not described in Table 2.

COMPREHENSIVE REPORT
Report Date: 07/10/2006

Facility Information

RBLC ID:	NE-0020 (final)	**Date Determination Last Updated:**	07/08/2004
Corporate/Company Name:	IBP, INC.	**Permit Number:**	07339C10
Facility Name:	DAKOTA CITY PLANT	**Permit Date:**	06/22/2004 (estimated)
Facility Contact:		**FRS Number:**	
Facility Description:	MODIFICATION TO ADD 3 ANAEROBIC LAGOONS, TWO SCRUBBERS AND A FLARE TO THE WASTE TREATMENT PLANT.	**SIC Code:**	2011
Permit Type:	D: Both B (Add new process to existing facility) &C (Modify process at existing facility)	**NAICS:**	3116111
EPA Region:	7		
Faciliy County:			
Facility State:	NE		
Facility ZIP Code:			
Permit Issued By:	NEBRASKA DEPT. OF ENVIRONMENTAL QUALITY (Agency Name) MR. CLARK SMITH (Agency Contact) (402) 471-4204 CLARK.SMITH@NDEQ.STATE.NE.US		
Other Agency Contact Info:	CLARK SMITH SUITE 400, THE ATRIUM, 1200 N STREET, PO BOX 98922 LINCOLN, NE 68509 402-471-2186		
Other Permitting Information:			

Process/Pollutant Information

PROCESS NAME:	WASTE TREATMENT PLANT
Process Type:	19.320 (Digester and Landfill Gas Flares)
Primary Fuel:	BIO GAS
Throughput:	41.54 MMBTU/H
Process Notes:	IBP is converting 5 anaerobic lagoons into Waste Activated Sludge (WAS) lagoons, installing two packed-bed scrubbers and a Bio-Gas flare.

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 100 T/YR

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (P) FUEL CONSUMPTION LIMIT 41.54 MMBTU/H AVERAGE FOR 365 DAYS.

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 40 T/YR Less than 40 T/YR

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (P) FUEL USE LIMITED TO 90,000 SCF/H

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 40 T/YR Less than 40 T/YR

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:
Control Method: (P) SULFUR LIMITED TO 4.85 LB/H OR LESS TO THE FLARE
Est. % Efficiency:
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Total Reduced Sulfur **CAS Number:** 7704
Emission Limit 1: 0.42 T/YR Less than 0.42 T/YR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: Other Case-by-Case
Other Applicable Requirements:
Control Method: (P) LIMIT TO 4.85 LB/H TRS OR LESS TO THE FLARE
Est. % Efficiency:
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Visible Emissions (VE) **CAS Number:** VE
Emission Limit 1: 20 % OPACITY
Emission Limit 2:
Standard Emission: 20 % OPACITY
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: Other Case-by-Case
Other Applicable Requirements:
Control Method: (A) 2-SCRUBBERS
Est. % Efficiency:
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Facility Information

RBLC ID:	VA-0294 (final)	**Date Determination Last Updated:**	10/04/2005
Corporate/Company Name:	WM ATLANTIC WASTE DISPOSAL INC.	**Permit Number:**	51278
Facility Name:	ATLANTIC WASTE DISPOSAL LANDFILL	**Permit Date:**	02/05/2003 (actual)
Facility Contact:	D RICHARD GUIDRY 8043633313	**FRS Number:**	110020667580
Facility Description:	MUNICIPAL SOLID WASTE LANDFILL. EQUIPMENT TO BE CONSTRUCTED (SUBJECT TO NSPS WWW AND NESHAP AAAA) AT THIS FACILITY CONSISTS OF: MUNICIPAL SOLID WASTE LANDFILL CELLS 5A,5B,6B,7A-C,8A,8B,9A,9B,10A-C,11A-C,12A-C WITH A TOTAL CAPACITY OF 92,106,543 YD3 (ASSUMED MAXIMUM COMPACTION OF 1900 LBS/ YD3) OF COMBINED WASTE. THREE LFG&E TRITION UTILITY FLARES MODEL CF-3500 OR EQUIVALENT (CF-4,CF-5,AND CF-6) EACH WITH A FLOW RATING OF 3500 SCFM, INCLUDING BLOWERS AND OTHER EQUIPMENT TO COLLECT LANDFILL GAS TO ROUTE TO THE FLARES OR TREATMENT PROCESS.	**SIC Code:**	4953
Permit Type:	C: Modify process at existing facility	**NAICS:**	562212
EPA Region:	3		
Faciliy County:	SUSSEX		
Facility State:	VA		
Facility ZIP Code:	23890		
Permit Issued By:	VIRGINIA ENVIRONMENTAL QUALITY AIR DIV. (Agency Name) MR. YOGESH DOSHI (Agency Contact) (804)698-4017 YNDOSHI@DEQ.VIRGINIA.GOV		
Other Agency Contact Info:	THE PERMIT WRITER FOR THIS FACILITY IS ALISON SINCLAIR. SHE MAY BE REACHED AT (804)527-5155 OR E-MAILED AT AMSINCLAIR@DEQ.VIRGINIA.GOV		
Other Permitting Information:			

Process/Pollutant Information

PROCESS NAME: FLARES, 3500 SCFM LFG (3)

Process Type: 19.320 (Digester and Landfill Gas Flares)

Primary Fuel: LANDFILL GAS

Throughput: 630000 scf/h

Process Notes: 3 3500 SCFM LFG FLARES

POLLUTANT NAME: Particulate Matter < 10 μ (PM10) **CAS Number:** PM

Emission Limit 1: 2.2 LB/H

Emission Limit 2:

Standard Emission: 0.0220 LB/MMBTU CALCULATED SEE NOTE

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT, NESHAP, NSPS

Control Method: (P) PROPER MAINTENANCE OF THE FLARE, INCLUDING MONITORING FOR THE PRESENCE OF A FLAME, LGF FLOW RATE, 0% OPACITY, MEASURING % METHANE IN LFG

Est. % Efficiency: 98

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: THE EMISSION RATE IS FOR ONE OF THREE FLARES. STANDARD EMISSION LIMIT IS CALCULATED USING AN ASSUMPTION OF 475 BTU/SCF LGF. PERMIT DOES NOT INCLUDE A LIMIT IN LB/MMBTU UNITS.

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 1.9 LB/H

Emission Limit 2:

Standard Emission: 0.0190 LB/MMBTU CALCULATED, SEE NOTE

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT, NESHAP, NSPS

Control Method: (P) PROPER MAINTENANCE OF THE FLARE, INCLUDING MONITORING FOR THE PRESENCE OF A FLAME, LGF FLOW RATE, 0% OPACITY, MEASURING % METHANE IN LFG

Est. % Efficiency: 98

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: THE EMISSON RATE IS FOR ONE OF THREE FLARES. STANDARD EMISSION LIMIT IS CALCULATED USING AN ASSUMPTION OF 475 BTU/SCF LGF. PERMIT DOES NOT INCLUDE A LIMIT IN LB/MMBTU UNITS.

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 5.1 LB/H

Emission Limit 2:

Standard Emission: 0.0510 LB/MMBTU CALCULATED SEE NOTE

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT, NESHAP, NSPS

Control Method: (P) PROPER MAINTENANCE OF THE FLARE, INCLUDING MONITORING FOR THE PRESENCE OF A FLAME, LGF FLOW RATE, 0% OPACITY, MEASURING % METHANE IN LFG

Est. % Efficiency: 98

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: EMISSIONS ARE FOR ONE OF 3 FLARES. STANDARD EMISSION LIMIT IS CALCULATED USING AN ASSUMPTION OF 475 BTU/SCF LGF. PERMIT DOES NOT INCLUDE A LIMIT IN LB/MMBTU UNITS.

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 17.30 LB/H

Emission Limit 2:

Standard Emission: 0.0170 LB/MMBTU CALCULATED SEE NOTE

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT, NESHAP, NSPS

Control Method: (P) PROPER MAINTENANCE OF THE FLARE, INCLUDING MONITORING FOR THE PRESENCE OF A FLAME, LGF FLOW RATE, 0% OPACITY, MEASURING %METHANE IN LFG

Est. % Efficiency: 98

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: EMISSIONS ARE FOR 1 OF 3 FLARES. STANDARD EMISSION LIMIT IS CALCULATED USING AN ASSUMPTION OF 475 BTU/SCF LGF. PERMIT DOES NOT INCLUDE A LIMIT IN LB/MMBTU UNITS.

POLLUTANT NAME: Nonmethane Organic Carbon **CAS Number:** VOC

Emission Limit 1: 1.4 LB/H

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT, NESHAP, NSPS

Control Method: (P) PROPER MAINTENANCE OF THE FLARE, INCLUDING MONITORING FOR THE PRESENCE OF A FLAME, LGF FLOW RATE, 0% OPACITY, MEASURING % METHANE IN LFG

Est. % Efficiency: 98

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: EMISSIONS ARE FOR 1 OF 3 FLARES.

POLLUTANT NAME: Volatile Organic Compounds (VOC) **CAS Number:** VOC

Emission Limit 1: 0.60 LB/H

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT, NESHAP, NSPS

Control Method: (P) PROPER MAINTENANCE OF THE FLARE, INCLUDING MONITORING FOR THE PRESENCE OF A FLAME, LGF FLOW RATE, 0% OPACITY, MEASURING % METHANE IN LFG

Est. % Efficiency: 98

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: FLARES, 2500 SCFM LGF (2)

Process Type: 19.320 (Digester and Landfill Gas Flares)

Primary Fuel:

Throughput: 300000 scf/h

Process Notes: EMISSIONS ARE FOR 1 OF 2 FLARES

POLLUTANT NAME: Particulate Matter < 10 μ (PM10) **CAS Number:** PM

Emission Limit 1: 1.6 LB/H

Emission Limit 2:

Standard Emission: 0.02 LB/MMBTU CALCULATED NOT PERMIT LIMIT

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT, NESHAP, NSPS

Control Method: (P) PROPER MAINTENANCE OF THE FLARE, INCLUDING MONITORING FOR THE PRESENCE OF A FLAME, LGF FLOW RATE, 0% OPACITY, MEASURING % METHANE IN LFG

Est. % Efficiency: 98

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: EMISSIONS ARE FOR 1 OF 2 FLARES. STANDARD EMISSION LIMIT IS CALCULATED USING AN ASSUMPTION OF 475 BTU/SCF LGF. PERMIT DOES NOT INCLUDE A LIMIT IN LB/MMBTU UNITS.

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 1.4 LB/H

Emission Limit 2:

Standard Emission: 0.02 LB/MMBTU CALCULATED SEE NOTE

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT, NESHAP, NSPS

Control Method: (P) PROPER MAINTENANCE OF THE FLARE, INCLUDING MONITORING FOR THE PRESENCE OF A FLAME, LGF FLOW RATE, 0% OPACITY, MEASURING %METHANE IN LFG

Est. % Efficiency: 98

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: EMISSIONS ARE FOR 1 OF 2 FLARES. STANDARD EMISSION LIMIT IS CALCULATED USING AN ASSUMPTION OF 475 BTU/SCF LGF. PERMIT DOES NOT INCLUDE A LIMIT IN LB/MMBTU UNITS.

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 3.6 LB/H

Emission Limit 2:

Standard Emission: 0.05 LB/MMBTU CALCULATED, SEE NOTE

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT, NESHAP, NSPS

Control Method: (P) PROPER MAINTENANCE OF THE FLARE, INCLUDING MONITORING FOR THE PRESENCE OF A FLAME, LGF FLOW RATE, 0% OPACITY, MEASURING %METHANE IN LFG

Est. % Efficiency: 98

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: EMISSIONS ARE FOR 1 OF 2 FLARES. STANDARD EMISSION LIMIT IS CALCULATED USING AN ASSUMPTION OF 475 BTU/SCF LGF. PERMIT DOES NOT INCLUDE A LIMIT IN LB/MMBTU UNITS.

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 12.30 LB/H

Emission Limit 2:

Standard Emission: 0.17 LB/MMBTU CALCULATED SEE NOTE

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT, NESHAP, NSPS

Control Method: (P) PROPER MAINTENANCE OF THE FLARE, INCLUDING MONITORING FOR THE PRESENCE OF A FLAME, LGF FLOW RATE, 0% OPACITY, MEASURING % METHANE IN LFG

Est. % Efficiency: 98

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: EMISSIONS ARE FOR 1 OF 2 FLARES. STANDARD EMISSION LIMIT IS CALCULATED USING AN ASSUMPTION OF 475 BTU/SCF LGF. PERMIT DOES NOT INCLUDE A LIMIT IN LB/MMBTU UNITS.

POLLUTANT NAME: Nonmethane Organic Carbon **CAS Number:** VOC

Emission Limit 1: 1 LB/H

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT, NESHAP, NSPS

Control Method: (P) PROPER MAINTENANCE OF THE FLARE, INCLUDING MONITORING FOR THE PRESENCE OF A FLAME, LGF FLOW RATE, 0% OPACITY, MEASURING % METHANE IN LFG

Est. % Efficiency: 98

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: EMISSIONS ARE FOR 1 OF 2 FLARES

POLLUTANT NAME: Volatile Organic Compounds (VOC) **CAS Number:** VOC

Emission Limit 1: 98 % REDUCTION

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT, NESHAP, NSPS

Control Method: (P) PROPER MAINTENANCE OF THE FLARE, INCLUDING MONITORING FOR THE PRESENCE OF A FLAME, LGF FLOW RATE, 0% OPACITY, MEASURING % METHANE IN LFG

Est. % Efficiency: 98

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: EMISSIONS ARE FOR 1 OF 2 FLARES

Process/Pollutant Information

PROCESS NAME: FLARES, COMBINED

Process Type: 19.320 (Digester and Landfill Gas Flares)

Primary Fuel:

Throughput: 930000 scf/h

Process Notes: TOTAL EMISSIONS FOR ALL 5 FLARES: TWO 2500 SCFM AND THREE 3500 SCFM

POLLUTANT NAME: Particulate Matter < 10 μ (PM10) **CAS Number:** PM

Emission Limit 1: 41.60 T/YR

Emission Limit 2:

Standard Emission: SEE NOTE

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT, NESHAP, NSPS

Control Method: (P) PROPER MAINTENANCE OF THE FLARE, INCLUDING MONITORING FOR THE PRESENCE OF A FLAME, LGF FLOW RATE, 0% OPACITY, MEASURING % METHANE IN LFG

Est. % Efficiency: 98

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: TOTAL EMISSIONS FOR 5 FLARES. STANDARD EMISSIONS IN 2500 SCFM AND 3500 SCFM FLARE ENTRIES.

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 36.30 T/YR

Emission Limit 2:

Standard Emission: SEE NOTE

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT, NESHAP, NSPS

Control Method: (P) PROPER MAINTENANCE OF THE FLARE, INCLUDING MONITORING FOR THE PRESENCE OF A FLAME, LGF FLOW RATE, 0% OPACITY, MEASURING % METHANE IN LFG

Est. % Efficiency: 98

Compliance Verified: UNKNOWN

TOTAL EMISSIONS FOR 5 FLARES. STANDARD EMISSIONS IN 2500 SCFM AND 3500 SCFM FLARE ENTRIES.

CASCAS Number: 10102

97.80 T/YR

SEE NOTES

llutillution technology considerations influence the BACT decisions: U

BACT-PSD

nts: nts: MACT, NESHAP, NSPS

(P) PROPER MAINTENANCE OF THE FLARE, INCLUDING MONITORING FOR THE PRESENCE OF A FLAME, LGF FLOW RATE, 0% OPACITY, MEASURING % METHANE IN LFG

98

UNKNOWN

TOTAL EMISSIONS FOR 5 FLARES. STANDARD EMISSIONS IN 2500 SCFM AND 3500 SCFM FLARE ENTRIES.

CASCAS Number: 630-08-0

334 T/YR

SEE NOTES

llutillution technology considerations influence the BACT decisions: U

BACT-PSD

nts: nts: MACT, NESHAP, NSPS

(P) PROPER MAINTENANCE OF THE FLARE, INCLUDING MONITORING FOR THE PRESENCE OF A FLAME, LGF FLOW RATE, 0% OPACITY, MEASURING %METHANE IN LFG

98

UNKNOWN

TOTAL EMISSIONS FOR 5 FLARES. STANDARD EMISSIONS IN 2500 SCFM AND 3500 SCFM FLARE ENTRIES.

POLLUTANT NAME: Nonmethane Organic Carbon **CAS Number:** VOC

Emission Limit 1: 26.50 T/YR

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT, NESHAP, NSPS

Control Method: (P) PROPER MAINTENANCE OF THE FLARE, INCLUDING MONITORING FOR THE PRESENCE OF A FLAME, LGF FLOW RATE, 0% OPACITY, MEASURING % METHANE IN LFG

Est. % Efficiency: 98

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: TOTAL EMISSIONS FOR 5 FLARES

POLLUTANT NAME: Volatile Organic Compounds (VOC) **CAS Number:** VOC

Emission Limit 1: 10.20 T/YR

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: MACT, NESHAP, NSPS

Control Method: (N)

Est. % Efficiency: 98

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: TOTAL EMISSIONS FOR 5 FLARES

Facility Information

RBLC ID:	CO-0046 (final)	**Date Determination Last Updated:**	12/03/2002
Corporate/Company Name:	EXCEL CORPORATION - FT. MORGAN	**Permit Number:**	99-MR-0691
Facility Name:	EXCEL CORPORATION - FT. MORGAN	**Permit Date:**	04/27/2000 (actual)
Facility Contact:	PAUL PEAKE OR ELDON FISHER 970-867-9862	**FRS Number:**	110000467637
Facility Description:	CATTLE SLAUGHTERING, BEEF PROCESSING AND PACKING FACILITY.	**SIC Code:**	2011
Permit Type:	A: New/Greenfield Facility	**NAICS:**	311611
EPA Region:	8		
Faciliy County:	FORT MORGAN		
Facility State:	CO		
Facility ZIP Code:	80701		
Permit Issued By:	COLORADO DEPT OF HEALTH - AIR POLL CTRL (Agency Name) MR. RAM SEETHARAM (Agency Contact) (303) 692-3198 RAM.SEETHARAM@STATE.CO.US		
Other Agency Contact Info:	RAM N. SEETHARAM CO 303-692-3198		
Other Permitting Information:	WASTEWATER GENERATED IN THE PROCESSING AND PACKING OF BEEF IS SENT TO THE WASTEWATER TREATMENT PLANT. BIOGAS FROM THE WW TREATMENT PLANT IS SENT TO THE STEAM BOILERS OR ALTERNATIVELY TO A FLARE IF THE BOILERS ARE OUT OF SERVICE OR UNABLE TO ACCEPT ALL THE GASES GENERATED. ONLY SOX EMISSIONS WERE SUBJECT TO BACT REVIEW IN THIS PERMIT. START UP AND COMPLIANCE DATES NOT AVAILABLE. ADDITIONAL PLANTWIDE LIMIT: H2S = 0.10 T/YR.		

Process/Pollutant Information

PROCESS NAME:	WASTE WATER TREATMENT PLANT
Process Type:	22.200 (Industrial Wastewater Treatment)
Primary Fuel:	
Throughput:	54 MMGAL/MO
Process Notes:	WASTE WATER TREATMENT SHALL NOT EXCEED 548,000,000 GAL/YR AND 54,000,000 GAL/MO.

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 98 % REDUCTION

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) SULFUR RECOVERY SYSTEM, LOW SULFUR CONTENT WATER.

Est. % Efficiency: 98

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: STEAM BOILER (B-1)

Process Type: 13.390 (Other Gaseous Fuel & Gaseous Fuel Mixtures)

Primary Fuel: NATURAL GAS / BIOGAS

Throughput: 20.90 MMBTU/H

Process Notes: NATURAL GAS - 135.9 MMSCF/YR; BIOGAS - 174 MMSCF/YR; TOTAL HEAT INPUT TO BOTH BOILERS SHALL NOT EXCEED 287,040 MMBTU/YR AND 24,000 MMBTU/MO AND 6,240 H/YR OPERATION FOR EACH BOILER; HEATING VALUE NATURAL GAS - 960 BTU/SCF; BIOGAS - 750 BTU/SCF

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 98 % REDUCTION

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) SULFUR RECOVERY SYSTEM. ALL LIMITS ARE ON A FACILITY WIDE BASIS, NO OTHER INFORMATION AVAILABLE.

Est. % Efficiency: 98
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: STEAM BOILER 2 (B-3)
Process Type: 13.390 (Other Gaseous Fuel & Gaseous Fuel Mixtures)
Primary Fuel: NATURAL GAS/BIOGAS
Throughput: 25.10 MMBTU/H
Process Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5

Emission Limit 1: 98 % REDUCTION
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) SULFUR RECOVERY SYSTEM. ALL LIMITS ON A FACILITY WIDE BASIS, NO OTHER INFORMATION IS AVAILABLE.
Est. % Efficiency: 98
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: FLARE (B-9)
Process Type: 19.320 (Digester and Landfill Gas Flares)
Primary Fuel: BIOGAS
Throughput: 67.50 MMBTU/H
Process Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5

Emission Limit 1: 98 % REDUCTION
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) ALL LIMITS ARE ON A FACILITY WIDE BASIS, NO OTHER INFORMATION IS AVAILABLE.
Est. % Efficiency: 98
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Facility Information

RBLC ID:	NJ-0053 (final)	**Date Determination Last Updated:**	07/03/2003
Corporate/Company Name:	MCUA LANDFILL GAS UTILIZATION PROJECT	**Permit Number:**	01-98-1326 TO 1328
Facility Name:	MCUA	**Permit Date:**	03/09/1999 (actual)
Facility Contact:	RICHARD WAGNER	**FRS Number:**	110017411932
Facility Description:	LANDFILL GAS UTILIZATION	**SIC Code:**	4925
Permit Type:	A: New/Greenfield Facility	**NAICS:**	22121
EPA Region:	2		
Faciliy County:	MIDDLESEX		
Facility State:	NJ		
Facility ZIP Code:	06013		
Permit Issued By:	NEW JERSEY DEPT OF ENV PROTECTION (Agency Name) VIORICA PETRIMAN (Agency Contact) (609) 292-1638 VIORICA.PETRIMAN@DEP.STATE.NJ.US		

Other Agency Contact Info: RAJ PATEL
NJ
(609) 777-0419

Other Permitting Information: FACILITY HAS OBTAINED 130.5 OF NOX OFFSETS PRIOR TO INSTALLATION

Process/Pollutant Information

PROCESS NAME: LANDFILL GAS TURBINE

Process Type: 16.150 (Other Gaseous)

Primary Fuel: LANDFILL GAS

Throughput: 65 MMBTU/H (NOMINAL)*

Process Notes: *74MMBTU/HR PEAK THROUGHPUT CAPACITY/SIZE

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 52.45 LB/H

Emission Limit 2:

Standard Emission: 72 PPM @ 15% O2

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Nonmethane Hydrocarbons **CAS Number:** VOC

Emission Limit 1: 2.78 LB/H

Emission Limit 2: 5 PPMVD@ 15% O2

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE
Est. % Efficiency:
Compliance Verified: Y
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 9.52 LB/H
Emission Limit 2:
Standard Emission: 32 PPM @ 15% O2
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) NONE
Est. % Efficiency:
Compliance Verified: Y
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate Matter < 10 μ (PM10) **CAS Number:** PM

Emission Limit 1: 2.5 LB/H
Emission Limit 2: 0.0340 LB/MMBTU
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) NONE
Est. % Efficiency:
Compliance Verified: Y
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 2.98 LB/H

Emission Limit 2: 0.04 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Total Suspended Particulates **CAS Number:** PM

Emission Limit 1: 1.25 LB/H

Emission Limit 2: 0.0170 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: DUCT FIRED HRSG

Process Type: 13.390 (Other Gaseous Fuel & Gaseous Fuel Mixtures)

Primary Fuel: LANDFILL GAS

Throughput: 31 MMBTU/H NOMINAL *

Process Notes: *43 MMBTU/HR PEAK THROUGHPUT CAPACITY/SIZE

POLLUTANT NAME: Nonmethane Hydrocarbons **CAS Number:** VOC

Emission Limit 1: 1.62 LB/H

Emission Limit 2: 0.0380 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 4.28 LB/H

Emission Limit 2:

Standard Emission: 0.10 LB/MMBTU

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 1.73 LB/H

Emission Limit 2:

Standard Emission: 0.04 LB/MMBTU

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Total Suspended Particulates **CAS Number:** PM

Emission Limit 1: 0.0730 LB/H

Emission Limit 2:

Standard Emission: 0.0170 LB/MMBTU

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 10.27 LB/H

Emission Limit 2:

Standard Emission: 0.24 LB/MMBTU

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:
Control Method: (N) NONE
Est. % Efficiency:
Compliance Verified: Y
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: TURBINE WITH HRSG
Process Type: 16.250 (Other Gaseous)
Primary Fuel: LANDFILL GAS
Throughput: 74 MMBTU/H
Process Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102
Emission Limit 1: 13.80 LB/H
Emission Limit 2: 0.1210 LB/MMBTU
Standard Emission: 32.67 PPM @ 15% O2 CALCULATED
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate Matter < 10 μ (PM10) **CAS Number:** PM
Emission Limit 1: 3.96 LB/H
Emission Limit 2: 0.0340 LB/MMBTU
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) NONE
Est. % Efficiency:
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 4.71 LB/H
Emission Limit 2: 0.04 LB/MMBTU
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) NONE
Est. % Efficiency:
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Total Suspended Particulates **CAS Number:** PM

Emission Limit 1: 1.98 LB/H
Emission Limit 2: 0.0170 LB/MMBTU
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 62.73 LB/H

Emission Limit 2:

Standard Emission: 80 PPM @ 15% O2

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Nonmethane Hydrocarbons **CAS Number:** VOC

Emission Limit 1: 4.39 LB/H

Emission Limit 2: 5 PPM @ 15% O2

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: OPEN FLARE

Process Type: 19.320 (Digester and Landfill Gas Flares)

Primary Fuel: LANDFILL GAS

Throughput: 90 MMBTU/H*

Process Notes: *@ 500BTU/SET OF HHV, FEED RATE = 3000 SCFM -<= 3000 SCFM ON 1-HR BLOCK BASIS, SERVE AS BACK-UP TO TURBINES

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 16.20 LB/H

Emission Limit 2: 17.74 T/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT; 0.18 LB/MMBTU

POLLUTANT NAME: Hydrochloric Acid **CAS Number:** 7647-01-0

Emission Limit 1: 0.43 LB/H

Emission Limit 2: 0.30 T/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT: 0.003 LB/MMBTU

POLLUTANT NAME: Nonmethane Organic Carbon **CAS Number:** VOC

Emission Limit 1: 3.4 LB/H

Emission Limit 2: 3.75 T/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:
Control Method: (N) NONE- FLARE EFFICIENCY
Est. % Efficiency: 98
Compliance Verified: Unknown
Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT: .038 LB/MMBTU

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 5.4 LB/H
Emission Limit 2: 5.91 T/YR
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) NONE
Est. % Efficiency:
Compliance Verified: Unknown
Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT: 0.06 LB/MMBTU

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 3.6 LB/H
Emission Limit 2: 3.94 T/YR
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) NONE
Est. % Efficiency:
Compliance Verified: Unknown
Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT: 0.04 LB/MMBTU

POLLUTANT NAME: Total Suspended Particulates **CAS Number:** PM

Emission Limit 1: 1.5 LB/H

Emission Limit 2: 1.68 T/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT: 0.017 LB/MMBTU

POLLUTANT NAME: Volatile Organic Compounds (VOC) **CAS Number:** VOC

Emission Limit 1: 2.5 LB/H

Emission Limit 2: 2.76 T/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT: 0.028 LB/MMBTU

Facility Information

RBLC ID:	NY-0090 (final)	**Date Determination Last Updated:**	06/02/2003
Corporate/Company Name:	FRESH KILLS LANDFILL	**Permit Number:**	2-6403-00011/00063
Facility Name:	FRESH KILLS LANDFILL	**Permit Date:**	07/06/1998 (actual)
Facility Contact:	MARTHA K. HIRST	**FRS Number:**	110017411442
Facility Description:	LANDFILL	**SIC Code:**	4953
Permit Type:	A: New/Greenfield Facility	**NAICS:**	562212
EPA Region:	2		
Faciliy County:	RICHMOND		
Facility State:	NY		
Facility ZIP Code:	100004		
Permit Issued By:	NEW YORK DEC, DIV OF AIR RESOURCES (Agency Name) MR. JOHN PENN (Agency Contact) (212) 639-9675		
Other Agency Contact Info:	JOHN J. FERGUSON 47-40 21ST STREET LONG ISLAND CITY, NY 718-482-4997		
Other Permitting Information:	AGENCY CONTACT: JOHN J. FERGUSON PH:718-482-4997 "THIS IS THE FIRST FACILITY TO MEET THE TOUGH NEW CAA STANDARDS FOR LANDFILL GAS." -JOHN FERGUSON FX: 718-482-4975 AD: 47-40 21ST ST, LONG ISLAND CITY, NY		

Process/Pollutant Information

PROCESS NAME:	LANDFILL GAS COLLECTION AND FLARING SYSTEM
Process Type:	19.320 (Digester and Landfill Gas Flares)
Primary Fuel:	LANDFILL GAS
Throughput:	32728 FT^3/MIN TOTAL
Process Notes:	5 FLARE STATIONS WITH 2 ENCLOSED FLARE ASSEMBLIES AT EACH STATION 5000STD CFM EACH OF LANDFILL GAS, EACH FLARE RATED AT 168.56 MMBTU/HR

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 27.26 LB/H

Emission Limit 2: 0.16 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (P) COMBINED MAX INPUT RATE FOR FLARES 7-10=15195 SCFM, 1-2=4394, 3-4= 5914, 5-6=7225

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Nonmethane Organic Carbon **CAS Number:** VOC

Emission Limit 1: 1.6 LB/H

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (P) COMBINED MAX INPUT RATES. SEE POLLUTANT NOTES.

Est. % Efficiency: 98

Compliance Verified: Y

Pollutant/Compliance Notes: RATE FOR FLARES 7-10=15195 SCFM, 1-2=4394, 3-4= 5914, 5-6=7225, ENCLOSED FLARES

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 13.3160 LB/H

Emission Limit 2: 0.0790 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:
Control Method: (P) MAX INPUT RATES. SEE POLLUTANT NOTES
Est. % Efficiency:
Compliance Verified: Y
Pollutant/Compliance Notes: COMBINED MAX INPUT RATE FOR FLARES 7-10=15195 SCFM, 1-2=4394, 3-4= 5914, 5-6=7225

POLLUTANT NAME: Particulate Matter < 10 μ (PM10) **CAS Number:** PM

Emission Limit 1: 9.3 LB/H
Emission Limit 2: 0.0550 LB/MMBTU
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) SEE POLLUTANT NOTES
Est. % Efficiency:
Compliance Verified: Y
Pollutant/Compliance Notes: COMBINED MAX INPUT RATE FOR FLARES 7-10=15195 SCFM, 1-2=4394, 3-4= 5914, 5-6=7225

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 4.2 LB/H
Emission Limit 2: 4.55 PPM
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) SEE POLLUTANT NOTES
Est. % Efficiency:
Compliance Verified: Y
Pollutant/Compliance Notes: COMBINED MAX INPUT RATE FOR FLARES 7-10=15195 SCFM, 1-2=4394, 3-4= 5914, 5-6=7225

Facility Information

RBLC ID:	CA-0752 (final)	**Date Determination Last Updated:**	12/18/2001
Corporate/Company Name:	CITY OF STOCKTON MUNICIPAL UTILITIES DEPT	**Permit Number:**	N-811-18-0
Facility Name:	CITY OF STOCKTON MUNICIPAL UTILITIES DEPT	**Permit Date:**	11/22/1996 (actual)
Facility Contact:		**FRS Number:**	110000759377
Facility Description:		**SIC Code:**	4952
Permit Type:		**NAICS:**	
EPA Region:	9		
Faciliy County:	SAN JOAQUIN		
Facility State:	CA		
Facility ZIP Code:			
Permit Issued By:	SJVUAPCD - CENTRAL REGIONAL OFFICE, CA (Agency Name) MR. GEORGE HEINEN (Agency Contact) (559) 230-6000		
Other Agency Contact Info:	SEYED SADREDIN CA (209) 468-3474		
Other Permitting Information:	THIS IS THE REGIONAL WASTE WATER CONTROL FACILITY		

Process/Pollutant Information

PROCESS NAME:	DIGESTER GAS-FIRED FLARE
Process Type:	19.320 (Digester and Landfill Gas Flares)
Primary Fuel:	DIGESTER GAS
Throughput:	36 MMBTU/HR
Process Notes:	

POLLUTANT NAME: Sulfur Oxides (SOx) **CAS Number:** 7446

Emission Limit 1: 241.9 LB/DAY
Emission Limit 2: 0
Standard Emission: 0
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: LAER
Other Applicable Requirements:
Control Method: (P) LPG OR NATURAL GAS FIRED PILOT
Est. % Efficiency: 0
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 0.30 LB/MMBTU
Emission Limit 2: 0
Standard Emission: 0
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: LAER
Other Applicable Requirements:
Control Method: (N) NO CONTROL EQUIPMENT THAT IS NOT INTEGRAL TO THE FLARE
Est. % Efficiency: 0
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 51.80 LB/DAY
Emission Limit 2: 0.06 LB/MMBTU
Standard Emission: 0
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: LAER

Other Applicable Requirements:

Control Method: (N) NO CONTROL THAT IS NOT INTEGRAL TO THE FLARE

Est. % Efficiency: 0

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate Matter < 10 μ (PM10) **CAS Number:** PM

Emission Limit 1: 0.02 LB/MMBTU

Emission Limit 2: 0

Standard Emission: 0

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: LAER

Other Applicable Requirements:

Control Method: (N) NO CONTROL EQUIPMENT THAT IS NOT INTEGRAL TO THE FLARE

Est. % Efficiency: 0

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC) **CAS Number:** VOC

Emission Limit 1: 0.03 LB/MMBTU

Emission Limit 2: 0

Standard Emission: 0

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: LAER

Other Applicable Requirements:

Control Method: (N) NO CONTROL EQUIPMENT THAT IS NOT INTEGRAL TO THE FLARE

Est. % Efficiency: 0

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Department of Environmental Protection

Jeb Bush
Governor

Southeast District
400 N. Congress Ave. Suite 200
West Palm Beach, Florida 33401

David B. Struhs
Secretary

NOTICE OF PERMIT

Via Electronic Mail
ccampagna@wm.com

APR 15 2003

Ms. Charles J. Campagna, V.P.
Waste Management Inc. of Florida
d.b.a. Okeechobee Landfill, Inc.
10800 N.E. 128th Avenue
Okeechobee, FL 34972

Okeechobee County
Berman Road Landfill
Permit File

Dear Mr. Campagna:

Enclosed is Permit Number 0040842-010-SC to construct and operate a Solid Waste Management Facility known as the Berman Road Landfill.

Any party to this Order (permit) has the right to seek judicial review of the permit pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date this Notice is filed with the Clerk of the Department. If you have any questions, please contact Mr. Joseph Lurix of this office, telephone number (561)681-6668.

Executed in West Palm Beach, Florida on this 15th day of April, 2003.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

John F. Moulton III
Acting Director of District Management
Southeast District

JFM/PW/LH/np/jl

CERTIFICATE OF SERVICE

This is to certify that this **NOTICE OF PERMIT** and all copies were mailed before the close of business on APR 15 2003 to the listed persons.

FILING AND ACKNOWLEDGMENT:

FILED, on this date, pursuant to §120.52(7), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Clerk

APR 15 2003
Date

Copies furnished to:
Ali Khatami, P.E., GLOBEX – via electronically khatami@globexeng.com
Richard Tedder, P.E., SW/TLH – via electronically richard.tedder@dep.state.fl.us
Tor Bejnar, SW/TLH – MS 4565 – via electronically tor.bejnar@dep.state.fl.us
Neha Pandya, WCS/SED – via electronically neha.pandya@dep.state.fl.us

"More Protection, Less Process"

Printed on recycled paper.

Department of Environmental Protection

Jeb Bush
Governor

Southeast District
400 N. Congress Ave. Suite 200
West Palm Beach, Florida 33401

David B. Struhs
Secretary

APR 15 2003

PERMITTEE:

Okeechobee Landfill, Inc.
ATT: Mr. Charles J. Campagna, V.P.
Waste Management Inc. of Florida
10800 N.E. 128th Avenue
Okeechobee, FL 34972

GMS I.D. NUMBER: 5147C30001
WACS ID. NUMBER: SED/47/00070436
PERMIT/CERTIFICATION NUMBER: 0040842-010-SC
DATE OF ISSUE: April 11, 2003
EXPIRATION DATE: April 10, 2008
COUNTY: Okeechobee
LATITUDE/LONGITUDE: 27°20'29"/80°41'12"
SECTION/TOWNSHIP/RANGE: 13, 24, 25, 36/T36S/R36E

This permit is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and Chapters 62-302, 62-520, 62-522, 62-701 and 62-709, Florida Administrative Code (F.A.C.). The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

Berman Road Landfill, owned and operated by Okeechobee Landfill, Inc. totals194 acres lying within Sections 13, 24, 25 and 36. Berman Road Landfill has107 available acres remaining for solid waste disposal and a comprehensive stormwater control system. The conceptual Environmental Resources Permit Number EC-472777746 was issued on October 31, 1996 for impacts to wetlands and the surface water management system. A consolidated Environmental Resource Permit Number EI-47-0131315-001 was issued on March 13, 1998.

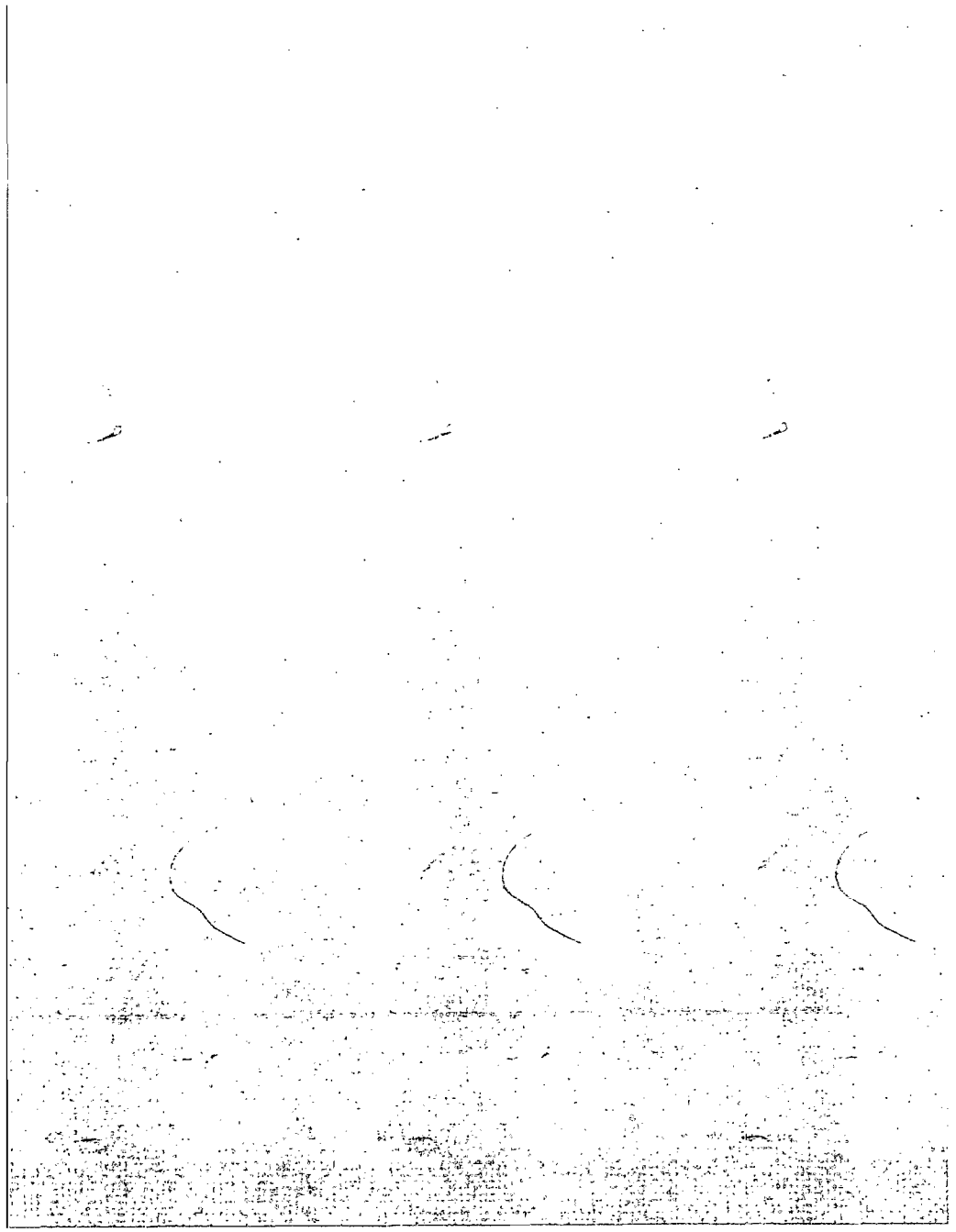
TO OPERATE: A 10,000 ton/day Class I sanitary landfill consisting of 87 lined acres, identified as Cells 1 through 16. The liner system is comprised of a double composite lining system with a Geosynthetic Clay Liner (GCL) beneath the secondary liner geomembrane. The liner system includes a leachate collection system (LCS) and a leak detection system (LDS). Other systems include an active gas control system with two - 20, 000 gallon per day leachate evaporators and flare systems.

TO CONSTRUCT/OPERATE: A Class I sanitary landfill consisting of 107 lined acres, identified as Cells 17 through 34 (herein referred to as the lateral expansion of the Berman Road Landfill).

Cells 17 through 34 will be constructed with the following components (from top down):

a 2-ft. thick layer of protective cover soil;
a LCS geocomposite;
a primary liner 60-mil thick High Density Polyethylene (HDPE) textured geomembrane liner;
a primary GCL;
a LDS geocomposite;
a secondary liner 60-mil thick HDPE textured geomembrane liner; and
a secondary GCL.

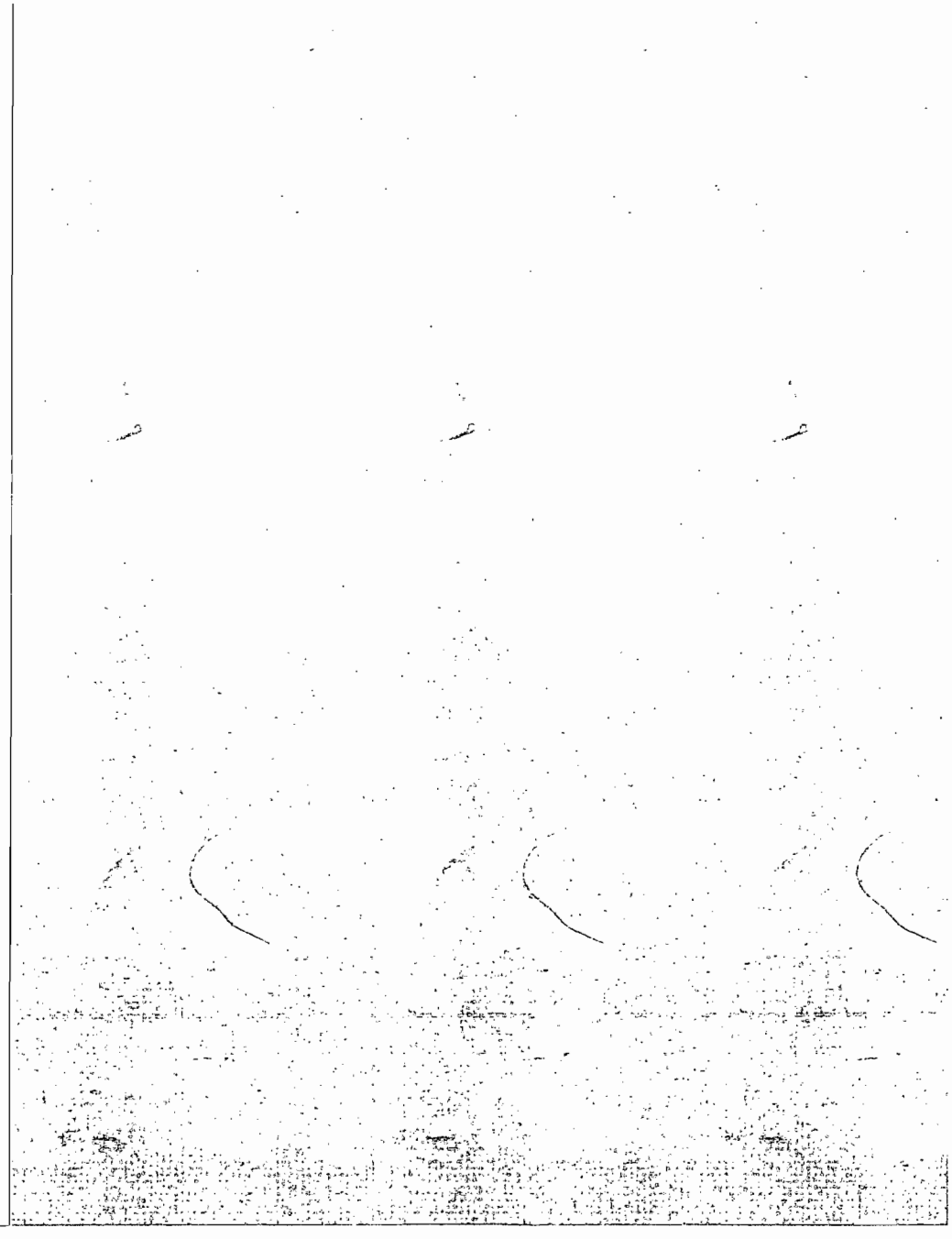
Cells 17 through 34 shall be built in accordance with revised engineering drawings 1 through 31, received on December 2, 2002, prepared by GLOBEX Engineering & Development, engineers project no. 1329, signed and sealed by Ali Khatami, dated December 2002.



IN ACCORDANCE WITH: An application for the construction and operation of a Solid Waste Resource Recovery and Management Facility received December 2, 2002, with additional information submitted on Janaury 17, 2003. Previous submittals were received July 15, 1996, October 7, 1996 and December 1, 1997. A Notice of Application was published on July 29, 1996.

LOCATED AT: 10800 N.E. 128th Avenue, Okeechobee, FL 34972.

SUBJECT TO: General Conditions 1-15 (attached as pages 3 and 4) and Specific Conditions 1-32 (attached as pages 5 through 13).



GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth herein are "Permit Conditions" and as such are binding upon the permittee and enforceable pursuant to the authority of Sections 403.161, Florida Statutes. The permittee is hereby placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of the "Permit Conditions" by the permittee, its agents, employees, servants or representatives.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in Subsections 403.087(6), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Nor does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state, or local laws or regulations. This permit does not constitute a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute state recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the state. Only the Trustees of the Internal Improvement Trust Fund may express state opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, plant or aquatic life or property and penalties therefor caused by the construction or operation of this permitted source, nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

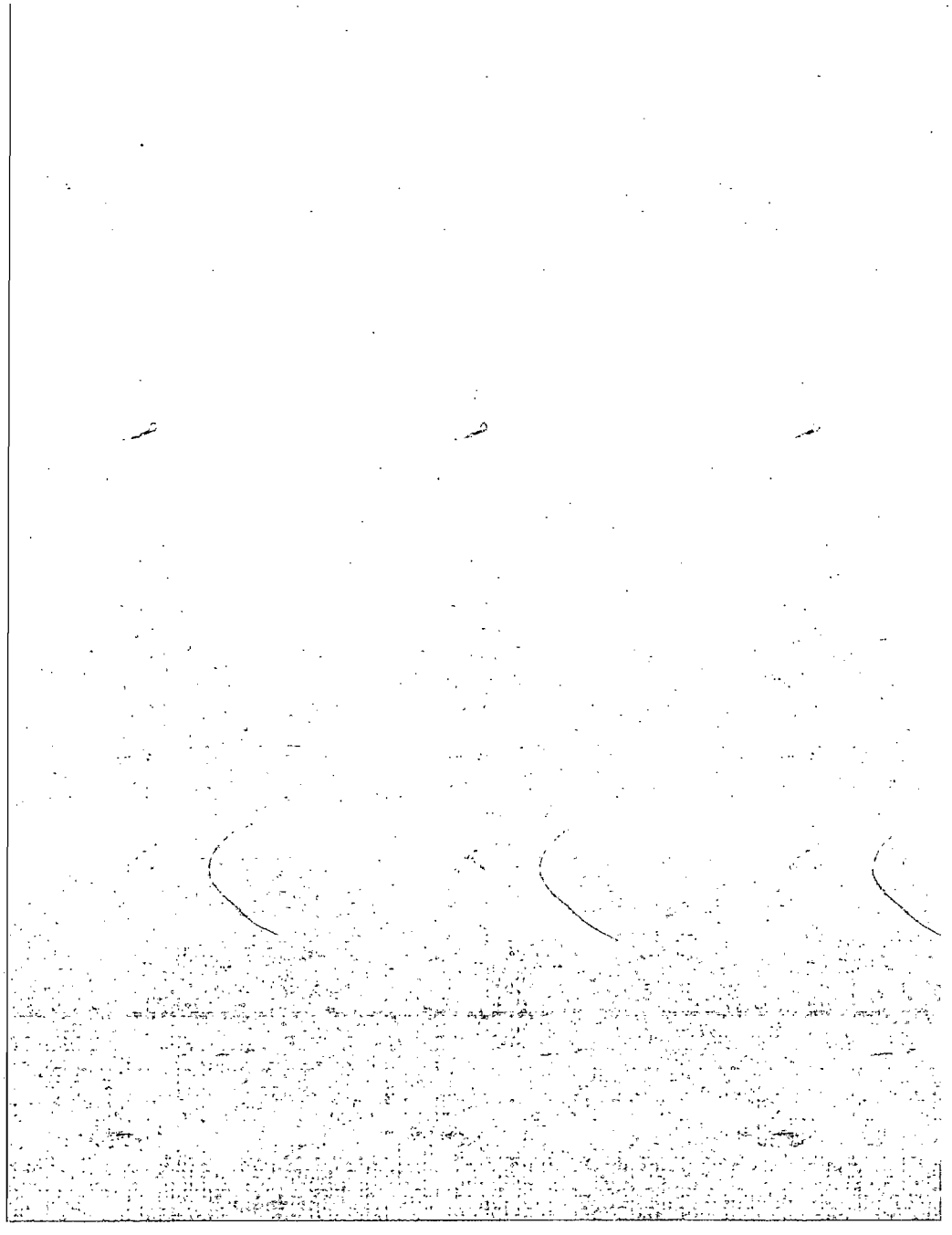
6. The permittee shall at all times properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law, access to the premises, at reasonable times, where the permitted activity is located or conducted for the purpose of:

   a. Having access to and copying any records that must be kept under the conditions of the permit;
   b. Inspecting the facility, equipment, practices, or operations regulated or required under this permit; and
   c. Sampling or monitoring any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.
   Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in the permit, the permittee shall immediately notify and provide the Department with the following information:

   a. A description of and cause of non-compliance; and
   b. The period of non-compliance, including exact dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance. The permittee shall be responsible for any and all damages, which may result and may be subject to enforcement action by the Department for penalties or revocation of this permit.



GENERAL CONDITIONS Cont'd:

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source, which are submitted to the Department, may be used by the Department as evidence in any enforcement case arising under the Florida Statutes or Department rules, except where such use is proscribed by Sections 403.73 and 403.111, Florida Statutes.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance, provided however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

11. This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 62-4.120 and 62-730.300, as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit is required to be kept at the work site of the permitted activity during the entire period of construction or operation.

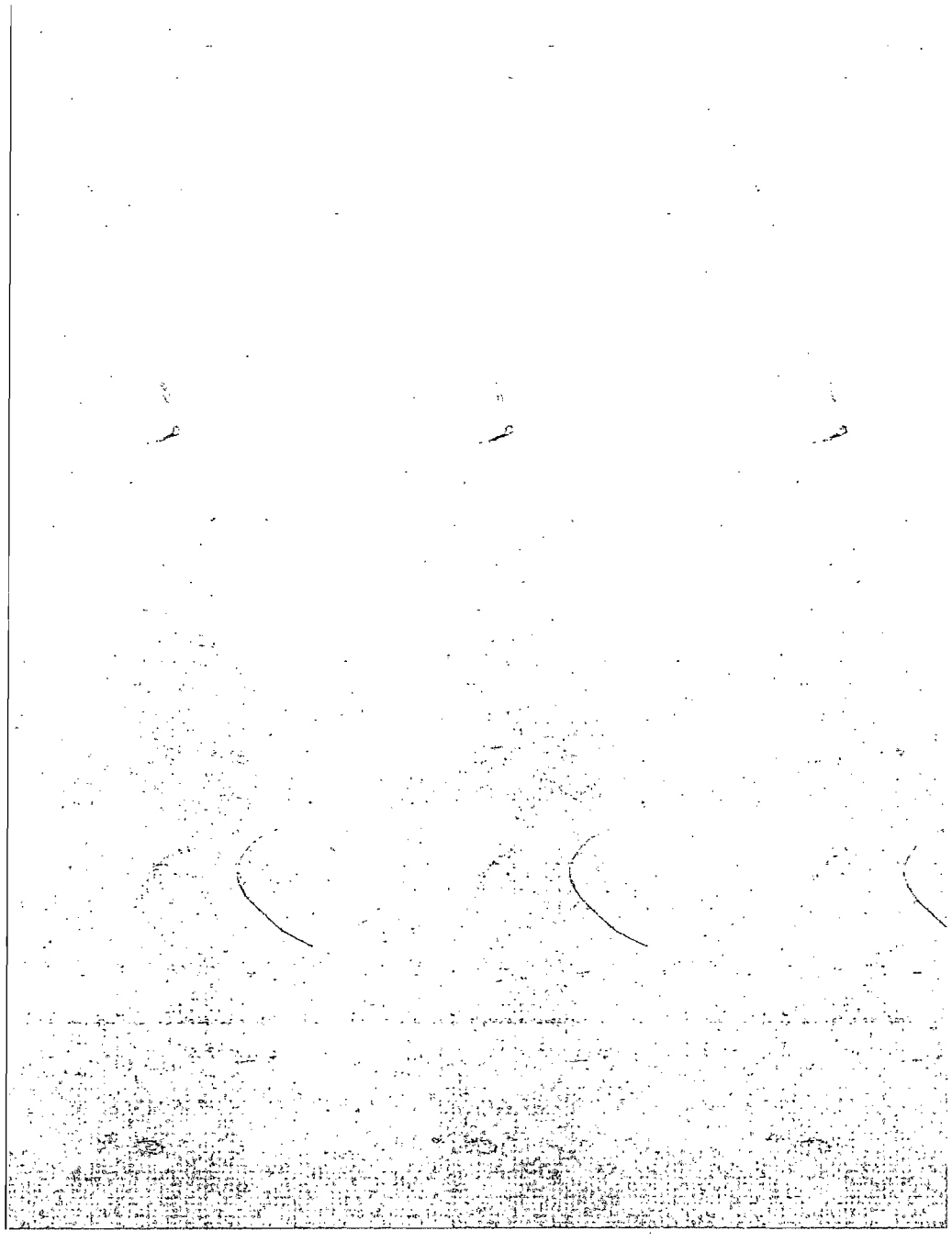
13. This permit also constitutes:

( ) Determination of Best Available Control Technology (BACT)
( ) Determination of Prevention of Significant Deterioration (PSD)
( ) Certification of Compliance with State Water Quality Standards (Section 401, PL 92-500)
( ) Compliance with New Source Performance Standards

14. The permittee shall comply with the following monitoring and record keeping requirements:

a. Upon request, the permittee shall furnish all records and plans required under Department rules. The retention period for all records will be extended automatically, unless otherwise stipulated by the Department, during the course of any unresolved enforcement action.
b. The permittee shall retain at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation), copies of all reports required by this permit, and records of all data used to complete the application for this permit. The time period of retention shall be at least three years from the date of the sample, measurement, report or application unless otherwise specified by Department rule.
c. Records of monitoring information shall include:
- the date, exact places, and time of sampling or measurements;
- the person responsible for performing the sampling or measurements
- the date(s) analyses were performed;
- the person responsible for performing the analyses;
- analytical techniques or methods used; and
- results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law, which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be submitted or corrected promptly.



SPECIFIC CONDITIONS:

Ground Water Monitoring Network Construction/Operation and Maintenance

1. The Water Quality Monitoring Plan, which includes the groundwater, leachate and surface-water monitoring programs for this site that was submitted as a part of the construction and operating permit renewal on December 2, 2002, with revision and amendment submitted on January 17, 2003, is approved pursuant to 62-520, 62-522, 62-302, 62-160, and 62-701 Florida Administrative Code (F.A.C.). The locations of the proposed and existing monitoring wells, leachate and surface water sampling points are shown on Exhibit A attached, with the designations and types of monitoring wells listed on Exhibit B.

2. All new or replacement monitoring wells shall be constructed and/or abandoned in accordance with Chapter 62-532, F.A.C., and the approved water quality monitoring plan. All new monitoring wells shall be installed by a Florida certified water well contractor. Well completion reports shall be submitted to the Department within thirty (30) days, upon completion of installation on DEP Form 62-522.900(3).

   Pursuant to Rule 62-701.510(3)(d), F.A.C., the location of each monitor well in degrees, minutes and seconds of latitude and longitude, the Universal Transverse Mercator coordinates [UTM], and the elevation of the top of the well casing to the nearest 0.01 foot, NGVD, shall be determined by a registered Florida land surveyor within fourteen (14) days of the certified completion of all new wells proposed for this permit, and within sixty (60) days of permit issuance for all existing wells. A drawing illustrating this information, signed and sealed by a certified Florida land surveyor, shall be submitted to the Department within forty-five (45) days of each survey.

   Well development prior to sampling events and purge/sampling water discharges shall be followed pursuant to the Department's Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, DEP QA-002/02.

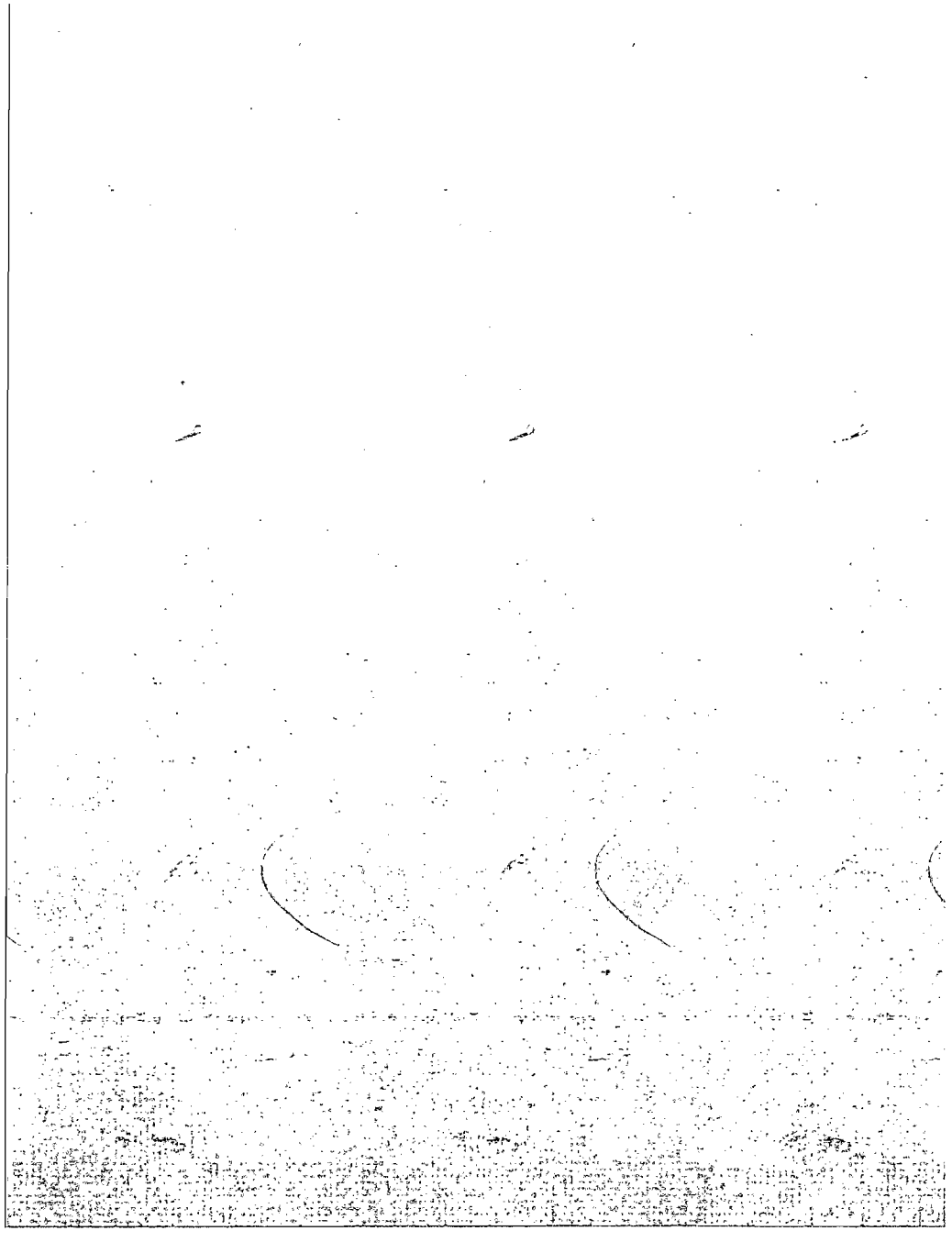
   All monitor wells shall be clearly identified and maintained in good condition to prevent or minimize sampling interferences, loss of well integrity or vandalism. All monitoring wells shall have well maintained concrete pads and be properly sealed and locked. Monitor wells finished above grade shall be protected by bumper guards and steel risers. Monitor wells finished at or below grade shall have traffic bearing, steel plate cover assemblies.

   The permittee shall maintain reasonable access to all of the monitoring well stations required by this permit. The permittee is responsible for maintaining the integrity of the monitoring well stations and protecting them from destruction or vandalism. Should any of these monitoring well stations be damaged or vandalized in any manner, or destroyed, the permittee shall notify the Department immediately upon discovery. The notification shall include pertinent information as to the cause, and what steps are being taken to replace the monitoring well station and prevent the recurrence of such problems in the future.

Groundwater Testing and Reporting Requirements

3. Background water quality for the approved landfill expansion shall be determined by analysis of at least one water sample taken from each new well that is installed, and each surface water monitoring prior to waste placement in a new cell or at the next semi-annual sampling event, whichever comes first, for the parameters listed in Exhibit C and Exhibit F respectively (attached).

4. In the event of an emergency which results in a discharge to surface or ground water, the permittee shall notify the Department in person or by telephone within one business day of the incident and shall submit a written report describing the incident to the Department within three business days of the start of the incident. In addition, a final written report shall be sent to the Department within two (2) weeks of the incident. The final



SPECIFIC CONDITIONS Cont'd:

report shall contain a complete description and discussion of the cause of the discharge, the anticipated time that the discharge, if any, will continue, the steps that will be taken to evaluate, reduce, eliminate, and prevent recurrence of the event, and all other information deemed necessary by the Department.

5. The existing wells listed in Exhibit B shall be sampled and analyzed semi-annually (April and October) for the parameters listed on Exhibit C.

Water level elevations shall be measured within 1/100th of a foot in reference to NGVD for all wells listed above and submitted semi-annually, along with elevation references for top of casing (TOC), to the Department along with the semi-annual data.

Pursuant to Rule 62-701.510(9)(a), F.A.C., all ground water quality parameters and analytical results, sampling and analytical methods, method detection limits, applicable water quality standards, Storet codes, TOC elevation, water level measurements, ground water elevations, monitor well identification number, monitor well name, monitor well type (background, detection, compliance, etc.), sample collection date, sample analysis date, facility name, and facility identification number shall be recorded and submitted certified by the permittee to the Department within the time frames required in this condition.

The semi-annual analytical results for groundwater, surface water, and leachate shall be submitted to the Department no later than the fifteenth day of the second month of each sampling and analysis event (May 15 and November 15), unless written approval of time extension is granted by the Department.

All semi-annual and annual water quality analyses reports shall be submitted as described in this condition on DEP Form 62-522.900(2), Exhibit G (attached), with a summary of the information, including any anomalous data or events that may affect the data, exceedances of any Department standards or criteria, confirmation sampling events, applicable charts or graphs or any information related to the water quality monitoring well network to:

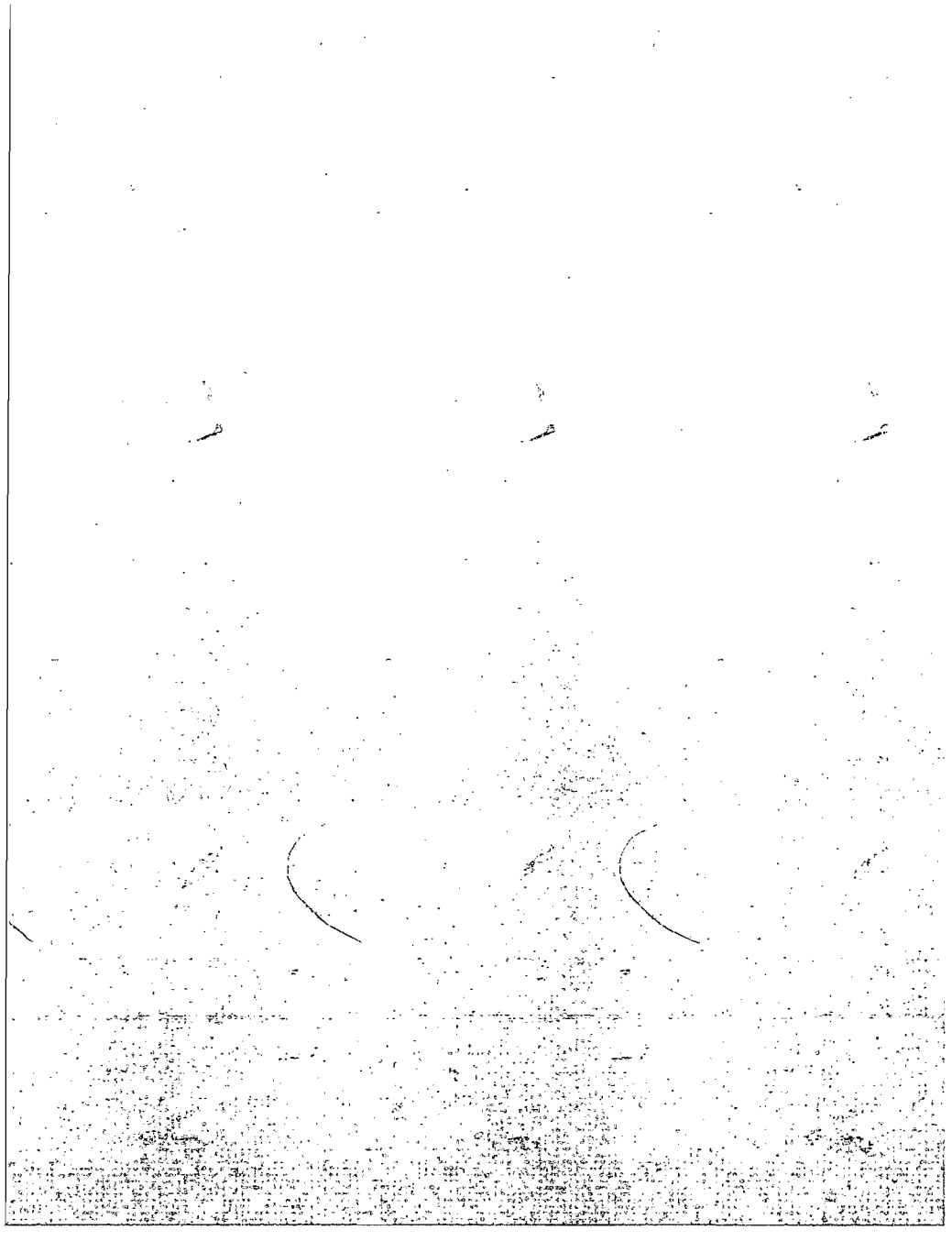
Florida Department of Environmental Protection
Solid Waste Administrator
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

and to:

Florida Department of Environmental Protection
Southeast Florida District Office
Solid Waste Section
400 North Congress Avenue, Suite 200
West Palm Beach, Florida 33401

In accordance with Chapter 62-701.510(9)(b), F.A.C., a technical report, prepared, signed and sealed by a professional geologist or professional engineer with experience in hydrogeologic investigations, shall be submitted to the Department every two years, and shall be updated at the time of permit renewal. The report shall summarize and interpret the water quality data and water level measurements collected during the past two years. The report shall be submitted to the addresses above and also contain the following:

(1) tabular and graphical displays of any data, which shows that a monitoring parameter has been detected, including hydrographs for all monitor wells;
(2) trend analyses of any monitoring parameters detected;



SPECIFIC CONDITIONS Cont'd:

(3) comparisons among shallow, middle and deep zone wells, as shown in Exhibit B;
(4) comparisons between background water quality and water quality in monitoring wells;
(5) correlations between related parameters such as total dissolved solids and specific conductance;
(6) discussion of erratic and/or poorly correlated data; and
(7) an interpretation of the ground water contour maps, including an evaluation of ground water flow rates; and
(8) an evaluation of the adequacy of the water quality monitoring frequency and sampling locations based upon site conditions.

The Department's Southeast District Waste Cleanup section shall be notified at least fourteen (14) days prior to any well drilling or sampling event so the Department, if desired, may observe the drilling, sampling, or collect split samples.

Compliance Monitoring Requirements

6. Pursuant to Rule 62-701.510(7), F.A.C., if indicator parameters are detected at concentrations significantly above those water quality levels established as background for the site, or which are at levels above the Department's water quality standards or criteria specified in Chapter 62-520, F.A.C. in any detection, intermediate or compliance well, the affected well may be resampled for confirmation purposes within thirty (30) days after the permittee's receipt of the data. The Department's Waste Cleanup section must be notified seven (7) days prior to any confirmatory resampling event at this site. Should the permittee choose not to resample, the Department will consider the water quality analysis as representative of current ground water conditions at the facility. If the data is confirmed, or the permittee chooses not to resample, the permittee shall notify the Department in writing with fourteen (14) days of this finding. The Department may require additional monitoring wells or samples to be taken if analyses indicate that ground water contamination must be more specifically defined in extent or concentration.

Pursuant to Rule 62-701.510(7), F.A.C., evaluation monitoring and corrective actions shall be initiated within the specified time frames and requirements upon confirmation and notice to the Department of an exceedance described in this condition.

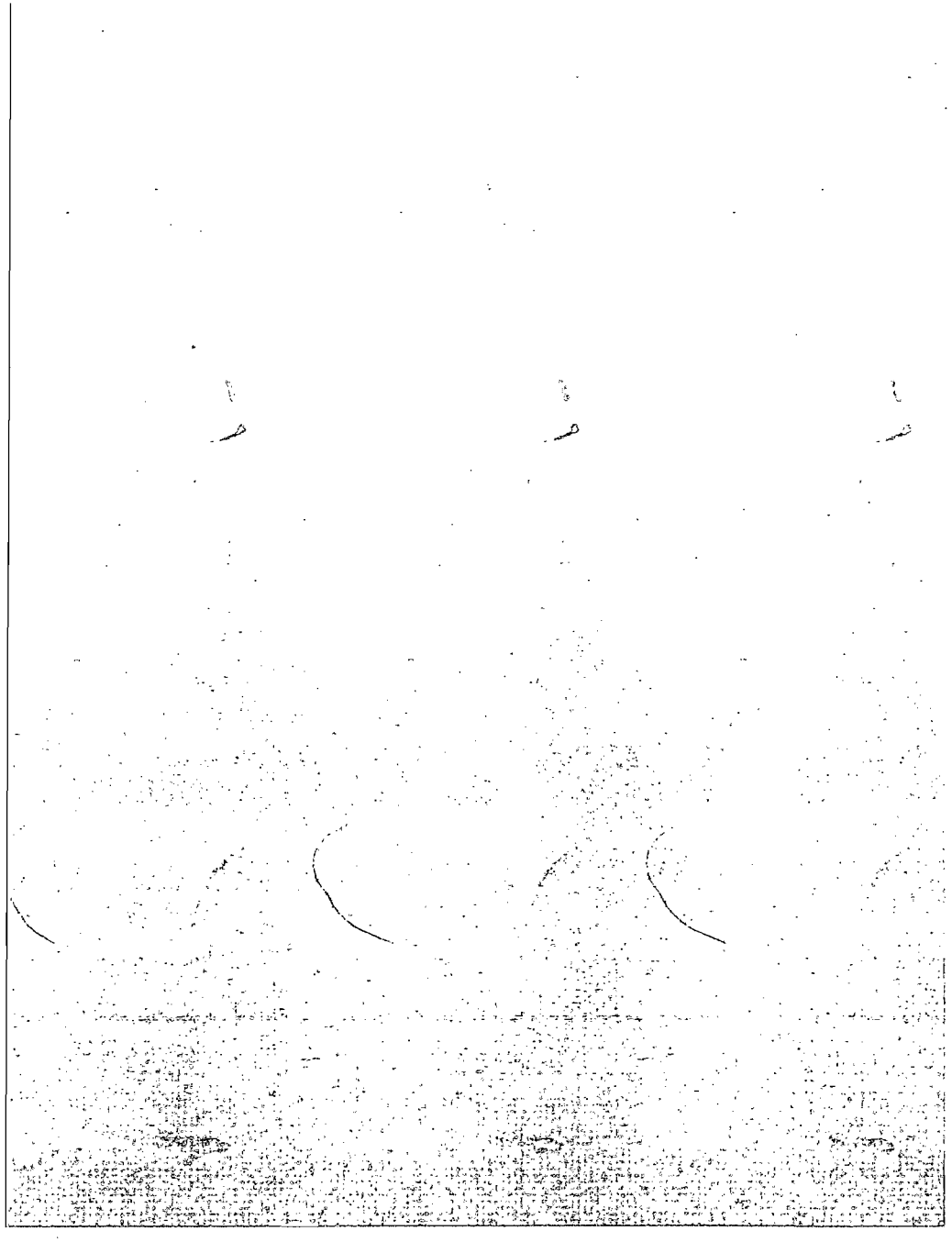
Leachate Monitoring Requirements

7. A leachate sample will be collected annually (October) from the sampling port on the force main at existing LTM4 (leachate transmission manhole 4) adjacent to Leachate Pond 2 for cells 1-8 and from the sampling port on the force main at existing LTM39, adjacent to Leachate Pond 1 for cells 9-34 and analyzed for the parameters listed in Exhibit D.

Pursuant to Rule 62-701.510(6) (c), F.A.C., if the results of leachate analysis indicate a contaminant listed in Title 40 Code of Federal Regulations (CFR), Part 261.24 exceeds the regulatory level, the permittee shall initiate a monthly sampling and analysis program. If the exceedance is observed in any three consecutive months, the permittee shall, within ninety (90) days, initiate a program to identify the source and reduce the contaminant level to below the regulatory level. If no listed contaminant exceeds the regulatory level in any three consecutive months, the permittee shall return to normal sampling pursuant to this condition.

Surface Water Monitoring Requirements

8. The locations of the proposed surface water sampling points (Ponds 1-D, 2 and 3) for the stormwater retention ponds are shown on Exhibit A. Surface water sampling locations designated in Exhibit A will be sampled semi-annually (April and October), once constructed, for the parameters listed in Exhibit F, and submitted



SPECIFIC CONDITIONS Cont'd:

concurrently with the groundwater monitoring reports.

Pursuant to Rule 62-701.510(4)(c), F.A.C., each surface water monitoring location shall be marked and its position shall be determined by a registered Florida land surveyor in degrees, minutes, and seconds of latitude and longitude and Universal Transverse Mercator coordinates within sixty (60) days of permit issuance. This information shall be submitted to the Department within forty-five (45) days of the survey.

If any surface water analytical results exceed the Department's water quality standards or criteria in Chapter 62-302, F.A.C., a confirmatory sample shall be taken within thirty (30) days of the permittee's receipt of the data. The Department's Southeast District Waste Cleanup section must be notified seven (7) days prior to any surface water resampling event. Should the permittee choose not to resample, the Department will consider the water quality analysis as representative of current surface water conditions at the facility. If the data is confirmed, or the permittee chooses not to resample, the permittee shall notify the Department in writing with fourteen (14) days of this finding.

Zone of Discharge

9. The zone of discharge for this site shall be in accordance with Chapter 62-522 and Rule 62-701.340 F.A.C., and extend horizontally as described on Exhibit A and extend vertically to the first continuous confining layer.

Quality Assurance Requirements

10. Pursuant to Rule 62-701.510(2)(b), F.A.C., all sampling and analysis activities shall be performed by organizations that hold certification in accordance with Rule 62-160.300 (1), F.A.C. All sampling, analysis, recording and reporting activities for groundwater, surface water and leachate shall be in accordance with the Department's quality assurance requirements described in Rule 62-160, F.A.C.

Class I Landfill Construction

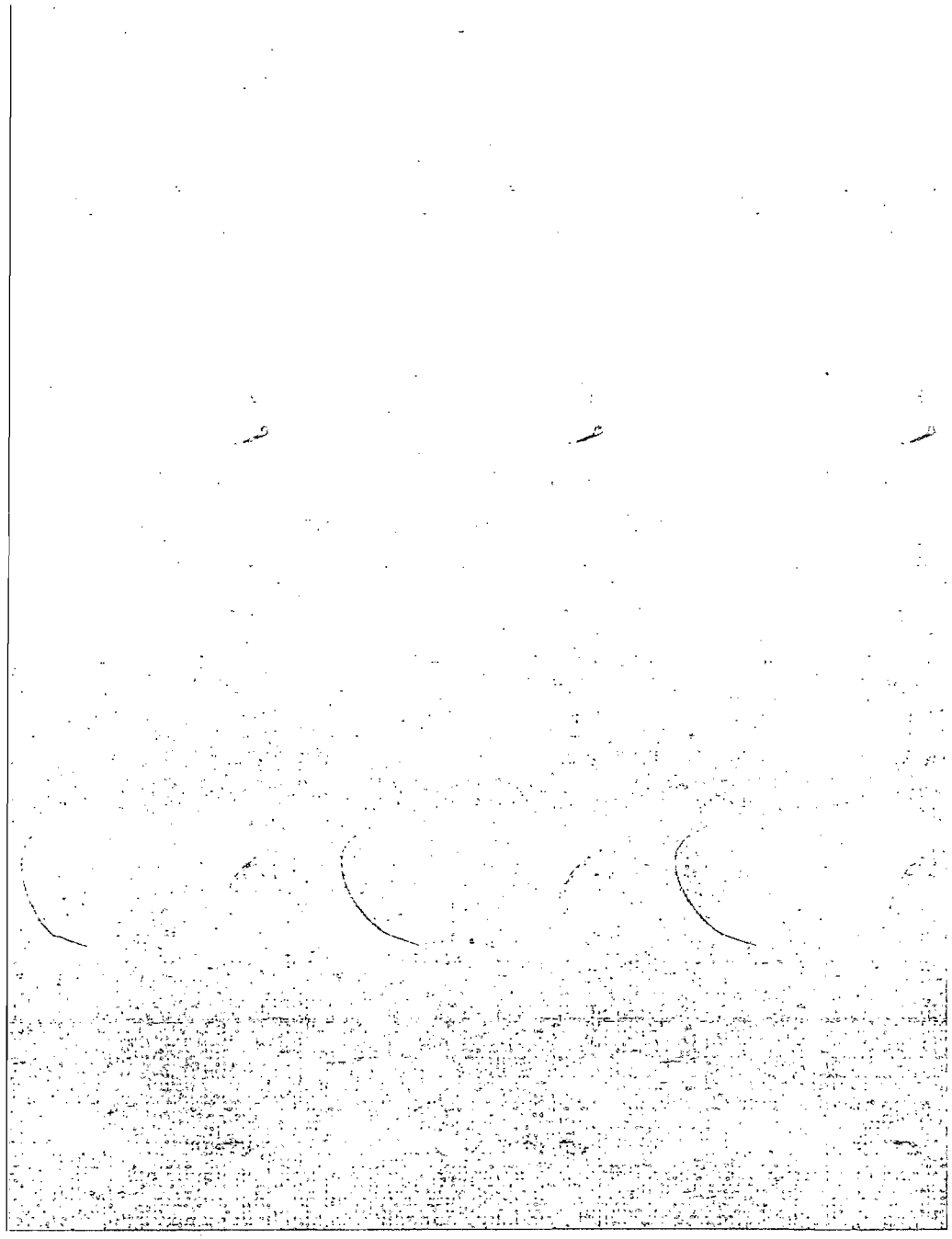
11. The permittee is responsible for retaining a professional engineer registered in the State of Florida for the supervision of the construction of this project, and upon completion, the engineer shall submit a summary report to the Department describing the substantial conformity with the plans and specifications approved by the Department. This summary report shall include record drawings, the documented control program of the liner installation, liner inspections, the quality assurance/quality control testing procedures and laboratory analyses, and engineer's certification of completion.

12. Prior to liner installation of each new phase, the subgrade shall be prepared to provide a firm, unyielding foundation. The base shall be brought up to grade by placement and compaction of fill materials as specified by the engineer of record. All materials in direct contact with the liner shall be free of sharp materials or any larger than one-half inch in accordance with Rule 62-701.400(3)(d)3.

    The landfill subgrade shall consist of either a minimum of 6 inches of soil with a maximum saturated hydraulic conductivity of 1×10^{-5} cm/sec, or a geosynthetic clay liner (GCL) with minimum hydraulic conductivity in accordance with Rule 62-701.400(3)(c)1, F.A.C.

13. The permittee is responsible for obtaining the services of a Florida land surveyor who shall provide a minimum second order of accuracy on: triangulation, traverse, leveling and base-line measurements of the base grade as shown on the approved engineering drawings, submitted in support of this application. The base grade shall be certified by the engineer of record.

14. No solid waste shall be disposed of into newly constructed areas until the engineer of record, or other professional registered in the State of Florida certifies completion of construction on



SPECIFIC CONDITIONS Cont'd:

DEP Form 62-701.900(2) (attached as Exhibit I) and notifies the Department of the opportunity for an inspection of the newly constructed areas in accordance with Rule 62-701.320(9)(a), F.A.C.

Class I Landfill Operation

Capacity

15. On or before January 31 of each operating year, the permittee shall submit an annual elevation survey of the site that is prepared by a land surveyor registered in the State of Florida. This survey shall clearly show the horizontal and vertical dimensions of the landfilled areas. Along with this survey, the permittee shall estimate the remaining life and capacity in cubic yards of the existing constructed landfill. The annual estimate shall be based upon a summary of the heights, lengths, and widths of the solid waste disposal unit.

16. Pursuant to Rule 62-701.500(4), F.A.C., the permittee shall weigh all solid waste that is received and record the solid waste in tons per day. The amount of solid waste received shall be estimated for the following types of wastes listed in Rule 62-701.500(4)(b), F.A.C. Waste reports shall be compiled monthly and submitted to the Department quarterly. During those periods that leachate from Martin County Landfill is received for disposal into the leachate ponds at the Berman Road Landfill, the permittee shall provide in its next quarterly report to the Department, the approximate remaining storage capacity of the leachate ponds. A copy of the report shall be sent to the Division Solid Waste Program Administrator and the Southeast District Solid Waste Program.

17. The permittee shall comply with waste handling and cover requirements in accordance with Rule 62-701.500(7), F.A.C. The minimum frequency for applying initial cover is daily at this landfill or as authorized with the usage of Alternative Initial Cover. A mixture of mulch and clean soils may be used as initial cover, intermediate, and final cover material. In accordance with Rule 62-701.500(7)(e)1, for those areas where solid waste will be deposited on the working face within 18 hours, initial cover may be a temporary cover, such as a tarpaulin, which may be removed prior to deposition of additional waste. Contaminated soils, which have been treated pursuant to Chapter 62-713, F.A.C., may be used as cover material if it meets the criteria of Rules 62-701.200(39), (59) and (61), F.A.C.

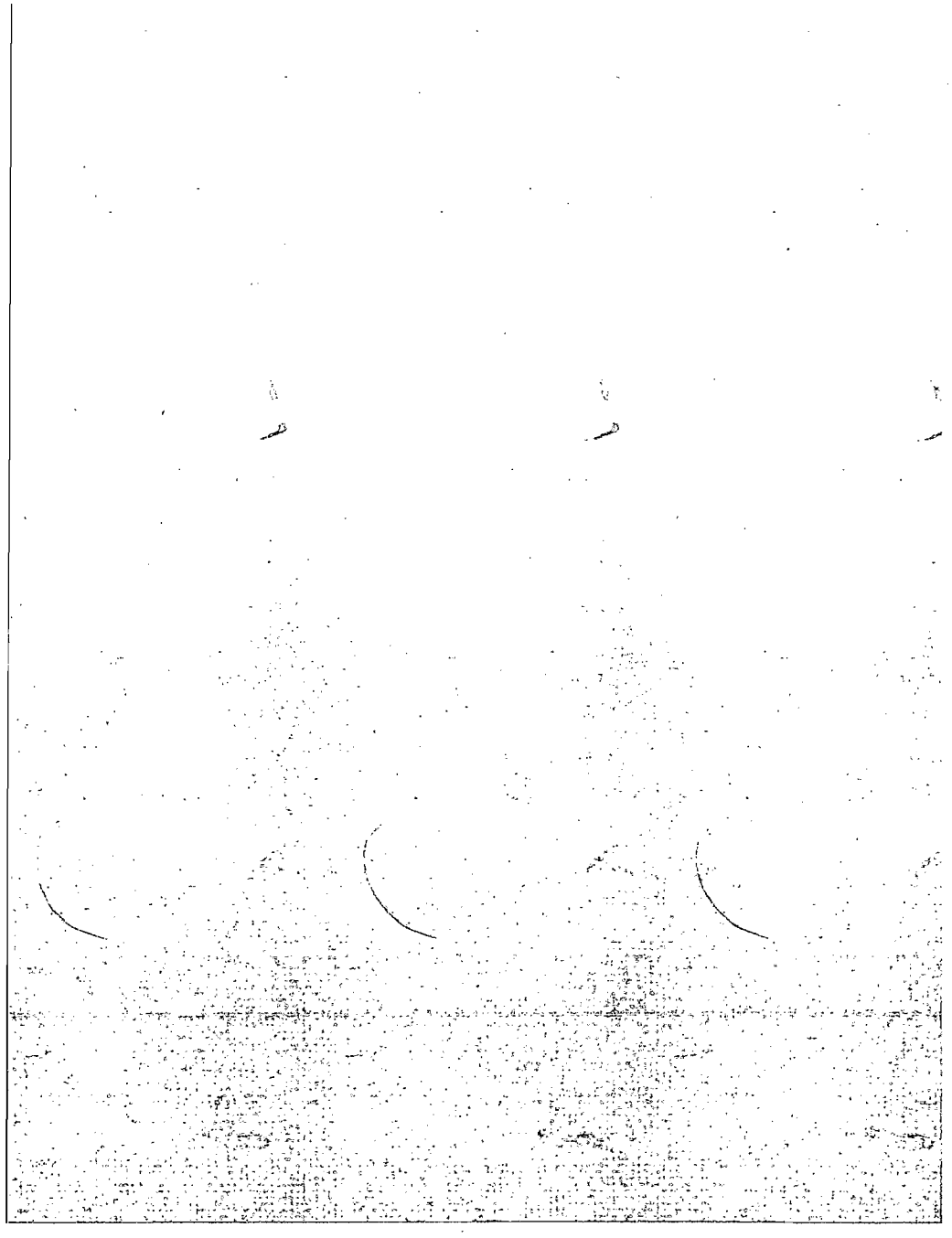
18. Stormwater shall meet the water quality standards as established in Chapter 62-302, F.A.C., at the point of discharge from the stormwater management system into waters of the State.

19. Leachate shall not be discharged into the stormwater management system. Stormwater or other surface water which comes into contact with or mixes with the landfilled solid waste or leachate shall be considered leachate and is subject to the requirements of Rules 62-701.500(8) and 62-701.510(5), F.A.C.

20. Leachate, if treated/disposed off-site, shall be transported to a facility permitted to receive leachate. The permittee shall provide a copy, to the Southeast District Solid Waste Section, of a written contract or agreement including amendments from any facility that accepts leachate from this landfill within 30 days of execution of the contract. Leachate is normally treated at the onsite leachate evaporation system and the effluent is discharged to the landfill.

21. The permittee shall demonstrate that new leachate collection systems are water pressure cleaned or inspected by video recording after construction but prior to initial placement of wastes. The existing leachate collection systems shall be water pressure cleaned or inspected by video recording at the time of permit renewal. The survey shall provide the date, time, the location of each leachate lateral surveyed and those laterals that were not surveyed. For illustrative purposes, a labeled leachate collection systems site plan shall be clearly marked to show the results of the survey. Jet cleaning shall include the following objectives:

    a. Removing any silt build up accumulated in the leachate collection system pipes;
    b. Re-opening plugged holes in the lateral pipes; and
    c. Locating physical damage to the pipe or closed valves.



SPECIFIC CONDITIONS Cont'd:

The permittee shall provide the Department with ten (10) days notice prior to performing the subject demonstration. The demonstration results shall be submitted to the Department within 30 days of completion for new collection systems and with the permit application for renewal. The demonstration results shall include a summary report, results of the survey, findings clearly shown on the aforementioned site plan, recommendations for repairs to the leachate collection system if found to be not operating as designed, or in accordance with Chapter 62-701, F.A.C., and a timetable for repairs completion.

Class I Financial Assurance

22. The permittee shall maintain, in good standing, the financial assurance mechanisms established to demonstrate proof of financial assurance. Support documentation and evidence of inflation adjustment increases shall be submitted within the time frames specified in Rule 62-701.630, F.A.C. All submittals in response to this specific condition shall be sent to:

    Florida Department of Environmental Protection
    Financial Coordinator - Solid Waste Section
    Twin Towers Office Building
    2600 Blair Stone Road, MS 4565
    Tallahassee, Florida 32399-2400

23. The permittee shall annually adjust the closure cost estimate for inflation using Form 62-701.900(28). Adjustments shall be made in accordance with Rule 62-701.630(4), F.A.C. and 40 CFR Part 264.142(a) and 264.144(a). An owner or operator using a letter of credit, guarantee bond, performance bond, financial test, corporate guarantee, trust fund or insurance shall submit the adjusted cost estimate between January 1 and March 1. An owner or operator using an escrow account shall submit the adjusted estimate between July 1 and September 1. All submittals in response to this specific condition shall be sent to:

    Southeast District Office
    Florida Department of Environmental Protection
    Solid Waste Program
    400 N. Congress Avenue, Suite 200
    West Palm Beach, FL 33401

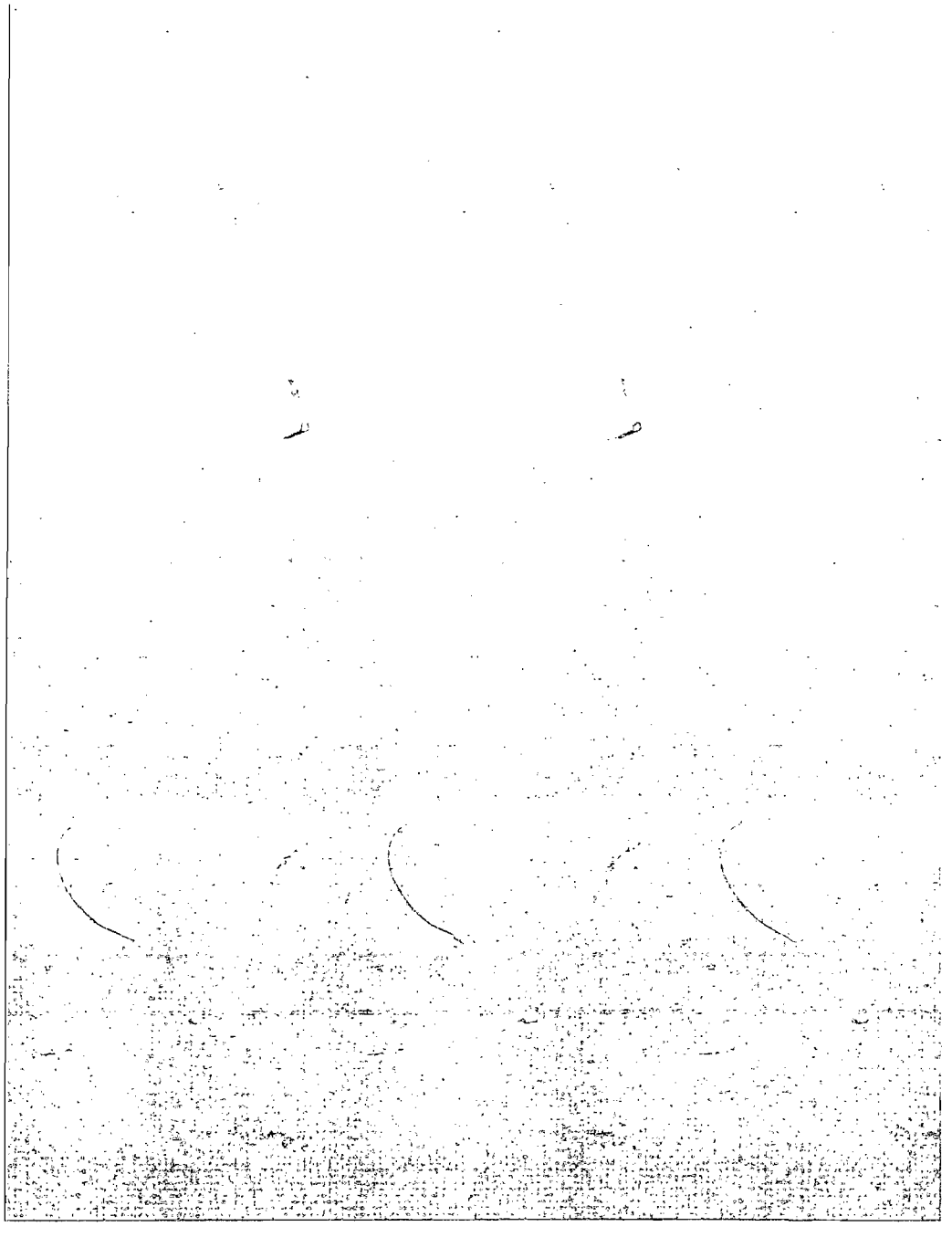
    with a copy to:

    Florida Department of Environmental Protection
    Financial Coordinator - Solid Waste Section
    Twin Towers Office Building
    2600 Blair Stone Road, MS 4565
    Tallahassee, Florida, 32399-2400

Landfill Closure

24. Berman Road Landfill shall close in accordance with the closure plans submitted in support of the permit application. The maximum permitted elevation of the Berman Road Landfill shall be 227 feet N.G.V.D. as shown on sheet 10 of 31, drawing no. 10, dated December 2, 2002, prepared by Mr. Ali Khatami, P.E. of GLOBEX.

Permitted height at closure 227 ft NGVD.



SPECIFIC CONDITIONS Cont'd:

25. The permittee shall submit a closure schedule to the Department at least one year prior to, and shall apply for a closure permit at least 90 days prior to the projected date when the wastes will no longer be accepted at the landfill in accordance with Rule 62-701.600 (2) and (3), F.A.C.

Gas Control and Recovery

26. Gas controls shall be operated and maintained functional as designed and as shown on the application drawings and subsequent submittals approved by the Department, and in accordance with Rules 62-701.400(10), 62-701.500 (9), and 62-701.530, F.A.C. The collected gas will be flared.

27. The landfill owner or operator is not required to obtain any air construction permit unless landfill construction or any modification is subject to the prevention of significant deterioration (PSD) requirements of Chapter 62-212, F.A.C. A landfill for which construction or modification is subject to PSD requirements must make application to the Bureau of Air Regulation, Mail Station 5505, 2600 Blair Stone Road, Tallahassee, Florida, 32399-2400, for an air construction permit and must obtain such permit prior to beginning any construction or modification.

28. The landfill owner or operator is not required to obtain any air operating permit unless the landfill is required to obtain a Title V air operating permit (Title V permit) pursuant to Sec 403.0872, F.S. A landfill is required to obtain a Title V permit if the landfill (or the total facility, if the landfill is collocated or part of a larger facility) has the potential to emit 10 TPY of any hazardous air pollutant, 25 TPY of any combination of hazardous air pollutants or 100 TPY of any other regulated air pollutant. A landfill is also required to obtain a Title V permit if the maximum design capacity, as defined at 40 CFR 60, Subpart WWW, is equal or greater than 2.5 million Megagrams or 2.5 million cubic meters. Title V permits must be applied for in accordance with the timing and content requirements of Rule 62-204.800, F.A.C. and Chapter 62-213, F.A.C. Title V applications shall be submitted to the District Air Program Administrator or County Air Program Administrator with air permitting authority for the landfill location.

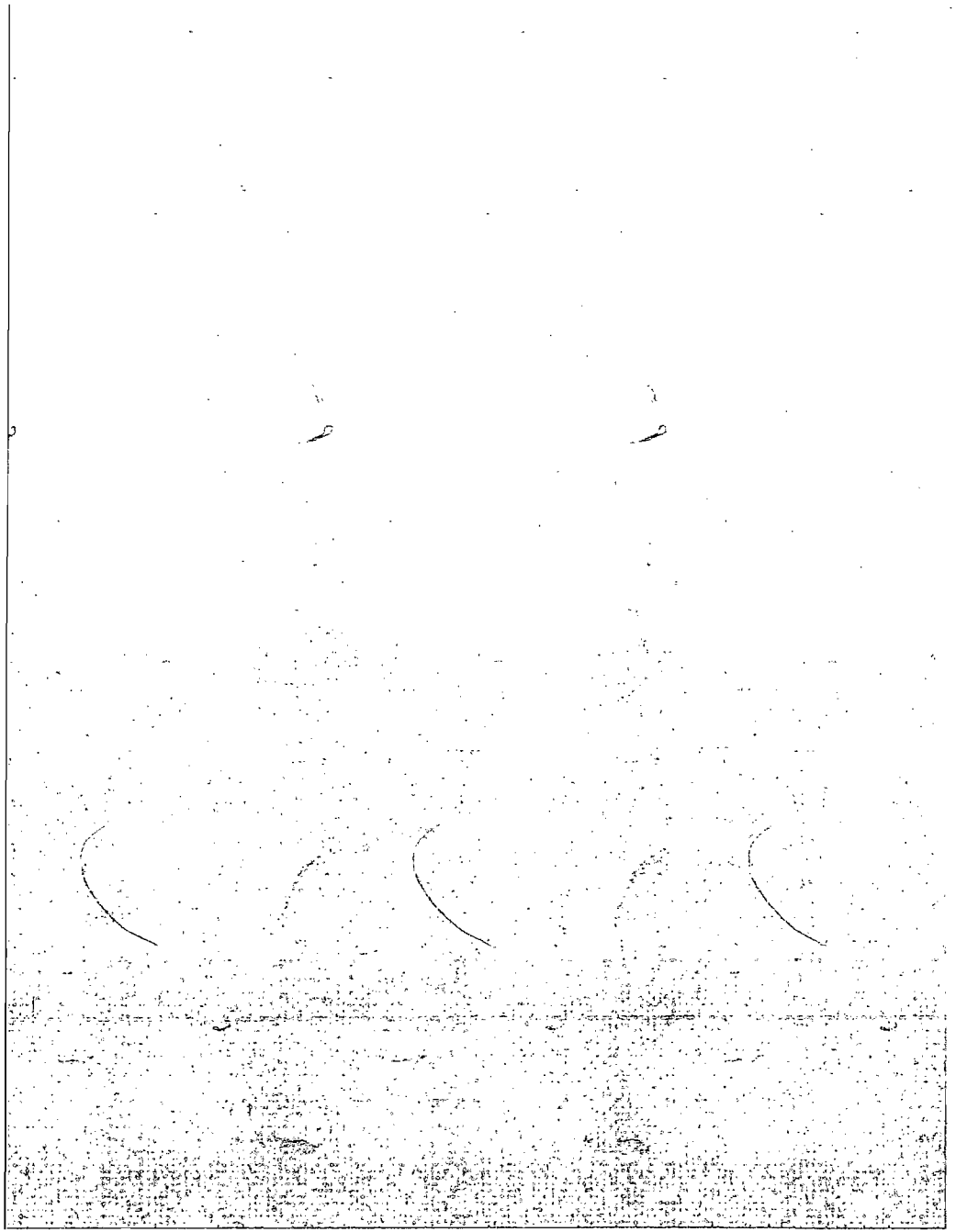
29. The permittee shall comply with the requirements of 40 CFR 60, Subparts WWW and CC, as adopted by reference at Rule 62-204.800, F.A.C. The permittee shall submit to the Division of Air Resources Management, Department of Environmental Protection, Mail Station 5500, 2600 Blair Stone Road, Tallahassee, FL 32399-2400 any amended design capacity report and any Non-Methane Organic Compound (NMOC) emission rate report, as applicable, pursuant to 40 CFR 60.757(a)(3) and (b).

Yard Trash Processing

30. The permittee shall submit an annual report on DEP Form 62-709.320(7)(b), attached as Exhibit H, to the Division Solid Waste Program Administrator with a copy to the Southeast District Solid Waste Program, no later than April 1 of the subsequent calendar year in accordance with Rule 62-709.320(5)(d) and (6), F.A.C., excluding the submittal of the registration form.

Site Conditions

31. Unless otherwise approved by the Department, the permittee shall operate the facilities in accordance with all the applicable sections of Chapters 62-701, 62-709 and 62-711, F.A.C.



SPECIFIC CONDITIONS Cont'd:

32. At least sixty (60)* days prior to the expiration of this permit, the permittee shall make an application to the Department for renewal of the permit in a manner prescribed by the Department in order to assure conformance with all applicable Department rules.

Issued this 14 day of April, 2003

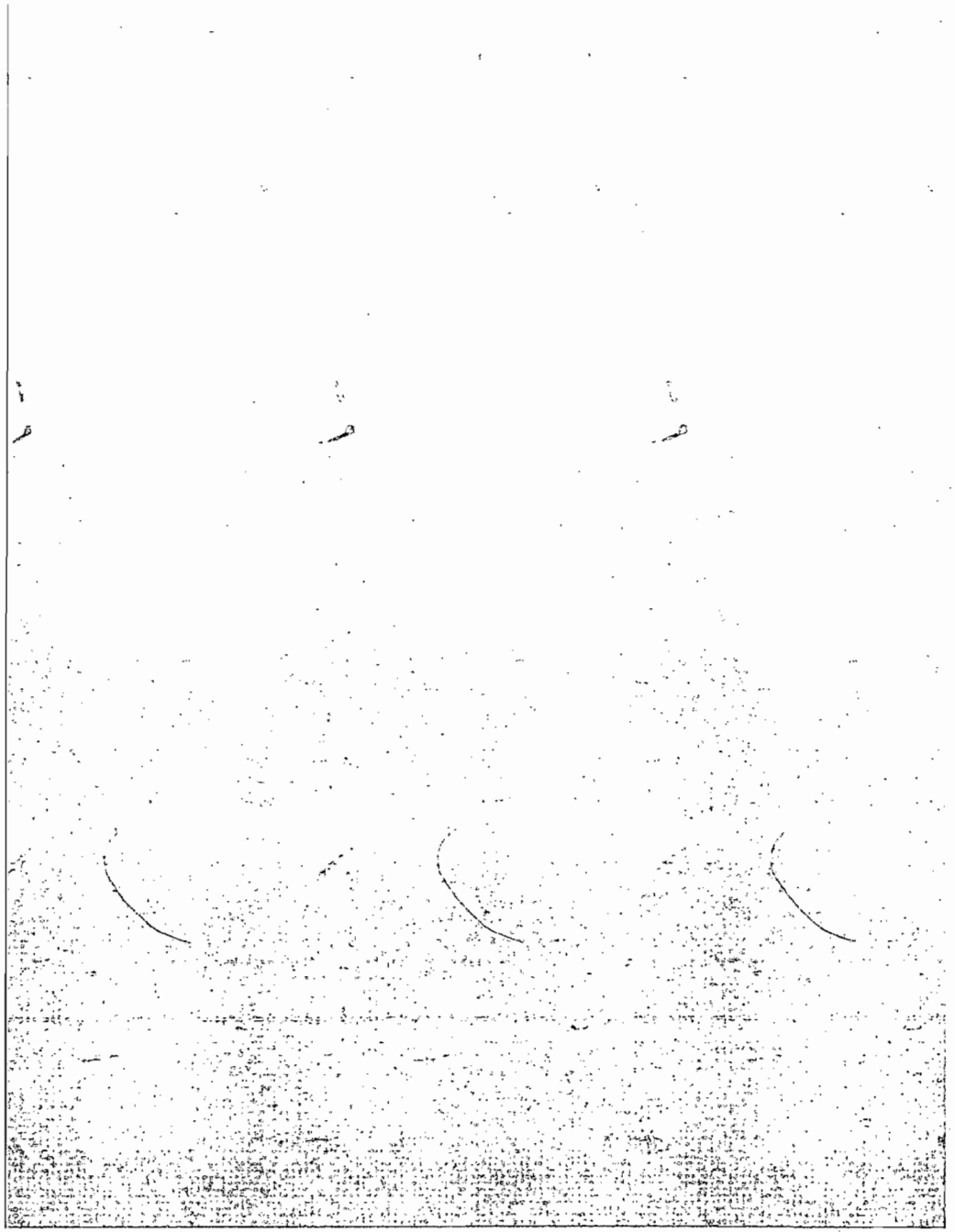
STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

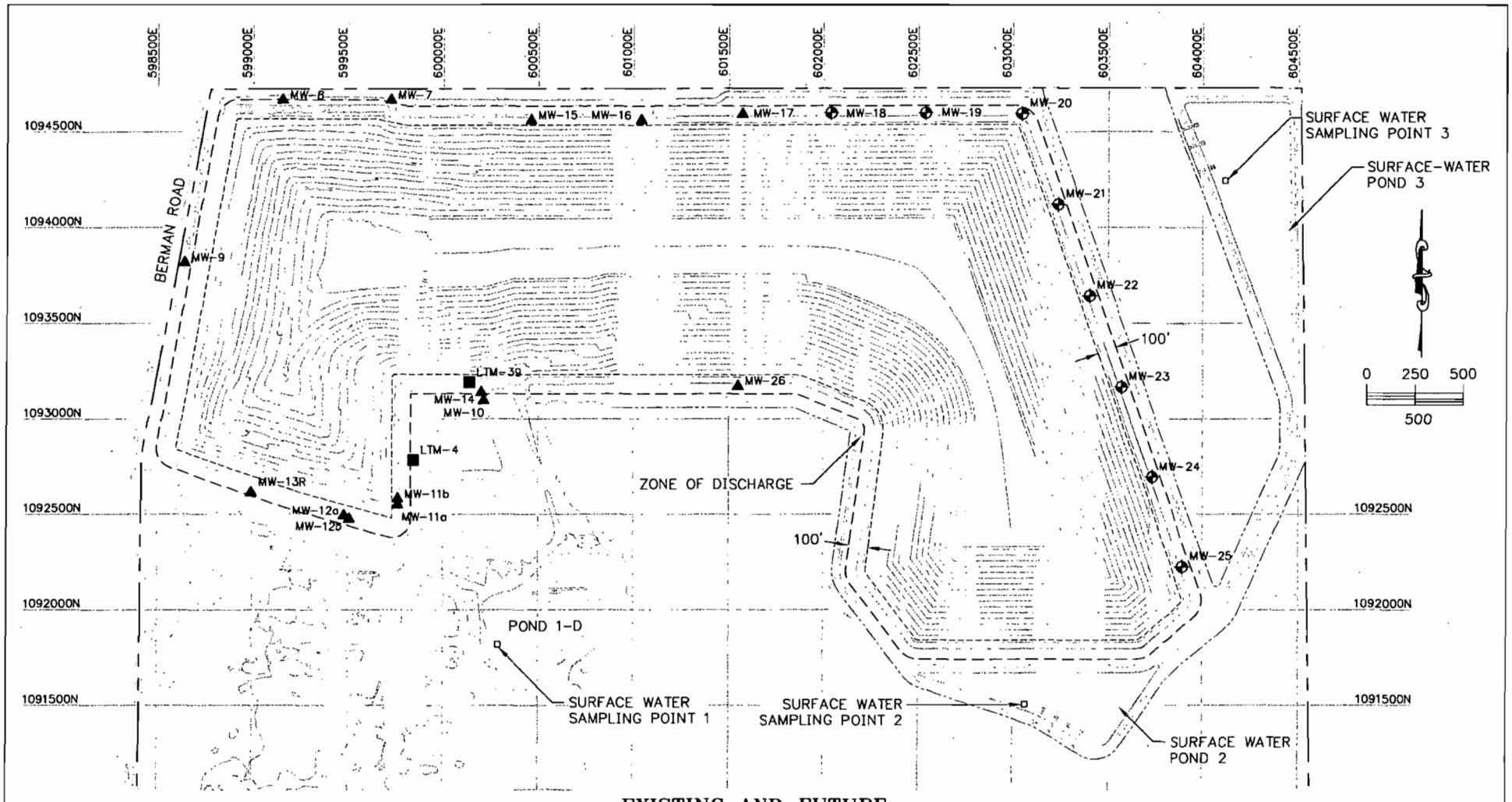
4/14/03

John F. Moulton III Date
Assistant Director of District Management
Southeast District

JFM/PW/LH/mp/jl

* Note: There is no Exhibit E in this permit.





EXISTING AND FUTURE WATER QUALITY MONITORING POINTS

EXHIBIT A

LEGEND

- MW-14 ▲ EXISTING MONITORING WELL
- MW-25 ◆ FUTURE MONITORING WELL
- PERIMETER ROAD
- ZONE OF DISCHARGE
- TOP OF SURFACE-WATER DIKE
- WETLAND IMPACT BOUNDARY
- SURFACE WATER POND
- PERIMETER WASTE BOUNDARY
- LTM-39 ■ LEACHATE SAMPLING POINT
- SURFACE WATER SAMPLING POINT

GLOBEX
ENGINEERING & DEVELOPMENT
Deerfield Beach, Florida

FIGURE NO.	VII-3
PROJECT NO.	1329
DOCUMENT NO.	
PAGE NO.	

1329F041c.DWG 200211271500JK