TITLE V PERMIT (INITIAL) EVALUATION

APPLICANT'S NAME: BOWERMAN POWER LFG, L.L.C.

MAILING ADDRESS: 680 ANDERSON DRIVE, FOSTER PLAZA, 5TH FLOOR
PITTSBURGH, PA 15220
ATTN.: RENEE VOYT, ENV. PROGRAM MANAGER

EQUIPMENT ADDRESS: 11002 BEE CANYON ACCESS ROAD
(FRANK R. BOWERMAN LANDFILL)
IRVINE, CA 92602

FACILITY ID: **157152**

Information pertaining to specific application's evaluation is listed on page No. shown below.

Application No.	Page No.
4489110 – Landfill gas (LFG) treatment and compression system	1 through 5
489111, 489112, 489115, 489116 & 489117	5 through 19
(Five identical LFG combustion turbines)	
489109 - Initial Title V Facility Permit	19

Background:

Bowerman Power LFG, LLC, a subsidiary company of Montauk Energy Capital, LLC with Corporate offices located in Pittsburgh, PA., submitted application 489109 for initial Title V facility permit on 10/10/2008.. SCS Engineers (SCS), on behalf of Bowerman Power LFG, prepared and submitted the complete application package for the landfill gas to energy (LFGTE) project. The project consists of the following applications,

APPLICATION NO. 489110 : (Pgs. 1 through 5)

LANDFILL GAS (LFG) TREATMENT AND COMPRESSION SYSTEM, 9,000 SCFM TOTAL MAXIMUM CAPACITY, CONSISTING OF;

1. LANDFILL GAS SUPPLY FROM GAS COLLECTION HEADER (FRANK R. BOWERMAN LANDFILL).

2. LIQUID/GAS SEPARATION KNOCK-OUT POT.

3. MULTIPLE LANDFILL GAS BLOWERS, CAPABLE OF PRODUCING UP TO 9,000 SCFM AT DISCHARGE PRESSURE SUFFICIENT FOR THE GES BIOGAS CHILLING AND TREATMENT SYSTEM.

4. GES BIOGAS CHILLING PACKAGE WITH MODEL PCW 650 CHILLER, HEAT EXCHANGER, AND A LIQUID/GAS SEPARATOR OR EQUIVALENT.

5. INTERMEDIATE COALESCING FILTER, WITH MINIMUM 1 MICRON FILTERING ELEMENT.

6. SILOXANE ADSORPTION SYSTEM CONSISTING OF;

   FOUR (4) BULK SILOXANE ADSORPTION SYSTEMS, MODEL GES 1500 (DUPLEX) PRESSURE VESSELS OR EQUIVALENT, IN PARALLEL, EACH WITH PROPRIETARY BLEND OF SILICA GEL AND/OR ACTIVATED ALUMINA MEDIA, 0.01 MICRON COALESCING PRE-FILTER, AN ELECTRIC HEATER. MINIMUM 168 KW, WITH INTEGRAL TEMPERATURE SWING ADSORPTION (TSA) REGENERATION SYSTEM, AND ONE MICRON PARTICULATE FILTER.

   MAXIMUM 1900 SCFM REGENERATIVE OFF-GAS, VENTED TO THE ENCLOSED LANDFILL GAS FLARE (EXISTING FLARE AT F. R. BOWERMAN LANDFILL FACILITY).

7. FIVE (5) GAS COMPRESSORS TO FUEL THE GAS TURBINES, EACH VILTER SINGLE SCREW OR EQUIVALENT, UP TO 800 HP AND UP TO 3000 SCFM, EQUIPPED WITH A COALESCING FILTER (MINIMUM 1 MICRON FILTERING ELEMENT), AND WITH AMBIENT AIR COOLERS FOR FUEL GAS COOLING.

CONDITIONS:

1. OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN COMPLIANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED, UNLESS OTHERWISE NOTED BELOW.
   [RULE 204]

2. THIS EQUIPMENT SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD OPERATING CONDITION AT ALL TIMES.
   [RULE 204]

3. THIS EQUIPMENT SHALL BE OPERATED BY PERSONNEL PROPERLY TRAINED IN ITS OPERATION.
   [RULE 204]

4. THE OWNER OR OPERATOR OF THIS EQUIPMENT SHALL PROVIDE TO SCAQMD FINAL LANDFILL GAS (LFG) TREATMENT AND COMPRESSION SYSTEM P & I DIAGRAMS, CONTROLS, EQUIPMENT SPECIFICATIONS (MAKE, MODEL, DIMENSIONS, SIZE, TYPE OF ADSORBENT MEDIA AND ADSORBERS' ARRANGEMENT AND MAXIMUM CAPACITY) PRIOR TO THE INSTALLATION OF THE EQUIPMENT.
   [RULE 204]

5. THE LFG TREATMENT SYSTEM SHALL BE OPERATED TO COMPLY WITH ALL APPLICABLE REQUIREMENTS OF EPA 40 CFR PART 60, SUBPART WWW, SUCH AS DESIGN SPECIFICATIONS FOR FILTRATION, DE-WATERING, COMPRESSION SYSTEM AND EQUIPMENT PERFORMANCE AND MONITORING REQUIREMENTS.
   [40 CFR PART 60, SUBPART WWW]

6. DURING AN ADSORBENT REGENERATION MODE, THE OFF-GAS FROM THE ADSORBER TRAIN SHALL BE VENTED AT ALL TIMES TO AN AIR POLLUTION CONTROL SYSTEM (ENCLOSED FLARE) WHICH IS IN FULL OPERATION AND HAS A VALID PERMIT TO CONSTRUCT/ OPERATE ISSUED BY THE SCAQMD.
   [RULE 1303(a) (1) – BACT]

7. WHENEVER THE LFG TREATMENT SYSTEM IS IN OPERATION, THE TOTAL FLOW OF LFG TREATED AND REGENERATION OFF-GAS FLOW RATE (SCFM) SHALL BE MEASURED AND RECORDED.
[RULE 3004 (a) (4)]

8. SAMPLING PORTS, FOR EACH ADSORBER TRAIN OF THE LANDFILL GAS TREATMENT SYSTEM, SHALL BE PROVIDED IN THE INLET AND OUTLET LINE, AND THE ADSORBER'S REGENERATION OFF-GAS LINE.
[RULE 204]

9. GRAB SAMPLES SHALL BE COLLECTED AT THE INLET AND OUTLET OF THE LFG TREATMENT SYSTEM AND REGENERATION OFF-GAS LINE, AT INITIAL START-UP AND ON A MONTHLY BASIS FOR THE FIRST THREE MONTHS, AND ON A QUARTERLY BASIS THEREAFTER. GRAB SAMPLES SHALL BE ANALYZED FOR CONCENTRATION (PPMV) OF TOTAL SILOXANE COMPOUNDS, TOTAL NON METHANE ORGANIC COMPOUNDS (TNMOC) AND TOTAL SULFUR AS H2S, USING EPA, CARB, OR DISTRICT APPROVED METHODS. RESULTS SHALL BE RECORDED AND MAINTAINED.
[RULE 204, 3004 (a) (4)]

10. THE LFG TREATMENT SYSTEM SHALL BE OPERATED AS PER MANUFACTURER'S RECOMMENDED OPERATING SPECIFICATIONS AND THE FOLLOWING PARAMETERS SHALL BE MONITORED AND RECORDED ON A DAILY BASIS,

    TEMPERATURE (INLET AND OUTLET LFG)
    % MOISTURE (INLET AND OUTLET LFG)
    % OXYGEN (INLET LFG)
    PRESSURE DROP ACROSS THE ADSORBER TRAIN, INCHES OF WATER COLUMN.
    ADSORBENT MEDIA REGENERATION TEMPERATURE
    BREAKTHROUGH FREQUENCY (DAYS)
    ADSORBENT REGENERATION DURATION (HOURS OR DAYS)

    [RULE 204, 3004 (a) (4), 40 CFR PART 60, SUBPART WWW]

11. WITHIN 180 DAYS OF LFG TREATMENT SYSTEM OPERATION, THE OWNER OR OPERATOR SHALL SUBMIT TO AQMD A COMPLETE REPORT WITH RESULTS, SUCH AS TOTAL SILOXANES AND OTHER IMPURITIES REMOVAL EFFICIENCY, ESTIMATED MEDIA LIFE, BREAKTHROUGH EFFICIENCY, REGENERATION CYCLE, PROCESS PARAMETERS MEASURED AND MONITORED, ETC.

    REPORT SHALL BE SENT TO: SCAQMD, REFINERY AND WASTE MANAGEMENT PERMITTING, 21865 COPLEY DRIVE, DIAMOND BAR, CA 91765. THE SUBMITTAL SHALL INCLUDE A COPY OF THIS PERMIT.
    [RULE 204]

12. ALL RECORDS SHALL BE KEPT AND MAINTAINED FOR A PERIOD OF AT LEAST FIVE YEARS AND SHALL BE MADE AVAILABLE TO AQMD PERSONNEL UPON REQUEST.
    [RULE 3004 (a) (4)]

The above-described equipment (A/N 489110) will treat raw LFG from the gas collection header (from Frank R. Bowerman Landfill). The typical system generally consists of; liquid/gas separator, gas blowers, first-stage compressor and a filter, air cooled heat exchanger and moisture separator, bulk siloxane removal systems with adsorption media, regeneration purge-air blower with electrical heater and automatic temperature swing adsorption (TSA) process controls, final stage compressor with dewatering and coalescing filter, and regeneration off-gas exhaust to the existing enclosed LFG flare at F. R. Bowerman Landfill (F96619, A/N 457095. This permit is subject to modification requirement to treat regenerative off-gas).

The proposed gas cleaning system with "on-site regeneration" is the more recent feature for LFG application. Volatile organic silicon compounds (VOSC) adsorption with proprietary solid media is a well-proven technology. The proposed LFG treatment and compressor system will produce a fuel that is filtered, to remove PM down to 3-microns in diameter, and contains less than 1.5% moisture. The proposed siloxane removal system is designed to remove siloxane compounds in the LFG to a final outlet concentration to less than 5 mg/m^3.

At regular intervals, the adsorption media (two vessels in pairs, one on-line, other stand-by mode) in the siloxane removal system is regenerated by desorbing the captured siloxanes with the use of heated air supplied from an electric heater and blower skid. The heated air and

desorbed siloxanes will be vented to an enclosed flare that will combust fuel impurities (organic siloxanes and hydrocarbons).

The above system is a preliminary design and may change until final design specifications finalized.

A/N 489111: (Pgs. 5 through 19)

LANDFILL GAS CONTROL AND GAS-TO-ENERGY SYSTEM CONSISTING OF:

1. PRETREATED LANDFILL GAS (LFG) SUPPLY.

2. GAS TURBINE, NO. 1, SOLAR, MERCURY 50 OR EQUIVALENT, LANDFILL GAS (LFG) FIRED, MAXIMUM 51.78 MILLION BTU PER HOUR HEAT INPUT RATING (HHV), BRAYTON CYCLE WITH RECUPERATOR, WITH ELECTRIC START MOTOR, TEN-STAGE AXIAL FLOW COMPRESSOR, ULTRA LEAN PREMIX (ULP) ANNULAR COMBUSTOR, AUTOMATIC PROPANE PILOT AND FUEL CONTROL SYSTEM, PROGRAMMABLE CONTROLLER, AND DRIVING A 4.6 MEGAWATT (MW) ELECTRIC GENERATOR.

3. EXHAUST STACK, 3'- 3" DIA. X 25' HIGH.

A/N 489113: (Pgs. 5 through 19)

LANDFILL GAS CONTROL AND GAS-TO-ENERGY SYSTEM CONSISTING OF:

1. PRETREATED LANDFILL GAS (LFG) SUPPLY.

2. GAS TURBINE, NO. 2, SOLAR, MERCURY 50 OR EQUIVALENT, LANDFILL GAS (LFG) FIRED, MAXIMUM 51.78 MILLION BTU PER HOUR HEAT INPUT RATING (HHV), BRAYTON CYCLE WITH RECUPERATOR, WITH ELECTRIC START MOTOR, TEN-STAGE AXIAL FLOW COMPRESSOR, ULTRA LEAN PREMIX (ULP) ANNULAR COMBUSTOR, AUTOMATIC PROPANE PILOT AND FUEL CONTROL SYSTEM, PROGRAMMABLE CONTROLLER, AND DRIVING A 4.6 MEGAWATT (MW) ELECTRIC GENERATOR.

3. EXHAUST STACK, 3'- 3" DIA. X 25' HIGH.

A/N 489115: (Pgs. 5 through 19)

LANDFILL GAS CONTROL AND GAS-TO-ENERGY SYSTEM CONSISTING OF:

1. PRETREATED LANDFILL GAS (LFG) SUPPLY.

2. GAS TURBINE, NO. 3, SOLAR, MERCURY 50 OR EQUIVALENT, LANDFILL GAS (LFG) FIRED, MAXIMUM 51.78 MILLION BTU PER HOUR HEAT INPUT RATING (HHV), BRAYTON CYCLE WITH RECUPERATOR, WITH ELECTRIC START MOTOR, TEN-STAGE AXIAL FLOW COMPRESSOR, ULTRA LEAN PREMIX (ULP) ANNULAR COMBUSTOR, AUTOMATIC PROPANE

PILOT AND FUEL CONTROL SYSTEM, PROGRAMMABLE CONTROLLER, AND DRIVING A 4.6 MEGAWATT (MW) ELECTRIC GENERATOR.

3. EXHAUST STACK, 3'- 3" DIA. X 25' HIGH.

A/N 489116: (Pgs. 6 through 19)

LANDFILL GAS CONTROL AND GAS-TO-ENERGY SYSTEM CONSISTING OF:

1. PRETREATED LANDFILL GAS (LFG) SUPPLY.

2. GAS TURBINE, NO. 4, SOLAR, MERCURY 50 OR EQUIVALENT, LANDFILL GAS (LFG) FIRED, MAXIMUM 51.78 MILLION BTU PER HOUR HEAT INPUT RATING (HHV), BRAYTON CYCLE WITH RECUPERATOR, WITH ELECTRIC START MOTOR, TEN-STAGE AXIAL FLOW COMPRESSOR, ULTRA LEAN PREMIX (ULP) ANNULAR COMBUSTOR, AUTOMATIC PROPANE PILOT AND FUEL CONTROL SYSTEM, PROGRAMMABLE CONTROLLER, AND DRIVING A 4.6 MEGAWATT (MW) ELECTRIC GENERATOR.

3. EXHAUST STACK, 3'- 3" DIA. X 25' HIGH.

A/N 489117: (Pgs. 6 through 20)

LANDFILL GAS CONTROL AND GAS-TO-ENERGY SYSTEM CONSISTING OF:

1. PRETREATED LANDFILL GAS (LFG) SUPPLY.

2. GAS TURBINE, NO. 5, SOLAR, MERCURY 50 OR EQUIVALENT, LANDFILL GAS (LFG) FIRED, MAXIMUM 51.78 MILLION BTU PER HOUR HEAT INPUT RATING (HHV), BRAYTON CYCLE WITH RECUPERATOR, WITH ELECTRIC START MOTOR, TEN-STAGE AXIAL FLOW COMPRESSOR, ULTRA LEAN PREMIX (ULP) ANNULAR COMBUSTOR, AUTOMATIC PROPANE PILOT AND FUEL CONTROL SYSTEM, PROGRAMMABLE CONTROLLER, AND DRIVING A 4.6 MEGAWATT (MW) ELECTRIC GENERATOR.

3. EXHAUST STACK, 3'- 3" DIA. X 25' HIGH.

Conditions:

1. OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN COMPLIANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED, UNLESS OTHERWISE NOTED BELOW.
[RULE 204]

2. THIS EQUIPMENT SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD OPERATING CONDITION AT ALL TIMES.
[RULE 204]

3. THIS EQUIPMENT SHALL BE OPERATED BY PERSONNEL PROPERLY TRAINED IN ITS OPERATION.
[RULE 204]

4. THIS EQUIPMENT SHALL BE FIRED ONLY WITH LANDFILL GAS DURING NORMAL OPERATION. PROPANE GAS MAY BE USED DURING EQUIPMENT START UP NOT TO EXCEED 60 MINUTES, WHEN THE LFG QUALITY IS LOWER THAN 400 (WOBBE INDEX).
[RULE 204]

5. THE OWNER OR OPERATOR OF THIS EQUIPMENT SHALL PROVIDE TO SCAQMD FINAL GAS TURBINE DESIGN DRAWINGS, P & I DIAGRAMS, CONTROLS, EQUIPMENT SPECIFICATIONS (MAKE, MODEL, DIMENSIONS, SIZE AND MAXIMUM CAPACITY) PRIOR TO INSTALLATION OF THE EQUIPMENT.
[RULE 204]

6. A FLOW INDICATING AND RECORDING DEVICE SHALL BE INSTALLED AND MAINTAINED IN THE LANDFILL GAS SUPPLY LINE TO THE GAS TURBINE TO MEASURE AND RECORD THE QUANTITY OF LANDFILL GAS (IN SCFM) BEING BURNED.
[RULE 1303(b) (1)-MODELING, 1303(b) (2)-OFFSET, 3004 (a) (4),]

7. WEEKLY READINGS OF THE BTU CONTENT OF LANDFILL GAS AT THE INLET TO THE GAS TURBINE SHALL BE TAKEN USING AN INSTRUMENT APPROVED BY THE SCAQMD. ALL RESULTS SHALL BE RECORDED.
[RULE 3004 (a) (4)]

8. THE TOTAL HEAT INPUT OF LANDFILL GAS BURNED IN THE GAS TURBINE SHALL NOT EXCEED 51.78 MM BTU PER HOUR (HHV @ 500 BTU/SCF). A LOG SHALL BE KEPT INDICATING THE TOTAL HEATING VALUE OF LANDFILL GAS BURNED IN THE GAS TURBINE BASED ON THE RECORDED FLOW RATE (SCFM) AND THE LATEST WEEKLY BTU CONTENT READING.
[RULE 1303(b) (1)-MODELING, 1303(b) (2)-OFFSET, 3004 (a) (4)]

9. ALL RECORDING DEVICES SHALL BE SYNCHRONIZED WITH RESPECT TO THE TIME OF THE DAY.
[RULE 204]

10. THE OWNER OR OPERATOR SHALL PROVIDE 100% BACKUP CONTROL. THE LANDFILL GAS NOT UTILIZED BY THIS EQUIPMENT SHALL BE DIRECTED TO THE FLARE FOR COMBUSTION OR ANY OTHER COMBUSTION OR PROCESSING FACILITY, WHICH IS IN FULL USE, CAN ADEQUATELY PROCESS THE VOLUME OF GAS COLLECTED AND HAS BEEN ISSUED A VALID PERMIT BY THE SCAQMD.
[RULE 1303 (a) (1)-BACT]

11. OPERATION OF THIS EQUIPMENT SHALL NOT RESULT IN THE RELEASE OF RAW LANDFILL GAS INTO THE ATMOSPHERE. ANY BREAKDOWN OR MALFUNCTION WHICH RESULTS IN EMISSIONS OF FUEL GAS SHALL BE REPORTED TO THE SCAQMD MANAGER OF REFINERY AND WASTE MANAGEMENT TEAM WITHIN ONE HOUR AFTER OCCURRENCE, OR WITHIN ONE HOUR OF THE TIME THE OPERATING PERSONNEL KNEW OR REASONABLY SHOULD HAVE KNOWN OF THE OCCURRENCE, AND IMMEDIATE REMEDIAL MEASURES SHALL BE

UNDERTAKEN TO CORRECT THE PROBLEM AND PREVENT FURTHER EMISSIONS INTO THE ATMOSPHERE.
[RULE 402, 430]

12. THIS EQUIPMENT SHALL BE OPERATED IN COMPLIANCE WITH THE SCAQMD RULE 431.1.
[RULE 431.1]

13. ADEQUATE NUMBER OF SAMPLING PORTS AND WELDED NIPPLES WITH CAPS, WITH ITS SAFE ACCESS SHALL BE INSTALLED AND MAINTAINED IN THE EXHAUST STACK IN ACCORDANCE WITH RULE 217 AND SCAQMD'S APPROVAL.
[RULE 217]

14. A CONTINUOUS EMISSION MONITORING SYSTEM (CEMS), APPROVED BY THE EXECUTIVE OFFICER, SHALL BE INSTALLED, OPERATED AND MAINTAINED TO MEASURE THE EXHAUST CONCENTRATION FOR NOx AND O2, ON A DRY BASIS. IN ADDITION, THE SYSTEM SHALL CONVERT THE ACTUAL NOx CONCENTRATION TO A CORRECTED NOx CONCENTRATION AT 15% O2 AND CONTINUOUSLY RECORD THE STACK NOx CONCENTRATION AT 15% O2. THIS MONITORING SYSTEM SHALL COMPLY WITH THE REQUIREMENTS OF SCAQMD RULE 218. PRIOR TO INSTALLATION, THIS MONITORING SYSTEM SHALL BE APPROVED IN WRITING BY THE EXECUTIVE OFFICER.
[RULE 218, 1303(b) (1)-MODELING, 1303(b) (2)-OFFSET, 3004 (a) (4)]

15. WITHIN 180 DAYS AFTER INITIAL START-UP, AND ANNUALLY (WITHIN 45 DAYS OF ANNIVERSARY OF INITIAL TEST) THEREAFTER, THE OPERATOR SHALL CONDUCT PERFORMANCE TESTS, AT MAXIMUM ACHIEVABLE LOAD, IN ACCORDANCE WITH THE APPROVED TEST PROCEDURES. WRITTEN RESULTS OF SUCH PERFORMANCE TESTS SHALL BE SUBMITTED WITHIN 60 DAYS AFTER TESTING. NOTICE SHALL BE PROVIDED TO THE AQMD 10 DAYS PRIOR TO THE TESTING SO THAT AN OBSERVER MAY BE PRESENT. ALL SOURCE TESTING AND ANALYTICAL METHODS SHALL BE SUBMITTED TO THE AQMD, REFINERY AND WASTE MANAGEMENT TEAM MANAGER, FOR APPROVAL AT LEAST 30 DAYS PRIOR TO START OF THE TESTS. THE TESTS SHALL INCLUDE, BUT MAY NOT BE LIMITED TO, A TEST OF THE INLET LANDFILL GAS AND THE GAS TURBINE EXHAUST FOR:

A. METHANE AND TOTAL NON-METHANE HYDROCARBONS
B. CARBON MONOXIDE (EXHAUST ONLY)
C. OXIDES OF NITROGEN (EXHAUST ONLY)
D. CARBON DIOXIDE
E. TOTAL PARTICULATES, REPORTED AS PM10/PM2.5 (EXHAUST ONLY)
F. C1 THROUGH C3 SULFUR COMPOUNDS (SPECIATED, INLET ONLY)
G. FORMALDEHYDE (EXHAUST ONLY)
H. TOXIC AIR CONTAMINANTS INCLUDING, BUT NOT LIMITED TO, BENZENE, CHLOROBENZENE, 1, 2-DICHLOROETHANE, 1, 1-DICHLOROETHENE, DICHLOROMETHANE, TETRACHLOROETHYLENE, TETRA CHLOROMETHANE, TOLUENE, 1, 1, 1-TRICHLOROETHANE, TRICHLOROETHYLENE, TRICHLOROMETHANE, VINYL CHLORIDE, AND XYLENE ISOMERS.
I. OXYGEN AND NITROGEN
J. MOISTURE CONTENT
K. TEMPERATURE
L. FLOW RATE

M. VOLATILE ORGANIC COMPOUNDS (VOCS) CONTROL EFFICIENCY, WT% (BASED ON INLET AND EXHAUST VOCS)

THE REPORT SHALL ALSO PRESENT THE EMISSIONS DATA IN UNITS OF POUNDS PER HOUR (LB/HR), POUNDS PER MILLION BTU (LB/MMBTU), AND PARTS PER MILLION (PPMV) ON A DRY BASIS AT 15% O2 (CO, NOx, AND TNMHC). ALSO, PROVIDE GAS TURBINE'S DEMONSTRATED EFFICIENCY AT FULL LOAD, IN BTU/KW-HR, CORRECTED TO THE HIGHER HEATING VALUE (HHV) OF THE FUEL.
[RULE 1303 (a) (1)-BACT, 1303(b) (1)-MODELING, 1303(b) (2)-OFFSET, 1401, 3004 (a) (4)]

16. DURING NORMAL OPERATION, EMISSIONS FROM THE GAS TURBINE SHALL NOT EXCEED THE FOLLOWING:

CONTAMINANT	LBS/DAY
CO	260
NOx (AS NO2)	133.7
PM10/PM2.5	26.2
TGNMOC (AS CH4)	17.3
SOX (AS SO2)	64.5

[RULE 1303(b) (1)-MODELING, 1303(b) (2)-OFFSET]

17. EMISSIONS OF OXIDES OF NITROGEN SHALL NOT EXCEED 25 PPMV, CALCULATED AT 15% O2, DRY BASIS, EXCEPT DURING PERIODS OF STARTUP AND SHUTDOWN NOT TO EXCEED 30 MINUTES PER INCIDENT.
[RULE 1303 (a) (1)-BACT, 1303(b) (1)-MODELING, 1303(b) (2)-OFFSET]

18. EMISSIONS OF CARBON MONOXIDE SHALL NOT EXCEED 80 PPMV, CALCULATED AT 15% O2, DRY BASIS, EXCEPT DURING PERIODS OF STARTUP AND SHUTDOWN NOT TO EXCEED 30 MINUTES PER INCIDENT.
[RULE 1303 (a) (1)-BACT, 1303(b) (1)-MODELING, 1303(b) (2)-OFFSET]

19. THE GAS TURBINE'S CO AND NOx EMISSIONS, BASED ON MEASURED AND MONITORED RESULTS (OR MANUFACTURER'S EMISSIONS TESTING METHODS UPON DISTRICT'S APPROVAL), SHALL BE USED TO ESTABLISH THE CO AND NOx LIMITS OF THE FINAL PERMIT TO OPERATE.
[RULE 204]

20. THE OWNER OR OPERATOR SHALL CALCULATE THE MAXIMUM INDIVIDUAL CANCER RISK (MICR), ACUTE HAZARD INDEX (HIA) AND CHRONIC HAZARD INDEX (HIC), BASED ON THE SOURCE TESTS RESULTS, USING AQMD PUBLISHED "RISK ASSESSMENT PROCEDURES FOR RULES 1401 AND 212" (VERSION 7.0), TO DETERMINE THE COMPLIANCE WITH RULE 1401. RESULTS SHALL BE SUBMITTED TO AQMD.
[RULE 1401]

21. ALL RECORDS SHALL BE KEPT FOR A PERIOD OF AT LEAST FIVE YEARS AND SHALL BE MADE AVAILABLE TO AQMD PERSONNEL UPON REQUEST.
[RULE 3004 (a) (4)]

Emissions And Requirements:

THIS EQUIPMENT IS SUBJECT TO THE APPLICABLE REQUIREMENTS OF THE FOLLOWING RULES AND REGULATIONS.

22. CO: 2000 PPMV, DRY, 15 MIN. AVG., RULE 407
    CO: 80 PPMV, @ 15% O2, DRY, MAJOR SOURCE – MFGR. GUARANTEE
    NOx: 25 PPMV, @ 15% O2, DRY, MAJOR SOURCE - LAER
    NOx: 74 PPMV, @ 15% O2, DRY, NSPS, 40CFR60 SUBPART KKKK
    PM: RULE 404, SEE APPENDIX B FOR EMISSION LIMITS
    ROG: 20 PPMV, AS HEXANE, @ 3% O2, DRY OR 98% (BY WT) DESTRUCTION EFFICIENCY, RULE 1150.1 & NSPS
    SOx: BASED ON 150 PPMV H2S CON. IN LFG, RULE 431.1
    SOx: 0.90 LB/MWh OR 0.06 LB/MMBTU, NSPS, 40CFR60 SUBPART KKKK.

A/N 489111, 489113, 489115, 489116 & 489117 – Five (5) identical, LFG fired gas turbines, each Solar Mercury 50, generating 4.6 MW electricity (Gross 23 MW).

The proposed landfill gas to energy project will be located at Frank R. Bowerman Landfill (active LF, Facility ID # 69646, that will provide LFG) which is located in Irvine, Orange County, California. The landfill is owned and operated by OC Waste & Recycling, which is considered a separate facility from the Bowerman Power LFG, LLC. Application states that none of these existing operations (i.e. OC W & R, at FRB LF) will be under common ownership or control with the proposed Bowerman Power LFG facility.

Proposed LFGTE facility's air pollutant emissions rates are expected to exceed major source threshold specified in Regulation XXX, Rule 3001. Therefore, this facility is considered a Title V facility.

Applicant has proposed to install five (5) identical gas turbines to generate approximately 23 MW gross electricity (4.6 MW each turbine). Ambient air will be filtered and compressed in multi-stage axial flow compressor. LFG fuel at high pressure will be introduced into the annular, ultra lean premix (ULP) combustor with fuel injectors. Upon combustion at high temperature and pressure, the hot exhaust gas drives a generator producing 4.6 MW power. This is a Brayton cycle turbine with recuperator (no heat recovery steam generator downstream), and exhaust gases leave through the stack. There are no add-on controls for further reduction of air pollutants. Products of combustion are CO, NO_x, ROG (with TACs), PM_{10}, SO_x, CO_2 and moisture. Each gas turbine will be equipped with continuous emission monitoring System (CEMS or shared, if approved) to monitor NO_x and oxygen concentrations in the exhaust.

Gas turbine specifications:

Manufacturer	Solar
Model	Mercury 50
Exhaust Stack	3'- 3".Dia. X 25' H.
Heat Input Capacity	51.78 MMbtu/hr.
Heat Rate	8863 Btu/KW-hr @ LHV
Thermal Efficiency	38.14

Power Output	4.6 MW
Inlet flow, Max.	1771 scfm LFG [@ 500 BTU/SCF, HHV], 8050 ppmv TNMOC 8050 ppmv from F-factor analysis, Sept.12, 2007, GSF/FRB Flare 1.
Exhaust flow rate	30,628 scfm and 72,861 acfm @ 15% O_2 (This number was confirmed by the applicant, E-mail of June 24, 2009)
Exhaust Temperature	710 Deg. F

Start up and shut down emissions:
Propane gas will be used during start-ups. The proposed gas turbine is a simple cycle with no add-on controls (such as SCR or catalytic oxidation). Therefore, there will be no minimum temperature requirements. Generally, this type of gas turbine does not take long time for start up or shut down. Considering short periods for start-up and shutdown (60 min. for startup, 30 min. for shutdown) and not having add-on controls, these emissions are not accounted towards maximum emissions. The required CO and NOx con. limits exclude start-up and shutdown period not to exceed 30 minutes, each.

EMISSIONS: Gas turbine(s)
(Given 1771 scfm LFG@ 500 Btu/scf, 51.78 MMBtu/hr heat input rate, 4.6 MW Power output.) Emissions provided by the applicant (October 2008 submittal, Table 1, EF & emission rates) have been reviewed, revised as necessary, and shown below;

ONE GAS TURBINE:

Pollutant	Emission Factor lbs/MMBtu	Emission Rates lbs/hr	lbs/day	tons/yr
CO	0.2097*	10.86	260.6	47.6
NO_x, as NO_2	0.1075*	5.57	133.7	24.4
$PM_{10}/PM_{2.5}$	0.021+	1.09	26.2	4.8
TNMOC (VOC)	@ 98% DRE	0.72	17.3	3.2
SO_x , as SO_2		2.69	64.5	11.8

* E.F. calculated from lbs/hr emission and 51.78 MMBtu/hr heat input rating.
+ EF per Solar Mfgr. guarantee

CO = (30628 scfm @ 15% O2) $\frac{(80\ E\text{-}06)}{379}$ (28) (60) = **10.86 lbs CO/hr** = 260.6 lbs CO /day

EF (CO) = 10.86 / 51.78 = 0.2097 lbs CO/ MMBTU

NOx = (30628 scfm @15% O2) $\frac{(25\ E\text{-}06)}{379}$ (46) (60) = **5.57 lbs NOx/hr** = 133.7 lbs NOx /day

EF (NOx) = 5.57/ 51.78 = 0.1075 lbs NOx/ MMBTU

TNMOC = (30628 scfm)(20.9 – 15.0/20.9-3.0) $\frac{(20\ E\text{-}06)}{379}$ (86) (60) = 2.75 lbs TNMOC/hr =
as Hexane @ 3% O2 = 66 lbs TNMOC /day
OR
TNMOC* @ 98% DRE = (1771 scfm) $\frac{(8050\ E\text{-}06)}{379}$ (16) (60) (1.0 – 0.98) = **0.72 lbs TNMOC/hr**
= 17.3 lbs TNMOC /day

* TNMOC = 0.805 mole% $(CH_2)_n$, F-factor analysis, Sept. 12, 2007, GSF/FRB Flare 1.

Use stringent value for TNMOC = 0.72 lbs /hr = 17.3 lbs/day.

SOx = (1771 scfm) $\frac{(150\ E\text{-}06)}{379}$ (64) (60) = **2.69 lbs SOx/hr** = 64.5 lbs SOx /day

TOTAL PROJECT EMISSIONS FROM FIVE (5) GAS TURBINES:

	Emission Rates (5 GTs)		
Pollutant	**lbs/hr**	**lbs/day**	**tons/yr**
CO	54.30	**1303**	237.8
NO_x, as NO_2	27.85	**668**	121.9
$PM_{10}/PM_{2.5}$	5.45	**131**	23.9
TNMOC (VOC)	3.60	**86.4**	15.8
SO_x , as SO_2	13.45	**323**	58.9

Lbs/day Project emissions shown in **BOLD** exceed daily threshold limits under Rule 212 (g).

AEIS / NSR:
For LFG treatment and compression system, A/N 489110, emissions entered = 0 (venting to flare, F96619, A/N 457095, owned and operated by OC Waste & Recycling, Frank R, Bowerman LF).

RULES EVALUATION:

RULE 212: This is a significant project in terms of criteria pollutants' emissions.
There is no school within 1000' of emission source.
Risk due to operation of each equipment is expected to be less than one in a million (HRA is being reviewed and pending approval by the Planning Dept.).
Estimated maximum daily emission for criteria pollutants, from the Project – consisting of 5 GTs - exceed daily threshold limits indicated under 212(g).
Therefore, public notice is required.

RULE 218: CEMS. Exempt per Rule 218 (b) (1), as equipment is subject to Reg. IX – NSPS. However, permit condition requires installation and operation of approved CEMS for NOx & O2 by the SCAQMD.

RULE 401: With proper operation, control and maintenance, equipment is expected to comply with this rule.

RULE 402: With proper operation, control and maintenance, nuisance complaints are not expected from each GT operation.

RULE 404: Gas turbine is exempt from provisions of this rule per 404 (c).

RULE 407: Compliance is expected with the 2000 ppmv CO limit.
Exempt from SOx, 500-ppmv limit, per 407(c) (2).

RULE 409: Rule compliance with combustion contaminants concentration of 0.1 grains/cu. Ft. at 12% CO2, over 15 minutes is expected based on other similar GTs permitted in the District.

RULE 431.1: Compliance with LFG Sulfur content limit of 150 ppmv is expected. Based on the information provided, FRB LF showed an average H_2S concentration of 48.5 ppmv, in September 2007. Compliance is expected.

RULE 474: This rule is not applicable since the turbine heat input rating is less than 555 MMBtu/hr and NOx emission will be < 300 ppmv limit.

RULE 475: This rule is not applicable since the turbine rating is less than 10 MW.

REGULATION IX: Standards of Performance for New Stationary Gas Turbines (40 CFR 60 Subpart GG)

EXEMPT. SUPERSEDED BY REQUIREMENTS UNDER 40 CFR PART 60, SUBPART KKKK (FINAL RULE, JULY 6, 2006)

RULE 1134: This rule is applicable to only existing gas turbines, ≥ 0.3 MW, as of August 4, 1989. This is a new construction, therefore rule is not applicable.

RULE 1150.1: Pretreated and conditioned LFG will be combusted in Solar Turbine, Mercury 50. Similar type of turbines are issued PCs. Proposed GTs are expected to meet NMOC destruction efficiency, 98% by wt., or 20 ppmv ROG as Hexane in exhaust @ 3% O2, dry. Compliance can be determined upon completion of the source tests and final report.

REG XIII:

LAER/BACT: Current LAER for CO is 130 ppmv @ 15% O2, dry and for NOx is 25 ppmv @ 15% O2, dry.

The proposed gas turbine has no add-on controls. Add-on controls, such as SCR with ammonia injection for NOx control, and oxidation catalysts to reduce CO and VOC emissions are not cost-effective and, yet not achieved-in-practice for

LFG fired gas turbine. (PCs are granted for GTs for Ameresco Chiquita Energy and LA CO. San. District without add-on controls). However, proposed GTs are expected to meet LAER limits for NOx (25 ppmv) and CO (80 ppmv, new limit yet to be confirmed upon S/T) based on information stated in application that Solar Turbine manufacturer guarantees such performance to meet LAER limits.

Please refer to the application package for detailed LAER analysis.

Modeling: A formal request was submitted to Planning, Rule Development & Area Sources (PRDAS) for their review of the Tier 4 air dispersion analysis, recommendation, and compliance determination with the applicable rule (1303).

On July 22, 2009, Memo from Naveen Berry to Jay Chen, stated that the LFGTE will meet air dispersion modeling requirements. Estimated risk from the Project is 0.05 in a million and HIA = 0.0083 and HIC = 0.0094 were determined. Compliance with modeling requirements is expected.

Offsets*: The proposed LFG to energy project meets the requirements of Essential Public Service, as listed under Rule 1302 (m) (7) "construction and operation of a landfill gas control or processing facility". This new facility does not hold any Emission Reduction Credit (ERC). Therefore, offsets (1:1) listed below, shall be provided from the Priority Reserve account for **each** gas turbine per Rule 1309.1 (a) (3).

CONTAMINANT	P.R. Offset required (each GT), lbs/day
CO	~~261~~ (Not required, in-attainment)
NOx (AS NO2)	134
PM10 (PM2.5)	26
TGNMOC (AS CH4)	17
SOX (AS SO2)	64

* With the current moratorium on permit issuance, and until the affected rules (1309.1, 1304 & 1315) can be readopted, permits cannot be granted, as offsets are required. The facility is not considering providing ERCs as it will be very costly.

Sensitive Zone Requirements: Not applicable as credits will be provided from the Priority Reserve (Offsets from PR pending until permit moratorium issue is resolved).

Facility Compliance: Form 400-A states that there are no other facilities in SCAQMD jurisdiction operated by the same operator. Compliance can be expected with the applicable rules and regulations of the SCAQMD.

Major Polluting Facility:

Proposed gas turbine(s) is (are) expected to meet the current LAER requirements.

Gas turbine (s) will be located on an existing and active landfill where LFG fuel is readily available, where no extensive fuel delivery piping

required if the fuel is to be brought from far distances that will increase project costs and can have additional environmental impacts. The proposed gas turbine is predicted to have thermal efficiency of about 38% that is better than the modern IC engines. Gas turbine is capable of operating with as low as 33% methane in LFG (avg. 400 Btu/scf). The gas turbine is expected to have better than 98% destruction efficiency for NMOCs. Based on this information, GT is considered a suitable technology for LFG to energy project, for LFG control, and expected to comply with applicable rules. Therefore, no further alternative analysis is required.

Also, compliance requirements with Major Polluting Facilities – Alternative analysis may be met through the approved CEQA documents. (Note: Other facilities in the District are granted permits for GTs employed for LFGTE technology).

Protection of Visibility:

Not applicable. Irvine is not near any of the specified Federal Class I area, and estimated NOx and PM10 emissions from each gas turbine is 26 TPY and 5 TPY, respectively, (emission threshold limit >40 TPY NOx and > 15 TPY PM10 emissions).

Compliance through CEQA:

The applicant has provided approved Notice of Determination (NOD) that was filed (December 9, 2008, copy in folder) with County clerk County of Orange. The Lead agency is County of range.
Compliance with Reg. XIII can be expected.

RULE 1401: Review by the PRD & A Division staff concluded that the LFGTE Project will comply with the rule requirement. Risk due to Project emissions is estimated at 0.05 in a million, HIA = 0.0083 and HIC = 0.0094 (See Memo from Naveen Berry to Jay Chen, July 22, 2009).

RULE 1401.1: Bowerman Power LFG, LLC, is a new facility that will operate proposed equipment on an existing active landfill site (OC waste & Recycling, Frank R. Bowerman Landfill, ID 069646). There are no schools within the vicinity of 1000' from the emission source(s) and risk from the Project is estimated at 0.05 in a million. Compliance is expected.

REG. XX: Regional Clean Air Incentive Market (RECLAIM)

This facility is exempt from RECLAIM per Rule 2001(i) (1) (C) – construction and operation of landfill gas control, processing or landfill gas energy recovery facilities, and such facility is prohibited from electing to enter RECLAIM.

REG. XXX: Title V

Bowerman Power LFG, LLC is considered a major source Title V facility, and has filed an Initial Title-V facility permit A/N 489109. Upon completion of Initial Title V facility, draft permit will be sent to the facility for their review and comments, before TV is finalized.

Initial proposed Title V facility permit will be subject to public notice (combined Rule 212/ Title V) review/commenting from EPA , public, and other Governmental agencies.

Potential to emit (PTE) from the proposed LFGTE project (facility) will exceed emission threshold levels for CO (50 TPY limit), NOx (10 TPY limit), and VOC (10 TPY limit).

PTE for single HAP-HCl is based on emission factor used for the Sunshine Gas Producers, Inc. (ID 139938), LFGTE project.

PTE for HCl = (5.12 lb HCl /10^6 MMCF LFG) (1771 scf LFG/min) (60 min/hr)
= 0.54 lbs HCl/hr
= 12.96 lbs HCl/day
= 2.36 TPY HCl – from one GT
= **11.8 TPY HCl – from 5 GTs.**

PTE for Total HAPs = (5.54 lb HCl /10^6 MMCF LFG) (1771 scf LFG/min) (60 min/hr)
= 0.59 lbs HAPs/hr
= 14.16 lbs HAPs/day
= 2.58 TPY HAPs – from one GT
= 12.9 TPY HAPs – from 5 GTs.

Aldehyde emissions = 0.465 TPY- from 5 GTs
Total = **13.36 TPY HAPs – from 5 GTs**

HCl is not listed under Rule 1150.1 Table 1 & 2, however, is subject to Rule 1401 HIC, HIA.

REG. XVII: Preventative Significant Deterioration (PSD)

Rule 1701 General - states this regulation sets forth preconstruction review requirements for stationary sources that shall meet BACT, modeling and other explicabilities. The source may be interpreted as "combinations of permitted units, a project, or a Facility, then the potential to emit (PTE) emission limit can be 100 0r 250 TPY.

Rule 1702 (m) (1) defines Major Stationary Source (different categories). The LFGTE project category is not listed as a Major Stationary Source. However, 1702 (2) says an unlisted stationary source that emits or has PTE 250 TPY or more……
Therefore, LFGTE, major stationary unlisted source, would be subject to 250 tpy limitation. Estimated CO emissions for the project (5-GTs) is 251 TPY.

Rule 1704 Exemptions…(a)(4) lists resource recovery project and shall not be subject to PSD analysis under 1703 (a)(3) to major stationary source….
Therefore, this facility is considered exempt from PSD requirement.

FEDERAL REGULATIONS:

NSPS Requirements 40CFR Part 60- subpart GG
Exempt. Superseded by 40 CFR Part 60- subpart KKKK

NSPS Requirements 40CFR Part 60- subpart KKKK
(Stationary Combustion GT > 10 MMBtu/hr)

SOx:
Proposed gas turbine will comply with SO_2 emission standards that GT shall not exceed 0.90 lb/MWh or burn fuel with potential SO_2 emission in excess of 0.060 lb/MMBtu.

SO_x as SO_2 = 2.69 lbs/hr SO_2 / 4.6 MWhr = 0.585 lb/MW < 0.90 lb/MW,
OR
2.69 lbs/hr SO_2 / 51.78 MMBtu/hr (HHV) = 0.052 lb/MMBtu.
Compliance is expected with subpart KKKK.

NOx:

New turbine firing fuels other than natural gas, Electric generating	> 50 MMBtu/hr (HHV) and ≤850 MMBtu/hr	74 ppmv NOx at 15% O2 or 460 ng/J of useful output (3.6 lb/MWh).

Gas turbine shall meet LAER limit of 25 ppmv NOx at 15% O2 (permit condition) whixh is more stringent than 96 ppmv limit.
Compliance is expected with subpart KKKK.

NESHAPS - 40CFR Part 63- Subpart AAAA

Bowerman Power LFG, LLC is required to comply with this regulation per §63.1935 (c). It states that if you own or operate stationary equipment that is used to collect, control, or treat LFG from a MSW landfill that is subject to this subpart (regardless of the location of the control or treatment system).

Also, §63.1935 (2) states that- MSW LFG collection, control, or treatment system owners/operators are responsible for complying with the requirements of this subpart for the portion of the LFG collection, control, or treatment system they own/operate.

HCL, HAPs and Aldehyde Emissions:

	One-GT TPY	5-GTs TPY
HCL	2.36	11.8
HAPs	2.58	12.9
Aldehyde	0.093	0.465

Compliance Assurance Monitoring (CAM) - 40CFR Part 64

Proposed gas turbine is considered major stationary source, however, the proposed GT will not use any controls (such as add-on controls) to achieve a specified emission limit. Also, each GT is required to have a CEMS (Permit Condition No. 14) that qualifies as a continuous compliance determination method in accordance with 40 CFR 64.1. Thus, GT is exempt from CAM requirements.

Acid Rain Program - 40CFR Part 72

This is a "non-utility Unit" and do not supply more than 25 MWe output to any power distribution system for sale (Gross 23 MWe will be produced by five GTs). Therefore, exempt from the provisions of 40CFR Part 72.

CONCLUSIONS/RECOMMENDATION:

The above-proposed equipment for the LFGTE project are expected to comply with the AQMD's Rules and Regulations. Permit(s) to Construct with proposed conditions is (are) recommended upon completion of required public notices (Rule 212 and Title V) and EPA and public commenting period.

A/N 489109: Initial Title V Permit: (Pg. 19)

Background:

Bowerman Power LFG, LLC, a subsidiary company of Montauk Energy Capital, LLC with Corporate offices located in Pittsburgh, PA., submitted application 489109 for initial Title V facility permit on 10/10/2008.. SCS Engineers (SCS), on behalf of Bowerman Power LFG, prepared and submitted the complete application package for the landfill gas to energy (LFGTE) project. The project consists of the following applications,

A/N 489110 – LFG treatment and compression inline system for Siloxane removal, 8,855 scfm maximum capacity, with on-site media regeneration.

A/N 489111, 489113, 489115, 489116 & 489117 – Five (5) identical, LFG fired gas turbines, each Solar Mercury 50, generating 4.6 MW electricity (Gross 23 MW).

The proposed landfill gas to energy project will be located at Frank R. Bowerman Landfill (active LF, Facility ID # 69646, that will provide LFG) which is located in Irvine, Orange County, California. The landfill is owned and operated by OC Waste & Recycling, which is considered a separate facility from the Bowerman Power LFG, LLC. Application states that none of these existing operations (i.e. OC W & R, at FRB LF) will be under common ownership or control with the proposed Bowerman Power LFG facility.

Proposed LFGTE facility's air pollutant emissions rate is expected to exceed major source threshold specified in Regulation XXX, Rule 3001. Therefore, this facility is considered a Title V facility.

Permits to Construct evaluations for the LFGTE project- five stationary gas combustion turbines and LFG treatment system are attached here.

Rules Evaluation:

Compliance with applicable rules and regulations is expected.

Conclusions & Recommendations:

Issue the initial Title V permit for the facility upon completion of Rule 212 & Title V public notice issuance, 45-day EPA review, and public and other governmental agencies' commenting period.