Bay Area Air Quality Management District

939 Ellis Street
San Francisco, CA 94109
(415) 771-6000

2007

Permit Evaluation and Statement of Basis for MAJOR FACILITY REVIEW PERMIT Minor Revision

for

Sonoma County Central Landfill
Facility #A2254

Facility Address:
500 Mecham Road
Petaluma, CA 94952

Mailing Address:
2300 County Center Drive, Suite B-100
Santa Rosa, CA 95403

BAAQMD Facility Engineer: Ted Hull

Application 14592

Title V – Minor Revision

A. BACKGROUND

This facility is subject to the Operating Permit requirements of Title V of the federal Clean Air Act, Part 70 of Title 40 of the Code of Federal Regulations (CFR), and BAAQMD Regulation 2, Rule 6, Major Facility Review because it is a major facility as defined by BAAQMD Regulation 2-6-212. It is a major facility because it has the "potential to emit" more than 100 tons per year of a regulated air pollutant.

Major Facility Operating permits (Title V permits) must meet specifications contained in 40 CFR Part 70 as contained in BAAQMD Regulation 2, Rule 6. The permits must contain all applicable requirements (as defined in BAAQMD Regulation 2-6-202), monitoring requirements, recordkeeping requirements, and reporting requirements. The permit holders must submit reports of all monitoring at least every six months and compliance certifications at least every year.

In the Bay Area, state and District requirements are also applicable requirements and are included in the permit. These requirements can be federally enforceable or non-federally enforceable. All applicable requirements are contained in Sections I through VI of the permit.

The Sonoma County Central Landfill (Site #A2254) was issued a Major Facility Operating Permit (Title V Permit) on February 27, 2001. The Title V permit has since undergone two Significant Revisions, two Minor Revision, and a Title V Renewal. The most recent permit was issued on August 28, 2007 under Application #13631.

B. SUMMARY OF PROPOSED ACTION

This application is for a Minor Permit Revision to add the Pilot Scale Landfill Gas Compression Plant S-15 to the permit; and to modify permit conditions to reflect alternative wellhead standards and recent landfill gas collection system construction activities. This revision consolidates permitting activities reviewed and approved under BAAQMD Permit Applications #14593, 16497, and 16582. The BAAQMD engineering evaluation reports for each application are included as attachments to this document. In summary, the following changes will be made to the permit:

- Add Landfill Gas Compression Plant S-15 to Tables II-A, IV-A, and VII-A.
- Add Permit Condition #23087 (for S-15) to Section VI "Permit Conditions" and condition reference to Table IV-A.
- Modify Permit Condition #4044, Part 4 to include gas collection system changes pursuant to Application #16497.
- Replace Permit Condition #4044, Part 5 with a new part that includes the alternative wellhead standards and operating requirements pursuant to application #16582.

C. EMISSIONS DISCUSSION

There is no increase of emissions associated with this minor permit revision. The Landfill Gas Compression Plant S-15 is essentially part of the landfill gas collection system and is subject to the same requirements. It is a closed loop system with no vents or exhaust stacks. All waste gases from the plant are transferred back into the system and combusted in either the existing energy plant (IC engines) or flare. Also, the well modifications and alternative wellhead standards associated with Applications #16497 and #16582 will not increase facility emissions.

D. MONITORING

The Landfill Gas Compression Plant S-15 is considered to be part of the landfill gas collection system and will share the existing monitoring requirements for the landfill.

Additional surface monitoring requirements will be added for the landfill gas extraction wells for which alternative oxygen limits have been requested in order to demonstrate that the alternate standards do not affect the integrity of the landfill. The existing temperature-monitoring requirement should be sufficient to indicate the presence of subsurface fires that could potentially occur in areas of the landfill where the oxygen content is elevated.

E. RECOMMENDATION

Issue a Minor Permit Revision to the Title V permit for the Sonoma County Landfill as shown in the Proposed Major Facility Review Permit and described in this evaluation.

By:_____

Ted Hull
Senior Air Quality Engineer

ATTACHMENT:

BAAQMD Engineering Evaluation Reports
Application #s: 14593, 16497, & 16582

ENGINEERING EVALUATION REPORT
SONOMA COUNTY LANDFILL
APPLICATION NUMBER 014593

BACKGROUND:

The Sonoma County Central Landfill has applied for a permit to operate the following:

S-15: Landfill Gas Compression Plant – Pilot Scale

This facility is designed to process 100 scfm of collected landfill gas into compressed natural gas (CNG) to be used as a fuel for CNG vehicles. Landfill gas is primarily composed of methane and carbon dioxide (CO_2), but contains small amounts of water, hydrogen sulfide (H_2S), and other contaminants. In order to be used as a motor fuel, the gas must be dry, free of contaminants, and concentrated as methane by removing most of the CO_2.

PROCESS DESCRIPTION:

The equipment to be used in the Landfill Gas Compression Plant includes a dehydration tank where water in the gas stream is removed by condensation; a compressor module to compress the gas to 120 psi for further processing; a heat exchanger to lower the gas temperature to enable further moisture separation; a carbon bed module for VOC and H_2S removal; and a membrane separation unit to separate the CO_2 from the methane. The CO_2 rich stream is either sent to the flare or is blended back into landfill gas fired at the energy plant (10 IC engine/generators). The methane rich stream is then compressed to 3,900 psi by an electric powered four-stage compressor and is stored, ready to be used as a fuel.

EMISSIONS DISCUSSION:

According to the applicant, the proposed Landfill Gas Compression Plant is a closed loop system with no vents or exhaust stacks. All waste gases will be transferred to the existing treatment systems at the facility (i.e. energy plant or flare). CNG combustion emissions from motor vehicles are excluded from District requirements.

There will no increase of emissions from this application.

STATEMENT OF COMPLIANCE:

CEQA Requirements (Regulation 2, Rule 1):
The Sonoma County Board of Supervisors certified an Environmental Impact Report (EIR) for this project. (See attached "Notice of Determination").

Major Facility Review (Regulation 2, Rule 6):
This facility was initially issued an MFR Permit on on February 27, 2001, with an expiration date of January 31, 2006. A renewal Title V permit is currently being processed. The permit will be revised in conjunction with this application to reflect the new Landfill Gas Compression Plant. In accordance with Regulation 2-6-215, the proposed revision to the MFR Permit is a "Minor Revision", because it is neither a "Significant Revision" as defined by Regulation 2-6-226 nor an "Administrative Permit Amendment" as defined by Regulation 2-6-201.

Landfill Gas Emission Control System Requirements (Regulation 8, Rule 34):
The proposed Landfill Gas Compression plant will not effect compliance with the control requirements of Regulation 8-34-301. Once the landfill gas has been converted to CNG it is no longer subject to Regulation 8-34.

Federal Requirements:
No new federal requirements are triggered by the proposed project.

PERMIT CONDITIONS:

S-15: Landfill Gas Compression Plant

> The Landfill Gas Compression Plant S-15 shall be designed and operated as a closed loop system, with all waste gases vented to a landfill gas control device that meets the applicable requirements of Regulation 8-34-301. (basis: Cumulative Increase, Regulation 8-34-301)

RECOMMENDATIONS:

It is recommended that an Authority to Construct be issued to the Sonoma County Landfill as follows:

S-15: Landfill Gas Compression Plant – Pilot Scale

By: _____
Ted Hull
Senior Air Quality Engineer

ENGINEERING EVALUATION REPORT
SONOMA COUNTY LANDFILL
APPLICATION NUMBER 016497

BACKGROUND:
The County of Sonoma Department of Transportation and Public Works has applied for District approval to make modifications to their landfill gas (LFG) collection system at the Sonoma County Central Landfill. The proposed modifications include the following:

- Replacing 8 existing vertical LFG extraction wells. This well replacement involves concurrently installing and decommissioning wells that serve the same area. The primary reason for this type of replacement is the inability to install leachate extraction pumps in the existing wells. Leachate extraction is vital to ensuring proper gas extraction in wet areas of the landfill.

- Constructing up to 28 new LFG extraction wells. Initially, 8 new vertical extraction wells will be added. In addition, up to 20 new horizontal and vertical LFG extraction wells will be added as necessary to ensure future gas collection efficiency. Notification will be made to the District as wells are installed during the Authority to Construct period.

- Decommissioning up to 20 existing LFG extraction wells due to redundant coverage. The wells to be removed have been replaced in advance by new wells under the authority of previous District permit actions.

Upon completion of these construction activities, the gas collection system at the Central Landfill will include the following components:

- Up to 130 Vertical Gas Extraction Wells
- Up to 20 Horizontal Gas Extraction Wells

EMISSIONS DISCUSSION:
There will no increase of emissions from this application. The well replacements are intended to improve the efficiency of the gas collection system.

STATEMENT OF COMPLIANCE:
There are no new District or Federal regulations triggered by the proposed landfill gas collection system modification. However, changing the number of gas collection wells at the landfill will require that the Title V permit for the facility be modified. The Title V revision required as a result of the actions taken in this application will coincide with the issuance of the BAAQMD permit for this application.

PERMIT CONDITIONS:
It is recommended that Permit Condition #4044, Part 4 be amended as follows to account for changes to the landfill gas collection system at the Sonoma County Central Landfill:

4. The ~~Permit Holder has been issued a Permit to Operate for~~ Sonoma County Central Landfill includes the landfill gas collection system components listed below. Well and collector locations, depths, and lengths are as described in detail in ~~Permit Applications #002227, #008259, #009584, #019313, and #007834.~~ the Amended Landfill Collection and Control System Design Plan (submitted to the BAAQMD on October 8, 2007).

Total Number of Vertical Wells:	130
Total Number of Horizontal Collectors:	20

The Permit Holder shall apply for and receive an Authority to Construct prior to modifying the landfill gas collection system. Increasing or decreasing the number of wells or collectors, or significantly changing the length of collectors or the locations of wells or collectors are ~~all considered to be~~

modifications that are subject to the Authority to Construct requirement. (basis: Regulations 2-1-301, 8-34-301.1, 8-34-304, 8-34-305).

RECOMMENDATIONS:
It is recommended that an Authority to Construct be issued to the Sonoma County Landfill as follows:

S-1: Sonoma County Central Landfill – Modifications to Gas Collection System to Include; Replacement of (8) Existing Gas Extraction Wells, Construction of up to (28) New Gas Extraction Wells, and Decommissioning of up to (20) Existing Gas Extraction Wells

By: _____
Ted Hull
Senior Air Quality Engineer

ENGINEERING EVALUATION REPORT
SONOMA COUNTY LANDFILL
APPLICATION NUMBER 016582

BACKGROUND:

The County of Sonoma Department of Transportation and Public Works has applied for District approval of alternative wellhead standards for (4) existing landfill gas extraction wells. They have requested that the oxygen concentration limits be raised from 5% to 15% at the Vertical Extraction Wells V-058, V-061, V-062, and V-117.

BAAQMD Regulation 8-40-305.4 requires the oxygen concentration in each landfill gas wellhead to be less than 5% by volume, unless the operator has received permit conditions with alternative operating levels. Similarly, 40CFR60.753(c) states that landfill gas wellheads must have either a nitrogen level less than 20% or an oxygen level less than 5%. However, the owner or operator may establish a higher nitrogen, or oxygen value at a particular well if they can demonstrate that elevated parameter does not cause fires or significantly inhibit anaerobic decomposition by killing methanogens.

JUSTIFICATION FOR ALTERNATIVE STANDARD:

The BAAQMD and EPA wellhead standards have been established to ensure reliable and proper wellhead operation, although it is not unusual to see wells operating properly at higher levels. Due to the variable nature of landfill operations, landfilled materials, soil overlay, compaction, density, moisture content, etc, it is not unusual to see considerable variation in the oxygen and nitrogen content from well to well. The District has found (previously reported in Applications #13178 and #13227) that very high oxygen levels (>15%) are often found at wellheads that have positive pressure and/or inadequate landfill gas flow from the well, potentially resulting in surface leaks near the wellhead area.

Sonoma County has had wells out of compliance with the 5% oxygen limit since at least December of 2006. During this time, monitoring has shown large fluctuations in wellhead methane and oxygen concentrations; as adjustments were made attempting to correct the cause of the oxygen readings. By August of 2007, months of tedious wellhead tuning had finally brought the oxygen levels within the 5% limit and methane concentrations returned to their historical norms. The fact that methane levels returned to normal as soon as oxygen levels stabilized at or below 5% is the basis for Sonoma County's demonstration that the elevated oxygen levels that existed for several months did not significantly inhibit anaerobic decomposition by killing methanogens. They conclude that the only effect of high oxygen concentrations on the methane was temporary dilution, with no lasting detriment to continued anaerobic decomposition. Additionally, carbon monoxide (CO) monitoring at the wells in question found concentrations in the range of 10-30 parts per million by volume (ppmv), well below the AP-42 Table 2.4-1 CO default value of 141 ppmv and there were no exceedances of the Regulation 8-34-305.2 landfill gas temperature limits (55^{o}C, 131^{o}F). This, they conclude, indicates that the increased available oxygen did not start any sub-surface fires.

Although there is apparently no current evidence of any adverse impacts on the landfill or air quality caused by elevated oxygen levels at the wells in question, there is equally no evidence that problems will not occur in the future if a higher oxygen concentration limit is approved as requested. It is therefore recommended that additional periodic monitoring be added for the wells in order to demonstrate that the alternate standards do not affect the integrity of the landfill. Additional surface emission monitoring in the vicinity of the affected wells will be implemented in order to demonstrate that the alternative wellhead oxygen will not cause landfill gas emissions at the surface. The existing temperature-monitoring requirement should be sufficient to indicate the presence of subsurface fires.

PERMIT CONDITIONS:

It is recommended that the existing Permit Condition #4044, Part 5 be replaced as follows:

~~5. The landfill gas collection system described in Part 4.a. shall be operated continuously. Wells shall not be shut off, disconnected or removed from operation without written authorization from the District, unless the Permit Holder complies with all applicable requirements of Regulation 8, Rule 34, Sections 113, 116, 117, and 118. (basis: Regulation 8-34-301.1)~~

5. Operating Requirements for Landfill Gas Collection Systems and Collection System Components:

a. The landfill gas collection systems described in part 4a shall be operated continuously. Wells shall not be disconnected or removed, nor isolation valves shut completely off, unless the Permit Holder complies with all applicable requirements of Regulation 8, Rule 34, Sections 113, 116, 117, and 118. (Basis: Regulation 8-34-301.1)

b. Each landfill gas collection system component listed in Part 4a shall be operated in compliance with the wellhead limits of Regulation 8-34-305, unless an alternative wellhead limit has been approved for that component, as identified in subpart b(i), and the Permit Holder complies with all of the additional requirements for that component, as identified in subparts b(ii-vii). (Basis: Regulations 8-34-303, 8-34-304, 8-34-305, 40 CFR 60.755(a) and 60.759)

i. The nitrogen and oxygen concentration limits in Regulation 8-34-305.3 and 8-34-305.4 shall not apply to the landfill gas collection wells listed below, provided that the oxygen concentration in each of the following wells does not exceed 15% by volume: V-058, V-061, V-062, and V-117.

ii. The Permit Holder shall demonstrate compliance with the alternative wellhead oxygen limit in subpart b(i) by monitoring each wellhead for oxygen on a monthly basis, in accordance with the provisions of Regulations 8-34-505 and 8-34-604.

iii. All test dates, wellhead oxygen concentration data, any deviations from the subpart b(i) limit, repair actions, repair dates, re-monitoring dates and results, and compliance restoration dates shall be recorded in a District approved log and made available to District staff upon request in accordance with Regulations 8-34-34-501.4, 8-34-501.9, and 8-34-414.

iv. To demonstrate that the alternative wellhead oxygen limit in subpart b(i) will not cause surface emission leaks, the Permit Holder shall conduct additional surface emission monitoring in the vicinity of each component listed in subpart b(i). For each component in subpart b(i), the Permit Holder shall maintain a map showing the location of the buried collection component and identifying the approximate radius of influence for the component. For each component in subpart b(i), the Permit Holder shall monitor for landfill surface emissions – in accordance with Regulations 8-34-506 and 8-34-607 – at three representative points on the landfill surface that are within the radius of influence of the component and that are not more than 15 meters from the surface location of the component. This additional surface emission monitoring shall be conducted on a monthly basis for a period of at least six consecutive months.

v. If no excesses of the Regulation 8-34-303 surface emission limit are detected in the vicinity of a component for six consecutive months, the Permit Holder may discontinue the additional monthly surface emission monitoring in the vicinity of that component and shall continue with the routine quarterly surface emission monitoring requirements in the vicinity of that component.

vi. If one or more excesses of the Regulation 8-34-303 surface emission limit are detected in the vicinity of a component during a six consecutive month period, the Permit Holder shall follow all applicable requirements for recording and reporting the excess and shall follow the Regulation 8-34-415 repair schedule for landfill surface leak excesses. The additional monthly surface emission monitoring in the vicinity of that component shall continue until either the no surface excess requirements of subpart b(v) have been achieved or the repair and compliance restoration requirements of subpart b(vii) have been satisfied.

vii. If excesses of the Regulation 8-34-303 surface emission limit are detected in the vicinity of a component for three or more monitoring events during a six consecutive month period, the subpart b(i) alternative wellhead oxygen limit shall be revoked for that component. The Permit Holder shall conduct all necessary repairs to the landfill gas collection well, to any piping associated with the well or the remote wellhead monitoring system, to valves, flanges, or other connectors, and to any test ports or other openings that are necessary to eliminate air intrusion into the well or the monitoring point, to prevent impairment of vacuum application or vacuum adjustment at the collection well, and to restore the collection well and associated monitoring point to proper function. The Permit Holder shall complete all of the above repairs and any necessary landfill surface and shall restore compliance with the Regulation 8-34-303 surface emission limit (in the vicinity of that component) and the Regulation 8-34-305.4 wellhead oxygen concentration limit by the earlier of the following dates: (a) within 120 days of the date that the first excess was discovered if the three excess events are discovered within a single quarterly period pursuant to the re-monitoring requirements of 8-34-415 or (b) within 60 days of detection of the third excess.

RECOMMENDATION:
It is recommended that a Change of Permit Conditions be issued to the Sonoma County Landfill as shown above (Condition #4044, Part 5).

By:_____
Ted Hull
Senior Air Quality Engineer