Bay Area Air Quality Management District

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July 2005

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

for

Sonoma County Central Landfill
Facility #A2254

Facility Address:
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Site Engineer: Robert Hull
Application Engineer: Robert Hull

Application 9277

Title V – Significant 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," as defined by BAAQMD Regulation 2-6-218, of 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, with an expiration date of January 31, 2006. The Title V permit has since undergone a Significant Revision and was reissued on March 29, 2004. Sonoma County has now requested an additional revision (Application 9277) to the permit to change the parameter monitoring requirements for the landfill gas fired internal combustion engine generator sets operated by the facility. This is a "Significant Permit Revision" in accordance with BAAQMD Regulation 2-6-226.3 "Any significant change or relaxation of any applicable monitoring, reporting, or recordkeeping condition". Although this revision includes a significant modification to the monitoring requirements of the permit, no increase of emissions is anticipated.

Municipal solid waste landfills generate landfill gas as a byproduct of the biodegradation of organic materials placed in the landfill. Landfill gas contains mainly methane, carbon dioxide, and small amounts of non-methane organic compounds (<1%) and sulfur compounds (<400 ppmv). Many of the non-methane organic compounds (NMOCs) found in landfill gas are precursor organic compounds (POC), and some NMOCs are hazardous air pollutants (HAP). Various local, state, and federal regulations require that landfill gas be collected and controlled to reduce POC and HAP emissions to the atmosphere. In order to meet these requirements, the Sonoma County Central Landfill (S-1) is equipped with an active landfill gas collection and control system. Under normal operating conditions the collection system operates continuously and, all of the collected landfill gas is vented to control devices. Typically the landfill gas is vented to the (10) Internal Combustion Engines (S-4, S-5, S-6, S-7, S-9, S-10, S-11, S-12, S-13, and S-14). When one or more engines are shut down, some of the collected landfill gas is vented to the A-2 Landfill Gas Flare in addition to the remaining operational engines.

Existing Parameter Monitoring

For control devices other than an open flare or an enclosed combustor 40 CFR 60.758(b)(2)(i) requires that the average combustion temperature be monitored at least every 15 minutes. This requirement was incorporated into the permit conditions for the IC Engines (Permit Condition #19933, Part 11) as part of the initial Title V permitting process. The permit condition requires that the exhaust gas temperature from each of the engines be maintained within plus or minus 10 ^{o}F of the temperature range established during the most recent source test required to demonstrate compliance with the destruction efficiency requirements of BAAQMD Regulation 8-34-301.4. This permit condition also satisfies the requirement for monitoring a "key emission control system operating parameter" in accordance with Regulation 8-34-509.

The premise for this monitoring is that the NMOC destruction efficiency is related to the exhaust gas temperature, so if the exhaust gas temperature is maintained in the same range as it was in a source test that demonstrated compliance, it can be assumed that destruction efficiency compliance is being maintained.

B. REQUESTED CHANGES TO PARAMETER MONITORING

Due to difficulties and uncertainties involved with monitoring exhaust gas temperature, Sonoma County has requested that a different parameter (exhaust oxygen concentration) be used. The proposed exhaust gas oxygen monitoring is intended to reasonably demonstrate ongoing compliance with the applicable NMOC destruction efficiency requirements of BAAQMD Regulation 8-34-301.4 and 40 CFR 60.752(b)(2)(iii)(B) and to satisfy the "Key Emission Control System Operating Parameter" monitoring requirements of BAAQMD Regulation 8-34-509. The proposal is a request for an alternative to the exhaust gas temperature monitoring requirement in 40 CFR 60.758(b)(2)(i) as allowed under Section 60.756(d).

Through source testing and engine monitoring, Sonoma County has concluded that the exhaust gas temperature is not necessarily the most accurate indicator of NMOC destruction efficiency for their IC engines. They found that factors affecting combustion temperature, such as ambient temperature and engine load do not proportionally affect the NMOC destruction efficiency. As an alternative to exhaust gas temperature monitoring, Sonoma County has suggested that the exhaust gas oxygen concentration would be a more reliable key emission control system operating parameter, since it is a key indicator of combustion efficiency. This is based on an applicability determination from USEPA Region VII that outlines an approved compliance scheme for IC engines that uses the fuel-to-air ratio as an indication of NMOC destruction efficiency (Control Number 9900021, May 19, 1999). In this approach, the fuel-to-air setting and the exhaust gas oxygen content are recorded during a complying source test. The engine will then be required to operate at the prescribed fuel-to-air setting for the life of the engine, or until a new complying source test is completed for the engine in which a different fuel-to-air setting is used. Since the oxygen content of the exhaust gas is directly related to the fuel-to-air ratio used in combustion, the exhaust gas oxygen content is periodically monitored to demonstrate ongoing compliance.

Sonoma County is requesting a similar approach, using the exhaust gas oxygen content rather than the fuel-to-air ratio as the key emission control system operating parameter. After reviewing the results of 28 source tests conducted on the IC Engines at the facility during 2002 and 2003,

Sonoma County has determined that compliance with the NMOC destruction efficiency requirements can reasonably be assured if the exhaust gas oxygen concentration for each of the (10) IC Engines/Generator Sets is maintained in a range of 6.44 to 8.32 percent. This range is based on a statistical analysis of the 28 source tests and represents 3 standard deviations from the mean exhaust oxygen concentration.

AP-42 Chapter 3.2 "Natural Gas-Fired Reciprocating Engines", Section 3.2.3.2 states the following concerning VOC emissions:

> *"The pollutants commonly classified as VOC can encompass a wide spectrum of volatile organic compounds that are photoreactive in the atmosphere. VOC occur when some of the gas remains unburned or is only partially burned during the combustion process. With natural gas, some organics are carryover, unreacted, trace constituents of the gas, while others may be pyrolysis products of the heavier hydrocarbon constituents. Partially burned hydrocarbons result from poor air-to-fuel mixing prior to, or during, combustion, or incorrect air-to-fuel ratios in the cylinder during combustion due to maladjustment of the engine fuel system. Also, low cylinder temperature may yield partially burned hydrocarbons due to excessive cooling through the walls, or early cooling of the gases by expansion of the combustion volume caused by piston motion before combustion is completed."*

Based on this statement, both the exhaust gas temperature and exhaust gas oxygen content (as a demonstration of the fuel-to-air ratio) are parameters related to the VOC emissions from an IC engine. Therefore, it seems reasonable that either parameter could be monitored for the purpose of demonstrating ongoing compliance with the NMOC destruction efficiency requirements of Regulation 8-34-301.4.

Numerous source tests conducted on the IC Engines at the Sonoma County Landfill do not conclusively support either temperature or oxygen content as parameters affecting compliance with NMOC emissions limits. In fact, Sonoma County has never had a source test of an IC engine that has shown non-compliance with the NMOC requirements of either 40 CFR 60.752(b)(2)(iii)(B) or BAAQMD Regulation 8-34-301.4. Sonoma County contends that of the two parameters, exhaust gas temperature is the most likely to fluctuate. Factors such as ambient temperature and engine load cause temperature fluctuations that have little or no effect on NMOC destruction efficiency. On the other hand, exhaust gas oxygen content is inversely proportional to the fuel-to-air ratio and is much more likely to be a stable indication of proper combustion. Too little oxygen in the exhaust stream of lean-burn engines indicates the potential for incomplete NMOC combustion, while too much oxygen would indicate an excessive amount of air in the combustion process, which may affect NMOC destruction through reduced cylinder temperature temperature.

Since Sonoma County's proposal for monitoring the exhaust gas oxygen content for the (10) landfill gas fired IC Engines/Generator Sets operating at the facility can reasonably be deemed to be equivalent to the current exhaust gas temperature requirement, the District is not opposed to establishing exhaust gas oxygen content as the key emission control system operating parameter.

C. PROPOSED CHANGES TO PERMIT CONDITIONS

All changes to existing permit conditions are clearly shown in "strike-out/underline" format in the proposed permit. When the permit is issued, all 'strike-out" language will be deleted; all "underline" language will be retained.

The existing permit conditions are derived from previously issued District Authorities to Construct (A/C) or Permits to Operate (P/O). Permit conditions may also be imposed or revised as part of the annual review of the facility by the District pursuant to California Health and Safety Code (H&SC) § 42301(e), through a variance pursuant to H&SC § 42350 et seq., an order of abatement pursuant to H&SC § 42450 et seq., or as an administrative revision initiated by District staff. Permit conditions are revised in accordance with the procedures in Regulation 2, Rule 6, Major Facility Review.

The regulatory basis is listed following each condition.

It is recommended that Parts 9 and 11 of Condition #19933 be amended/replaced as shown below to reflect the alternative IC engine monitoring standard requested by Sonoma County:

9. The Permit Holder shall maintain the following records in a District approved logbook:
   a. On a daily basis, record the operating times for each engine.
   b. On a daily basis, calculate and record the amount of landfill gas burned in each engine.
   c. On any day that natural gas is burned in an engine, record the amount of natural gas burned in each engine.
   d. On a monthly basis, summarize all daily records for each engine.
   e. On a monthly basis, calculate and record the maximum daily and total monthly heat input rate (in BTU) to each engine based on the average methane concentration in the landfill gas (as measure during the most recent source test), a high heating value for methane of 1013 BTU/scf, a high heating value for natural gas of 1050 BTU/scf, and the amounts of landfill gas and natural gas burned in each engine (recorded pursuant to subparts b. and c. above).
   f. On an annual basis: record the fuel-to-air-ratio setting for each engine during the source test required in Part #8.

   All records shall be maintained on site or shall be made readily available to District staff upon request for at least 5 years from the date of entry. These record keeping requirements do not replace the record keeping requirements contained in any applicable rules or regulations.
   (basis: Regulation 2-1-403, Cumulative Increase, and Offsets)

~~11. The engine exhaust temperature for each Internal Combustion Engine (S-4, S-5, S-6, S-7, S-9, S-10, S-11, S-12, S-13, and S-14) shall be maintained at the temperature determined by the most recent annual source test, plus or minus 10 degrees F (or other appropriate range established by the source test) averaged over 3 hours, during all times that the engine is operated. In order to demonstrate compliance with this condition, each engine shall be equipped with at least one thermocouple to monitor engine exhaust temperature.~~

~~The engine exhaust temperature shall be automatically recorded at least once every 15 minutes. (Basis: Regulations 8-34-301.4, 8-34-501.4 and 8-34-509)~~

11. In order to demonstrate ongoing NMOC destruction through proper combustion in the Internal Combustion Engines (S-4, S-5, S-6, S-7, S-9, S-10, S-11, S-12, S-13, and S-14), the permit holder shall operate each engine at the fuel-to-air ratio established during the most recent complying source test. In addition, the exhaust oxygen concentration for each engine shall be maintained within a range of 6.4 to 8.3 percent as established in Permit Application #9277. In order to demonstrate compliance with this requirement, the exhaust gas oxygen content for each engine shall be measured and recorded in a District approved log on at least a monthly basis. Monthly oxygen measurements shall be made with a LAND Instruments Lancom III portable flue gas analyzer or District approved equivalent. If this device is not the same device used to measure oxygen content during the annual performance test required by part 8 above, it shall be calibrated to achieve a one to one correlation to the device used during the performance test. If the same device is used for both the annual performance test and for monthly monitoring its calibration shall be maintained to achieve a one to one correlation with its condition at the time of the performance test.

If the fuel-to-air ratio is not set as established during the most recent complying source test or if the oxygen content measured during a monthly inspection is outside the established range, it shall be considered a reportable exceedance and shall be included in the semi-annual monitoring report required by Section I.F. of the Title V permit. A fuel-to-air ratio exceedance shall be corrected upon discovery. If an exceedance of the oxygen content range occurs, the engine operating parameters shall be adjusted until the measured oxygen concentration is within the established range. For each occurrence of an exhaust gas oxygen concentration outside of the established range, monitoring of that engine shall be repeated every seven days until compliance has been established on two consecutive tests where no adjustments to the engine operating parameters were made. All equipment calibration and monitoring records shall be maintained on site or shall be made readily available to District staff upon request for at least 5 years from the date of entry.-(Basis: Regulations 8-34-301.4, 8-34-501.4 and 8-34-509; 40 CFR 60.752(b)(2)(iii)(B) and 60.756(d))

D. COMPLIANCE WITH APPLICABLE REQUIREMENTS

BAAQMD Regulation 2, Rule 2 “New Source Review”

New Source Review is not triggered for the proposed permit revision because the proposed changes to monitoring will not result in an increase of emissions from the IC Engines at the facility. Furthermore, the exhaust temperature monitoring condition was added to the permit conditions for the IC Engines as a direct result of the promulgation of 40 CFR Subpart WWW (effective March 12, 1996) and BAAQMD Regulation 8, Rule 34 (effective October 6, 1999) and was not part of a NSR permitting decision.

BAAQMD Regulation 2, Rule 6 "Major Facility Review"
The proposed changes to monitoring constitute a Significant Permit Revision under Regulation 2-6-226.3 "Any significant change of relaxation of any applicable monitoring, reporting, or recordkeeping condition".

BAAQMD Regulation 8, Rule 34 "Solid Waste Disposal Sites"
Regulation 8-34-301.4 requires emission control devices other than flares to reduce the amount of NMOC in the collected gas by at least 98 percent by weight or to emit less than 120 ppm (vol) NMOC (expressed as methane @ 3% O_2).

Regulation 8-34-509 requires operators using emission control devices other than flares to determine and monitor key emission control system operating parameters for the device used. Sonoma County's proposal to change from one set of emission control system operating parameters to another is in accordance with Regulation 8-34-509 and is not expected to affect ongoing compliance with Regulation 8-34-301.4.

40 CFR 60 Subpart WWW "Standards of Performance for Municipal Solid Waste Landfills"
Section 60.752(b)(2)(iii)(B) requires a control system to either reduce NMOC by 98 weight percent or reduce the outlet NMOC concentration to less than 20 ppm by volume (expressed as hexane @ 3% O_2). Section 60.756(d) requires an owner/operator seeking to demonstrate compliance with the above NMOC requirement using a device other than an open flare or an enclosed combustor (in this case IC engines) to provide information on the device to the Administrator for review and approval. This information must describe the operation of the control device, the operating parameters that would indicate proper performance, and the appropriate monitoring procedures for the device.

In accordance with Section 60.758(b)(2)(i), if a control device other than an open flare or an enclosed combustor is used, the owner/operator is required to monitor the average combustion temperature at least every 15 minutes. Sonoma County's current proposal does not meet this requirement because they have requested that the current temperature monitoring requirements be removed. However, Section 60.756(e) allows the use of alternative monitoring parameters with the Administrator's approval. The Administrator has delegated authority to the BAAQMD to implement and enforce Subpart WWW requirements in the Bay Area (with the exception of Section 60.754(a)(5): the use of an alternative method for determining landfill gas NMOC concentration or the use of site specific "k" values). Therefore, the BAAQMD has the authority to approve an alternative monitoring standard for Sonoma County.

E. OTHER CHANGES TO THE PERMIT

In addition to the Significant Permit Revision described above, the District has made the following "Administrative" and "Minor" permit revisions:

Section I: Standard Conditions

- The dates of adoption and approval of rules in Standard Condition 1.A have been updated.

- The following language was added to Standard Condition I.B: "If the permit renewal has not been issued by [ ], but a complete application for renewal has been submitted in accordance with the above deadlines, the existing permit will continue in force until the District takes final action on the renewal application." This is the "application shield," set forth in BAAQMD Regulation 2-6-407.
- Standard Condition I.B.11, which requires the responsible official to certify all documents submitted, was added to conform to the most recent version of Regulation 2, Rule 6.
- Standard Condition I.E.1 requiring the permit holder to provide any information, records, and reports requested or specified by the APCO, was added because it was inadvertently omitted in the initial permit.
- Standard Condition I.H was modified to conform to the current standard.
- Standard Condition I.J has been added to clarify that the capacity limits prescribed in Table II-A are enforceable limits.

Section II: Equipment

- Standard text has been updated to clarify that the capacity limits prescribed in Table II-A are enforceable limits.

Section III: Generally Applicable Requirements

- Language has been added to Section III to clarify that this section contains requirements that may apply to temporary sources. This provision allows contractors that have "portable" equipment permits that require them to comply with all applicable requirements to work at the facility on a temporary basis, even if the permit does not specifically list the temporary source. Examples are temporary sand-blasting or soil-vapor extraction equipment.
- Section III has been modified to say that SIP standards are now found on EPA's website and are not included as part of the permit. The updated website address has been added.
- Table III has been updated to remove outdated SIP requirements and add rules and requirements as necessary to conform to the current District standard.
- The dates of adoption or approval of the rules and their "federal enforceability" status in Table III have also been updated.

Section IV: Source-Specific Applicable Requirements

- Section IV has been modified to say that SIP standards are now found on EPA's website and are not included as part of the permit. The updated website address has been added.
- Table IV-B has been updated to account for the proposed changes to the IC engine parameter monitoring. Because the engines will be using alternative monitoring parameters, it was determined that most of 40 CFR 60.758(b) does not apply.

Section VII: Applicable Limits and Compliance Monitoring Requirements

- The standard text was updated for clarity and to state that Sections I-VI take precedence if there is a conflict with the VII Tables.
- Table VII-B was updated to account for the proposed changes to parameter monitoring.

Section VIII: Test Methods

- Table VIII was updated to account for the proposed changes to parameter monitoring.

Section XI: State Implementation Plan

- This section has been deleted. The address for EPA's website is now found in Sections III and IV.

F. RECOMMENDATION:

Issue a significant 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
Air Quality Engineer II

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