

Bay Area Air Quality Management District

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**Permit Evaluation
and
Statement of Basis
MAJOR FACILITY REVIEW PERMIT
MINOR REVISION**

for
**Kirby Canyon Landfill
Facility #A1812**

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Title V Statement of Basis

A. Background

The Kirby Canyon Landfill was issued a Title V permit on July 10, 2003. This facility was initially subject to the Operating Permit requirements of Title V of the federal Clean Air Act, Part 70 of Volume 40 of the Code of Federal Regulations (CFR), and BAAQMD Regulation 2, Rule 6, Major Facility Review because it is a designated facility as defined by BAAQMD Regulation 2-6-204. The Emission Guidelines (EG) for Municipal Solid Waste Landfills (40 CFR Part 60, Subpart Cc) require the owner or operator of a landfill that is subject to this part and that has a design capacity greater than or equal to 2.5 million mega grams and 2.5 million cubic meters to obtain an operating permit pursuant to Part 70. As discussed in more detail below in Section C.IV of this report, this facility is a designated facility because it meets the criteria listed in 40 CFR § 60.32c(c). In addition, the Kirby Canyon Landfill is now also subject to Title V, because the additional equipment proposed in this revision increases the facility-wide potential to emit carbon monoxide (CO) to more than 100 tons per year, making it a “Major Facility” as defined by Regulation 2-6-212.

The proposed revisions to the Title V permit include permit modifications made in four District permit applications (Application #: 7300, 7835, 8255, and 9220), the details of which are included in the attached Engineering Evaluation Reports. The potential increase of criteria pollutant emissions from the proposed new equipment at the facility is summarized as follows:

Increased Facility Emissions from Proposed New Equipment

Emissions Source	Annual Emissions (tons/yr)				
	NO _x	CO	POC	PM	SO ₂
A-11 Flare	6.847	22.824	0	1.940	1.597
S-5 Generator Set	6.651	23.279	2.217	0.555	3.326
S-6 Generator Set	6.651	23.279	2.217	0.555	3.326
S-7 Generator Set	6.651	23.279	2.217	0.555	3.326
	26.800	92.661	6.651	3.605	11.575

Emissions offsets have been provided as required by BAAQMD Regulation 2-2-302.

At the request of the District, Kirby Canyon has agreed to accept permit limits for pre-existing Diesel IC Engines (S-3 and S-4) that reflect the maximum anticipated annual usage (i.e. 3,120 hours per year for each engine) rather than presuming unlimited operation. The effect of the usage limits is to keep the potential facility NO_x emissions below 50 tons per year, thereby qualifying them to receive emissions offsets from the District’s Small Facility Banking Account for the new Flare and Generator Sets in accordance with BAAQMD Regulation 2-2-302. Although the usage limits allow the facility to avoid providing their own offsets, this is not a Significant Revision as defined by BAAQMD Regulation 2-6-226. Therefore, this application is being treated as a Minor Permit Revision.

The following is a summary of the proposed revisions to the permit:

- Update the gas collection well totals in the Landfill source description to reflect recent construction activities. (Application #7835)
- Add existing (loss of permit exemption) Diesel IC Engines S-3 and S-4 to Title V permit. (Application #7300)
- Add proposed Landfill Gas Fired IC Engine Generator Sets S-5, S-6, and S-7. (Application #9220)
- Remove proposed Landfill Gas Fired IC Engine Generator Set S-2. (Application #3539 withdrawn by applicant)
- Add new Landfill Gas Flare A-11 and removed existing Flare A-10. (Application #8255)
- Update Generally Applicable Requirements (Table III).
- Update tables and permit conditions to reflect the additions and removals of permitted and proposed equipment.
- Update tables to remove future effective dates that have since passed.
- Add Section X “Revision History” and renumber the “Glossary” and “Applicable State Implementation Plan” as Sections XI and XII.

B. Facility Description

The Kirby Canyon Landfill (S-1) is an active 311-acre Class III landfill located approximately 15 miles south of downtown San Jose, adjacent to U.S. Highway 101. The types of wastes the facility accepts include: non-hazardous residential, commercial, industrial, and inert. The landfill has an estimated closure date of June 2018. This landfill is equipped with an active gas collection system (a system of pipes and blowers) that includes gas extraction wells. The wells are perforated sections of the pipes that are buried in the refuse at various locations. The blowers collect landfill gas by creating a vacuum in the buried refuse that draws landfill gas into the perforated pipes. The blowers vent the collected landfill gas to an enclosed flare and/or to the proposed IC engine/generator sets.

C. Permit Content

The legal and factual basis for this significant revision follows. The permit sections are described in the order that they are presented in the permit. A full Statement of Basis was created for the initial issuance in 2003 and is available on request.

I. Standard Conditions

This section contains administrative requirements and conditions that apply to all facilities. If the Title IV (Acid Rain) requirements for certain fossil-fuel fired electrical generating facilities or the accidental release (40 CFR § 68) programs apply, the section will contain a standard condition pertaining to these programs. Many of these conditions derive from 40 CFR § 70.6, Permit Content, which dictates certain standard conditions that must be placed in the permit. The language that the District has developed for many of these requirements has been adopted into the BAAQMD Manual of Procedures, Volume II, Part 3, Section 4, and therefore must appear in the permit.

The standard conditions also contain references to BAAQMD Regulation 1 and Regulation 2. These are the District's General Provisions and Permitting rules.

Condition I.J has been added to clarify that the capacity limits shown in Table II-A are enforceable limits.

No changes were made to this section.

II. Equipment

This section of the permit lists all permitted or significant sources. Each source is identified by an S and a number (e.g., S24).

Permitted sources are those sources that require a BAAQMD operating permit pursuant to BAAQMD Regulation 2-1-302.

Significant sources are those sources that have a potential to emit of more than 2 tons of a "regulated air pollutant," as defined in BAAQMD Regulation 2-6-222, per year or 400 pounds of a "hazardous air pollutant," as defined in BAAQMD Regulation 2-6-210, per year.

All abatement (control) devices that control permitted or significant sources are listed. Each abatement device whose primary function is to reduce emissions is identified by an A and a number (e.g., A-24). If a source is also an abatement device, such as when an engine controls VOC emissions, it will be listed in the abatement devices table but will have an "S" number. An abatement device that is also a source (such as a thermal oxidizer that burns fuel) will have an "A" number.

The equipment section is considered to be part of the facility description. It contains information that is necessary for applicability determinations, such as fuel types, contents or sizes of tanks, etc. This information is part of the factual basis of the permit.

With the exception of the IC Engine Generator Sets (S-5, S-6, and S-7) proposed in Permit Application #9220, each of the listed sources has previously been issued an authority to construct (A/C) and/or permit to operate pursuant to the requirements of BAAQMD Regulation 2, Permits. These A/Cs and permits are issued in accordance with state law and the District's

regulations. The capacities in the permitted sources table are the maximum allowable capacities for each source, pursuant to Standard Condition I.J and Regulation 2-1-403.

The Diesel IC Engines S-3 and S-4 were added to the Title V permit because they lost their exemption from BAAQMD permitting requirements. Prior to May 17, 2000, all internal combustion engines and gas turbines with rated capacities of 250 hp or less were exempt from permitting. However, revisions to Regulation 2, Rule 1 “Permits, General Requirements” adopted on May 17, 2000 lowered the IC engine and gas turbine horsepower exemption to 50 hp. Since the permit exemption was lost due to these revisions, the diesel engines for the Flare Generator (S-3) and Trash Pump (S-4) became subject to permitting in accordance with Regulation 2-1-424 “Loss of Exemption or Exclusion”. (see Application #7300)

The BAAQMD issued an Authority to Construct for the Flare A-11 on November 4, 2003 under Application #8255. A-11 is intended to replace the existing Flare A-10.

III. Generally Applicable Requirements

This section of the permit lists requirements that generally apply to all sources at a facility including insignificant sources and portable equipment that may not require a District permit. If a generally applicable requirement applies specifically to a source that is permitted or significant, the standard will also appear in Section IV and the monitoring for that requirement will appear in Sections IV and VII of the permit. Parts of this section apply to all facilities (e.g., particulate, architectural coating, odorous substance, and sandblasting standards). In addition, standards that apply to insignificant or unpermitted sources at a facility (e.g., refrigeration units that use more than 50 pounds of an ozone-depleting compound) are placed in this section.

Sources that are exempt from District permits pursuant to an exemption in BAAQMD Regulation 2, Rule 1. They may, however, be specifically described in a Title V permit if they are considered a significant source pursuant to the definition in BAAQMD Rule 2-6-239. This facility does not have any significant sources that do not have District permits.

This section has been updated as necessary to reflect the current version of each requirement. In addition, a statement was added to clarify that these requirements may also apply to temporary sources.

IV. Source-Specific Applicable Requirements

This section of the permit lists the applicable requirements that apply to permitted or significant sources. These applicable requirements are contained in tables that pertain to one or more sources that have the same requirements. The order of the requirements is:

- District Rules and Regulations
- SIP Rules (if any) are listed following the corresponding District regulations. SIP rules are District regulations that have been approved by EPA for inclusion in the California State Implementation Plan. SIP rules are “federally enforceable” and a “Y” (yes) indication will appear in the “Federally Enforceable” column. If the SIP rule is the current District rule, separate citation of the SIP rule is not necessary and the “Federally Enforceable” column will have a “Y” for “yes”. If the SIP rule is not the current District rule, the SIP rule or the

necessary portion of the SIP rule is cited separately after the District rule. The SIP portion is federally enforceable; the non-SIP version are not federally enforceable, unless EPA has approved it through another program.

- Other District requirements, such as the Manual of Procedures, as appropriate.
- Federal requirements (other than SIP provisions)
- BAAQMD permit conditions. The text of BAAQMD permit conditions is found in Section VI of the permit.
- Federal permit conditions. The text of Federal permit conditions, if any, is found in Section VI of the permit.

Section IV of the permit contains citations to all of the applicable requirements. The text of the requirements is found in the regulations, which are readily available on the District's or EPA's websites, or in the permit conditions, which are found in Section VI of the permit. All monitoring requirements are cited in Section IV. Section VII is a cross-reference between the limits and monitoring requirements. A discussion of monitoring is included in Section C.VII of this permit evaluation/statement of basis.

Changes to this section primarily reflect the additions of new equipment and the removal of the existing Flare A-10 and the proposed IC Engine Generator Set S-2. In addition, all references to SIP Regulation 1-523.5 were removed because the requirement does not exist.

Complex Applicability Determinations

Landfills and landfill gas combustion equipment are subject to BAAQMD Regulation 8, Rule 34. This regulation requires landfills with more than 1 million tons of refuse in place to collect and control the landfill gas that is generated by waste decomposition and specifies numerous operating, monitoring, and reporting requirements for subject operations. Regulation 8, Rule 34 has required that the landfill at this site be controlled by an active landfill gas collection system and a landfill gas control system since 1994.

Landfills and landfill gas combustion equipment may also be subject to either the federal New Source Performance Standards (NSPS) for Municipal Solid Waste (MSW) Landfills or the Emission Guidelines (EG) for MSW Landfills. The federal NSPS for MSW Landfills (40 CFR Part 60, Subpart WWW) applies to landfills that have had a design capacity modification after May 30, 1991. The EG for MSW Landfills (40 CFR Part 60, Subpart Cc) applies to landfills that have had no design capacity modifications since May 30, 1991 but that have accepted waste after November 8, 1987.

BAAQMD implemented the EG by amending Regulation 8, Rule 34 on October 6, 1999. Initially, Bay Area landfills were subject to the Federal Plan for MSW Landfills (40 CFR Part 62, Subpart GGG) until EPA incorporated the October 1999 amendments to Regulation 8, Rule 34 into the California State Plan for MSW Landfills (40 CFR §62.1115). On September 20, 2001, EPA amended the California State Plan to include the BAAQMD's October 1999 amendments and amended the Federal Plan to remove Bay Area landfills from the Federal Plan, effective November 19, 2001. Therefore, BAAQMD Regulation 8, Rule 34, as amended on October 6, 1999, is federally enforceable. The October 1999 amendments were adopted into the SIP, effective August 30, 2002.

In accordance with the EG, BAAQMD Regulation 8, Rule 34 requires landfills with a design capacity of more than 2.5 million Mg (2.755 million tons) and more than 2.5 million m³ (3.269 million yd³) to be equipped with landfill gas collection and control systems. The design capacity of the Kirby Canyon Landfill exceeds these applicability criteria. Subject landfills and the associated collection and control systems are required to meet numerous operating, monitoring, and reporting requirements. These requirements are listed in Section IV of the permit.

Landfill operations and landfill gas combustion devices are also subject to other BAAQMD regulations and permit conditions. All applicable requirements are described in Section IV of the permit.

Complex applicability determinations for the proposed new equipment are included in the attached engineering evaluations.

Note: An error relating to Regulation 6 applicability was discovered in the Engineering Evaluation Report for the Diesel IC Engines S-3 and S-4 (Application #7300) and was corrected in the Proposed Significant Revision. The Engineering Evaluation implies that S-3 and S-4 are subject to Regulation 6-301 (Ringelmann #1), when in fact they are instead subject to Regulation 6-303 (Ringelmann #2).

V. Schedule of Compliance

A schedule of compliance is required in all Title V permits pursuant to BAAQMD Regulation 2-6-409.10, which provides that a major facility review permit shall contain the following information and provisions:

“409.10 A schedule of compliance containing the following elements:

- 10.1 A statement that the facility shall continue to comply with all applicable requirements with which it is currently in compliance;
- 10.2 A statement that the facility shall meet all applicable requirements on a timely basis as requirements become effective during the permit term; and
- 10.3 If the facility is out of compliance with an applicable requirement at the time of issuance, revision, or reopening, the schedule of compliance shall contain a plan by which the facility will achieve compliance. The plan shall contain deadlines for each item in the plan. The schedule of compliance shall also contain a requirement for submission of progress reports by the facility at least every six months. The progress reports shall contain the dates by which each item in the plan was achieved and an explanation of why any dates in the schedule of compliance were not or will not be met, and any preventive or corrective measures adopted.”

Since the District has not determined that the facility is out of compliance with an applicable requirement, the schedule of compliance for this permit contains only sections 2-6-409.10.1 and 2-6-409.10.2.

There has been no change to the compliance status at this facility.

VI. Permit Conditions

During the Title V permit development, the District has reviewed the existing permit conditions, deleted the obsolete conditions, and, as appropriate, revised the conditions for clarity and enforceability. Each permit condition is identified with a unique numerical identifier, up to five digits.

While the District has authority to revise the existing permits, and is doing so here concomitantly with the Title V process, it also has authority to supplement the terms of existing permits through the Title V process itself. When necessary to meet Title V requirements, additional monitoring, recordkeeping, or reporting has been added to the permit.

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. After issuance of the Title V permit, permit conditions will be revised using the procedures in Regulation 2, Rule 6, Major Facility Review.

The regulatory basis is listed following each condition. The regulatory basis may be a rule or regulation. The District is also using the following terms for regulatory basis:

- BACT: This term is used for a condition imposed by the APCO to ensure compliance with the Best Available Control Technology in Regulation 2-2-301.
- Cumulative Increase: This term is used for a condition imposed by the APCO that limits a source to the operations described in the permit application pursuant to BAAQMD Regulation 2-1-403.
- Offsets: This term is used for a condition imposed by the APCO to ensure compliance with the use of offsets for the permitting of a source or with the banking of emissions from a source pursuant to Regulation 2, Rules 2 and 4.
- PSD: This term is used for a condition imposed by the APCO to ensure compliance with a Prevention of Significant Deterioration permit pursuant to Regulation 2, Rule 2.
- TRMP: This term is used for a condition imposed by the APCO to ensure compliance with limits that arise from the District’s Toxic Risk Management Policy.

Additional monitoring has been added, where appropriate, to assure compliance with the applicable requirements.

Changes to the permit:

Condition #1437

Modifications were made to account for the replacement of the Flare A-10 with A-11 and the replacement of the proposed IC Engine Generator Set S-2 with S-5, S-6, and S-7. In addition, Part 9 was changed to account for the initial uncertainty of the appropriate combustion zone temperature for A-11.

Condition #18696

The conditions for the proposed IC Engine Generator Set S-2 were deleted, as they are no longer relevant.

Condition #21582

This set of conditions for the Diesel IC Engines S-3 and S-4 was added as part of the Significant Revision of the permit to cap usage and establish monitoring for SO₂ and visible emissions. S-3 and S-4 were initially permitted without conditions because they were existing engines that lost their exemption from permits due to a regulation change. Usage limits for these sources were necessary to accurately reflect the potential emissions from the facility.

Condition #21583

These conditions were added for the proposed IC Engine Generator Sets S-5, S-6, and S-7.

VII. Applicable Limits and Compliance Monitoring Requirements

This section of the permit is a summary of numerical limits and related monitoring requirements for each source. The summary includes a citation for each monitoring requirement, frequency of monitoring, and type of monitoring. The applicable requirements for monitoring are contained in Sections IV, Source-Specific Applicable Requirements, and VI, Permit Conditions, of the permit.

The District has reviewed all monitoring and has determined the existing monitoring is adequate with the exceptions below. This Statement of Basis addresses only the changes made in the proposed Significant Revision.

Monitoring decisions are typically the result of a balancing of several different factors including: 1) the likelihood of a violation given the characteristics of normal operation, 2) the degree of variability in the operation and in the control device, if there is one, 3) the potential severity of impact of an undetected violation, 4) the technical feasibility and probative value of indicator monitoring, 5) the economic feasibility of indicator monitoring, and 6) some other factor, such as a different regulatory restriction applicable to the same operation, that also provides some assurance of compliance with the limit in question.

These factors are the same as those historically applied by the District in developing monitoring for applicable requirements. It follows that, although Title V calls for a re-examination of all monitoring, there is a presumption that these factors have been appropriately balanced and incorporated in the District's prior rule development and/or permit issuance. When a rule or permit requirement has historically had no monitoring associated with it, no monitoring may still be appropriate in the Title V permit if, for instance, there is little likelihood of a violation. Compliance behavior and associated costs of compliance are determined in part by the frequency

and nature of associated monitoring requirements. As a result, the District will generally revise the nature or frequency of monitoring only when it can support a conclusion that existing monitoring is inadequate.

Following is a discussion of the monitoring decisions made for the proposed new equipment at this facility:

A-11: Landfill Gas Flare

The monitoring requirements approved in the initial Title V permit for the existing Flare A-10 have been retained for the proposed Flare A-11 and adequately demonstrate compliance with the applicable requirements. Since NO_x and CO emissions standards have been added for A-11, an annual source test requirement for NO_x and CO was also added (see Condition #1437, Parts 10, 11, and 12).

S-3, S-4: Diesel IC Engines

Particulate Matter and Visible Emissions:

BAAQMD Regulation 6-310 limits PM emissions to 0.15 gr/dscf. If it is assumed that the diesel engine exhaust gases contain 15% excess oxygen under normal operating conditions, the Regulation 6-310 limit can be compared to the AP-42 PM emission factor as follows:

From 40 CFR 60, Appendix A, Method 19, Table 19-1, a stoichiometric dry gas combustion factor of 9,190 dscf/MMBTU is given for distillate oil combustion. At 15% excess O₂ this factor becomes:

$$9,190 \times [21\% / (21\% - 15\%)] = 32,165 \text{ dscf (combustion products) / MMBTU}$$

The conversion of 0.15 gr/dscf @ 15% O₂ to lb/MMBTU is then:

$$(32,165 \text{ dscf / MMBTU}) \times (0.15 \text{ gr / dscf}) \times (\text{lb} / 7,000 \text{ gr}) = 0.689 \text{ lb / MMBTU}$$

Based on the fuel consumption rates (i.e. S-3: 1.64 MMBTU/hr, S-4: 0.42 MMBTU/hr) and assumed PM emissions data for each engine (see Engineering Evaluation Report, Application #7300), the PM emission rate in terms of fuel consumption for each engine is:

- S-3: 0.18 lb/MMBTU
- S-4: 0.32 lb/MMBTU

Since the estimated PM emission rates are well below the converted Regulation 6-310 emission rate, compliance is assumed.

BAAQMD Regulation 6-303.1 limits visible emissions for internal combustion engines <1500 cubic inch displacement to Ringelmann 2.0. Permit Condition #21582, Part 3 was added to require the operator to actively observe the sources for visible emissions during all periods of operation. This is a standard method of monitoring for visible emissions for this type of source. The Permit Holder is required to take all steps necessary to prevent visible emissions including shutting down the source if necessary. Since particulate emissions are visible before a

Ringelmann 2.0 limit would be exceeded, these steps should prevent the exceedance of the Ringelmann 2.0 limit.

SO₂ Emissions

BAAQMD Regulation 9-1-304 requires all liquid fuels to have a sulfur content $\leq 0.5\%$ (wt). Permit Condition #21582, Part 2 requires vendor fuel sulfur content certifications to demonstrate compliance with this limit.

BAAQMD Regulation 9-1-301 sets limitations on ground level concentrations of SO₂. Sources complying with the BAAQMD Regulation 9-1-304 fuel sulfur content limit are not expected to result in exceedances of the BAAQMD Regulation 9-1-301 ground level limits due to the dispersion of the SO₂ emissions that will occur in the atmosphere over the facility. Based on a fuel sulfur limit of 0.5%, the maximum potential emissions from S-3 and S-4 combined will be 1.45 tons/year of SO₂. Since actual emissions are not substantial, monitoring for ground level SO₂ concentrations in addition to monitoring the fuel for compliance with the 0.5% fuel sulfur content limits is not recommended.

S-5, S-6, S-7: IC Engine Generator Sets

NO_x, CO, NMOC Emissions

In order to demonstrate compliance with the applicable emissions limits established for the proposed IC Engine Generator Sets S-5, S-6, and S-7, the permit holder will be required by permit conditions to perform District approved source testing of each engine. Initial source testing is required prior to permit issuance, with an annual testing requirement thereafter. In addition, the permit holder shall determine key emission control system operating parameter(s) that are indicative of NMOC destruction efficiency and that can be monitored. Once determined, the specific operating parameter, allowable operating range, type and location of monitors, and monitoring frequency shall be added to the Title V permit using minor revision procedures.

Particulate Matter and Visible Emissions (Regulation 6):

BAAQMD Regulation 6-310 limits PM emissions to 0.15 gr/dscf. Based on the emissions data provided by the manufacturer, the IC Engines S-5, S-6, and S-7 will each emit 0.13 lb/hr of PM₁₀, at an exhaust gas flow rate of 2,347 dscfm during peak operation.

The PM emissions from these engines are equivalent to 0.006 gr/dscf as follows:

$$(0.13 \text{ lb/hr})(\text{hr}/60\text{min})(\text{min}/2,347 \text{ dscf})(7,000 \text{ gr/lb}) = 0.006 \text{ gr/dscf}$$

Therefore, S-5, S-6, and S-7 will comply with Regulation 6-310 and no additional monitoring is necessary.

BAAQMD Regulation 6-301 limits the visible emissions from S-5, S-6, and S-7 to Ringelmann 1.0. However, as demonstrated above, PM emissions from the engines will be quite low (as is typical for the combustion of gaseous fuels) so violations of the Ringelmann 1.0 limit are not expected. Therefore, the addition of periodic monitoring for the Ringelmann limit would not be appropriate.

SO₂ Emissions

BAAQMD Regulation 9-1-302 limits SO₂ emissions from the exhaust stream of any source (other than a ship) to 300 ppm (dry).

Given the following (see Engineering Evaluation Report, Application #9220):

SO ₂ Emission Rate for each IC Engine:	0.69 lb/hr
Peak Exhaust Flow Rate:	2,347 dscfm
Molecular Weight of SO ₂ :	64 lb/lb-mole
Volume of Gas at 70°F:	386 scf/lb-mole

$$\begin{aligned}\text{ppm SO}_2 &= (0.69 \text{ lb SO}_2/\text{hr})(\text{hr}/60 \text{ min})(\text{min}/2,347 \text{ dscf})(\text{lb-mole SO}_2/64 \text{ lb SO}_2)(386 \text{ dscf} \\ &\quad \text{gas/lb-mole gas}) \\ &= 2.96 \times 10^{-5} \text{ lb-mole SO}_2/\text{lb-mole gas} \\ &= 29.6 \text{ ppm SO}_2\end{aligned}$$

Because the SO₂ exhaust concentration based on the mass emission rate is well below 300 ppm it is anticipated that S-5, S-6, and S-7 will comply with Regulation 9-1-302. However, an annual demonstration of compliance is recommended as follows:

The results of the required annual SO₂ source test for the Flare A-11 can also be used to demonstrate SO₂ compliance for the IC Engines S-5, S-6, and S-7 since it is assumed that SO₂ emissions are based solely of the amount of sulfur in the combusted landfill gas, regardless of whether it is flared or used as a fuel. However, due to differences in the dilution of the exhaust streams from the two types of combustors, an oxygen correction factor will have to be made to apply the flare results to the IC engines. It is recommended that the results of the source testing for the flare be corrected to zero percent oxygen in order to be used to demonstrate Regulation 9-1-302 compliance for the IC engines.

Hydrogen Sulfide (H₂S) Discussion

Regulation 9-2-301: Hydrogen sulfide can be detected by its odor at concentrations as low as 0.0005 ppmv and is generally identified by its characteristic rotten egg smell at a concentration of 0.005 ppmv or less. Therefore, H₂S emissions are typically discovered by smell well before the concentration approaches the lowest Regulation 9-2-301 emission limit of 0.03 ppmv. The District rarely receives complaints about hydrogen sulfide odors from Bay Area landfills and has never received any complaints about hydrogen sulfide odors from this facility. Since H₂S odors have not been detected at this facility, the concentration of H₂S at the property line is expected to be well below the Regulation 9-1-301 limits. Therefore, monitoring for ground level H₂S is not appropriate when no H₂S odor problem exists.

Heat Input

The use of a gas flow meter and records is a standard method of monitoring for heat input to combustion devices and will be required by permit conditions (Condition #21583, Parts 4 and 10.b.).

VIII. Test Methods

This section of the permit lists test methods that are associated with standards in District or other rules. It is included only for reference. In most cases, the test methods in the rules are source test methods that can be used to determine compliance but are not required on an ongoing basis. They are not applicable requirements.

If a rule or permit condition requires ongoing testing, the requirement will also appear in Section IV of the permit.

The applicable test method for BAAQMD Regulation 6-303 (Ringelmann 2.0) was added to Table VIII.

IX. Permit Shield

The District rules allow two types of permit shields. The permit shield types are defined as follows: (1) A provision in an MFR permit explaining that specific federally enforceable regulations and standards that are not applicable to a source or group of sources, or (2) A provision in an MFR permit explaining that specific federally enforceable applicable requirements for monitoring, recordkeeping and/or reporting are subsumed because other applicable requirements for monitoring, recordkeeping, and reporting in the permit will assure compliance with all emission limits.

The second type of permit shield is allowed by EPA's White Paper 2 for Improved Implementation of the Part 70 Operating Permits Program. The District uses the second type of permit shield for all streamlining of monitoring, record keeping, and reporting requirements in Title V permits. The District's program does not allow other types of streamlining in Title V permits.

There are no changes to permit shields proposed in this revision.

D. Alternate Operating Scenarios

No alternate operating scenario has been requested for this facility.

APPENDIX A
GLOSSARY

ACT

Federal Clean Air Act

APCO

Air Pollution Control Officer: Head of Bay Area Air Quality Management District

ARB

Air Resources Board (same as CARB)

BAAQMD

Bay Area Air Quality Management District

BACT

Best Available Control Technology

BARCT

Best Available Retrofit Control Technology

Basis

The underlying authority that allows the District to impose requirements.

CAA

The federal Clean Air Act

CAAQS

California Ambient Air Quality Standards

CAPCOA

California Air Pollution Control Officers Association

CARB

California Air Resources Board (same as ARB)

CEQA

California Environmental Quality Act

CEM

A "continuous emission monitor" is a monitoring device that provides a continuous direct measurement of some pollutant (e.g. NO_x concentration) in an exhaust stream.

CFR

The Code of Federal Regulations. 40 CFR contains the implementing regulations for federal environmental statutes such as the Clean Air Act. Parts 50-99 of 40 CFR contain the requirements for air pollution programs.

CH₄ or CH₄

Methane

CO

Carbon Monoxide

CO₂ or CO₂

Carbon Dioxide

CT

Combustion Zone Temperature

Cumulative Increase

The sum of permitted emissions from each new or modified source since a specified date pursuant to BAAQMD Rule 2-1-403, Permit Conditions (as amended by the District Board on 7/17/91) and SIP Rule 2-1-403, Permit Conditions (as approved by EPA on 6/23/95). Used to determine whether threshold-based requirements are triggered.

District

The Bay Area Air Quality Management District

E 6

Very large or very small number values are commonly expressed in a form called scientific notation, which consists of a decimal part multiplied by 10 raised to some power. For example, 4.53 E 6 equals $(4.53) \times (10^6) = (4.53) \times (10 \times 10 \times 10 \times 10 \times 10 \times 10) = 4,530,000$. Scientific notation is used to express large or small numbers without writing out long strings of zeros.

EG

Emission Guidelines

EO

Executive Order

EPA

The federal Environmental Protection Agency.

Excluded

Not subject to any District regulations.

Federally Enforceable, FE

All limitations and conditions which are enforceable by the Administrator of the EPA including those requirements developed pursuant to 40 CFR Part 51, subpart I (NSR), Part 52.21 (PSD), Part 60, (NSPS), Part 61, (NESHAPs), Part 63 (HAP), and Part 72 (Permits Regulation, Acid Rain), including limitations and conditions contained in operating permits issued under an EPA-approved program that has been incorporated into the SIP.

FP

Filterable Particulate as measured by BAAQMD Method ST-15, Particulate.

FR

Federal Register

GDF

Gasoline Dispensing Facility

GLM

Ground Level Monitor

H₂S or H₂S

Hydrogen Sulfide

HAP

Hazardous Air Pollutant. Any pollutant listed pursuant to Section 112(b) of the Act. Also refers to the program mandated by Title I, Section 112, of the Act and implemented by 40 CFR Part 63.

Hg

Mercury

HHV

Higher Heating Value. The quantity of heat evolved as determined by a calorimeter where the combustion products are cooled to 60F and all water vapor is condensed to liquid.

LFG

Landfill gas

LHV

Lower Heating Value. Similar to the higher heating value (see HHV) except that the water produced by the combustion is not condensed but retained as vapor at 60 °F.

Major Facility

A facility with potential emissions of: (1) at least 100 tons per year of regulated air pollutants, (2) at least 10 tons per year of any single hazardous air pollutant, and/or (3) at least 25 tons per year of any combination of hazardous air pollutants, or such lesser quantity of hazardous air pollutants as determined by the EPA administrator.

MAX or Max.

Maximum

MFR

Major Facility Review. The District's term for the federal operating permit program mandated by Title V of the Federal Clean Air Act and implemented by District Regulation 2, Rule 6.

MIN or Min.

Minimum

MOP

The District's Manual of Procedures.

MSDS

Material Safety Data Sheet

MSW

Municipal solid waste

MW

Molecular weight

N2 or N₂

Nitrogen

NA

Not Applicable

NAAQS

National Ambient Air Quality Standards

NESHAPS

National Emission Standards for Hazardous Air Pollutants. See in 40 CFR Parts 61 and 63

NMHC

Non-methane Hydrocarbons (Same as NMOC)

NMOC

Non-methane Organic Compounds (Same as NMHC)

NO_x or NO_x

Oxides of nitrogen.

NSPS

Standards of Performance for New Stationary Sources. Federal standards for emissions from new stationary sources. Mandated by Title I, Section 111 of the Federal Clean Air Act, and implemented by 40 CFR Part 60 and District Regulation 10.

NSR

New Source Review. A federal program for pre-construction review and permitting of new and modified sources of pollutants for which criteria have been established in accordance with Section 108 of the Federal Clean Air Act. Mandated by Title I of the Federal Clean Air Act and implemented by 40 CFR Parts 51 and 52 and District Regulation 2, Rule 2. (Note: There are additional NSR requirements mandated by the California Clean Air Act.)

O₂ or O₂

Oxygen

Offset Requirement

A New Source Review requirement to provide federally enforceable emission offsets for the emissions from a new or modified source. Applies to emissions of POC, NO_x, PM₁₀, and SO₂.

Phase II Acid Rain Facility

A facility that generates electricity for sale through fossil-fuel combustion and is not exempted by 40 CFR 72 from Titles IV and V of the Clean Air Act.

POC

Precursor Organic Compounds

PM

Particulate Matter

PM10 or PM₁₀

Particulate matter with aerodynamic equivalent diameter of less than or equal to 10 microns

PSD

Prevention of Significant Deterioration. A federal program for permitting new and modified sources of those air pollutants for which the District is classified "attainment" of the National Air Ambient Quality Standards. Mandated by Title I of the Act and implemented by both 40 CFR Part 52 and District Regulation 2, Rule 2.

PV or P/V Valve

Pressure/Vacuum Valve

RMP

Risk Management Plan

S

Sulfur

SIP

State Implementation Plan. State and District programs and regulations approved by EPA and developed in order to attain the National Air Ambient Quality Standards. Mandated by Title I of the Act.

SO₂ or SO₂

Sulfur dioxide

SSM

Startup, Shutdown, or Malfunction

SSM Plan

A plan, which states the procedures that will be followed during a startup, shutdown, or malfunction, that is prepared in accordance with the general NESHAP provisions (40 CFR Part 63, Subpart A) and maintained on site at the facility.

TAC

Toxic Air Contaminant (as identified by CARB)

THC

Total Hydrocarbons (NMHC + Methane)

Title V

Title V of the federal Clean Air Act. Requires a federally enforceable operating permit program for major and certain other facilities.

TOC

Total Organic Compounds (NMOC + Methane, Same as THC)

TPH

Total Petroleum Hydrocarbons

TRMP

Toxic Risk Management Policy

TRS

Total Reduced Sulfur

TSP

Total Suspended Particulate

VOC

Volatile Organic Compounds

VMT

Vehicle Miles Traveled

Symbols:

<	=	less than
>	=	greater than
≤	=	less than or equal to
≥	=	greater than or equal to

Units of Measure:

bhp	=	brake-horsepower
btu	=	British Thermal Unit
BTU	=	British Thermal Unit
°C	=	degrees Centigrade
cfm	=	cubic feet per minute
dscf	=	dry standard cubic feet
°F	=	degrees Fahrenheit
ft ³	=	cubic feet
g	=	grams
gal	=	gallon
gpm	=	gallons per minute

gr	=	grains (7000 grains = 1 pound)
hp	=	horsepower
hr	=	hour
in	=	inches
kg	=	kilograms
lb	=	pound
lbmol	=	pound-mole
M	=	thousand
m ²	=	square meter
m ³	=	cubic meters
Mg	=	mega-grams (1000 kg)
min	=	minute
mm	=	millimeter
MM	=	million
MMBTU	=	million BTU
MMcf	=	million cubic feet
mm Hg	=	millimeters of mercury (pressure)
MW	=	megawatts
ppb	=	parts per billion
ppbv	=	parts per billion, by volume
ppm	=	parts per million
ppmv	=	parts per million, by volume
ppmw	=	parts per million, by weight
psia	=	pounds per square inch, absolute
psig	=	pounds per square inch, gauge
scf	=	standard cubic feet
scfm	=	standard cubic feet per minute
sdcf	=	standard dry cubic feet
sdcfm	=	standard dry cubic feet per minute
therms	=	1 therm = 100,000 BTU
yd	=	yard
yd ³	=	cubic yards
yr	=	year

APPENDIX B
ENGINEERING EVALUATION REPORTS

**ENGINEERING EVALUATION REPORT
KIRBY CANYON RECYCLING AND DISPOSAL
APPLICATION NUMBER 007300**

BACKGROUND:

The Kirby Canyon Recycling and Disposal Facility (P# 1812) has applied for permits to operate the following:

S-3: Diesel IC Engine, Flare Generator – Cummins 6BT-5.9, 134 BHP

S-4: Diesel IC Engine, Trash Pump – Deutz F4L912, 62 BHP

This equipment was installed at the facility prior to 1991 and is currently in operation.

Loss of Exemption

Prior to May 17, 2000, all internal combustion engines and gas turbines with rated capacities of 250 hp or less were exempt from permitting. However, revisions to Regulation 2, Rule 1 “Permits, General Requirements” adopted on May 17, 2000 lowered the IC engine and gas turbine horsepower exemption to 50 hp. Since the permit exemption was lost due to these revisions, the above equipment became subject to permitting in accordance with Regulation 2-1-424 “Loss of Exemption or Exclusion”.

EMISSION CALCULATIONS:

The following factors from EPA AP-42 Table 3.3-2 “Emission Factors For Uncontrolled Gasoline And Diesel Industrial Engines” (1/95) will be assumed:

- NOx: 3.10 E-02 lb/hp-hr
- CO: 6.68 E-03 lb/hp-hr
- POC: 2.51 E-03 lb/hp-hr
- PM10: 2.20 E-03 lb/hp-hr
- SOx: 2.05 E-03 lb/hp-hr

Applying the AP-42 emission factors and assuming that the engines will operate continuously, the estimated emissions from S-3 and S-4 are summarized as follows:

Source	Rated Power (bhp)	Est. Hours of Operation (hours/yr)	Emissions Summary		
			Pollutant	Emission Factor (lb/hp-hr)	Estimated Emissions (lb/yr)
S-3	134	8,760	NOx	3.10 E-02	36,389
			CO	6.68 E-03	7,841
			POC	2.51 E-03	2,946
			PM10	2.20 E-03	2,582
			SO ₂	2.05 E-03	2,406
S-4	62	8,760	NOx	3.10 E-02	16,837
			CO	6.68 E-03	3,628
			POC	2.51 E-03	1,363
			PM10	2.20 E-03	1,195
			SO ₂	2.05 E-03	1,113

KIRBY CANYON RECYCLING AND DISPOSAL: APPLICATION #007300

CUMULATIVE EMISSIONS:

Since these are “loss of exemption” sources, there is no cumulative increase of emissions for this application.

TOXIC RISK, BACT, OFFSETS REVIEWS:

Toxic Risk, BACT, and Offsets reviews are not required for this application because the IC engines are not new or modified sources.

STATEMENT OF COMPLIANCE:

The Diesel IC Engines in this application are subject to the requirements of Regulation 6 “Particulate Matter and Visible Emissions” and Regulation 9, Rule 1 “Inorganic Gaseous Pollutants – Sulfur Dioxide”.

Particulate Matter and Visible Emissions

BAAQMD Regulation 6-310 limits PM emissions to 0.15 gr/dscf. If it is assumed that the diesel engine exhaust gases contain 15% excess oxygen under normal operating conditions, the Regulation 6-310 limit can be compared to the AP-42 PM emission factor as follows:

From 40 CFR 60, Appendix A, Method 19, Table 19-1-F, the dry gas combustion factor for distillate fuels is 9,190. At 15% excess O₂ the combustion factor is 32,554 dscf (combustion products)/MMBTU.

The conversion of 0.15 gr/dscf @ 15% O₂ to lb/MMBTU is then:

$$(32,554 \text{ dscf/MMBTU}) \times (0.15 \text{ gr/dscf}) \times (\text{lb}/7,000 \text{ gr}) = 0.70 \text{ lb/MMBTU}$$

The AP-42 PM₁₀ emission factor for diesel IC engines (based on fuel consumption) from Table 3.3-2 is 0.31 lb/MMBTU. Since this assumed emission factor is well below the converted Regulation 6-310 emission rate, compliance is assumed.

Compliance with the Ringelmann 1.0 limit of Regulation 6-301 can be demonstrated by casual observation.

SO₂ Emissions

Regulation 9-1-304 requires all liquid fuels to have a sulfur content $\leq 0.5\%$ (wt). The Kirby Canyon facility is expected to comply with this limit.

Other Requirements

PSD, NSPS, and NESHAPs do not apply. This application is exempt from the requirements of a CEQA review because all sources are exempt from CEQA per Regulation 2-1-312.4, loss of exemption from permitting.

PERMIT CONDITIONS:

No permit conditions are necessary for these “loss of exemption” sources.

RECOMMENDATIONS:

It is recommended that a Permit to Operate be issued to the Kirby Canyon Recycling and Disposal Facility for the following:

KIRBY CANYON RECYCLING AND DISPOSAL: APPLICATION #007300

S-3: Diesel IC Engine, Flare Generator – Cummins 6BT-5.9, 134 BHP

S-4: Diesel IC Engine, Trash Pump – Deutz F4L912, 62 BHP

By: _____

Ted Hull
Air Quality Engineer II

**ENGINEERING EVALUATION REPORT
WASTE MANAGEMENT, INC – KIRBY CANYON LANDFILL
APPLICATION NUMBER 007835**

BACKGROUND:

Waste Management, Inc has applied for an Authority to Construct for the following modifications to the Kirby Canyon Landfill, P# 1812:

S-1: Municipal Solid Waste Landfill with Gas Collection System – Installation of up to (15) New Landfill Gas Extraction Wells, Replacement of up to (10) Existing Vertical Wells, and Connection of up to (5) Leachate Cleanout Riser Pipes to the Gas Collection System

These modifications will bring the total number of permitted wells at the landfill to (46) vertical gas collection wells and (5) leachate cleanout risers.

EMISSIONS DISCUSSION:

The existing control system for collected landfill gas is the Enclosed Landfill Gas Flare A-10. This flare has a landfill gas capacity of 1,400 scfm and was sized to process the entire gas flow from the expanded landfill. In addition, the facility has been issued an Authority to Construct for a landfill gas fired IC engine with a combustion design capacity of approximately 500 scfm (see Application #3539). In combination, these devices are more than adequate to control all estimated landfill gas production throughout the life of the landfill. The secondary emissions from the flare and IC engine were fully accounted for in Applications #12951 and #3593. Therefore, there is no increase of emissions for this application.

STATEMENT OF COMPLIANCE:

There are no new District or Federal regulations triggered by the proposed landfill gas collection system modification.

PERMIT CONDITIONS:

No change of permit conditions is necessary for this application.

RECOMMENDATIONS:

It is recommended that an Authority to Construct be issued to Waste Management, Inc – Kirby Canyon Landfill for the following:

S-1: Municipal Solid Waste Landfill with Gas Collection System – Installation of up to (15) New Landfill Gas Extraction Wells, Replacement of up to (10) Existing Vertical Wells, and Connection of up to (5) Leachate Cleanout Riser Pipes to the Gas Collection System

By: _____
Ted Hull
Air Quality Engineer II

**ENGINEERING EVALUATION REPORT
KIRBY CANYON RECYCLING AND DISPOSAL FACILITY
APPLICATION NUMBER 008255**

BACKGROUND:

The Kirby Canyon Recycling and Disposal Facility has applied for an Authority to Construct the following:

A-11: Enclosed Landfill Gas Flare with Condensate Injection System; LFG Specialties Model No. EF84018, 1,480 SCFM maximum capacity, 45 MMBTU/hr, 5 gallons per minute Condensate Injection Rate

This flare is intended to be the primary source of landfill gas abatement for the Kirby Canyon Landfill (S-1) and will replace the existing Landfill Gas Flare A-10.

EMISSIONS DISCUSSION:

Non-methane organic compound (i.e. POC) emissions from landfill gas occur as either fugitive emissions from uncollected gas or as the small fraction of POC that passes through the control device unabated. For permitting purposes, these emissions are assigned to the landfill source and are based on the amount of decomposable refuse that the landfill receives. In this application, the landfill itself is not being modified so it can be assumed that there will be no increase of POC emissions. However, since the abatement device (the Flare A-11) is new, all secondary pollutants from combustion must be added to the Cumulative Increase for the facility. Emissions of secondary air pollutants from the Landfill Gas Flare A-11 will be determined as follows:

NO_x and CO

The flare manufacturer has supplied the following expected emission factors for secondary pollutants from the flare:

Outlet Temp. 1600 degrees F

- NO_x: 0.06 lb/MMBTU
- CO: 0.20 lb/MMBTU

SO₂

Since the Sulfur Dioxide (SO₂) emissions will vary directly with the amount of Sulfur compounds present in the fuel, a mass balance calculation can be performed to determine SO₂ emissions based on the total concentration of sulfur compounds in the landfill gas. Assuming a typical landfill gas total sulfur concentration to be 50 ppm (vol), the SO₂ emission factor will be:

$$\begin{aligned} \text{SO}_2 &= (50 \times 10^{-6} \text{ lb-mole S/lb-mole gas})(\text{lb-mole SO}_2/\text{lb-mole S})(64 \text{ lb SO}_2/\text{lb-mole SO}_2)(\text{lb-mole} \\ &\quad \text{gas}/386 \text{ scf})/(596 \text{ BTU/scf}) \\ &= 1.4 \times 10^{-8} \text{ lb SO}_2/\text{BTU} \\ &= 0.014 \text{ lb/MMBTU} \end{aligned}$$

PM

AP-42 Table 2.4-5 "Emission Rates for Secondary Compounds Exiting Control Devices" provides a PM emission factor of 17 lb/10⁶ dscf Methane. The applicant has stated that the landfill gas at the facility has a maximum methane content of 60%. At standard conditions (70 °F, 1 atm), a 60% methane landfill gas will have a higher heating value (HHV) of 596 BTU/scf. Therefore, the AP-42 PM emission factor can be converted to lb/MMBTU as follows:

$$\text{PM} = (17 \text{ lb}/10^6 \text{ dscf Methane})(0.6 \times 10^6 \text{ dscf Methane}/10^6 \text{ scf LFG})(10^6 \text{ scf LFG}/596 \text{ MMBTU})$$

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= 0.017 lb/MMBTU

Assuming continuous use at the peak landfill gas capacity (1,480 scfm, 45 MMBTU/hr) the highest estimated emissions of secondary air pollutants from the Enclosed Landfill Gas Flare A-11 will be:

NO_x = (0.06 lb/MMBTU)(45 MMBTU/hr)(24 hr/day)(365 days/yr)
= 23,652 lb/yr
= 11.826 tons/yr

CO = (0.20 lb/MMBTU)(45 MMBTU/hr)(24 hr/day)(365 days/yr)
= 78,840 lb/yr
= 39.420 tons/yr

SO₂ = (0.014 lb/MMBTU)(45 MMBTU/hr)(24 hr/day)(365 days/yr)
= 5,519 lb/yr
= 2.759 tons/yr

PM = (0.017 lb/MMBTU)(45 MMBTU/hr)(24 hr/day)(365 days/yr)
= 6,701 lb/yr
= 3.351 tons/yr

The landfill gas condensate injection rate will not change from the current 5 gallon per minute maximum. Therefore, there is no increase of emissions from this operation.

CUMULATIVE EMISSIONS:

	(lbs/day)		(tons/yr)
NO _x	= 64.8	NO _x	= 11.826
CO	= 216.0	CO	= 39.420
SO ₂	= 15.1	SO ₂	= 2.759
PM	= 18.4	PM	= 3.351

TOXIC RISK ASSESSMENT:

Since the proposed Flare A-11 has a larger capacity than the existing Flare A-10 (i.e. 1,480 scfm, 45 MMBTU/hr for A-11 versus 1,250 scfm, 38 MMBTU/hr for A-10), the possible increased risk associated with the higher capacity must be evaluated. As previously discussed, there is no increase of landfill gas POC emissions from this application because the landfill has not been modified. Therefore, any increased risk associated with the new flare (over the existing flare) will be from a potential increase of secondary pollutants associated with the larger capacity flare.

Although it is difficult to predict exactly what compounds will be emitted as secondary air pollutants from flared landfill gas, based on the known and suspected constituents of the gas from the Kirby Canyon Landfill it is reasonably certain that the following compounds will be present as a result of the combustion of compounds containing chlorine, fluorine, and bromine:

- Hydrogen Chloride
- Hydrogen Bromide
- Hydrogen Fluoride

The attached spreadsheet estimates emissions of each compound, using the following methodology and assumptions:

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- Compounds of interest are those that are listed in EPA AP-42 Table 2.4-1 “Default Concentrations For LFG Constituents” and which contain Chlorine, Bromine, or Fluorine.
- The concentrations used in the spreadsheet are based on the results of gas sampling performed by Slakey and Associates in 1998, 1999, and 2000. AP-42 default values are used where test results are not available.
- The increased LFG fuel feed rate to the flare is assumed to be a continuous 230 scfm (standard conditions: 1 atm, 70 degrees F), the difference in capacity between the existing Flare A-10 and the proposed Flare A-11.
- Halogenated compounds are completely combusted to yield HCl, HBr, and HF gases.

The spreadsheet results are summarized as follows in Table I:

Table I: Toxic Air Contaminants

Compound	Calculated Emission Factor (lb/MMscf)	Estimated Emissions (lb/yr)	Risk Screen Trigger (lb/yr)
Hydrogen Chloride	9.35 E+00	1.13 E+03	1.4 E+03
Hydrogen Bromide	6.55 E-01	7.92 E+01	4.6 E+03
Hydrogen Fluoride	1.69 E+00	2.04 E+02	1.1 E+03

Since the projected incremental emissions of these compounds are below the respective risk screen trigger levels no risk screen is required.

Although formaldehyde and other organic toxic air contaminants may be emitted as secondary air pollutants from combustion processes, significant quantities are not expected from landfill gas flaring at this facility. A source test conducted by Best Environmental on September 9, 2003 on the existing Flare A-10 found NMOC concentrations in the exhaust of the flare to be below detectable levels (e.g. < 3.0 ppm @ 12.3% excess oxygen, expressed as methane). Since the new Flare A-11 is expected to have a similarly high NMOC destruction efficiency, it is assumed that any increase of secondary organic toxic air contaminants from the increased capacity of the new flare will be negligible.

BACT/RACT REVIEW:

In accordance with Regulation 2-2-112, BACT does not apply to emissions of secondary pollutants that are the direct result of the use of an abatement device that complies with the BACT or BARCT requirements for the control of another pollutant. Since the Enclosed Flare meets the BARCT requirements of Regulation 8-34-301.3 for organic compounds, BACT is not triggered for the emissions of secondary pollutants from the flare. However, Regulation 2-2-112 does require Reasonably Available Control Technology (RACT) for secondary pollutants. The District specifies RACT for Enclosed Landfill Gas Flares as that which will achieve the following emission rates:

- NO_x: 0.06 lb/MMBTU
- CO: 0.20 lb/MMBTU

The Enclosed Landfill Gas Flare A-11 meets RACT for NO_x and CO.

OFFSET REVIEW:

With the addition of the new Landfill Gas Flare A-11 (and removal of the existing Flare A-10) the permitted facility wide emissions of NO_x will be 22.701 tons/yr. In accordance with Regulation 2-2-302, before the District may issue an authority to construct or permit to operate for a new or modified source at a facility that emits or will be permitted to emit more than 15 tons per year but less than 50 tons/yr of POC or NO_x on a pollutant specific basis, emissions offsets shall be provided by the District at a 1.0 to 1.0 ratio from the Small Facility Banking Account in accordance with the provisions of Regulation 2-4-414. Offsets shall be provided for the emissions from the new or modified source, plus any pre-existing cumulative increase, minus any

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onsite contemporaneous emission reduction credits determined in accordance with Section 2-2-605. This facility has no pre-existing cumulative increase, but will have contemporaneous emission reduction credits from the removal of the existing Landfill Gas Flare A-10.

Contemporaneous Emission Reduction Credits

In accordance with Regulation 2-2-605, a baseline emission rate is used to determine the amount of available emission reduction credits, with the baseline period being the 3-year period immediately preceding the date that the application is complete. The baseline emission rate is the average actual emission rate of the source during the baseline period. Therefore, for the Landfill Gas Flare A-10, the baseline emission rate is equal to the average actual emissions from the flare that occurred between 9/30/00 and 9/30/03.

Based on information provided by the facility during the past 3 annual permit renewal cycles (12/31/99 through 12/31/02) the Flare A-10 has combusted an average of 327,670 thousand cubic feet of landfill gas per year. Assuming that the gas is 50% methane (HHV = 1,013 BTU/scf), the average annual heat input to the flare during the baseline period is estimated to be 165,964.9 MMBTU/yr

Although it is intended that the baseline emission rate be based on actual emissions, no reliable actual emissions data is available for the Flare A-10. It is therefore recommended that the BARCT level emission factors used for A-11 in this application be applied to the existing Flare A-10 in order to estimate the baseline emissions. This approach is considered to be conservative because A-10 is an older flare that was not required to meet the current BARCT levels for NOx and CO. Using the baseline fuel consumption rate of 165,964.9 MMBTU/yr, the estimated baseline emissions for A-10 are as follows:

Table II: Baseline Emissions for A-10 Flare

Pollutant	BARCT Emission Factor (lb/MMBTU)	Baseline Emissions (lb/yr)	Baseline Emissions (tons/yr)
NOx	0.06	9,958	4.979
CO	0.20	33,193	16.596
SO ₂	0.014	2,324	1.162
PM	0.017	2,821	1.411

From Table II, above, the available amount of Contemporaneous Emission Reduction Credits for NOx will be 4.979 tons/yr.

Required Offsets

NOx: Offsets are required for this application as follows:

Table III: Required Offsets for Enclosed Landfill Gas Flare A-11

Pollutant	Emissions Increase (tons/yr)	Contemporaneous Emission Reduction Credits (tons/yr)	Net Emissions Increase (tons/yr)	Offset Ratio	Offsets Required (tons/yr)
NOx	11.826	4.979	6.847	1.0:1.0	6.847

PM and SO₂: As stated in Regulation 2-2-303, offsets of PM₁₀ and SO₂ emission increases are only required if the facility is considered to be a major facility of PM₁₀ and SO₂ emissions. The Kirby Canyon Landfill is not a major facility for either PM₁₀ or SO₂ emissions, because facility-wide emissions will be less than 100 tons/year. Therefore, Regulation 2-2-303 does not apply and PM₁₀ and SO₂ offsets are not required.

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PSD REVIEW

In accordance with Regulation 2-2-304, a PSD review is required for a new major facility, which will emit 100 tons per year or more of a regulated air pollutant, if it is one of the 28 PSD source categories listed in Section 169(1) of the federal Clean Air Act, or 250 tons per year or more for an unlisted category. PSD review is also required for a major modification of a major facility if the cumulative increase, from the PSD Baseline Date, minus the contemporaneous emission reduction credits at the facility are in excess of 40 tons per year of sulfur dioxide or nitrogen oxides, or 15 tons per year of PM₁₀. Similarly, Regulation 2-2-305 requires a PSD review for a major modification of a major facility with an increase of 100 tons per year or more of carbon monoxide.

The Kirby Canyon Landfill is not a PSD Major Facility for any pollutants, because maximum facility-wide emissions will be less than 250 tons/year for each pollutant. Note that landfills and landfill gas combustion equipment are NOT in one of the 28 listed categories that are subject to the lower PSD Major Facility threshold of 100 tons/year. Therefore, PSD review is not triggered for this application.

STATEMENT OF COMPLIANCE:

Public Notification Requirements (Regulation 2, Rule 1):

The project is over 1000 feet from the nearest school and is therefore not subject to the public notification requirements of Regulation 2-1-412.

CEQA Requirements (Regulation 2, Rule 1):

The proposed Landfill Gas Flare A-11 is considered to be an abatement device and is required for compliance with Regulation 8, Rule 34. In accordance with Regulation 2-1-312.2, permit applications involving the installation of abatement equipment are categorically exempt from CEQA review. Since the flare is expressly exempted from CEQA by 2-1-312.2, comparison to the significance thresholds is not required and no further CEQA review is necessary.

Maximum Achievable Control Technology (MACT) Requirement (Regulation 2-2-317):

Total HAP emissions from this facility (including fugitive emissions from the landfill) have been determined to be less than 25 tons/year of all HAPs combined and less than 10 tons/year of any single HAP. Therefore, Regulation 2-2-317 does not apply.

Major Facility Review (Regulation 2, Rule 6):

This facility was initially issued an MFR Permit on July 10, 2003, which expires on June 30, 2008. The permit will be revised to reflect the proposed change of flares. 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):

District Regulation 8-34-301.3 requires enclosed ground type flares to reduce the amount of NMOC in the collected gas by at least 98 percent by weight or emit less than 30 ppm (vol) NMOC (expressed as methane @ 3% O₂). Annual source testing and continuous flare temperature monitoring will be required in order to demonstrate compliance with this requirement.

Particulate Matter and Visible Emissions (Regulation 6):

The new Flare A-11 is expected to comply with the Ringelmann 1 limit of Regulation 6-301 and will have no visible emissions. The flare will also comply with Regulation 6-310 (PM ≤ 0.15 grains/dscf), because it is expected to emit less than 0.02 grains/dscf (converted AP-42 PM emission factor for Enclosed Landfill Gas Flares).

WASTE MANAGEMENT, INC – KIRBY CANYON LANDFILL: APPLICATION #008255

Sulfur Dioxide (Regulation 9, Rule 1)

Regulation 9-1-302 limits sulfur dioxide in the exhaust from the Flare A-11 to 300 ppmv. A source test conducted by Best Environmental on September 9, 2003 on the existing Flare A-10 found the average SO₂ emissions to be 3.1 ppm @ 12.3% O₂. Since the SO₂ concentration in the exhaust is directly proportional to the amount of sulfur in the landfill gas, the new Flare A-11 should have approximately the same SO₂ emissions. Therefore, compliance with Regulation 9-1-302 is assumed. Since this equipment will comply with 9-1-302, it is also expected to comply with the ground level SO₂ limits of 9-1-301.

Federal Requirements:

No new federal requirements are triggered by the proposed A-11 Flare.

PERMIT CONDITIONS:

It is recommended that the permit conditions for the Landfill and Flare be modified as follows to account for the replacement of the existing Flare A-10 with a new Flare A-11.

Condition #1437

For: S-1, Active Landfill with Landfill Gas Collection System;

For: ~~A-10~~A-11, Landfill Gas Flare

1. The Permit Holder shall comply with the following waste acceptance and disposal limits and shall obtain the appropriate New Source Review permit, if one of the following limits is exceeded:
 - a. Except for temporary emergency situations approved by the Local Enforcement Agency, the total waste accepted and placed at the landfill shall not exceed 2600 tons in any day. (Basis: Regulation 2-1-301)
 - b. The total cumulative amount of all waste placed in the landfill shall not exceed 19.84 million tons. Exceedance of the cumulative tonnage limit is not a violation of the permit and does not trigger the requirement to obtain a New Source review permit, if the operator can, within 30 days of the date of discovery of the exceedance, provide documentation to the District demonstrating, in accordance with BAAQMD Regulation 2-1-234.3, that the limit should be higher. (Basis: Regulation 2-1-234.3)
 - c. The maximum design capacity of the landfill (total volume of all wastes placed in the landfill) shall not exceed 36.40 million cubic yards. (Basis: Regulation 2-1-301)
2. Handling Procedures for Soil Containing Volatile Organic Compounds
 - a. The procedures listed below in subparts b-l do not apply if the following criteria are satisfied. However, the record keeping requirements in subpart m, below, are applicable.
 - i. The Permit Holder has appropriate documentation demonstrating that either the organic content of the soil or the organic concentration above the soil is below the "contaminated" level (as defined in Regulation 8, Rule 40, Sections 205, 207, and 211). The handling of soil containing VOCs in concentrations below the "contaminated" level is subject to Part 3 below.
 - ii. The Permit Holder has no documentation to prove that soil is not contaminated, but source of the soil is known and there is no reason to suspect that the soil might contain organic compounds.
 - b. The Permit Holder shall provide verbal notification to the Compliance and Enforcement Division of the Permit Holder's intention to accept contaminated soil at the facility at least 24 hours in advance of receiving the contaminated soil. The Permit Holder shall provide an estimate of the amount of contaminated soil to be received, the degree of contamination (range and average VOC Content), and the type or source of contamination.

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- c. Any soil received at the facility that is known or suspected to contain volatile organic compounds (VOCs) shall be handled as if the soil were contaminated, unless the Permit Holder receives test results proving that the soil is not contaminated. To prove that the soil is not contaminated, the Permit Holder shall collect soil samples in accordance with Regulation 8-40-601 within 24 hours of receipt of the soil by the facility. The organic content of the collected soil samples shall be determined in accordance with Regulation 8-40-602.
 - i. If these test results indicate that the soil is still contaminated or if the soil was not sampled within 24 hours of receipt by the facility, the Permit Holder must continue to handle the soil in accordance with the procedures set forth in subparts e-1, below, until the soil has completed treatment or has been placed in a final disposal location and adequately covered. Storing soil in a temporary stockpile or pit is not considered treatment. Co-mingling, blending, or mixing of soil lots is not considered treatment.
 - ii. If these test results indicate that the soil – as received at the facility – has an organic content of 50 ppmw or less, then the soil is no longer contaminated and shall be handled in accordance with the procedures in Part 3 instead of Part 2, subparts e-l.
- d. Any contaminated soil received at the facility shall be clearly identified as contaminated soil, shall be handled in accordance with subparts e-l. below, and shall be segregated from non-contaminated soil. Contaminated soil lots may not be co-mingled, blended, or otherwise mixed with non-contaminated soil lots prior to treatment, reuse, or disposal. Mixing soil lots in an attempt to reduce the overall concentration of the contaminated soil or to circumvent any requirements or limits is strictly prohibited.
- e. On-site handling of contaminated soil shall be limited to no more than 2 on-site transfers per soil lot. For instance, unloading soil from off-site transport vehicles into a temporary storage pile is 1 transfer. Moving soil from a temporary storage to a staging area is 1 transfer. Moving soil from a temporary storage pile to a final disposal site is 1 transfer. Moving soil from a staging area to a final disposal site is 1 transfer. Therefore, unloading soil from off-site transport into a temporary storage pile and then moving the soil from that temporary storage pile to the final disposal site is allowed. Unloading soil from off-site transport into a staging area and then moving the soil from that staging area to the final disposal site is allowed. However, unloading soil from off-site transport to a temporary storage pile, moving this soil to a staging area, and then moving the soil again to a final disposal site is 3 on-site transfers and is not allowed.
- f. If the contaminated soil has an organic content of less than 500 ppmw, the contaminated soil shall be treated, deposited in a final disposal site, or transported off-site for treatment within 90 days of receipt at the facility.
- g. If the contaminated soil has an organic content 500 ppmw or more, the contaminated soil shall be treated, deposited in a final disposal site, or transported off-site for treatment within 45 days of receipt at the facility.
- h. All active storage piles shall meet the requirements of Regulation 8-40-304 by using water sprays, vapor suppressants or approved coverings to minimize emissions. The exposed surface area of any active storage pile (including the active face at a landfill) shall be limited to 6000 ft². The types of storage piles that may become subject to these provisions include (but are not limited to) truck unloading areas, staging areas, temporary stockpiles, soil on conveyors, bulldozers or trucks, the active face of a landfill, or other permanent storage pile at the final disposal location.
- i. All inactive storage piles shall meet the requirements of Regulation 8-40-305 including the requirement to cover contaminated soil during periods of inactivity longer than one hour. The types of storage piles that may become subject to these provisions include (but are not limited to) soil on trucks or other on-site equipment, staging areas, temporary stockpiles, and the permanent storage pile at the final disposal location. District approved coverings for inactive storage piles include continuous heavy-duty plastic sheeting (in good condition, joined at the seams, and securely anchored) or encapsulating vapor suppressants (with re-treatment as necessary to prevent emissions).
- j. The Permit Holder must:

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- i. Keep contaminated soil covered with continuous heavy-duty plastic sheeting (in good condition, joined at the seams, and securely anchored) whenever soil is to be stored in temporary stockpiles or during on-site transport in trucks. Soil in trucks shall not be left uncovered for more than 1 hour.
- ii. Establish a tipping area for contaminated soils near the active face that is isolated from the tipping area for other wastes.
- iii. Spray contaminated soil with water or vapor suppressant immediately after dumping the soil from a truck at the tipping area.
- iv. Ensure that all contaminated soil is transferred from the tipping area to the active face immediately after spraying with water or vapor suppressant.
- v. Ensure that contaminated soil in the tipping area is not disturbed by subsequent trucks. Trucks shall not drive over contaminated soil in the tipping area or track contaminated soil out of the tipping area on their wheels.
- vi. Spray contaminated soil on the active face with water or vapor suppressant (to keep the soil visibly moist) until the soil can be covered with an approved covering.
- vii. Limit the area of exposed soil on the active face to no more than 6000 ft².
- viii. Ensure that contaminated soil spread on the active face is completely covered on all sides with one of the following approved coverings: at least 6 inches of clean compacted soil, at least 12 inches of compacted garbage, or at least 12 inches of compacted green waste.
- ix. Ensure that covering of soil on the active face is completed within one hour of the time that the soil was first dumped from a truck at the tipping area.
- k. Contaminated soil shall not be used as daily, intermediate, or final cover material for landfill waste operations unless the requirements of Regulation 8, Rule 40, Sections 116 or 117 have been satisfied.
- l. Contaminated soil is considered to be a decomposable solid waste pursuant to Regulation 8, Rule 34. All contaminated soil disposed of at a site shall be included in any calculations of the amount of decomposable waste in place that are necessary for annual reporting requirements or for purposes of 8-34-111 or 8-34-304.
- m. The Permit Holder shall keep the following records for each lot of soil received, in order to demonstrate on-going compliance with the applicable provisions of Regulation 8, Rule 40.
 - i. For all soil received by the facility (including soil with no known contamination), record the arrival date at the facility, the soil lot number, the amount of soil in the lot, the organic content or organic concentration of the lot (if known), the type of contamination (if any), and keep copies of any test data or other information that documents whether the soil is contaminated (as defined in 8-40-205) or not contaminated, with what, and by how much.
 - ii. If the soil is tested for organic content after receipt by the facility, record the sampling date, test results, and the date that these results were received.
 - iii. For all on-site handling of contaminated soil, use a checklist or other approved method to demonstrate that appropriate procedures were followed during all on-site handling activities. One checklist shall be completed for each day and for each soil lot (if multiple lots are handled per day).
 - iv. For soil aerated in accordance with 8-40-116 or 117 record the soil lot number, the amount of soil in the lot, the organic content, the final placement date, the final placement location, and describe how the soil was handled or used on-site.
 - v. For final disposal at a landfill, record on a daily basis the soil lot number, the amount of soil placed in the landfill, the disposal date, and the disposal location.

All records shall be retained for at least 5 years from the date of entry and shall be made available for District inspection upon request. (basis: Regulations 8-40-301, 8-40-304 and 8-40-305)

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3. Low VOC soil (soil that contains 50 ppmw or less of VOC) is not considered to be “contaminated soil” and may be used as daily, intermediate, or final cover material for landfill waste operations if the organic concentration above the soil does not exceed 50 ppmv (expressed as methane, C1). To demonstrate compliance with this requirement, each lot of soil to be used as cover material shall be randomly screened for VOC surface emissions (in such a manner as to be representative of the entire lot) using the testing procedures outlined in Regulation 8-40-604. The Permit Holder shall keep the following records for each lot of soil subject to this requirement:
 - a. The soil lot number as established in part 2m.i. (above).
 - b. The time and date of the soil screening.
 - c. The name and affiliation of the person performing the monitoring.
 - d. The results of the screening and an acknowledgement that the procedures outlined in Regulation 8-40-604 were used.

Soil presumed to be low VOC soil that is found to have a surface VOC concentration greater than 50 ppmv as described above shall be considered contaminated soil and will be subject to the requirements of part 2 of these conditions. (basis: Regulations 8-40-205, 8-40-604)

4. Water and/or dust suppressants shall be applied to all unpaved roadways, active soil removal, and fill areas as necessary to prevent visible particulate emissions. Paved roadways shall be kept sufficiently clear of dirt and debris to prevent visible particulate emissions from vehicle traffic or wind. (basis: Regulations 2-1-403, 6-301, and 6-305)
5. All collected landfill gas shall be vented to properly operating abatement equipment including the Landfill Gas Flare (A-10A-11) and/or the IC Engine (S-2). Raw landfill gas shall not be vented to the atmosphere, except for unavoidable landfill gas emissions that occur during collection system installation, maintenance, or repair that is performed in compliance with Regulation 8, Rule 34, Sections 113, 116, 117, or 118 and for component or surface leaks that do not exceed the limits specified in 8-34-301.2 or 8-34-303. (basis: Regulation 8-34-301)

6. The Permit Holder shall apply for and receive an Authority to Construct before modifying the landfill gas collection system described in Parts 6a-b below. Increasing or decreasing the number of wells or collectors, changing the length of collectors, or changing the locations of wells or collectors are all considered to be modifications that are subject to the Authority to Construct requirement.
 - a. The Permit Holder has been issued a Permit to Operate for the landfill gas collection system components listed below. Well and collector locations, depths, and lengths are as described in detail in Permit Application #2232.

Current

Total Number of Wells and Collectors: 31

- b. The Permit Holder has been issued an Authority to Construct for the additional landfill gas collection system components listed below. Specific well locations, depths, and lengths of associated piping are as described in detail in Permit Application #2583. After receiving a written start-up notification for any wells or collectors that have been installed, the APCO will revise the number of wells listed in Parts 6a and 6b using the administrative permit amendment procedures identified in Regulation 2-6-4134.

Proposed

Additional Number of Wells and Collectors: 7

(basis: Regulations 2-1-301, 8-34-301.1, 8-34-304, 8-34-305)

7. The landfill gas collection system described in Part 6a shall be operated continuously as defined in Regulation 8-34-219. Wells shall not be shut off, disconnected or removed from operation without written authorization from the APCO, 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)

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8. The heat input to the A-10A-11 Landfill Gas Flare shall not exceed 9421,080 million BTU per day and shall not exceed 332,880394,200 million BTU per year. In order to demonstrate compliance with this part, the Permit Holder shall calculate and record, on a monthly basis, the maximum daily and total monthly heat input to the flare based on: (a) the landfill gas flow rate recorded pursuant to part 14h, (b) the average methane concentration in the landfill gas measured in most recent source test, and (c) a high heating value for methane of 1013 BTU per cubic foot at 60 degrees F. (basis: Regulation 2-1-301)
- ~~9. Effective May 1, 2003, the combustion zone temperature of the flare shall be maintained at a minimum of 1432 degrees F, averaged over any 3-hour period. If a source test demonstrates compliance with all applicable requirements at a different temperature, the APCO will revise this minimum temperature limit in accordance with the administrative permit amendment procedures identified in Regulation 2-6-413 and the following criteria. The minimum combustion zone temperature for the flare shall be equal to the average combustion zone temperature determined during the most recent complying source test minus 50 degrees F, provided that the minimum combustion zone temperature is not less than 1400 degrees F. (Basis: Regulation 8-34-301.3 and Toxic Risk Management Policy)~~
9. The minimum combustion zone temperature of the Flare A-11 shall be determined by the results of the most recent source test in which compliance with all applicable requirements was demonstrated. The minimum combustion zone temperature shall be the average temperature measured during the complying source test minus 50 degrees F. Once the minimum temperature has been established, it shall be maintained during all periods of flare operation. Compliance with the temperature limit shall be based on a 3-hour averaging period. Under no circumstances shall the minimum flare temperature be less than 1,400 degrees F. Based on the results of required source testing of the flare, the APCO may add an explicit temperature limit to the conditions for the Flare A-11 in accordance with the procedures identified in Regulation 2-6-414 or 2-6-415. (Basis: Regulation 8-34-301.3)
10. Deleted Emissions of Nitrogen Oxides (NOx) from the Flare A-11 shall not exceed 0.06 pounds per million BTU (calculated as NO₂). (basis: RACT and Offsets)
11. Emissions of Carbon Monoxide (CO) from the Flare A-11 shall not exceed 0.2 pounds per million BTU. (basis: RACT and Offsets).
4412. To demonstrate compliance with Regulation 8, Rule 34, Sections 301.3 and 412, the Permit Holder shall ensure that a District approved source test is conducted annually on the Landfill Gas Flare (A-10A-11). The annual source test shall determine the following:
 - a. landfill gas flow rate to the flare (dry basis);
 - b. concentrations (dry basis) of carbon dioxide (CO₂), nitrogen (N₂), oxygen (O₂), total hydrocarbons (THC), methane (CH₄), and total non-methane organic compounds (NMOC) in the landfill gas;
 - c. stack gas flow rate from the flare (dry basis);
 - d. concentrations (dry basis) of nitrogen oxides (NOx), carbon monoxide (CO), THC, CH₄, NMOC, SO₂, and O₂ in the flare stack gas;
 - e. the NMOC destruction efficiency achieved by the flare; and
 - f. the average combustion temperature in the flare during the test period.Annual source tests shall be conducted no earlier than 9 months and no later than 12 months after the previous source test. The Source Test Section of the District shall be contacted to obtain approval of the source test procedures at least 14 days in advance of each source test. The Source Test Section shall be notified of the scheduled test date at least 7 days in advance of each source test. The source test report shall be submitted to the Compliance and Enforcement Division and to the Source Test Section within 45 days of the test date. (basis: RACT, Regulations 2-1-301, 8-34-301.3, 8-34-412, and 9-1-302)

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- ~~42~~13. The Permit Holder shall conduct a characterization of the landfill gas concurrent with the annual source test required by part 11 above. The landfill gas sample shall be drawn from the main landfill gas header. In addition to the compounds listed in part 11b, the landfill gas shall be analyzed for all the compounds listed in the most recent version of EPA's AP-42 Table 2.4-1 excluding acetone, carbon monoxide, and mercury. All concentrations shall be reported on a dry basis. The test report shall be submitted to the Compliance and Enforcement Division within 45 days of the test date. After conducting three annual landfill gas characterization tests, the Permit Holder may request to remove specific compounds from the list of compounds to be tested for if the compounds have not been detected, have no significant impact on the cancer risk determination for the site, and have no significant impact on the hazard index determination for the site. (basis: Toxic Risk Management Policy and Regulation 8-34-412)
- *~~43~~14. The landfill gas condensate injection rate shall not exceed 5 gallons per minute. Total landfill gas condensate injection throughput shall not exceed 375,000 gallons during any consecutive twelve-month period. The Permit Holder for S-1 and ~~A-40A-11~~ may submit a written petition to the District to increase the landfill gas condensate injection rate subject to current District-approved source test results. (basis: Toxic Risk Management Policy)
- ~~44~~15. To demonstrate compliance with the above conditions, the Permit Holder shall maintain the following records in a District approved logbook.
- The total amount of municipal solid waste received at S-1 recorded on a daily basis. A summary of the daily waste acceptance records for each calendar month.
 - For each area or cell that is not controlled by a landfill gas collection system, a record of the date that waste was initially placed in the area or cell. The cumulative amount of waste placed in each uncontrolled area or cell recorded on a monthly basis.
 - If the Permit Holder plans to exclude an uncontrolled area or cell from the collection system requirement, the Permit Holder shall also record the types and amounts of all non-decomposable waste placed in the area and the percentage (if any) of decomposable waste placed in the area.
 - Low VOC soil screening data, pursuant to part 3.
 - The dates, locations, and frequency per day of all watering activities on unpaved roads or active soil or fill areas. The dates, locations, and type of any dust suppressant applications. The dates and description of all paved roadway cleaning activities. All records shall be summarized monthly.
 - The initial operation date for each new landfill gas well and collector.
 - An accurate map of the landfill that indicates the locations of all refuse boundaries and the locations of all wells and collectors (using unique identifiers) that are required to be operating continuously pursuant to part 6a. Any areas containing only non-decomposable waste shall be clearly identified. This map shall be updated at least once a year to indicate changes in refuse boundaries and to include any newly installed wells and collectors.
 - The operating times and the landfill gas flow rate to the ~~A-40A-11~~ Landfill Gas Flare recorded on a daily basis. A monthly summary of the heat input to ~~A-40A-11~~, pursuant to part 8 shall be calculated and recorded.
 - Continuous records of the combustion zone temperature for the ~~A-40A-11~~ Landfill Gas Flare during all hours of operation.
 - Records of all test dates and test results performed to maintain compliance with parts ~~44~~12 and ~~42~~13 above or any applicable rule or regulation.
 - Records of landfill gas condensate injection throughput and the duration of the injection recorded daily.
- 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 recordkeeping requirements do not replace the recordkeeping requirements contained in any applicable rules or regulations. (basis: Cumulative Increase, 2-1-301, 2-6-501, 6-301, 6-305, 8-2-301, 8-34-301, 8-34-304, 8-34-501, and 9-1-302)

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~~45~~16. The annual report required by BAAQMD Regulation 8-34-411 shall be submitted in two semi-annual increments. The reporting period for the first increment of the Regulation 8-34-411 annual report that is submitted subsequent to the issuance of the MFR Permit for this site shall be from December 1, 2002 through August 31, 2003. This first increment report shall be submitted by September 30, 2003. The reporting periods and report submittal due dates for all subsequent increments of the Regulation 8-34-411 report shall be synchronized with the reporting periods and report submittal due dates for the semi-annual MFR Permit monitoring reports that are required by Section I.F. of the MFR Permit for this site. (basis: Regulation 8-34-411 and 40 CFR Part 63.1980(a))

RECOMMENDATIONS:

It is recommended that an Authority to Construct be issued to the Kirby Canyon Recycling and Disposal Facility for the following:

A-11: Enclosed Landfill Gas Flare with Condensate Injection System; LFG Specialties Model No. EF84018, 1,480 SCFM maximum capacity, 45 MMBTU/hr, 5 gallons per minute Condensate Injection Rate

It is also recommended that 6.847 tons of NOx offsets be provided for this application from the District's Small Facility Banking Account.

By: _____
Ted Hull
Air Quality Engineer II

Kirby Canyon Recycling and Disposal Facility

Application #008255

Secondary HCl Emissions from Flared Landfill Gas

Pollutant	Molecular Weight	Average Concentration (ppmv)	Moles of Cl- Produced in Combustion	Concentration of Chloride (ppmv)	Chloride in Landfill Gas (lb/hr)	Exhausted HCl Emissions (lb/hr)	Increased HCl Emissions (lb/yr)
Bromodichloromethane	163.83	3.13	2.0	6.3	7.934E-03	8.173E-03	7.16E+01
Carbon Tetrachloride	153.84	0.11	4.0	0.4	5.577E-04	5.744E-04	5.03E+00
Chlorobenzene	112.56	0.08	1.0	0.1	1.014E-04	1.044E-04	9.15E-01
Chlorodifluoromethane	86.47	1.30	1.0	1.3	1.648E-03	1.697E-03	1.49E+01
Chloroethane	64.52	1.25	1.0	1.3	1.584E-03	1.632E-03	1.43E+01
Chloroform	119.39	0.08	1.0	0.1	1.014E-04	1.044E-04	9.15E-01
Chloromethane	50.49	1.21	1.0	1.2	1.534E-03	1.580E-03	1.38E+01
Dichlorobenzene	147.00	0.21	2.0	0.4	5.323E-04	5.483E-04	4.80E+00
Dichlorodifluoromethane	120.91	15.70	2.0	31.4	3.980E-02	4.099E-02	3.59E+02
1,1-Dichloroethane	98.97	0.13	2.0	0.3	3.295E-04	3.394E-04	2.97E+00
1,1-Dichloroethene	96.94	0.20	2.0	0.4	5.070E-04	5.222E-04	4.57E+00
t-1,2-Dichloroethene	96.94	2.84	2.0	5.7	7.199E-03	7.415E-03	6.50E+01
1,2-Dichloroethane	98.96	0.41	2.0	0.8	1.039E-03	1.071E-03	9.38E+00
1,2-Dichloropropane	112.99	0.18	2.0	0.4	4.563E-04	4.700E-04	4.12E+00
Dichlorofluoromethane	102.92	2.62	2.0	5.2	6.642E-03	6.841E-03	5.99E+01
Fluorotrichloromethane	137.38	0.76	3.0	2.3	2.890E-03	2.977E-03	2.61E+01
Methylene Chloride	84.94	14.30	2.0	28.6	3.625E-02	3.734E-02	3.27E+02
Perchloroethylene	165.83	1.59	4.0	6.4	8.061E-03	8.303E-03	7.27E+01
1,1,2,2-Tetrachloroethane	167.85	1.11	4.0	4.4	5.628E-03	5.796E-03	5.08E+01
1,1,1-Trichloroethane	133.41	0.06	3.0	0.2	2.281E-04	2.350E-04	2.06E+00
Trichloroethylene	131.39	0.17	3.0	0.5	6.464E-04	6.658E-04	5.83E+00
Vinyl Chloride	62.50	0.41	2.0	0.8	1.027E-03	1.057E-03	9.26E+00

Total HCl = 1.13E+03

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Secondary HBr Emissions from Flared Landfill Gas

Pollutant	Molecular Weight	Average Concentration (ppmv)	Moles of Br-Produced in Combustion	Concentration of Bromide (ppmv)	Bromide in Landfill Gas (lb/hr)	Exhausted HBr Emissions (lb/hr)	Increased HBr Emissions (lb/yr)
Bromodichloromethane	163.83	3.13	1.0	3.1	8.941E-03	9.031E-03	7.91E+01
Ethylene Dibromide	187.88	1.00E-03	2.0	0.0	5.713E-06	5.770E-06	5.05E-02
Total HBr =						7.92E+01	

Secondary HF Emissions from Flared Landfill Gas

Pollutant	Molecular Weight	Average Concentration (ppmv)	Moles of F-Produced in Combustion	Concentration of Fluoride (ppmv)	Fluoride in Landfill Gas (lb/hr)	Exhausted HF Emissions (lb/hr)	Increased HF Emissions (lb/yr)
Chlorodifluoromethane	86.47	1.30	1.0	1.3	8.830E-04	9.271E-04	8.12E+00
Dichlorodifluoromethane	120.91	15.70	2.0	31.4	2.133E-02	2.239E-02	1.96E+02
Dichlorofluoromethane	102.92	2.62	2.0	5.2	3.559E-03	3.737E-03	3.27E+01
Fluorotrichloromethane	137.38	0.76	3.0	2.3	1.549E-03	1.626E-03	1.42E+01
Total HF =						2.04E+02	

Increased LFG Feed: 230 scfm

Notes:

1. Average Concentration is either based on analytical test results of landfill gas at the site or AP-42 Default Values.
2. Chloride in Landfill Gas (lb/hr) = [(Chloride Concentration/1,000,000) x 35.453 (lb/lb-mole) x LFG(scfm) x 60(min)]/386 (scf/lb-mole)
3. Bromide in Landfill Gas (lb/hr) = [(Bromide Concentration/1,000,000) x 79.904 (lb/lb-mole) x LFG(scfm) x 60(min)]/386 (scf/lb-mole)
3. Fluoride in Landfill Gas (lb/hr) = [(Fluoride Concentration/1,000,000) x 18.9984 (lb/lb-mole) x LFG(scfm) x 60(min)]/386 (scf/lb-mole)

**ENGINEERING EVALUATION REPORT
KIRBY CANYON RECYCLING AND DISPOSAL FACILITY
APPLICATION NUMBER 009220**

BACKGROUND:

The Kirby Canyon Recycling and Disposal Facility has applied for an Authority to Construct the following equipment:

- S-5: IC Engine Generator Set #1; Caterpillar Model G3516LE, 1,148 BHP, 10.5 MMBTU/hr, landfill gas fired**
- S-6: IC Engine Generator Set #2; Caterpillar Model G3516LE, 1,148 BHP, 10.5 MMBTU/hr, landfill gas fired**
- S-7: IC Engine Generator Set #3; Caterpillar Model G3516LE, 1,148 BHP, 10.5 MMBTU/hr, landfill gas fired**

These engines are designed to run continuously at full load, each burning up to 345.3 standard cubic feet per minute (scfm) of landfill gas (LFG). The existing Landfill Gas Flare A-11 will burn the balance of landfill gas collected at the facility. These engines are being proposed as a replacement for the following IC Engine Generator Set that was issued an Authority to Construct under Application #003539, but which will not be installed:

- S-2: IC Engine Generator Set; Deutz Genset Model TBG 620 V16K, 1,877 HP, 13.16 MMBTU/hr, landfill gas fired*

EMISSION CALCULATIONS:

Manufacturer's Certified Emission Rates

According to the applicant, Caterpillar has stated that the Model G3516LE IC Engines will meet the following emission rates:

- NO_x: 0.6 g/bhp-hr
- CO: 2.1 g/bhp-hr
- PM₁₀: 0.05 g/bhp-hr

NMOC (POC) Emissions

In addition to the above emission factors, Caterpillar has certified that these engines will have exhaust gas NMOC concentrations less than 120 ppm by volume, dry basis, expressed as methane, corrected to 3% oxygen. This concentration limit can be converted to a mass emission (M) as follows using data provided by Caterpillar for these engines:

LFG Combustion Rate (each engine):	345.3 scfm
Dry Exhaust Flow Rate:	2,347 dscfm
Excess O ₂ in Dry Exhaust Stream:	6.7%
Oxygen Correction Factor (to 3%):	0.79; [e.g.(20.9 – 6.7)/(20.9 – 3)]
Corrected Dry Exhaust Flow Rate:	1,854 dscfm @ 3% oxygen
Molecular Weight of Methane:	16 lb/lb-mole
Volume of Gas at 70°F:	386 scf/lb-mole

$$\begin{aligned} M &= [(120 \times 10^{-6})(16 \text{ lb/lb-mole})(1,854 \text{ dscf/min})]/(386 \text{ scf/lb-mole}) \\ &= 0.01 \text{ lb/min} \\ &= 0.6 \text{ lb/hr} \\ &= 0.2 \text{ g/bhp-hr} \end{aligned}$$

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SO₂ Emissions

Since the Sulfur Dioxide (SO₂) emissions will vary directly with the amount of Sulfur compounds present in the fuel, a mass balance calculation can be performed to determine SO₂ emissions based on the total concentration of sulfur compounds in the landfill gas. Based on past landfill gas sampling data, the applicant has stated that the maximum total concentration of sulfur in the landfill gas is expected to be 200 ppm (vol) (as H₂S). Assuming all sulfur is converted into SO₂ upon combustion, the SO₂ emission factor will be:

$$\begin{aligned} \text{SO}_2 &= (200 \times 10^{-6} \text{ lb-mole H}_2\text{S/lb-mole gas})(\text{lb-mole SO}_2/\text{lb-mole H}_2\text{S})(64 \text{ lb SO}_2/\text{lb-mole SO}_2)(\text{lb-mole gas}/386 \text{ scf}) \\ &= 3.32 \times 10^{-5} \text{ lb SO}_2/\text{scf} \end{aligned}$$

At a fuel feed rate of 345.3 scfm, the expected SO₂ emission rate is 0.011 lb/min or 0.69 lb/hr (0.3 g/bhp-hr).

Summary of Emission Factors

In summary, the factors used to calculate emissions of criteria pollutants from these engines will be as follows:

- NO_x: 0.6 g/bhp-hr
- CO: 2.1 g/bhp-hr
- POC: 0.2 g/bhp-hr
- PM₁₀: 0.05 g/bhp-hr
- SO₂: 0.3 g/bhp-hr

Estimated Annual Emissions

Assuming the following operating conditions for each of the IC Engines S-5, S-6, and S-7:

<u>Brake Horsepower</u> 1,148	<u>Maximum Hours of Operation</u> 8,760 hours/yr
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The highest allowable emissions from each engine will be as follows:

$$\begin{aligned} \text{NO}_x &= (0.6 \text{ g/bhp-hr})(10,056,480 \text{ bhp-hr/yr})(\text{lb}/453.6 \text{ g}) \\ &= 13,302 \text{ lb/yr} \\ \text{CO} &= (2.1 \text{ g/bhp-hr})(10,056,480 \text{ bhp-hr/yr})(\text{lb}/453.6 \text{ g}) \\ &= 46,558 \text{ lb/yr} \\ \text{POC} &= (0.2 \text{ g/bhp-hr})(10,056,480 \text{ bhp-hr/yr})(\text{lb}/453.6 \text{ g}) \\ &= 4,434 \text{ lb/yr} \\ \text{PM}_{10} &= (0.05 \text{ g/bhp-hr})(10,056,480 \text{ bhp-hr/yr})(\text{lb}/453.6 \text{ g}) \\ &= 1,109 \text{ lb/yr} \\ \text{SO}_2 &= (0.3 \text{ g/bhp-hr})(10,056,480 \text{ bhp-hr/yr})(\text{lb}/453.6 \text{ g}) \\ &= 6,651 \text{ lb/yr} \end{aligned}$$

CUMULATIVE EMISSIONS:

(lbs/day)	(tons/yr)
NO _x = 109.3	NO _x = 19.953
CO = 382.7	CO = 69.837
POC = 36.4	POC = 6.651
PM ₁₀ = 9.1	PM ₁₀ = 1.664

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SO₂ = 54.7

SO₂ = 9.977

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TOXIC RISK ASSESSMENT:

Potential emissions of toxic air contaminants (TACs) from the IC Engines S-5, S-6, and S-7 occur through the following pathways:

- Pass-through Emissions: TACs from the landfill gas that are not completely removed by combustion.
- Acid Gas Emissions: Halogenated compounds converted to acid gases during combustion.
- Secondary Organic TACs: Organic compounds converted to TACs during combustion.

Pass-through Emissions

This facility is required to perform a landfill gas characterization test on an annual basis to quantify the amounts of suspected toxic air contaminants common to landfill gas. The District has identified the list of compounds to be annually tested as those organic compounds appearing in AP-42 Table 2.4.1 that are also listed as TACs in BAAQMD Regulation 2, Rule 1, Table 2-1-316. In addition, Benzene and Toluene have been added because they appear in AP-42 Table 2.4-2 as likely components of landfill gas and Ethylbenzene has been included because the District has proposed adding it to Table 2-1-316. This combined list includes 29 TACs that are or may be present in landfill gas.

The attached spreadsheet Table 1 estimates the pass-through emissions of each of these compounds from the IC Engines, using the following methodology and assumptions:

- The concentration of each listed TAC is based on the results of the most recent gas sampling (October 21, 2003) performed by Best Environmental and Air Toxics Ltd. Where test results were not available, the AP-42 Table 2.4-1 default value was used.
- The combined LFG fuel feed rate to the (3) engines is assumed to be a continuous 1,036 scfm (standard conditions: 1 atm, 70 degrees F).
- The IC Engine abatement efficiency for each compound class was taken from AP-42 Table 2.4-3 "Control Efficiencies for LFG Constituents" (11/98). (e.g. Typical control efficiencies; NMOC = 97.2%, Halogenated Species = 93.0 %, Non-Halogenated Species = 86.1%)

Acid Gas Emissions

Spreadsheet Tables 2, 3, and 4 estimate the emissions of Hydrogen Chloride (HCl), Hydrogen Bromide (HBr), and Hydrogen Fluoride (HF) that are likely to occur during the combustion of halogenated compounds that are present or are thought to be present in the landfill gas at the Kirby Canyon Landfill. These tables use the following methodology and assumptions:

- Compounds of interest are those that are listed in EPA AP-42 Table 2.4-1 "Default Concentrations For LFG Constituents" and which contain Chlorine, Bromine, or Fluorine.
- The concentrations used in the spreadsheet are based on the results of the most recent gas sampling performed by Best Environmental and Air Toxics Ltd. AP-42 default values are used where test results are not available.
- The combined LFG fuel feed rate to the (3) engines is assumed to be a continuous 1,036 scfm (standard conditions: 1 atm, 70 degrees F).
 - Halogenated compounds are completely combusted to yield HCl, HBr, and HF gases.

Secondary Organic TACs

Emissions estimates for secondary organic TACs S-5, S-6, and S-7 will be made using factors from the California Air Resources Board database of "California Air Toxics Emission Factors" (CATEF) for 4-Stroke, lean burn, >650 hp engines firing natural gas. This database includes 14 compounds identified as TACs by the District. The estimated emissions of these compounds are summarized in spreadsheet Table 5. The following assumptions were used in the spreadsheet:

- The combined fuel input to the (3) IC engines is a continuous 31.5 MMBTU/hr.

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- The gross heating value of natural gas was assumed to be 1,000 BTU/scf

Summary of Projected TAC Emissions

In combining the three TAC emission pathways for the IC Engines S-5, S-6, and S-7 a total of 43 compounds were evaluated. Of these, 32 were assumed to be emitted either because they were detected in the most recent gas characterization test or had a default concentration value applied in lieu of test results. 7 compounds were found to have potential emissions that exceed the District’s risk screen triggers. The estimated TAC emissions associated with this application are summarized as follows:

Table I: Estimated TAC Emissions

Compound	Estimated Emissions (lb/yr)	Risk Screen Trigger (lb/yr)	Risk Screen Trigger Exceeded? (yes or no)
Acetaldehyde	1.46 E+02	7.2 E+01	yes
Acrolein	1.63 E+01	3.9 E+00	yes
Benzene	6.23 E+01	6.7 E+00	yes
1,3-Butadiene	1.01 E+02	1.1 E+00	yes
Chlorodifluoromethane	1.11 E+01	1.4 E+05	no
1,1-Dichloroethane	1.86 E+00	1.2 E+02	no
1,4-Dichlorobenzene	3.05 E+00	1.8 E+01	no
Dichlorodifluoromethane	1.87 E+02	1.4 E+05	no
Dichlorofluoromethane	2.66 E+01	1.4 E+05	no
Ethylbenzene	2.73 E+01	7.7 E+04	no
Ethylene Dibromide	1.86 E-02	2.7 E+00	no
Fluorotrichloromethane	1.03 E+01	1.4 E+05	no
Formaldehyde	1.30 E+03	3.3 E+01	yes
Hexane	5.62 E+00	8.3 E+04	no
Hydrogen Bromide	2.28 E-01	4.6 E+03	no
Hydrogen Chloride	3.07 E+03	1.4 E+03	yes
Hydrogen Fluoride	9.20 E+02	1.1 E+03	no
Hydrogen Sulfide	1.34 E+03	8.1 E+03	no
Methyl Ethyl Ketone	9.97 E+01	1.5 E+05	no
Methylene Chloride	3.27 E+00	1.9 E+02	no
PAH:			
Benzo(a)anthracene	1.62 E-02	4.4 E-02	no
Benzo(a)pyrene	7.45 E-04	4.4 E-02	no
Benzo(b)fluoranthene	1.13 E-02	4.4 E-02	no
Benzo(k)fluoranthene	2.16 E-03	4.4 E-02	no
Dibenz(a,h)anthracene	7.45 E-04	4.4 E-02	no
Indeno(1,2,3-cd)pyrene	1.98 E-03	4.4 E-02	no
Naphthaline	6.93 E+00	2.7 E+02	no
Perchloroethylene	6.11 E+01	3.3 E+01	yes
Toluene	6.59 E+01	3.9 E+04	no
Trichloroethylene	9.02 E+00	9.7 E+01	no
Vinyl Chloride	1.39 E+00	2.5 E+00	no
Xylene	2.46 E+02	5.8 E+04	no

As shown above, the estimated emissions of Acetaldehyde, Acrolein, Benzene, 1,3-Butadiene, Formaldehyde, Hydrogen Chloride, and Perchloroethylene exceed the District’s risk screen triggers for those compounds. Therefore, a risk screen is required.

Risk screen modeling was performed by the District for multiple pathway exposure to each of the above compounds using the ISCST3 model with SCREEN3 meteorological data and the CARB Hotspots Analysis

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and Reporting Program (HARP), version 1.0. The increased cancer risk to the maximally exposed individual receptor was found to be 3.3 in a million. The chronic hazard index was 0.2. In accordance with the District's risk management policy, sources that meet toxics best available control technology (TBACT) are required to have a maximum excess cancer risk less than 10 in a million and a hazard index of less than one.

Therefore, the risk screen passes for these sources. District risk screening results are included as an attachment to this application. (See memorandum from Jane Lundquist to Ted Hull, dated April 7, 2004)

BACT/TBACT REVIEW:

Best Available Control Technology (BACT) review is triggered for any new source that results in a potential emission on a pollutant specific basis equal to or greater than 10 pounds per highest day of POC, NPOC, NOx, SO₂, PM₁₀, or CO. Based on the emission calculations presented in this evaluation, BACT review is triggered for POC, NOx, CO, and SO₂.

From the District's BACT Guideline (Document # 96.2.1, 06/02/95), the following emission standards have been established as BACT #1 (i.e. technologically feasible if cost effective) for Landfill Gas Fired IC Engines \geq 250 HP:

- POC: 0.6 g/bhp-hr
- NOx: 1.0 g/bhp-hr
- SO₂: 0.3 g/bhp-hr
- CO: 2.1 g/bhp-hr

Toxics Best Available Control Technology (TBACT) for POC emissions is also 0.6 g/bhp-hr. The certified emission factors provided by Caterpillar demonstrate that S-5, S-6, and S-7 will meet BACT #1 and TBACT #1.

OFFSET REVIEW:

Facility Emissions Total

The Kirby Canyon Landfill recently obtained permits for (2) small diesel engines: S-3, Flare Generator and S-4, Trash Pump. These engines were permitted for unlimited operation and therefore have calculated potential NOx emissions of 26.6 tons per year. This creates a permitting problem for the proposed Generator Sets #1, #2, and #3 because the potential NOx emissions from these sources (19.9 tons per year) will cause the total facility NOx emissions (from Diesel Engines, Flare, and Generator Sets) to exceed 50 tons per year, requiring Kirby Canyon to provide offsets in accordance with Regulation 2-2-302.

At the request of the District, Kirby Canyon has agreed to accept permit limits for S-3 and S-4 that reflect the maximum anticipated annual usage (i.e. 3,120 hours per year for each engine). Based on the new limits for S-3 and S-4 and the pre-existing usage limit for the Flare A-11 the facility currently has the following potential emissions:

Table II: Existing Facility Emissions

Emissions Source	Annual Emissions (tons/yr)				
	NOx	CO	POC	PM	SO ₂
A-11 Flare*	11.826	39.420	2.499	3.351	2.759
S-1 Landfill	N/A	N/A	14.253	36.482	N/A
S-3 Diesel Eng*	6.498	1.396	0.525	0.460	0.429
S-4 Diesel Eng*	2.623	0.646	0.243	0.213	0.198
	20.947	41.462	17.520	40.506	3.386

* Indicates permitted emissions limit.

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Including the permitted emissions from the proposed IC Engines S-5, S-6, and S-7, the annual facility emissions total will be as follows:

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NOx = 40.900 tons/yr
CO = 111.299 tons/yr
POC = 24.171 tons/yr
PM = 42.170 tons/yr
SO₂ = 13.363 tons/yr

Offset Requirements – NOx, POC

In accordance with Regulation 2-2-302, before the District may issue an authority to construct or permit to operate for a new or modified source at a facility that emits or will be permitted to emit more than 15 tons per year but less than 50 tons/yr of POC or NOx on a pollutant specific basis, emissions offsets shall be provided by the District at a 1.0 to 1.0 ratio from the Small Facility Banking account in accordance with the provisions of Regulation 2-4-414. Offsets shall be provided for the emissions from the new or modified source, plus any pre-existing cumulative increase, minus any onsite contemporaneous emission reduction credits.

The Kirby Canyon Landfill has no pre-existing cumulative increase for NOx or POC. Therefore, the required POC and NOx offsets will be as follows:

Table III: NOx and POC Offset Requirements

Pollutant	Emissions Increase (tons/yr)	Pre-Existing Cumulative Increase (tons/yr)	Total Cumulative Increase (tons/yr)	Offset Ratio	Offsets Required (tons/yr)
NOx	19.953	0.000	19.953	1.0:1.0	19.953
POC	6.651	0.000	6.651	1.0:1.0	6.651

Offset Requirements – PM10, SO₂

In accordance with Regulation 2-2-303, PM10 and SO₂ offsets are not required for this application because the Kirby Canyon Landfill is not a major facility for these pollutants.

PSD REVIEW:

In accordance with Regulation 2-2-304, a PSD review is required for a new major facility, which will emit 100 tons per year or more of a regulated air pollutant, if it is one of the 28 PSD source categories listed in Section 169(1) of the federal Clean Air Act, or 250 tons per year or more for an unlisted category. PSD review is also required for a major modification of a major facility if the cumulative increase, from the PSD Baseline Date, minus the contemporaneous emission reduction credits at the facility are in excess of 40 tons per year of sulfur dioxide or nitrogen oxides, or 15 tons per year of PM10. Similarly, Regulation 2-2-305 requires a PSD review for a major modification of a major facility with an increase of 100 tons per year or more of carbon monoxide.

The Kirby Canyon Landfill is not a PSD Major Facility for any pollutants, because maximum facility-wide emissions will be less than 250 tons/year for each pollutant. Note that landfills and landfill gas combustion equipment are NOT in one of the 28 listed categories that are subject to the lower PSD Major Facility threshold of 100 tons/year. Therefore, PSD review is not triggered for this application.

STATEMENT OF COMPLIANCE:

Public Notification Requirements (Regulation 2, Rule 1):

The project is over 1000 feet from the nearest school and is therefore not subject to the public notification requirements of Regulation 2-1-412.

CEQA Requirements (Regulation 2, Rule 1):

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This application is exempt from the requirements of a CEQA review because the permitting of “Internal Combustion Engines” as outlined in Permit Handbook Chapter 2.3 is a ministerial operation.

Maximum Achievable Control Technology (MACT) Requirement (Regulation 2-2-317):

Total HAP emissions from this facility (including fugitive emissions from the landfill) have been determined to be less than 25 tons/year of all HAPs combined and less than 10 tons/year of any single HAP. Therefore, Regulation 2-2-317 does not apply.

Major Facility Review (Regulation 2, Rule 6):

This facility was initially issued an MFR Permit on July 10, 2003, which expires on June 30, 2008. The permit will be revised to reflect the proposed change of flares. 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.

At the request of the District, Kirby Canyon has agreed to accept permit limits for pre-existing Diesel IC Engines (S-3 and S-4) that reflect the maximum anticipated annual usage (i.e. 3,120 hours per year for each engine) rather than presuming unlimited operation. The effect of the usage limits is to keep the potential facility NOx emissions below 50 tons per year, thereby qualifying them to receive emissions offsets from the District’s Small Facility Banking Account for the new Flare and Generator Sets in accordance with BAAQMD Regulation 2-2-302. It is the District’s position that these mutually agreed upon limits do not constitute a Significant Permit Revision.

Landfill Gas Emission Control System Requirements (Regulation 8, Rule 34):

District 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 emits less than 120 ppm (vol) NMOC (expressed as methane @ 3% O₂) is required. As previously stated, Caterpillar has certified that the IC Engines S-5, S-6, and S-7 will have exhaust gas NMOC concentrations less than 120 ppm by volume, dry basis, expressed as methane, corrected to 3% oxygen.

Particulate Matter and Visible Emissions (Regulation 6):

BAAQMD Regulation 6-310 limits PM emissions to 0.15 gr/dscf. Based on the emissions data provided by the manufacturer, the IC Engines S-5, S-6, and S-7 will each emit 0.13 lb/hr of PM₁₀, at an exhaust gas flow rate of 2,347 dscfm during peak operation.

The PM emissions from these engines are equivalent to 0.006 gr/dscf as follows:

$$(0.13 \text{ lb/hr})(\text{hr}/60\text{min})(\text{min}/2,347 \text{ dscf})(7,000 \text{ gr/lb}) = 0.006 \text{ gr/dscf}$$

Therefore, S-5, S-6, and S-7 will comply with Regulation 6-310.

Compliance with the Ringelmann 1.0 limit of Regulation 6-301 can be demonstrated by casual observation.

Sulfur Dioxide (Regulation 9, Rule 1):

Regulation 9-1-302 limits SO₂ emissions from the exhaust stream of any source (other than a ship) to 300 ppm (dry).

Given the following:

SO ₂ Emission Rate for each IC Engine:	0.69 lb/hr
Peak Exhaust Flow Rate:	2,347 dscfm
Molecular Weight of SO ₂ :	64 lb/lb-mole
Volume of Gas at 70°F:	386 scf/lb-mole

$$\text{ppm SO}_2 = (0.69 \text{ lb SO}_2/\text{hr})(\text{hr}/60 \text{ min})(\text{min}/2,347 \text{ dscf})(\text{lb-mole SO}_2/64 \text{ lb SO}_2)(386 \text{ dscf gas/lb-mole gas})$$

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$$\begin{aligned} &= 2.96 \times 10^{-5} \text{ lb-mole SO}_2/\text{lb-mole gas} \\ &= 29.6 \text{ ppm SO}_2 \end{aligned}$$

Since the SO₂ exhaust concentration based on the mass emission rate is well below 300 ppm it is anticipated that S-5, S-6, and S-7 will comply with Regulation 9-1-302.

NOx and CO (Regulation 9, Rule 8):

The IC Engines S-5, S-6, and S-7 are subject to the requirements of Regulation 9, Rule 8 “Nitrogen Oxides and Carbon Monoxide from Stationary Internal Combustion Engines”. For lean-burn engines firing either natural gas or waste derived fuel gas, NOx emissions are limited to 140 ppmv @ 15% oxygen and CO emissions are limited to 2000 ppmv @ 15% oxygen. As previously discussed, these engines will have NOx and CO permit limits as follows:

- NOx: 0.6 g/bhp-hr
- CO: 2.1 g/bhp-hr

In order to demonstrate compliance with Regulation 9-8, a units conversion must be made. Given the following:

Dry Exhaust Flow Rate:	2,347 dscfm
Excess O ₂ in Dry Exhaust Stream:	6.7%
Oxygen Correction Factor (to 15%):	2.41; [e.g.(20.9 – 6.7)/(20.9 – 15)]
Corrected Dry Exhaust Flow Rate:	5,656 dscfm @ 15% oxygen
NOx Emission Rate:	1.5 lb/hr
Molecular Weight of NO ₂ :	46 lb/lb-mole
CO Emission Rate:	5.3 lb/hr
Molecular Weight of CO:	28 lb/lb-mole
Volume of Gas at 70°F:	386 scf/lb-mole

the NOx and CO emissions for S-5, S-6 and S-7 in terms of ppmv @ 15% O₂ will be:

$$\begin{aligned} \text{NOx} &= (1.5 \text{ lb NOx/hr})(\text{hr}/60 \text{ min})(\text{min}/5,656 \text{ dscf})(\text{lb-mole NOx}/46 \text{ lb NOx})(386 \text{ dscf c.p.}/\text{lb-mole dry c.p.}) \\ &= 3.7 \times 10^{-5} \text{ (lb-mole NOx/lb-mole dry c.p.)} \\ &= 37 \text{ ppmv @ 15\% O}_2 \end{aligned}$$

$$\begin{aligned} \text{CO} &= (5.3 \text{ lb CO/hr})(\text{hr}/60 \text{ min})(\text{min}/5,656 \text{ dscf})(\text{lb-mole CO}/28 \text{ lb CO})(386 \text{ dscf c.p.}/\text{lb-mole dry c.p.}) \\ &= 2.15 \times 10^{-4} \text{ (lb-mole CO/lb-mole dry c.p.)} \\ &= 215 \text{ ppmv @ 15\% O}_2 \end{aligned}$$

Since the converted NOx and CO emission rates are below the Regulation 9-8 limits for both NOx and CO, compliance with permit condition limits will assure compliance with Regulation 9-8.

National Emission Standards for Hazardous Air Pollutants (NESHAPs):

The NESHAP for Reciprocating Internal Combustion Engines does not apply to this facility because the total HAP emissions at this site (including fugitive emissions from the landfill) have been determined to be less than 25 tons/year of all HAPs combined and less than 10 tons/year of any single HAP.

California Environmental Quality Act (CEQA):

This application is exempt from the requirements of a CEQA review because the permitting of “Internal Combustion Engines” as outlined in Permit Handbook Chapter 2.3 is a ministerial operation.

MONITORING ANALYSIS:

In order to demonstrate compliance with the applicable emissions limits established in this application, the permit holder of the IC Engines S-5, S-6, and S-7 will be required by permit conditions to perform District approved source testing of each engine. Initial source testing is required prior to permit issuance, with an

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annual testing requirement thereafter. In addition, the permit holder shall determine key emission control system operating parameter(s) that are indicative of NMOC destruction efficiency and that can be monitored. Once determined, the specific operating parameter, allowable operating range, type and location of monitors, and monitoring frequency shall be added to the final version of the Title V permit. Monitoring conditions will also be added to the existing Diesel IC Engines S-3 and S-4 to demonstrate ongoing compliance with Regulation 6-303.1 (casual observation of visible emissions) and Regulation 9-1-304 (vendor certification of low sulfur fuel). The District concludes that the proposed monitoring is adequate to demonstrate compliance with the applicable emission standards.

PERMIT CONDITIONS:

For S-5, S-6, S-7: IC Engine Generator Sets

1. All collected landfill gas shall be vented to properly operating abatement equipment including the IC Engines S-5, S-6, and S-7 and/or the Landfill Gas Flare A-11. Raw landfill gas shall not be vented to the atmosphere, except for unavoidable landfill gas emissions that occur during control system installation, maintenance, or repair that is performed in compliance with Regulation 8, Rule 34, Sections 113, 116, 117, or 118 and for inadvertent component or surface leaks that do not exceed the limits specified in 8-34-301.2 or 8-34-303. (basis: Regulation 8-34-301)
2. The IC Engines S-5, S-6, and S-7 shall be fired exclusively by landfill gas. (basis: Cumulative Increase)
3. The Heat Input to each of the IC Engines S-5, S-6, and S-7 shall not exceed 252 million BTU per day and shall not exceed 91,980 million BTU per year. In order to demonstrate compliance with this part, the Permit Holder shall calculate and record on a monthly basis the maximum daily and total monthly heat input to the engine based on (a) the landfill gas flow rate recorded pursuant to part 4, (b) the average methane concentration in the landfill gas based on the most recent source test, and (c) a high heating value for methane of 1013 BTU/cubic foot at 60 degrees F. (basis: Regulation 2-1-301)
4. A District approved flow meter, to measure and record the landfill gas flow into the engine, shall be installed prior to any operation and maintained in good working condition. An automatically controlled landfill gas valve shall be installed, and maintained to ensure that landfill gas is immediately made available for flaring to the A-11 Landfill Gas Flare when the engine is down. (basis: Regulation 8-34-301, Regulation 8-34-508)
5. Emissions of Nitrogen Oxides (NO_x) from each of the IC Engines S-5, S-6, and S-7 shall not exceed either 0.6 grams of NO_x, calculated as NO₂, per brake horsepower-hour or 37 ppmv of NO_x, @ 15% oxygen, dry basis. (basis: BACT, Cumulative Increase)
6. Emissions of Carbon Monoxide (CO) from each of the IC Engines S-5, S-6, and S-7 shall not exceed either 2.1 grams of CO, per brake horsepower-hour or 215 ppmv of CO @ 15% oxygen, dry basis. (basis: BACT, Cumulative Increase)
7. Emissions of Non-Methane Organic Compounds (NMOC) from each of the IC Engines S-5, S-6, and S-7 shall be less than 120 ppm by volume (dry), expressed as methane @ 3% oxygen. (basis: Cumulative Increase, Regulation 8-34-301.4)
8. In order to demonstrate compliance with part 7, the permit holder of these IC Engines shall determine key emission control system operating parameter(s) that are indicative of NMOC destruction efficiency and that can be monitored. The permit holder shall submit a proposal for the key emission control system operating parameter(s) that will be measured during the initial source test and monitored during subsequent engine operation to the Source Test Section and to the Permit Services Division at least 14 days prior to conducting the initial source test

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required by Part 9. The specific operating parameter, allowable operating range, type and location of monitors, and monitoring frequency shall be added to this part via a minor permit revision after the District has received the results of the initial source test. Within 105 days of start-up of S-5, S-6, and S-7, the key emission control system operating parameter(s) shall be maintained within the range established by the most recent source test, during all times that the IC Engine is operated. (basis: Regulations 8-34-301.4 and 8-34-509)

9. In order to demonstrate compliance with parts 5, 6 and 7 above and Regulations 8-34-301.4, 9-8-302.1 and 9-8-302.3, the permit holder shall conduct source testing of S-5, S-6, and S-7 to determine the emissions of NO_x, CO, and NMOC and the destruction efficiency for NMOC. In addition, the operating range for each key emission control system operating parameter required by part 8 shall be determined by each test. An initial source test shall be performed within 60 days of startup, followed by annual source tests thereafter. All source testing shall be performed in accordance with the Manual of Procedures. The facility shall obtain prior approval from the Source Test Manager for the location of sampling ports and source testing procedures. The Source Test Section shall be notified of the scheduled test date at least 7 days in advance of each source test. All source test results shall be delivered to the Compliance and Enforcement Division and to the Source Test Section within 45 days of the date of the test. The time interval between source testing shall not exceed 12 months. (basis: BACT, Cumulative Increase, Regulations 8-34-301.4, 8-34-412, 9-8-302.1, and 9-8-302.3)
10. The owner/operator of the IC Engines S-5, S-6, and S-7 shall maintain the following records in a District approved log:
 - a. The times and dates of all startups and shutdowns for each engine and the reason for each shutdown.
 - b. The total landfill gas throughput to each engine on a monthly basis.
 - c. Records of key emission control system operating parameters for each engine on at least a monthly basis.
 - d. All source test results.
 - e. The operating times and the landfill gas flow rate to each engine on a daily basis, summarized monthly.
 - f. The heat input to each engine, pursuant to part 3 above.All records shall be maintained on-site for a minimum of 5 years and shall be made available for inspection by District personnel upon request. (basis: BACT, Cumulative Increase, Regulation 8-34-501)

In addition to the permit conditions for the proposed new IC Engines S-5, S-6, and S-7, conditions limiting usage must also be added to the existing Diesel IC Engines S-3 and S-4 as noted in the Offset Review section of this evaluation. It is recommended that conditions be added to the permits for S-3 and S-4 as follows:

For S-3, S-4: Diesel IC Engines for Flare Generator and Trash Pump

1. The Diesel Engines S-3 and S-4 shall each be limited to 3,120 hours per year of operation. (basis: Offsets)
2. Only low sulfur fuel (<0.5% sulfur by weight) shall be combusted at S-3 and S-4. The maximum sulfur content of the fuel shall be demonstrated by vendor certification. (basis: Regulation 9-1-304)
3. The exhaust of these engines shall be observed for visible smoke during all periods of operation. If persistent smoke is detected, the operator of the source shall take the necessary corrective action to stop the emissions. (basis: Regulation 6-303.1, Regulation 2-1-403)
4. In order to demonstrate compliance with the above requirements, the operator of S-3 and S-4 shall keep the following records in a District approved log. These records shall be updated on at least a

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monthly basis, kept on-site, and be available for District inspection for at least 5 years from the date on which a record was made. (basis: Offsets, Regulation 9-1-304)

- a. operating hours for S-3 and S-4
- b. vendor certified fuel sulfur content

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RECOMMENDATIONS:

It is recommended that an Authority to Construct be issued to the Kirby Canyon Recycling And Disposal Facility for the following:

- S-5: IC Engine Generator Set #1; Caterpillar Model G3516LE, 1,148 BHP, 10.5 MMBTU/hr, landfill gas fired**
- S-6: IC Engine Generator Set #2; Caterpillar Model G3516LE, 1,148 BHP, 10.5 MMBTU/hr, landfill gas fired**
- S-7: IC Engine Generator Set #3; Caterpillar Model G3516LE, 1,148 BHP, 10.5 MMBTU/hr, landfill gas fired**

By: _____
Ted Hull
Air Quality Engineer II

Kirby Canyon Recycling and Disposal Facility

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Table 1: Abated TAC Emissions From Landfill Gas Fired IC Engines

Pollutant	Molecular Weight	Average Concentration (ppmv)	Pollutant in Engine Fuel (lb/hr)	Abatement Efficiency (%)	Abated TAC Emissions (lb/yr)	Risk Screen Trigger (RST) (lb/yr)	TAC Emissions Above RST? (yes or no)
Acrylonitrile	53.06	0.00	0.000E+00	97.2%	0.00E+00	6.7E-01	no
Benzene	78.11	0.68	8.491E-03	97.2%	2.08E+00	6.7E+00	no
Carbon Disulfide	76.13	0.00	0.000E+00	97.2%	0.00E+00	1.4E+04	no
Carbon Tetrachloride	153.84	0.00	0.000E+00	93.0%	0.00E+00	4.6E+00	no
Chlorobenzene	112.56	0.00	0.000E+00	93.0%	0.00E+00	1.4E+04	no
Chlorodifluoromethane	86.47	1.30	1.810E-02	93.0%	1.11E+01	1.4E+05	no
Chloroethane	64.52	0.00	0.000E+00	93.0%	0.00E+00	1.9E+06	no
Chloroform	119.39	0.00	0.000E+00	93.0%	0.00E+00	3.6E+01	no
1,1-Dichloroethane	98.97	0.19	3.028E-03	93.0%	1.86E+00	1.2E+02	no
1,1-Dichloroethene	96.94	0.00	0.000E+00	93.0%	0.00E+00	6.2E+03	no
1,2-Dichloroethane	98.96	0.00	0.000E+00	93.0%	0.00E+00	8.7E+00	no
1,4-Dichlorobenzene	147.01	0.21	4.972E-03	93.0%	3.05E+00	1.8E+01	no
Dichlorodifluoromethane	120.91	15.70	3.057E-01	93.0%	1.87E+02	1.4E+05	no
Dichlorofluoromethane	102.92	2.62	4.342E-02	93.0%	2.66E+01	1.4E+05	no
Ethylbenzene	106.16	6.50	1.111E-01	97.2%	2.73E+01	7.7E+04	no
Ethylene Dibromide	187.88	1.00E-03	3.026E-05	93.0%	1.86E-02	2.7E+00	no
Fluorotrichloromethane	137.38	0.76	1.681E-02	93.0%	1.03E+01	1.4E+05	no
Hexane	86.18	1.65	2.290E-02	97.2%	5.62E+00	8.3E+04	no
Hydrogen Sulfide	34.08	200.00	1.098E+00	86.1%	1.34E+03	8.1E+03	no
Isopropyl Alcohol	60.11	0.00	0.000E+00	97.2%	0.00E+00	4.4E+05	no
Methyl Ethyl Ketone	72.11	35.00	4.064E-01	97.2%	9.97E+01	1.5E+05	no
Methylene Chloride	84.94	0.39	5.335E-03	93.0%	3.27E+00	1.9E+02	no
Perchloroethylene	165.83	3.73	9.961E-02	93.0%	6.11E+01	3.3E+01	yes
Toluene	92.13	0.00	0.000E+00	97.2%	0.00E+00	3.9E+04	no
1,1,1-Trichloroethane	133.41	0.00	0.000E+00	93.0%	0.00E+00	6.2E+04	no

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1,1,2,2-Tetrachloroethane	167.85	0.00	0.000E+00	93.0%	0.00E+00	3.3E+00	no
Trichloroethylene	131.39	0.70	1.471E-02	93.0%	9.02E+00	9.7E+01	no
Vinyl Chloride	62.50	0.23	2.265E-03	93.0%	1.39E+00	2.5E+00	no
Xylenes	106.16	16.25	2.778E-01	97.2%	6.81E+01	5.8E+04	no

LFG Fuel Feed Rate: 1036 scfm

Notes:

1. Average Concentration is either based on analytical test results of landfill gas at the site or AP-42 Default Values (*shown in italics*).
2. Pollutant in Engine Fuel (lb/hr) = [(Concentration/1,000,000) x MW (lb/lb-mole) x LFG(scfm) x 60(min)]/386 (scf/lb-mole)
3. Abatement Efficiencies for each class of compound were taken from AP-42 Table 2.4-3 "Control Efficiencies For LFG Constituents".

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Table 2: Secondary HCl Emissions From Landfill Gas Combustion

Pollutant	Molecular Weight	Average Concentration (ppmv)	Moles of Cl- Produced in Combustion	Concentration of Chloride (ppmv)	Chloride in Landfill Gas (lb/hr)	Exhausted HCl Emissions (lb/hr)	Increased HCl Emissions (lb/yr)
Bromodichloromethane	163.83	0.00	2.0	0.0	0.000E+00	0.000E+00	0.00E+00
Carbon Tetrachloride	153.84	0.00	4.0	0.0	0.000E+00	0.000E+00	0.00E+00
Chlorobenzene	112.56	0.00	1.0	0.0	0.000E+00	0.000E+00	0.00E+00
Chlorodifluoromethane	86.47	1.30	1.0	1.3	7.422E-03	7.645E-03	6.70E+01
Chloroethane	64.52	0.00	1.0	0.0	0.000E+00	0.000E+00	0.00E+00
Chloroform	119.39	0.00	1.0	0.0	0.000E+00	0.000E+00	0.00E+00
Chloromethane	50.49	0.00	1.0	0.0	0.000E+00	0.000E+00	0.00E+00
Dichlorobenzene	147.00	0.21	2.0	0.4	2.398E-03	2.470E-03	2.16E+01
Dichlorodifluoromethane	120.91	15.70	2.0	31.4	1.793E-01	1.846E-01	1.62E+03
1,1-Dichloroethane	98.97	0.19	2.0	0.4	2.170E-03	2.235E-03	1.96E+01
1,1-Dichloroethene	96.94	0.00	2.0	0.0	0.000E+00	0.000E+00	0.00E+00
cis-1,2-Dichloroethene	96.95	0.20	2.0	0.4	2.284E-03	2.352E-03	2.06E+01
1,2-Dichloroethane	98.96	0.00	2.0	0.0	0.000E+00	0.000E+00	0.00E+00
cis-1,3-Dichloropropene	100.97	0.00	2.0	0.0	0.000E+00	0.000E+00	0.00E+00
Dichlorofluoromethane	102.92	2.62	2.0	5.2	2.992E-02	3.081E-02	2.70E+02
Fluorotrichloromethane	137.38	0.76	3.0	2.3	1.302E-02	1.341E-02	1.17E+02
Methylene Chloride	84.94	0.39	2.0	0.8	4.453E-03	4.587E-03	4.02E+01
Perchloroethylene	165.83	3.73	4.0	14.9	8.518E-02	8.774E-02	7.69E+02
1,1,2,2-Tetrachloroethane	167.85	0.00	4.0	0.0	0.000E+00	0.000E+00	0.00E+00
1,1,1-Trichloroethane	133.41	0.00	3.0	0.0	0.000E+00	0.000E+00	0.00E+00
Trichloroethylene	131.39	0.70	3.0	2.1	1.199E-02	1.235E-02	1.08E+02
Vinyl Chloride	62.50	0.23	2.0	0.5	2.626E-03	2.705E-03	2.37E+01

Total HCl = 3.07E+03

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Table 3: Secondary HBr Emissions From Landfill Gas Combustion

Pollutant	Molecular Weight	Average Concentration (ppmv)	Moles of Br- Produced in Combustion	Concentration of Bromide (ppmv)	Bromide in Landfill Gas (lb/hr)	Exhausted HBr Emissions (lb/hr)	Increased HBr Emissions (lb/yr)
Bromodichloromethane	163.83	0.00	1.0	0.0	0.000E+00	0.000E+00	0.00E+00
Ethylene Dibromide	187.88	<i>1.00E-03</i>	2.0	0.0	2.573E-05	2.599E-05	2.28E-01

Total HBr = 2.28E-01

Table 4: Secondary HF Emissions From Landfill Gas Combustion

Pollutant	Molecular Weight	Average Concentration (ppmv)	Moles of F- Produced in Combustion	Concentration of Fluoride (ppmv)	Fluoride in Landfill Gas (lb/hr)	Exhausted HF Emissions (lb/hr)	Increased HF Emissions (lb/yr)
Chlorodifluoromethane	86.47	<i>1.30</i>	1.0	1.3	3.977E-03	4.176E-03	3.66E+01
Dichlorodifluoromethane	120.91	<i>15.70</i>	2.0	31.4	9.607E-02	1.009E-01	8.84E+02
Dichlorofluoromethane	102.92	<i>2.62</i>	2.0	5.2	1.603E-02	1.683E-02	1.47E+02
Fluorotrichloromethane	137.38	<i>0.76</i>	3.0	2.3	6.976E-03	7.324E-03	6.42E+01

Total HF = 9.20E+02

Total LFG Feed: 1036 scfm

Notes:

1. Average Concentration is either based on analytical test results of landfill gas at the site or AP-42 Default Values (*shown in italics*).
2. Chloride in Landfill Gas (lb/hr) = [(Chloride Concentration/1,000,000) x 35.453 (lb/lb-mole) x LFG(scfm) x 60(min)]/386 (scf/lb-mole)
3. Bromide in Landfill Gas (lb/hr) = [(Bromide Concentration/1,000,000) x 79.904 (lb/lb-mole) x LFG(scfm) x 60(min)]/386 (scf/lb-mole)
3. Fluoride in Landfill Gas (lb/hr) = [(Fluoride Concentration/1,000,000) x 18.9984 (lb/lb-mole) x LFG(scfm) x 60(min)]/386 (scf/lb-mole)

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Table 5: Secondary Organic TAC Emissions From Landfill Gas Fired IC Engines

Secondary Pollutant	CATEF (Mean) Emission Factor (lb/MMcf, NG)	Conv. CATEF Emission Factor (lb/MMBTU)	Estimated Emissions (lb/yr)	Risk Screen Trigger (RST) (lb/yr)	TAC Emissions Above RST? (yes or no)
Acetaldehyde	5.29E-01	5.29E-04	1.46E+02	7.20E+01	yes
Acrolein	5.90E-02	5.90E-05	1.63E+01	3.90E+00	yes
Benzene	2.18E-01	2.18E-04	6.02E+01	6.70E+00	yes
1,3-Butadiene	3.67E-01	3.67E-04	1.01E+02	1.10E+00	yes
Formaldehyde	4.71E+00	4.71E-03	1.30E+03	3.30E+01	yes
Toluene	2.39E-01	2.39E-04	6.59E+01	3.90E+04	no
Xylene	6.46E-01	6.46E-04	1.78E+02	5.80E+04	no
PAH:					
Benzo(a)anthracene	5.88E-05	5.88E-08	1.62E-02	4.40E-02	no
Benzo(a)pyrene	2.70E-06	2.70E-09	7.45E-04	4.40E-02	no
Benzo(b)fluoranthene	4.09E-05	4.09E-08	1.13E-02	4.40E-02	no
Benzo(k)fluoranthene	7.83E-06	7.83E-09	2.16E-03	4.40E-02	no
Dibenz(a,h)anthracene	2.70E-06	2.70E-09	7.45E-04	4.40E-02	no
Indeo(1,2,3-cd)pyrene	7.17E-06	7.17E-09	1.98E-03	4.40E-02	no
Naphthaline	2.51E-02	2.51E-05	6.93E+00	2.70E+02	no

Total LFG Feed: 31.5 MMBTU/hr

Notes:

1. Emissions estimates for the Landfill Gas Fired IC Engines were made using factors from the CARB database of "California Air Toxics Emission Factors" (CATEF) for 4-Stroke Lean Burn IC Engines >650 HP, firing natural gas.
2. The conversion from (lb/MMcf, NG) to (lb/MMBTU) assumes a natural gas heating value of 1,000 BTU/scf.
3. The Total LFG Feed assumes the highest potential combined operation of the 3 IC Engines.