Bay Area Air Quality Management District

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

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

for

TriCities Waste Management
Facility #A2246

Facility Address:
7010 Auto Mall Parkway
Fremont, CA 94538

Mailing Address:
7010 Auto Mall Parkway
Fremont, CA 94538

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TABLE OF CONTENTS

Title V Statement of Basis

A. Background

This facility is 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 New Source Performance Standards (NSPS) 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 of 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 subject to this NSPS and meets the designated facility criteria listed in 40 CFR § 60.32c(c).

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

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

Each facility in the Bay Area is assigned a facility number that consists of a letter and a 4-digit number. This facility number is also considered to be the identifier for the permit.

This facility received its initial Title V permit on November 28, 2001 with an expiration date of October 31, 2006. The main purpose of this modification is the addition of (4) Diesel Internal Combustion Engines that were previously exempt from permitting, but lost their exemption due to regulatory changes; and the addition of (3) proposed new Landfill Gas Fired Internal Combustion Engine Generator Sets. The existing diesel engines were issued BAAQMD permits on November 12, 2003 under Application #008278 and were given source numbers S-14 through S-17. The proposed landfill gas fired engine generator sets were issued an Authority to Construct by the BAAQMD on October 19, 2004 under Application #009222 and were given source numbers S-18, S-19, and S-20. In addition to the equipment additions, minor updates and corrections were made to the Title V permit to reflect the current standard format and recent changes to regulations.

Since the diesel engines added to the permit previously existed at the facility, they are not new sources of emissions. The proposed new landfill gas fired engine generator sets will result in potential increases of criteria air pollutants at the facility as follows:

Increased Facility Emissions from Proposed New Equipment

Emissions Source	Annual Emissions (tons/yr)				
	NOx	CO	POC	PM	SO_2
S-18 Generator Set	6.651	23.279	2.217	0.555	2.217
S-19 Generator Set	6.651	23.279	2.217	0.555	2.217
S-20 Generator Set	6.651	23.279	2.217	0.555	2.217
	19.953	**69.837**	**6.651**	**1.665**	**6.651**

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

At the request of the District, Tri-Cities Waste Management has agreed to accept permit limits for pre-existing Diesel IC Engines (S-9 and S-14 through S-17) that reflect the maximum anticipated annual usage (i.e. 1,456 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 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 because the required offsets were provided in accordance with a federally enforceable District regulation. Therefore, this application is being treated as a Minor Permit Revision.

*Note: BAAQMD Regulation 2-2-302 has since been modified and now requires that facilities have NOx or POC equal to or less than 35 tons per year in order to qualify for Small Facility offsets. This regulation change was made on December 21, 2004 (after the issuance of the Authority to Construct for S-18, S-19, and S-20) and does not affect Small Facilities offsets that were provided under Application #009222.

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

- Add existing (loss of permit exemption) Diesel IC Engines S-14 through S-17 to Title V permit.
- Add proposed Landfill Gas Fired IC Engine Generator Sets S-18, S-19, and S-20.
- Update version dates for newly modified regulations.
- Update tables and permit conditions to reflect the additions of permitted and proposed equipment.
- Remove Tables IV-C and VII-C for the Portable Engine S-9 and combine S-9 into the new Tables for "Small Diesel IC Engines". Re-letter existing tables accordingly.
- Remove Permit Condition #17680 for the Portable Diesel Engine S-9 because the requirements were redundant with Permit Condition #21617, which now applies to all Small Diesel Engines (S-9, S-14, S-15, S-16, and S-17).
- Modify standard permit text to say that SIP standards are now found on EPA's website and are not included as part of the permit. Remove Part XII. "Applicable State Implementation Plan" from the permit.
- Update Table VIII to include "Test Methods" for new equipment and remove the reference to Permit Condition #17680.

B. Facility Description

TriCities Waste Management owns and operates the TriCities Recycling and Disposal Facility (Site # A2246) located in Fremont, CA. The permitted property encompasses about 225 acres. Of the total site area, 115 acres are permitted for solid waste (MSW) disposal in a Class II/III landfill. This facility also includes a landfill gas flare, wood waste recycling operations, and a parts cleaning unit.

The S-1 Landfill has been accepting waste since 1968. The site currently accepts non-hazardous municipal solid waste, green waste, and some designated wastes such as petroleum-contaminated soils. In May 1994, the landfill was issued a revised Solid Waste Facility Permit that approved an increase to the design capacity of the landfill. In accordance with 40 CFR § 60.751, this 1994 design capacity expansion is considered a modification of the landfill. Therefore, the landfill is subject to the NSPS for MSW Landfills (40 CFR, Part 60, Subpart WWW). The landfill now has a maximum permitted capacity of 19.271 million cubic yards (about 13.49 million tons) and accepts a maximum of 2628 tons/day of refuse. The landfill has 10.9 million tons of refuse in place as of October 2003 and is expected to reach full capacity in 2005.

The landfill is equipped with an active continuously operated landfill gas collection system. Currently, all collected landfill gas is burned in the A-3 Landfill Gas Flare. A-3 is an enclosed ground flare with a maximum capacity of 41.8 MM BTU/hour or about 1375 scfm of landfill gas.

The wood waste recycling operations include the S-5 Wood Waste Stockpiles with particulate emissions controlled by the A-5 Water Truck and the S-9 Portable Diesel Engine.

As previously discussed, (4) diesel-fired engines (S-14, S-15, S-16, and S-17) were issued Permits to Operate in November 2003 due to a loss of exemption from District permit requirements (Permit Application #008278). In addition, the District has issued an Authority to Construct (Permit Application #009222) for (3) landfill gas fired engine generator sets (S-18, S-19, and S-20). These engines have been added to the Title V permit in this minor permit revision. All other currently permitted operations are included in this proposed MFR Permit revision.

The main source of air emissions at this facility is the S-1 Landfill. This active landfill generates significant fugitive particulate matter emissions due to waste disposal activities, vehicle traffic, cover material handling operations, and wind erosion. In addition, the waste decomposition process generates landfill gas. Landfill gas contains mainly methane, carbon dioxide, and small amounts of non-methane organic compounds (<1%) and sulfur compounds (<400 ppmv). Many of the non-methane organic compounds (NMOCs) found in landfill gas are precursor organic compounds (POC), and some NMOCs are hazardous air pollutants (HAP). Various local, state, and federal regulations require that landfill gas be collected and controlled to reduce POC and HAP emissions to the atmosphere. In order to meet these requirements, the landfill at this site is equipped with an active landfill gas collection system and a landfill gas control system.

Active landfill gas collection systems consist of perforated pipes that are buried in the refuse at numerous locations, solid pipes referred to as laterals and headers, and blowers. The perforated pipes are called horizontal collectors or vertical wells, depending on the orientation of the pipes

within the refuse. The solid pipes connect the horizontal collectors and vertical wells to the blowers. The blowers collect landfill gas by creating a vacuum in the buried refuse that draws landfill gas into the pipes. The blowers vent this collected landfill gas to the landfill gas control system.

The landfill gas control system at this site currently includes the A-3 Landfill Gas Flare. Currently, all collected landfill gas is vented to this flare. The flare destroys most of the methane, organic compounds, sulfur compounds, and HAPs in the landfill gas, but also produces secondary combustion pollutants including: nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter (PM_{10}), formaldehyde, and hydrogen chloride. Upon installation, the Engine Generator Sets S-18, S-19, and S-20 will combust a portion of the gas generated by the landfill to generate electricity and will also serve as abatement for the methane, organic compounds, sulfur compounds, and HAPs in the landfill gas.

The wood waste recycling operations are additional sources of particulate matter emissions. The diesel fired internal combustion engines produce combustion emissions including NO_x, CO, POC, SO_2, PM_{10}, and HAPs. The parts cleaning operation uses a low volatility solvent to equipment parts needing maintenance or repair.

C. Permit Content

The legal and factual basis for the permit follows. The permit sections are described in the order that they are presented in the permit.

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.

Changes to Permit:
The dates of adoption of the rules listed in Standard Condition I.A.1 have been updated.

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., S-1).

Permitted sources are those sources that require a BAAQMD operating permit pursuant to BAAQMD Regulation 2-1-302. There are currently (8) permitted sources at this facility.

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. There are no significant sources.

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-3). Some equipment, such as the landfill gas fired engine generator sets, are both sources and abatement devices. However, if the primary function of the equipment is something other than abating air pollutants, it will have an "S" number and will be listed in Table II A "Permitted Sources".

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-18, S-19, and S-20), which have been issued an Authority to Construct under Permit Application #9222, each of the listed sources has previously been issued a permit to operate pursuant to the requirements of BAAQMD Regulation 2, Permits. These 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. Permits for S-18, S-19, and S-20 will be issued upon installation and testing in accordance with the terms of the Authority to Construct.

The Diesel IC Engines S-17 through S-17 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. This regulatory change affected (4) small diesel engines at Tri-Cities, which were subsequently issued permits to operate under Application #008287.

Changes to Permit:

- The Diesel IC Engines S-14 through S-17 and the proposed Landfill Gas Fired IC Engine Generators S-18, S-19, and S-20 were added to Table II A.

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.

Changes to Permit:

- The standard permit text was modified to say that SIP standards are now found on EPA's website and are not included as part of the permit.
- The version date for the newly modified Regulation 2, Rule 1 was updated.

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.

Complex Applicability Determinations:

Landfills and landfill gas combustion equipment are subject to BAAQMD Regulation 8, Rule 34. This regulation requires landfills that have 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 TriCities Landfill (S-1) be controlled by an active landfill gas collection system and a landfill gas control system since 1987. The current landfill gas control system includes the A-2 Landfill Gas Flare.

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. As discussed previously, the 1994 design capacity increase to the landfill at this site was considered a modification pursuant to 40 CFR § 60.751. Therefore, the S-1 Landfill is subject to this NSPS (40 CFR, Part 60, Subpart WWW). The design capacity of the landfill is now 19.271 million cubic yards (14.734 million m^3) and about 13.5 million tons (12.25 million Mg) of waste.

In accordance with 40 CFR, Part 60, Subpart WWW and BAAQMD Regulation 8, Rule 34, large landfills (with a design capacity greater than or equal to 2.5 million Mg and greater than or equal to 2.5 million m^3) must be equipped with landfill gas collection and control systems. Subject landfills and the associated collection and control systems were required to meet numerous operating, monitoring, and reporting requirements pursuant to Subpart WWW and Regulation 8, Rule 34. These requirements are specified in detail in Section IV of the permit. Landfill operations and landfill gas combustion devices are also subject to numerous other BAAQMD regulations and permit conditions. Regulation 6 is listed as a source-specific applicable requirement for the landfill (S-1), because the landfill is operating and will produce particulate emissions due to waste deposition, cover material application, and vehicle traffic. All applicable requirements are described in Section IV of the permit.

The NESHAP for Municipal Solid Waste Landfills (40 CFR 63, Subpart AAAA) was adopted in November 2002 with an effective date of January 16, 2003. Any landfills that are subject to the MSW Landfill NSPS or Emission Guidelines landfill gas collection and control requirements are also subject to this NESHAP. For landfills subject to the NESHAP at the date of adoption, the requirements became effective on January 16, 2004. This NESHAP did not add any new control requirements, but it did require the preparation of a Startup, Shutdown, Malfunction Plan (to be retained on-site at all times) and added new reporting requirements. These requirements were added to Section IV of the permit.

None of the other sources at this facility are subject to any federal requirements. However, these sources are subject to several BAAQMD regulations and permit conditions. All applicable requirements are described in Section IV of the permit.

Changes to Permit:

- The standard permit text was modified to say that SIP standards are now found on EPA's website and are not included as part of the permit.
- Tables IV-D and IV-E were added for the newly permitted and proposed sources discussed in this permit revision.
- Table IV-C was removed and the requirements for the Portable Diesel Engine S-9 were combined with those for the other Small Diesel Engines into newly created Table IV-D.
- The previous Table IV-D for the S-10 Parts Cleaner was re-designated as Table IV-C.

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:

- Modified Part 5 of Permit Condition #8366 to add the IC Engine Generator Sets S-18, S-19, and S-20 as an acceptable form of landfill gas abatement.
- Condition #21617 was added for the Diesel IC Engines S-9 and S-14 through S-17. As previously discussed, this condition includes usage limitations for the engines.
- Condition #17680, previously for S-9 was removed because the requirements were redundant to Condition #21617.
- Condition #21619 was added for the proposed Landfill Gas Fired IC Engine Generator Sets S-18, S-19, and S-20.

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:

S-14, S-15, S-16, S-17: 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 O_2 this factor becomes:

9,190 x [21%/(21% - 15%)] = 32,165 dscf (combustion products)/MMBTU

The conversion of 0.15 gr/dscf @ 15% O_2 to lb/MMBTU is then:

(32,165 dscf/MMBTU) x (0.15 gr/dscf) x (lb/7,000 gr) = 0.689 lb/MMBTU

In the absence of actual emissions data for these engines, the District considers the AP-42 PM10 emission factor for diesel IC engines to be representative. From AP-42 Table 3.3-1, "Emission Factors For Uncontrolled Gasoline And Diesel Industrial Engines", the PM10 emission factor (based on fuel consumption) is 0.31 lb/MMBTU. Since this assumed emission factor is 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 #21617, 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.

SO_2 Emissions
BAAQMD Regulation 9-1-304 requires all liquid fuels to have a sulfur content $\leq$0.5% (wt). Permit Condition #21617, 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 SO_2. 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 SO_2 emissions that will occur in the atmosphere over the facility. Based on a fuel sulfur limit of 0.5%, and the permitted usage limit of 1,456 hours per year for each engine, the combined maximum potential emissions from S-14 through S-17 are 0.94 tons/year of SO_2. Since actual emissions are not substantial, monitoring for ground level SO_2 concentrations in addition to monitoring the fuel for compliance with the 0.5% fuel sulfur content limits is not recommended.

S-18, S-19, S-20: IC Engine Generator Sets

NOx, CO, NMOC Emissions
In order to demonstrate compliance with the applicable emissions limits established for the proposed IC Engine Generator Sets S-18, S-19, and S-20, 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-18, S-19, and S-20 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 lb/hr)(hr/60min)(min/2,347 dscf)(7,000 gr/lb) = 0.006 gr/dscf

Therefore, S-18, S-19, and S-20 will comply with Regulation 6-310 and no additional monitoring is necessary.

BAAQMD Regulation 6-301 limits the visible emissions from S-18, S-19, and S-20 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.

SO_2 Emissions

BAAQMD Regulation 9-1-302 limits SO_2 emissions from the exhaust stream of any source (other than a ship) to 300 ppm (dry).

Given the following (see Engineering Evaluation Report, Application #9222):

SO_2 Emission Rate for each IC Engine:	0.51 lb/hr
Peak Exhaust Flow Rate:	2,622 dscfm
Molecular Weight of SO_2:	64 lb/lb-mole
Volume of Gas at 70^{o}F:	386 scf/lb-mole

ppm SO_2 = (0.51 lb SO_2/hr)(hr/60 min)(min/2,622 dscf)(lb-mole SO_2/64 lb SO_2)(386 dscf gas/lb-mole gas)

= 1.94 X 10^{-5} lb-mole SO_2/lb-mole gas

= 19.4 ppm SO_2

Because the SO_2 exhaust concentration based on the mass emission rate is well below 300 ppm it is anticipated that S-18, S-19, and S-20 will comply with Regulation 9-1-302. However, a quarterly demonstration of compliance will be made as follows:

Permit Condition #8366, Part 12 limits the amount of total reduced sulfur compounds in the collected landfill gas to 1,300 ppmv (dry). Quarterly monitoring is required to demonstrate compliance with this requirement. Using 1,300 ppm as the maximum sulfur content of the gas combusted in the IC Engines S-18, S-19, and S-20, the maximum SO_2 exhaust gas concentration is determined as follows:

For each engine:

LFG Combustion Rate:	345.3 dscfm
Peak Exhaust Flow Rate:	2,622 dscfm

ppm SO_2 = (1,300 E-06 scf S/scf LFG)(1 scf SO_2/scf S)(345.3 dscf LFG/2,622 dscf exhaust)

= 1.71 E-04 scf SO2/dscf exhaust

= 171 ppmv

Therefore, if quarterly landfill gas monitoring shows the sulfur content to be below 1,300 ppm, the Landfill Gas Fired IC Engines will comply with the Regulation 9-1-302 limit.

BAAQMD Regulation 9-1-301 limits ground level concentrations of SO_2 generated by sources other than ships. As discussed above, this facility is subject to federally enforceable limits and monitoring requirements, which will ensure compliance with the Regulation 9-1-302 gas stream emission limit of 300 ppmv of SO_2 in the exhaust from the landfill gas combustion sources and with the Regulation 9-1-304 fuel sulfur content limit of 0.5% sulfur by weight for the diesel engines. Based on modeling analyses conducted at another landfill site, sources complying with

the Regulation 9-1-302 or 9-1-304 limits are not expected to result in an excess of the ground level concentration limits listed in Regulation 9-1-301. Furthermore, the actual emissions from this facility are expected to be no more than 10% of these federally enforceable limits. Therefore, non-compliance with the Regulation 9-1-301 limits is extremely unlikely and monitoring for ground level SO_2 concentrations would not be appropriate.

Hydrogen Sulfide (H_2S) 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, H_2S 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 H_2S odors have not been detected at this facility, the concentration of H_2S at the property line is expected to be well below the Regulation 9-1-301 limits. Therefore, monitoring for ground level H_2S is not appropriate when no H_2S 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 #21619, Parts 4 and 10.f.).

Changes to Permit:

- A disclaimer was added to the standard text of Section VII to state that in the event of a discrepancy between previously stated requirements in the permit and the tables in Section VII, the preceding sections take precedence.
- Tables VII-D and VII-E were added to summarize the applicable limits and compliance monitoring requirements for the Small Diesel IC Engines and the proposed IC Engine Generator Sets.
- Table VII-C for the Portable Engine S-9 was removed and S-9 was combined with the other Small Diesel Engines into Table VII-D.
- The previous Table VII-D for the Parts Washer S-10 was re-designated as Table VII-C.

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.

Changes to Permit:

- The applicable test methods for the requirements in the new permit conditions (Conditions #21617 and #21619) were added to Table VIII.
- The reference to Permit Condition #17680 (now deleted) was removed.

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.

Changes to Permit:
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.

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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. NOx 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 CH_4
Methane

CO
Carbon Monoxide

CO2 or CO_2
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) x (10^6) = (4.53) x (10 x 10 x 10 x 10 x 10 x 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 H_2S
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 N_2
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)

NOx 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 O_2
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, NOx, 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 PM_{10}
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 SO_2
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 REPORT

ENGINEERING EVALUATION REPORT
TRI-CITIES RECYCLING
APPLICATION NUMBER 009222

BACKGROUND:

Tri-Cities Recycling has applied for an Authority to Construct the following equipment:

S-18: IC Engine Generator Set #1; Caterpillar Model G3516LE, 1,148 BHP, 10.5 MMBTU/hr, landfill gas fired
S-19: IC Engine Generator Set #2; Caterpillar Model G3516LE, 1,148 BHP, 10.5 MMBTU/hr, landfill gas fired
S-20: 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-2 or the proposed Flare A-3 will burn the balance of landfill gas collected at the facility.

EMISSION CALCULATIONS:

Manufacturer's Certified Emission Rates
Caterpillar has stated that the Model G3516LE IC Engines will meet the following emission rates:

- NOx: 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):	294 scfm
Dry Exhaust Flow Rate:	2622 dscfm
Excess O_2 in Dry Exhaust Stream:	6.7%
Oxygen Correction Factor:	0.79; [e.g.(20.9 – 6.7)/(20.9 – 3)]
Corrected Dry Exhaust Flow Rate:	2,071 dscfm @ 3% oxygen
Molecular Weight of Methane:	16 lb/lb-mole
Volume of Gas at 70^{o}F:	386 scf/lb-mole

M = $[(120 \times 10^{-6})(16 \text{ lb/lb-mole})(2{,}071 \text{ dscf/min})]/(386 \text{ scf/lb-mole})$
= 0.01 lb/min
= 0.6 lb/hr
= 0.2 g/bhp-hr

SO2 Emissions
Since the Sulfur Dioxide (SO_2) emissions will vary directly with the amount of Sulfur compounds present in the fuel, a mass balance calculation can be performed to determine SO_2 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 H_2S). Assuming all sulfur is converted into SO_2 upon combustion, the SO_2 emission factor will be:

SO_2 = (200 X 10^{-6} lb-mole H_2S/lb-mole gas)(lb-mole SO_2/lb-mole H_2S)(64 lb SO_2/lb-mole SO_2)(lb-mole gas/386 scf)
= 3.32 x 10^{-5} lb SO_2/scf

At a fuel feed rate of 294 scfm, the expected SO_2 emission rate is 0.01 lb/min or 0.6 lb/hr (0.2 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:

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

Estimated Annual Emissions
Assuming the following operating conditions for each of the IC Engines S-18, S-19, and S-20:

Brake Horsepower	Maximum Hours of Operation
1,148	8,760 hours/yr

The highest allowable emissions from each engine will be as follows:

NOx = (0.6 g/bhp-hr)(10,056,480 bhp-hr/yr)(lb/453.6 g)
= 13,302 lb/yr

CO = (2.1 g/bhp-hr)(10,056,480 bhp-hr/yr)(lb/453.6 g)
= 46,558 lb/yr

POC = (0.2 g/bhp-hr)(10,056,480 bhp-hr/yr)(lb/453.6 g)
= 4,434 lb/yr

PM10 = (0.05 g/bhp-hr)(10,056,480 bhp-hr/yr)(lb/453.6 g)
= 1,109 lb/yr

SO_2 = (0.2 g/bhp-hr)(10,056,480 bhp-hr/yr)(lb/453.6 g)
= 4,434 lb/yr

CUMULATIVE EMISSIONS:

	(lbs/day)		**(tons/yr)**
NOx	= 109.3	NOx	= 19.953
CO	= 382.7	CO	= 69.837
POC	= 36.4	POC	= 6.651
PM10	= 9.1	PM10	= 1.664
SO_2	= 36.4	SO_2	= 6.651

TOXIC RISK ASSESSMENT:

Potential emissions of toxic air contaminants (TACs) from the IC Engines S-18, S-19, and S-20 occur though 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 (November 13, 2000) performed by Slakey and Associates. 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 Slakey and Associates. 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-18, S-19, and S-20 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.

- 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-18, S-19, and S-20 a total of 43 compounds were evaluated. 39 TAC compounds are assumed to be emitted, and of these, 7 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	6.05 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
Chloroethane	1.21E+00	1.9E+06	no
Chloroform	3.54E-02	3.6E+01	no
1,1-Dichloroethane	1.95 E+00	1.2 E+02	no
1,1-Dichloroethene	1.91E+00	6.2E+03	no
1,2-Dichloroethane	4.01E+00	8.7E+00	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	2.35 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	4.77 E+00	8.3 E+04	no
Hydrogen Bromide	3.57 E+02	4.6 E+03	no
Hydrogen Chloride	2.01 E+03	1.4 E+03	yes
Hydrogen Fluoride	1.32 E+02	1.1 E+03	no
Hydrogen Sulfide	1.25 E+03	8.1 E+03	no
Isopropyl Alcohol	1.09E+01	4.4E+05	no
Methyl Ethyl Ketone	2.82 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	1.38 E+01	3.3 E+01	no
Toluene	7.28 E+01	3.9 E+04	no
1,1,1-Trichloroethane	6.32E+00	6.2E+04	no
1,1,2,2-Tetrachloroethane	1.84E+01	3.3E+00	yes
Trichloroethylene	6.75 E+00	9.7 E+01	no
Vinyl Chloride	4.94 E+00	2.5 E+00	no
Xylene	4.19 E+01	5.8 E+04	no

As shown above, the estimated emissions of Acetaldehyde, Acrolein, Benzene, 1,3-Butadiene, Formaldehyde, Hydrogen Chloride, and 1,1,2,2-Tetrachloroethane 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 NUMI meteorological data and the CARB Hotspots Analysis and Reporting Program (HARP), version 1.0. The increased cancer risk to the maximally exposed individual receptor was found to be 0.48 in a million. The chronic hazard index is less than 1.0. 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 Daphne Chong to Ted Hull, dated April 20, 2004).

BACT 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 SO_2.

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
- SO_2: 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-18, S-19, and S-20 will meet BACT #1 and TBACT #1.

OFFSET REVIEW:

Facility Emissions Total
Tri-Cities has permits for (5) diesel IC engines that currently do not have any limits on emissions or the amount of operation. Therefore, they currently have the potential for continuous operation. Three of the engines (S-14, S-15, and S-17; John Deere Model 4239D, 80 HP), have available manufacturer's emissions data as follows:

- NOx: 10.6 g/hp-hr
- CO: 6.9 g/hp-hr
- POC: 0.25 g/hp-hr

For the other engines (S-9 and S-17) and the PM10 and SOx factors for all engines, the following factors from EPA AP-42 Table 3.3-2 "Emission Factors For Uncontrolled Gasoline And Diesel Industrial Engines" (1/95), converted to g/hp-hr, will be used. The potential emissions from each of these engines are given in Table II below.

- NOx: 14.1 g/hp-hr
- CO: 3.0 g/hp-hr
- POC: 1.1 g/hp-hr
- PM10: 1.0 g/hp-hr
- SOx: 0.9 g/hp-hr

Table II: Potential Emissions from Existing Diesel IC Engines

Source	Rated Power (bhp)	Est. Hours of Operation (hours/yr)	Emissions Summary		
			Pollutant	Emission Factor (g/hp-hr)	Estimated Emissions (lb/yr)
S-9	70	8,760	NOx	14.1	19,061
			CO	3.0	4,056
			POC	1.1	1,487
			PM10	1.0	1,352
			SO_2	0.9	1,217
S-14	80	8,760	NOx	10.6	16,377
			CO	6.9	10,660
			POC	0.25	386
			PM10	1.0	1,545
			SO_2	0.9	1,390
S-15	80	8,760	NOx	10.6	16,377
			CO	6.9	10,660
			POC	0.25	386
			PM10	1.0	1,545
			SO_2	0.9	1,390
S-16	177	8,760	NOx	14.1	48,197
			CO	3.0	10,255
			POC	1.1	3,760
			PM10	1.0	3,418
			SO_2	0.9	3,076
S-17	80	8,760	NOx	10.6	16,377
			CO	6.9	10,660
			POC	0.25	386
			PM10	1.0	1,545
			SO_2	0.9	1,390

The combined total potential emissions from the diesel IC engines at the facility are:

NOx = 58.195 tons/yr
CO = 23.146 tons/yr
POC = 3.203 tons/yr
PM10 = 4.703 tons/yr
SO_2 = 4.232 tons/yr

Clearly, the unlimited operation of these engines creates a permitting problem for the proposed Generator Sets S-18, S-19, and S-20 because the potential NOx emissions from these sources (58.195 tons per year) will cause the total facility NOx emissions to exceed 50 tons per year, requiring Tri-Cities to provide offsets in accordance with Regulation 2-2-302.

At the request of the District, Tri-Cities has agreed to accept permit limits for the diesel IC engines that reflect the maximum anticipated annual usage (i.e. 1,456 hours per year for each engine). Based on the proposed new limits for these engines and including the anticipated maximum emissions from the proposed new Landfill Gas Flare A-3 (see Application #009790), the current potential emissions for the facility are as follows:

Table III: Existing Facility Emissions

Emissions Source	Annual Emissions (tons/yr)				
	NOx	CO	POC	PM	SO_2
A-3 Flare[1]	12.579	62.894	4.193	3.564	13.627
S-1 Landfill	0.000	0.000	38.453	25.313	0.000
S-9 Diesel Eng[2]	1.584	0.337	0.124	0.112	0.101
S-14 Diesel Eng[2]	1.361	0.886	0.032	0.128	0.116
S-15 Diesel Eng[2]	1.361	0.886	0.032	0.128	0.116
S-16 Diesel Eng[2]	4.005	0.852	0.312	0.284	0.256
S-17 Diesel Eng[2]	1.361	0.886	0.032	0.128	0.116
	22.251	**66.741**	**43.178**	**29.657**	**14.332**

Notes:
1. Flare emissions are based on a landfill gas flow rate of 1,575 scfm, the estimated 2006 peak for recovered gas given in the "Amended And Restated Landfill Gas Collection And Control System Design Plan" for the Tri-Cities Landfill submitted November 25, 2003.
2. Based on a permitted limit of 1,456 hours of operation per year for each diesel IC engine.

* Indicates permitted emissions limit.

Including the permitted emissions from the proposed IC Engines S-18, S-19, and S-20, the annual facility emissions total will be as follows:

NOx = 42.204
CO = 136.578
POC = 49.829
PM = 31.321
SO_2 = 20.983

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.

Tri-Cities Recycling has no pre-existing cumulative increase for NOx or POC. Therefore, the required POC and NOx offsets will be as follows:

Table IV: 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, SO_2
In accordance with Regulation 2-2-303, PM10 and SO_2 offsets are not required for this application because the Tri-Cities 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 Tri-Cities 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 facility 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):
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 November 28, 2001, which expires on October 31, 2006. The permit will be revised to reflect the proposed equipment once it has been installed. In accordance with Regulation 2-6-215, the revision to the MFR Permit will be 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 8-34-301.4 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% O_2) is required. As previously stated, Caterpillar has certified that the IC Engines S-18, S-19, and S-20 will have exhaust gas NMOC concentrations less than 120 ppm by volume, dry basis, expressed as methane, corrected to 3% oxygen.

Subpart WWW: 40 CFR 60.752(b)(2)(iii)(B): This regulation requires a control system to either reduce NMOC by 98 weight percent or reduce the outlet NMOC concentration to less than 20 ppm by volume (expressed as hexane @ 3% O_2). The Regulation 8-34-301.4 requirement (reduce NMOC at least 98 percent by weight or emit less than 120 ppm (vol) NMOC expressed as methane @ 3% O_2) is equivalent to the federal requirement. Therefore, compliance with Regulation 8-34-301.4 ensures compliance with 40 CFR 60.752(b)(2)(iii)(B).

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-18, S-19, and S-20 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 lb/hr)(hr/60min)(min/2,347 dscf)(7,000 gr/lb) = 0.006 gr/dscf

Therefore, S-18, S-19, and S-20 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 SO_2 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^oF:	386 scf/lb-mole

ppm SO_2 = (0.69 lb SO_2/hr)(hr/60 min)(min/2,347 dscf)(lb-mole SO_2/64 lb SO_2)(386 dscf gas/lb-mole gas)

= 2.96 X 10^{-5} lb-mole SO_2/lb-mole gas
= 29.6 ppm SO_2

Since the SO_2 exhaust concentration based on the mass emission rate is well below 300 ppm it is anticipated that S-18, S-19, and S-20 will comply with Regulation 9-1-302.

NOx and CO (Regulation 9, Rule 8)
The IC Engines S-18, S-19, and S-20 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^oF:	386 scf/lb-mole

the NOx and CO emissions for S-18, S-19 and S-20 in terms of ppmv @ 15% O_2 will be:

NOx = (1.5 lb NOx/hr)(hr/60 min)(min/5,656 dscf)(lb-mole NOx/46 lb NOx)(386 dscf c.p./lb-mole dry c.p.)
= 3.7×10^{-5} (lb-mole NOx/lb-mole dry c.p.)
= 37 ppmv @ 15% O_2

CO = (5.3 lb CO/hr)(hr/60 min)(min/5,656 dscf)(lb-mole CO/28 lb CO)(386 dscf c.p./lb-mole dry c.p.)
= 2.15×10^{-4} (lb-mole CO/lb-mole dry c.p.)
= 215 ppmv @ 15% O_2

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-18, S-19, and S-20 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 final version of the Title V permit. Monitoring conditions will also be added to the existing Diesel IC Engines S-9, S-14, S-15, S-16, and S-17 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-18, S-19, S-20: IC Engine Generator Sets

1. All collected landfill gas shall be vented to properly operating abatement equipment including the IC Engines S-18, S-19, and S-20 and/or the Landfill Gas Flare A-3. 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-18, S-19, and S-20 shall be fired on landfill gas. If required, natural gas can be used as a supplemental fuel, but it shall not reduce or replace landfill gas available for use in this engine. Natural gas shall not be used as supplemental fuel when the A-3 Flare is operating concurrently with these engines. (basis: Cumulative Increase)

3. The Heat Input to each of the IC Engines S-18, S-19, and S-20 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 each 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-3 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-18, S-19, and S-20 shall not exceed either 0.6 grams of NO_x, calculated as NO_2, 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-18, S-19, and S-20 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-18, S-19, and S-20 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 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 an administrative permit amendment after the District has received the results of the initial source test. Within 105 days of start-up of S-18, S-19, and S-20, 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-18, S-19, and S-20 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-18, S-19, and S-20 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 and natural 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, conditions limiting usage must also be added to the existing Diesel IC Engines S-9 and S-14 through S-17 as noted in the Offset Review section of this evaluation. It is recommended that conditions be added to the permits for the existing diesel IC engines as follows:

For S-9, S-14, S-15, S-16, S-17: Small Diesel IC Engines

1. The Diesel Engines S-9, S-14, S-15, S-16, and S-17 shall each be limited to 1,456 hours per year of operation. Each engine shall be equipped with a non-resettable totalizing meter that measures and records the hours of operation for the engine. (basis: Offsets)

2. Only low sulfur fuel (<0.5% sulfur by weight) shall be combusted at these engines. 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 these engines shall keep the following records in a District approved log. These records shall be updated on at least a 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 each engine
    b. vendor certified fuel sulfur content

RECOMMENDATIONS:

It is recommended that an Authority to Construct be issued to Tri-Cities Recycling for the following:

S-18: IC Engine Generator Set #1; Caterpillar Model G3516LE, 1,148 BHP, 10.5 MMBTU/hr, landfill gas fired
S-19: IC Engine Generator Set #2; Caterpillar Model G3516LE, 1,148 BHP, 10.5 MMBTU/hr, landfill gas fired
S-20: 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

Tri-Cities Recycling

Application #009222

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	*6.33*	5.409E-02	97.2%	1.33E+01	6.7E-01	yes
Benzene	78.11	0.09	1.132E-03	97.2%	2.78E-01	6.7E+00	no
Carbon Disulfide	76.13	*5.80*	7.111E-02	97.2%	1.74E+01	1.4E+04	no
Carbon Tetrachloride	153.84	*4.00E-03*	9.910E-05	93.0%	6.08E-02	4.6E+00	no
Chlorobenzene	112.56	*0.25*	4.532E-03	93.0%	2.78E+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	0.19	1.974E-03	93.0%	1.21E+00	1.9E+06	no
Chloroform	119.39	*3.00E-03*	5.768E-05	93.0%	3.54E-02	3.6E+01	no
1,1-Dichloroethane	98.97	0.20	3.188E-03	93.0%	1.95E+00	1.2E+02	no
1,1-Dichloroethene	96.94	*0.20*	3.122E-03	93.0%	1.91E+00	6.2E+03	no
1,2-Dichloroethane	98.96	0.41	6.534E-03	93.0%	4.01E+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	5.60	9.574E-02	97.2%	2.35E+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	1.40	1.943E-02	97.2%	4.77E+00	8.3E+04	no
Hydrogen Sulfide	34.08	186.34	1.023E+00	86.1%	1.25E+03	8.1E+03	no
Isopropyl Alcohol	60.11	4.60	4.453E-02	97.2%	1.09E+01	4.4E+05	no
Methyl Ethyl Ketone	72.11	9.90	1.150E-01	97.2%	2.82E+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	0.84	2.243E-02	93.0%	1.38E+01	3.3E+01	no
Toluene	92.13	20.00	2.967E-01	97.2%	7.28E+01	3.9E+04	no
1,1,1-Trichloroethane	133.41	*0.48*	1.031E-02	93.0%	6.32E+00	6.2E+04	no
1,1,2,2-Tetrachloroethane	167.85	*1.11*	3.000E-02	93.0%	1.84E+01	3.3E+00	yes
Trichloroethylene	131.39	0.52	1.100E-02	93.0%	6.75E+00	9.7E+01	no
Vinyl Chloride	62.50	0.80	8.052E-03	93.0%	4.94E+00	2.5E+00	yes
Xylenes	106.16	10.00	1.710E-01	97.2%	4.19E+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".

Tri-Cities Recycling

Application #009222

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)	Secondary HCl Emissions (lb/yr)
Bromodichloromethane	163.83	*3.13*	2.0	6.3	3.574E-02	3.681E-02	3.22E+02
Carbon Tetrachloride	153.84	*4.00E-03*	4.0	0.0	9.135E-05	9.409E-05	8.24E-01
Chlorobenzene	112.56	*0.25*	1.0	0.3	1.427E-03	1.470E-03	1.29E+01
Chlorodifluoromethane	86.47	*1.30*	1.0	1.3	7.422E-03	7.645E-03	6.70E+01
Chloroethane	64.52	1.90	1.0	1.9	1.085E-02	1.117E-02	9.79E+01
Chloroform	119.39	*0.03*	1.0	0.0	1.713E-04	1.764E-04	1.55E+00
Chloromethane	50.49	*1.21*	1.0	1.2	6.908E-03	7.115E-03	6.23E+01
Dichlorobenzene	147.00	*0.21*	2.0	0.4	2.398E-03	2.470E-03	2.16E+01
Dichlorodifluoromethane	120.91	1.70	2.0	3.4	1.941E-02	1.999E-02	1.75E+02
1,1-Dichloroethane	98.97	0.20	2.0	0.4	2.284E-03	2.352E-03	2.06E+01
1,1-Dichloroethene	96.94	*0.20*	2.0	0.4	2.284E-03	2.352E-03	2.06E+01
cis-1,2-Dichloroethene	96.95	0.97	2.0	1.9	1.108E-02	1.141E-02	9.99E+01
1,2-Dichloroethane	98.96	0.41	2.0	0.8	4.682E-03	4.822E-03	4.22E+01
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	0.84	4.0	3.4	1.918E-02	1.976E-02	1.73E+02
1,1,2,2-Tetrachloroethane	167.85	*1.11*	4.0	4.4	2.535E-02	2.611E-02	2.29E+02
1,1,1-Trichloroethane	133.41	*0.48*	3.0	1.4	8.221E-03	8.468E-03	7.42E+01
Trichloroethylene	131.39	0.52	3.0	1.6	8.906E-03	9.174E-03	8.04E+01
Vinyl Chloride	62.50	0.80	2.0	1.6	9.135E-03	9.409E-03	8.24E+01
						Total HCl =	**2.01E+03**

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)	Secondary HBr Emissions (lb/yr)
Bromodichloromethane	163.83	*3.13*	1.0	3.1	4.028E-02	4.068E-02	3.56E+02
Ethylene Dibromide	187.88	*1.00E-03*	2.0	0.0	2.573E-05	2.599E-05	2.28E-01
						Total HBr =	**3.57E+02**

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)	Secondary HF Emissions (lb/yr)
Chlorodifluoromethane	86.47	*1.30*	1.0	1.3	3.977E-03	4.176E-03	3.66E+01
Dichlorodifluoromethane	120.91	1.70	2.0	3.4	1.040E-02	1.092E-02	9.57E+01
Dichlorofluoromethane	102.92	*2.62*	2.0	5.2	1.603E-02	1.683E-02	1.47E+02
Fluorotrichloromethane	137.38	*0.76*	3.0	2.3	6.976E-03	7.324E-03	6.42E+01
						Total HF =	**1.32E+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)

Tri-Cities Recycling

Application #009222

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.