NEW SOURCE REVIEW REQUIREMENTS FOR BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

GUIDANCE DOCUMENT

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OVERVIEW

Prior to the installation of new, modified, relocated, or replacement equipment which results in an increase of air pollution emissions, the San Diego County Air Pollution Control District (District) Rules and Regulations specify that the equipment must obtain an Authority to Construct and be evaluated in accordance with applicable New Source Review (NSR) rules. If such equipment will emit 10 or more pounds per day of Volatile Organic Compounds (VOC), Oxides of Nitrogen (NOx), Oxides of Sulfur (SOx) or Particulate Matter (PM_{10}), it must use the Best Available Control Technology (BACT) to reduce emissions. The purpose of this guidance document is to help permit applicants meet the District's NSR requirements for determining BACT for their equipment. Definitions for most of the terms used in this guidance document may be found in District Rule 20.1 or Rule 2.

Note: If you are already familiar with NSR and BACT and want to know which control/reduction measures will meet District BACT requirements for the new equipment or modification you are planning, skip directly to the BACT Look-up Tables located in Section 3 of this document.

Section 1 provides a general overview of what BACT is and when BACT must be used. Section 1 also discusses how to calculate emissions to determine if BACT is required and provides sample calculations. If BACT is required, the applicant can refer to the list of representative control/reduction measures found in the Section 3 BACT Look-up Tables.

Section 2 explains how to use the BACT Look-up Tables provided in Section 3 and provides two detailed examples using the Look-up Tables. Section 2 also includes guidance on determining alternative BACT Control Options and background information regarding the development of the Look-up Tables.

Section 3 contains the BACT Look-up Tables and a list of the equipment included in the Tables. The Look-up Tables are arranged in alphabetical order by equipment type. Each Look-up Table provides a list of air pollution control equipment and/or process modifications which can be utilized to meet the District's BACT requirements. The Look-up Tables are useful for the most frequently permitted types of equipment such as boilers, engines and painting operations.

Section 4 describes the step-by-step top-down BACT analysis process required when an applicant elects not to use the BACT control/reduction measures provided in the BACT Look-up Tables or when the equipment is not listed in the BACT Look-up Tables. In such cases, the applicant must prepare a project-specific analysis to determine what BACT is for the equipment or process being proposed.

As part of the pre-application meeting, the District assists the applicant in determining whether BACT is required. Available BACT control options, cost effectiveness and less stringent options are discussed. If less stringent BACT options are being considered, the District provides additional information on requirements for demonstrating technical and economical feasibility and for conducting the top-down BACT analysis, including requirements for supporting documentation.

Applicants are encouraged to use these guidelines to ensure consistent and expeditious processing of permit applications where BACT is required. For questions or concerns regarding BACT requirements or this document, please contact the District's Engineering Division at (858) 650-4700.

SECTION 1

BEST AVAILABLE CONTROL TECHNOLOGY (BACT) APPLICABILITY

The purpose of this section is to help applicants determine if the use of Best Available Control Technology (BACT) is required for the proposed equipment.

1.1 WHAT IS BACT?

Best Available Control Technology (BACT) is the level of air contaminant emission control or reduction required by state law and District rules for new, modified, relocated, and replacement emission sources. BACT is intended to reduce emissions to the maximum extent possible considering technological and economic feasibility.

According to District Rule 20.1 Section (c)(11), BACT is defined as:

"(i) the lowest emitting of any of the following:

(A) the most stringent emission limitation, or the most effective emission control device or control technique, which has been proven in field application and which is cost-effective for such class or category of emission unit, unless the applicant demonstrates to the satisfaction of the Air Pollution Control Officer that such limitation, device or control technique is not technologically feasible, or

(B) any emission control device, emission limitation or control technique which has been demonstrated but not necessarily proven in field application and which is cost-effective for such class or category of emission unit, as determined by the Air Pollution Control Officer, unless the applicant demonstrates to the satisfaction of the Air Pollution Control Officer that such limitation, device or control technique is not technologically feasible, or

(C) any control equipment, process modifications, changes in raw material including alternate fuels, and substitution of equipment or processes with any equipment or processes, or any combination of these, determined by the Air Pollution Control Officer on a case-by-case basis to be technologically feasible and cost-effective, including transfers of technology from another category of source, or

(D) the most stringent emission limitation, or the most effective emission control device or control technique, contained in any State Implementation Plan (SIP) approved by the federal EPA for such emission unit category, unless the applicant demonstrates to the satisfaction of the Air Pollution Control Officer that such limitation or technique has not been proven in field application, that it is not technologically feasible or that it is not cost-effective for such class or category of emission unit."

BACT is usually determined based on specific equipment categories such as diesel engines, utility boilers, or turbines and can consider case-by-case factors. The control device, technique or emission limitation chosen as BACT must be proven in field application and must be cost-

effective. These terms are defined in Rule 20.1 (c)(18) and (c)(56). BACT changes with time as improved control technologies are developed and are proven in field applications and as the cost-effectiveness of control techniques improves. Accordingly, this BACT Guidance Document will be updated on a periodic basis. To verify that the BACT Look-up Tables contained in Section 3 are current, please call the District's Engineering Division at (858) 650-4700.

1.2 WHEN IS BACT REQUIRED?[1]

BACT is required for any new, modified, relocated, or replacement emission unit which is required to obtain an Authority to Construct and/or Permit to Operate pursuant to Rule 10, which will result in an increased potential to emit, and which has a post-project potential to emit 10 or more pounds per day of the pollutant being increased. *(Potential to Emit is discussed in greater detail in Section 1.5.)* BACT must be applied for each of the following pollutants with emissions exceeding 10 pounds per day:

- inhalable particulates (PM_{10})
- oxides of nitrogen (NOx)
- volatile organic compounds (VOC)
- oxides of sulfur (SOx).

Replacement emission units are required to use BACT if the unit's potential to emit is equal to or greater than 10 pounds per day. Relocated emission units which are moved more than 10 miles from the original source or which have an increase in emissions are required to apply BACT if the unit's potential to emit is equal to or greater than 10 pounds per day.

Please note that if the equipment or modification is specifically exempt from permits pursuant to Rule 11, or is registered under District Rules 12 or 12.1 or the Statewide Portable Equipment Registration Program, the New Source Review rules do not apply (i.e. the BACT requirements do not apply).

Equipment or processes with a maximum potential to emit of less than 10 pounds per day for each of the listed pollutants are not required to apply BACT. However, the permit applicant is required to provide documentation showing that the emission unit's maximum potential to emit is less than 10 pounds per day. *(Potential to Emit is discussed in greater detail in Section 1.5.)*

Alternatively, the applicant may choose a limiting permit condition to ensure that the emissions from the equipment or process does not equal or exceed 10 pounds per day. Examples of limiting conditions include operating time limits, fuel limits, and production limits. The District may require ongoing record keeping to ensure that emissions from these units are below 10 pounds per day in actual operation.

1.3 HOW DOES BACT APPLY TO MODIFIED EMISSION UNITS?

[1] Rule References: Rule 20.2 (b) and (d) and Rule 20.3 (b) and (d).

BACT may be required for all of the emissions from a modified emission unit, or only for the increased emissions that result from the modification. This depends on the nature of the modification and the level of emission controls previously required for the equipment. Rule 20.1 Section (c)(11) specifies that:

"(ii) For modified emission units, the entire emission unit's post-project potential to emit shall be subject to BACT, except as follows. The provisions of this Subsection (c)(11)(ii) shall not apply to relocated or replacement emission units.

(A) BACT applies to the emissions increase associated with the modification and not the emission unit's entire potential to emit, if control technology, an emission limit or other emission controls meeting the BACT definition was previously applied to the unit and if the project's emission increase is less than the major modification thresholds of Table 20.1-5.

(B) BACT applies to the emission unit's entire potential to emit, if the emission unit was previously subject to BACT but BACT was determined to not be cost-effective, technologically feasible or proven in field application.

(C) BACT applies to the emissions increase associated with the emission unit and not the emission unit's entire potential to emit if the emissions increase associated with the modification is less than 25 percent of the emission unit's preproject potential to emit and if the project's emission increase is less than the major modification thresholds of Table 20.1-5."

1.4 WHAT EQUIPMENT IS TYPICALLY REQUIRED TO USE BACT?

The following are examples of emission units typically required to apply BACT. Similar equipment with similar control technology may vary significantly in emission rates depending on materials used, fuels, operating hours, production levels, etc. Therefore, these are only examples. Applicants should base their determination upon equipment-specific emissions data before determining whether or not BACT is required for their project.

- A 200 brake horsepower diesel-fired engine operated more than 4 hours per day would be required to use BACT to minimize NOx emissions. In general, the higher the BHP rating, the fewer hours such equipment may be operated before emissions exceeding the BACT threshold will occur.

- An auto-refinishing operation using 4 gallons per day of coatings with a volatile organic compound (VOC) content of 4.5 pounds per gallon has a VOC emission rate of 18 pounds per day and would be required to use BACT to minimize VOC emissions.

- A gasoline station that dispenses 4,000 gallons per day (1.15 million gallons per year) has a VOC emission rate of 12 pounds per day and would be required to use BACT to minimize VOC emissions (gasoline vapors).

- Continuous operation (24 hrs/day) of an uncontrolled natural gas-fired boiler rated at 5 MM Btu per hour or greater, would be required to use BACT to minimize NOx emissions.

Boilers with some NOx controls may also be required to use BACT if the controlled NOx emissions still equal or exceed 10 pounds per day.

1.5 POTENTIAL TO EMIT CALCULATIONS[1]

BACT applies if a new or modified emission unit has the 'potential to emit' 10 or more pounds per day of certain air contaminants. The maximum daily potential to emit (pounds per day) of each air contaminant emitted by the emission unit must be calculated to determine whether BACT is required. Example potential to emit calculations for projects where BACT may be required are provided in Section 1.6. Emission rates are calculated using District approved emissions estimation techniques. Emission data is usually obtained from equipment manufacturers, emission source tests, or District-approved Air Resources Board (ARB) or Environmental Protection Agency (EPA) emission factors.

Unless the applicant proposes or agrees to permit conditions that limit emissions, potential to emit calculations are based upon the maximum design capacity of the emission unit or other operating conditions which reflect the maximum potential emissions (such as horsepower rating of an engine, heat input rating of boilers, etc.). Operation is assumed to be 24 hours per day and 365 days per year unless otherwise limited by the applicant. Emissions from stacks and fugitive emissions from the emission unit must be included in calculating potential emissions for BACT determinations.

An emission unit's potential to emit cannot be greater than its physical ability to generate emissions given the equipment's physical and operational constraints. As noted above, an applicant can agree to permit conditions that limit emissions such as fuel usage limits, limits on operating hours, or VOC content limits. If these conditions are enforceable, these limits can be used to calculate the emission unit's potential to emit.

1.6 EXAMPLES OF POTENTIAL TO EMIT CALCULATIONS

Example 1 -- New Diesel Engine with No Operational Limits

Equipment/Given Information:

A new 240 horse power (hp) stationary diesel fuel engine with a NOx emission factor of 8.7 grams/hp-hour. The unit has the ability to operate 24 hours per day. No limiting permit conditions were proposed.

Maximum Potential to Emit (PTE) Emission Calculation:

PTE Emission Rate (lbs/day)

$$= \text{Engine Size (hp)} \times \frac{\text{(Emission Rate (grams/hp-hour))}}{\text{(453.6 grams/lb)}} \times \text{Operating Hours (hours/day)}$$

$$= 240 \text{ hp} \times \frac{\text{(8.7 grams/hp-hour)}}{\text{(453.6 grams/lb)}} \times 24 \text{ hours/day}$$

$$= 110.5 \text{ lbs NOx/day}$$

[1] Rule References: Rule 20.1 (d)(1)(i)(A) & (B).

Conclusion:

The maximum calculated PTE emission rate of 110.5 pounds NOx per day exceeds the 10 pounds per day BACT threshold. Therefore, BACT is required.

Example 2 -- New Diesel Engine with Operational Limits

Equipment/Given Information:

A 350 horse power (hp) stationary diesel fuel engine with a PM_{10} emission factor of 0.8 grams/hp-hour. The applicant has proposed to limit operation of the engine to no more than 10 hours per day.

Maximum Potential to Emit (PTE) Emission Calculation:

PTE Emission Rate (lbs/day)

$$= \text{Engine Size (hp)} \times \frac{(\text{Emission Rate (grams/hp-hour)})}{(453.6 \text{ grams/lb})} \times \text{Operating Hours (hours/day)}$$

$$= 350 \text{ hp} \times \frac{(0.8 \text{ grams/hp-hour})}{(453.6 \text{ grams/lb})} \times 10 \text{ hours/day}$$

$= 6.2$ lbs PM_{10}/day

Conclusion:

The maximum calculated PTE emission rate of 6.2 pounds PM_{10} per day is less than the 10 pounds per day BACT threshold. Therefore, BACT is not required for the PM_{10} emissions, but the applicant must accept a permit condition limiting operation of the engine to less than 10 hours per day.

Example 3 -- New Coating Operation with No Operational Limits

Equipment/Given Information:

A continuous feed roller coating operation will use 1.0 gallons per hour of a coating with a VOC content of 2.8 pounds per gallon. The unit has the ability to operate 24 hours per day. No limiting permit conditions were proposed.

Maximum Potential to Emit (PTE) Emission Calculation:

PTE Emission Rate (lbs/day)

$$= \text{Usage (gallons/hour)} \times \text{Operating Hours (hrs/day)} \times \text{VOC Content (lbs/gallon)}$$

$$= (1.0 \text{ gallons/hr}) \times (24 \text{ hrs/day}) \times (2.8 \text{ lbs/gallon})$$

$= 67.2$ lbs VOC/day

Conclusion:

The maximum calculated PTE emission rate of 268.8 pounds VOC per day is greater than the 10 pounds per day BACT threshold. Therefore, BACT is required.

Example 4 -- New Metal Parts Coating Operation with Operational Limits

Equipment/Given Information:

A metal parts coating operation uses 4 gallons of coating per 8-hour shift with a VOC content of 1.2 pound per gallon. The operation has the ability to operate 24 hours per day. The applicant has proposed to limit operations to 2 shifts (16 hours) per day and therefore coating usage will be limited to 8 gallons per day.

Maximum Potential to Emit (PTE) Emission Calculation:

PTE Emission Rate (lbs/day)

= Usage (gals/shift) x Operating Hours (shifts/day) x VOC Content (lbs/gal)

= (4.0 gallons/shift) x (2 shifts/day) x (1.2 lbs/gallon)

= 9.6 lbs VOC/day

Conclusion:

The maximum calculated PTE emission rate of 9.6 pounds VOC per day is less than the 10 pounds per day BACT threshold. Therefore, BACT is not required provided the applicant agrees to permit conditions limiting coating material usage to 8 gallons per day, the VOC content to 1.2 pounds per gallon, and daily usage records. As an alternative, the applicant may propose a permit condition limiting emissions to less than 10 pounds per day and maintain usage and VOC content records to demonstrate that actual daily emissions are below this limit.[1]

Example 5 -- Modified Metal Parts Coating Operation with Operational Limits

Equipment/Given Information:

An existing metal parts coating operation uses 3 gallons of coating per 24 hour day with a VOC content of 2.8 pounds per gallon.
A BACT determination was not made for the original application.
The coating complies with Rule 67.3 VOC limits.
The pre-project potential emissions are 8.4 pounds per day.
The applicant has proposed adding a new paint spray booth and increasing coating usage to 10 gallons per 24 hour day.

Maximum Potential to Emit (PTE) Emission Calculation:

PTE Emission Rate (lbs/day)

= Usage (gallons/24 hour day) x VOC Content (lbs/gallon)

= (10.0 gallons/24 hour day) x (2.8 lbs/gallon)

= 28.0 lbs VOC/day

Emission Increase:

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[1] In this example, the extremely low VOC content of the coating may be acceptable as BACT. If the coating is found to represent BACT, emissions would not need to be limited to 10 pounds VOC/ day.

Post-project potential minus pre-project potential emissions

= 28.0 lbs VOC/day - 8.4 lbs VOC/day = 19.6 lbs VOC/day

Conclusion:

The maximum calculated PTE emission rate of 28.0 pounds VOC per day is greater than the 10 pounds per day BACT threshold. Therefore, BACT is required. Since BACT was not applied in the original application, and the emission increase is greater than 25% of the pre-project potential emissions, BACT must be applied to the total post-project emissions from this operation.

SECTION 2

USING BACT LOOK-UP TABLES TO DETERMINE BACT

2.1 INTRODUCTION

This section provides background and support information regarding the BACT Look-up Tables found in Section 3. The BACT Look-up Tables provide listings of representative emission control/reduction measures such as emission limits, process modifications or the use of control equipment that can be proposed to meet BACT requirements.

The Look-up Tables may be used to locate a specific equipment category and the appropriate BACT control/reduction measure. Section 3.1 contains an alphabetical list by equipment type (by capacity) of the available BACT Look-up Tables developed by the District. Applicants should review this list to determine if a BACT Look-up Table is available for their specific equipment or process. If no BACT Look-up Table is available, or if the applicant chooses not to propose a listed BACT control/reduction measure or an alternative measure that meets the stated BACT Emission Rate, then the applicant must perform a "top-down" BACT analysis as described in Section 4.

Each BACT Look-up Table consist of two parts. The first part provides a maximum Emission Rate for each criteria pollutant (VOC, NOx, SOx, PM_{10}) in the row labeled "BACT Emission Rate." The second part consists of one or more rows labeled "BACT Control Option" which provide a list of equipment, materials, or methods that can be used to meet the stated BACT Emission Rate. Some Look-up Tables only contain BACT Control Options rather than specific BACT Emission Rates.

If an applicant proposes to use the first BACT Control Option listed in a Look-up Table, then that control/reduction measure will be accepted as BACT. The applicant must submit adequate documentation (e.g. manufacturer specifications, usage logs, MSDS, fuel meter readings, source tests etc.) that the selected control/reduction measure is capable of performing at the BACT Emission Rate, if a BACT Emission Rate is specified in the Look-up Table.

2.2 HOW TO USE THE BACT LOOK-UP TABLES WHEN <u>ONLY ONE</u> BACT OPTION IS LISTED

To determine an acceptable control measure from a BACT Look-up Table when only one BACT Control Option is provided, find the appropriate Look-up Table for the equipment being proposed for installation or modification. Select the BACT Control Option listed and reference the Section 3 Look-up Table in the permit application. An applicant may instead propose an alternative BACT Control Option as outlined in Section 2.6 or perform a "top-down" BACT analysis as described in Section 4.

EXAMPLE 2.2: When Only One BACT Control Option is Listed

A small 15 MM Btu/hr natural gas-fired boiler emits 12 pounds of NOx per day and therefore will need to apply BACT. The applicant locates the appropriate BACT Look-up Table, "Boilers (<50 MM Btu/hr) -- Fee Schedule 13A," and reviews the BACT Emission Rate and BACT Control Option listed for Natural Gas operation under the NOx and PM headings (See Table 2.2 below). The listed BACT Emission Rates are 12 ppmv NOx (corrected to 3% O_2) and 0.10 gr/dscf for PM emissions. The Look-up Table only provides one BACT Control Option for this type of equipment. The BACT Control Option row specifies a combination of natural gas as the fuel, a low NOx burner, flue gas recirculation, and oxygen controller to meet BACT requirements.

TABLE 2.2 - BACT Look-up Table for Example 2.2

BOILERS (<50 MM BTU/HR) -- Fee Schedule 13A

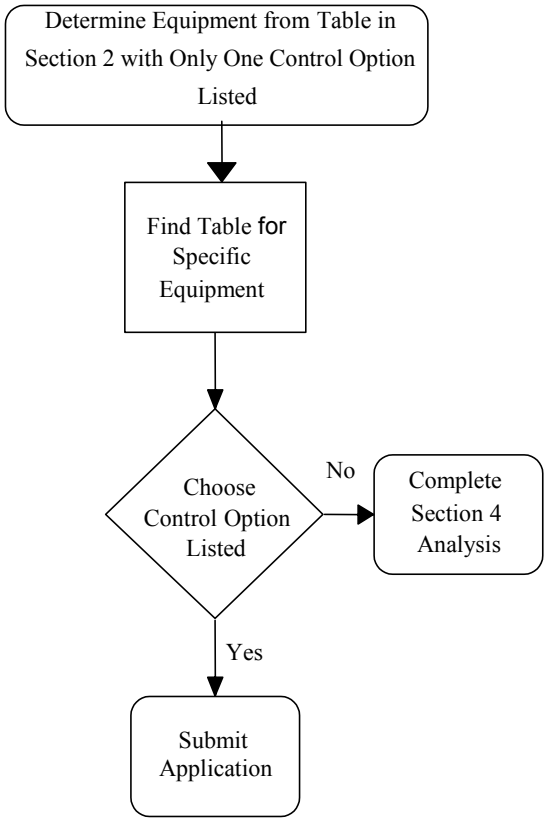
	VOC	NOx	SOx	PM
BACT Emission Rate Limit	Not Determined	12 ppm corrected to 3% O_2 NG or LPG	Not Determined	0.10 gr/dscf†
BACT Control Option (Using NG or LPG fuel only.)	NG or LPG fuel (A/P)	Low NOx Burner, FGR, and oxygen controller. NG or LPG (A/P)	NG or LPG fuel (A/P)	NG or LPG fuel (A/P)
BACT Control Option (Using No. 2 oil as backup fuel.)	(N/A)	Low NOx Burner, FGR, and oxygen controller. (A/P)	No. 2 fuel oil with < 0.05% sulfur content (A/P)	Low ash fuel (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

FGR - Flue Gas Recirculation
LPG - Liquefied Petroleum Gas
NG - Natural Gas
† The District has determined that the use of Natural Gas ensures compliance with the PM BACT Emission Rate of 0.1 gr/dscf. No further analysis is required for this pollutant.

The applicant proposes the use of all these technologies as part of the boiler application submitted to the District and references the Section 3 Look-up Table. The applicant must provide information demonstrating that the specific controls selected will meet the listed NOx BACT Emission Rates. By specifying the listed BACT Control Option and providing the required supporting information, the applicant has satisfied the BACT requirement. No further BACT analysis is required. (See Figure 2.2 for a flowchart of this process.) If the applicant chooses not to propose the BACT Control Option specified in the Look-up Table, they may propose an alternative BACT Control Option as outlined in Section 2.6 or perform a "top-down" BACT analysis as described in Section 4.

Figure 2.2 -- Flowchart of Example 2.2 (only one BACT Control Option)



2.3 HOW TO USE THE BACT LOOK-UP TABLES WHEN MORE THAN ONE BACT OPTION IS LISTED

To determine an acceptable control/reduction measure from a BACT Look-up Table when more than one BACT Control Option is provided, find the appropriate Look-up Table for the equipment being proposed for installation or modification. The possible BACT Control Options are listed in descending order of stringency. If an applicant chooses the top-listed Control Option, no further BACT analysis is required and the applicant only needs to reference the Section 3 BACT Look-up Table in their application. If the applicant does not choose the top-listed Control Option, the applicant must perform an analysis to determine the cost-effectiveness of each control technology listed in the boxes labeled technologically feasible (T/F) until a cost-effective control option is found. (A control/reduction measure is labeled (T/F) if it is technologically feasible and has been demonstrated but not necessarily proven in field application.) The analysis should include the uncontrolled potential to emit for the proposed equipment and the cost-effective calculations for each of the more stringent BACT Control Options not chosen, as well as the (T/F) option chosen.

The first control/reduction measure which is determined to be cost-effective will be considered BACT. If none of the technologically feasible control/reduction measures are

found to be cost-effective, the applicant must then propose the control/reduction measure designated achieved in practice (A/P), propose an alternative BACT Control Option as outlined in Section 2.6 or perform a "top-down" BACT analysis as described in Section 4. (A technology is labeled (A/P) if it has been achieved in practice or demonstrated in use for the specific equipment category.) If the final BACT Control Option chosen is a (A/P) option, then cost-effectiveness calculations are not required for that option, but are required for any (T/F) option not chosen.

These procedures are intended to reduce the applicant's time and effort in preparing a permit application as well as the cost of application review by the District. The analysis required when the BACT Look-up Tables are used is significantly less than when a full top-down BACT analysis is performed. However, an applicant may always choose to perform a project-specific full top-down BACT analysis as described in Section 4.

EXAMPLE 2.3: When More Than One BACT Control Option is Listed

A 55 MM Btu/hr natural gas-fired boiler has the potential to emit 120 pounds of NOx per day and therefore will need to use BACT. The facility is a major source for NOx since they currently emit 55 tons of NOx per year from existing equipment. The applicant locates the appropriate BACT Look-up Table, "Boilers (>50 MM Btu/hr) -- Fee Schedule 13B," and reviews the BACT Emission Rate and BACT Control Options listed for Natural Gas operation under the NOx and PM headings (See Table 2.3 below). The listed BACT Emission Rates are 5 ppmv NOx (corrected to 3% O_2) and 0.10 gr/dscf for PM emissions. The Table provides more than one BACT Control Option for this type of equipment. The first BACT Control Option row specifies the use of Selective Catalytic Reduction (SCR) to meet the NOx BACT requirements. The applicant may choose to propose the first BACT Control Option or may perform a cost-effectiveness analysis to determine if the technologically feasible control/reduction measure is also cost-effective. (See Figure 2.3 for a flowchart of this process.)

TABLE 2.3 - BACT Look-up Table for Example 2.3

BOILERS (50 to <250 MM BTU/HR) -- Fee Schedule 13B

	VOC	NOx	SOx	PM
BACT Control Option	NG or LPG fuel (A/P)	SCR on NG or LPG fuel (duct burner may be required) (T/F) **BACT Emission Rate Limit** – 5 PPM corrected to 3% O_2/NG or LPG	NG or LPG fuel (A/P)	NG or LPG fuel (A/P) **BACT Emission Rate Limit** - 0.10 grain/dscf†
BACT Control Option (Using NG or LPG fuel only)	NG or LPG fuel (A/P)	Low NOx burner, FGR, and oxygen controller. NG or LPG (A/P) **BACT Emission Rate Limit** – 9 PPM corrected to 3% O_2/NG or LPG.	NG or LPG fuel (A/P)	NG or LPG fuel (A/P) **BACT Emission Rate Limit** - 0.10 grain/dscf†
BACT Control Option (Using No. 2 oil as backup fuel.)	(N/A)	Low NOx burner, FGR, and oxygen controller. No. 2 fuel oil (A/P) **BACT Emission Rate Limit** – 9 PPM corrected to 3% O_2 on NG or LPG. Lowest achievable but no greater than 170 PPM corrected to 3% O_2 on No. 2 fuel oil backup	No. 2 fuel oil with < 0.05% sulfur content (A/P)	Low ash fuel (A/P) **BACT Emission Rate Limit** - 0.10 grain/dscf†

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

NOTES:

FGR - Flue Gas Recirculation
LPG - Liquefied Petroleum Gas
NG - Natural Gas
SCR-Selective Catalytic Reduction

† The District has determined that the use of Natural Gas ensures compliance with the PM BACT Emission Rate Limit of 0.1 gr/dscf. No further analysis is required for this pollutant.

The applicant elects not to propose SCR and calculates the cost-effectiveness value using the method outlined below in Example 2.5 and Figure 2.5.

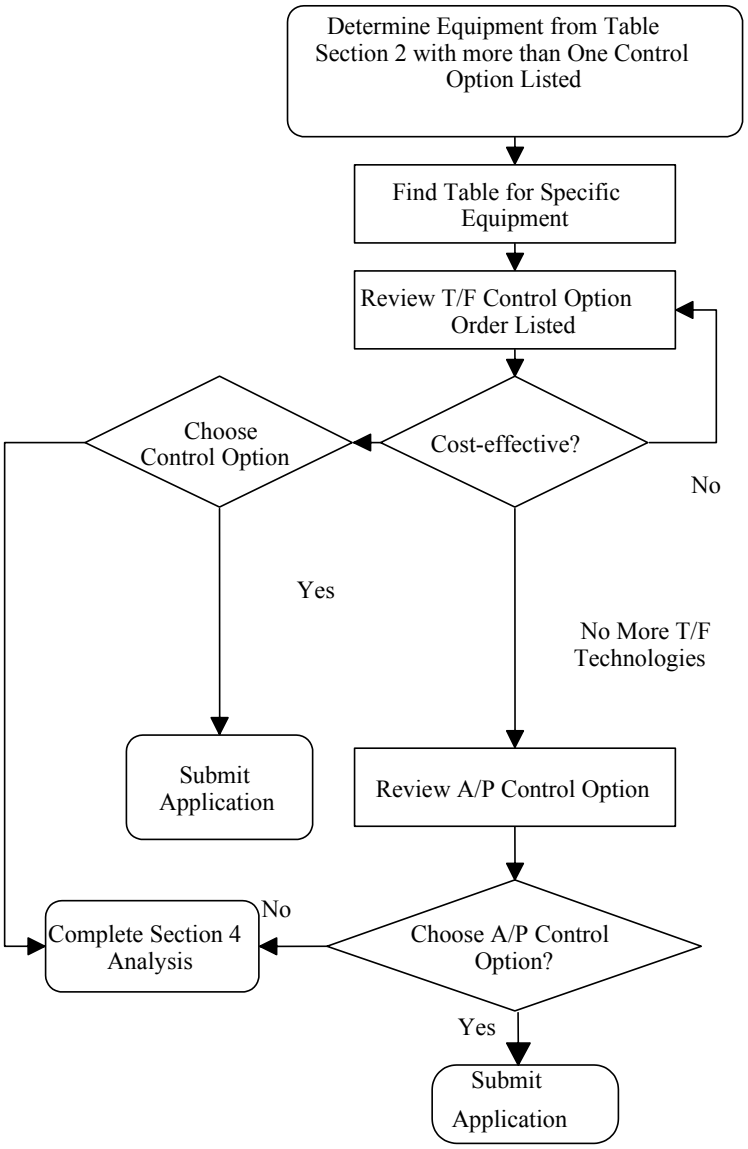
T/F Control/reduction Measures	**Cost-effectiveness**
Selective Catalytic Reduction	$12.00 per lb of NOx controlled

The applicant compares the calculated cost-effectiveness value with the reference cost-effectiveness values contained in Table 2.4. For a source emitting more than 15 tons per year of NOx, the cost-effectiveness threshold is $9.00 per pound of NOx controlled. For this example, the listed (T/F) technology is not cost-effective. A copy of the cost-effectiveness analysis must be submitted with the permit application.

The applicant continues by reviewing the BACT Control Option listed as (A/P). The applicant proposes the use of all the listed (A/P) technologies as part of the boiler permit application submitted to the District and references the Section 3 BACT Look-up Table. The applicant must submit documentation showing that each of the (T/F) technologies were not cost-effective for the suggested control equipment and provide information demonstrating that the specific (A/P)

controls selected meet the listed NOx BACT emission rates. By specifying the equipment listed as a BACT Control Option and providing the required supporting information, the applicant has satisfied the BACT requirement. No further BACT analysis is required. If the applicant chooses not to propose any of the BACT Control Options specified in the Look-up Table, the applicant can propose an alternative BACT Control Option as outlined in Section 2.6 or perform a "top-down" BACT analysis as described in Section 4.

Figure 2.3 -- Flowchart of Example 2.3 (more than one BACT Control Option)



2.4 COST-EFFECTIVENESS

When an applicant proposes to use a BACT control option other than the top-listed BACT control option or is performing a top-down BACT analysis, the applicant must evaluate the cost-effectiveness of emission controls. The cost-effectiveness analysis must be performed for each (T/F) control option in the order listed in the BACT Look-up Table until a control option is determined to be cost-effective or the (A/P) control option is reached. A control/reduction measure is considered cost-effective if the annualized cost of its implementation is equal to or less than the District defined cost-effectiveness value for the same pollutant contained in Table 2.4 below.

Table 2.4 - BACT Cost-Effectiveness Values[1]

	Cost-Effectiveness, $ per Pound of Pollutant Controlled				
Stationary Source's Post Project PTE	BACT Multiplier	VOC	NO_X	SO_X*	PM*
Cost-effective Bench Mark		$ 3.40	$ 6.00		
≤15 tons per year	1.1	$ 3.74	$ 6.60		
>15 tons per year	1.5	$ 5.10	$ 9.00		

*Cost-effectiveness values are not currently available for these pollutants.
Table was last revised 5/02.

2.5 COST-EFFECTIVENESS CALCULATIONS

Cost-effectiveness is defined as the annualized cost of the control option divided by the annual emission reductions from the control option. The following information is required to calculate the cost-effectiveness of a proposed control option: (1) the capital cost of purchasing and installing the control equipment or making a process modification, (2) the annual operating costs of the control option and (3) an estimate of the emissions before and after application of the control option.

The capital costs of purchasing the control option should be determined using actual vendor price quotes for each proposed control option. Installation costs should also be based on vendor price quotes. If vendor price quotes are unavailable, elements of the installation cost may be estimated by the applicant based on accepted cost estimation methodology.[2] Total capital costs may include the following:

---

[1] The BACT cost-effectiveness reference values contained in this table were calculated based on the highest cost per pound of pollutant controlled associated with RACT and BARCT rules for a particular pollutant. These values are revised as rules with higher costs are adopted and implemented. Therefore, these BACT cost-effectiveness reference values will change over time. The applicant should confirm the current cost-effectiveness reference values with District staff.

[2] Some helpful references include:
"Estimating Costs of Air Pollution Control," William M. Vatavuk, Lewis Publishers 1991.
"OAQPS Control Cost Manual, 5th edition" Emissions Standards Division of the Office of Air Quality Planning and Standards, U.S. EPA, December 1995.

Purchased Equipment Costs
- Control Device (or modified equip)
- Ancillary (including duct work)
- Instrumentation
- Taxes
- Freight

Direct Installation Costs
- Foundations and Supports
- Handling and Erection
- Electrical
- Piping
- Painting

Indirect Installation Costs
- Engineering
- Construction and Field Expenses
- Permitting
- Start-Up
- Performance Tests (Including Compliance Source Testing)
- Contingencies

When the total capital costs have been determined, they are annualized by the use of a capital recovery factor. The capital recovery factor is calculated using the following equation:

$$\text{Capital recovery factor (CRF)} = \frac{i(1+i)^n}{(1+i)^n - 1}$$

Where i = interest rate of the loan and
n = number of years in amortization period (Useful life of equipment)

The annual operating costs should be determined using actual costs when the data is available. Reasonable estimates may also be used when data is not available. Total operating costs may include the following:

Direct Costs
- Raw Materials
- Utilities (electricity, water, fuel)
- Waste Treatment/Disposal
- Labor
- Maintenance Materials
- Replacement Parts

Indirect Costs
- Overhead
- Property Taxes
- Insurance
- Administrative Charges

Recovery Cost Credits
- Materials
- Energy

Emission reductions are the last piece of information that must be determined prior to calculating the cost-effectiveness. When add-on controls are utilized, the maximum emissions before and after the application of a control option should be calculated based on what an operation is capable of emitting considering physical or operational limitations, including permit conditions limiting potential emissions. (Such as those limiting throughput or hours of operation.) The emission reduction is the difference between the total emissions before and after application of the control equipment. Both the capture and destruction

efficiencies of the control device should be considered when determining the maximum emissions after installation of the control device.

For control options based on process modifications such as product substitution, the emission reduction is the difference between the maximum emissions from a modified process and the unmodified process. Physical or operational limitations should also be considered when determining emissions in this case.

EXAMPLE 2.5: Cost-Effectiveness Calculation
For a 50 MM Btu boiler at 100% of operating capacity, the following information was determined for the purposes of calculating the Cost-effectiveness of installing Selective Catalytic Reduction as a control option. The facility is already a major source of NOx emissions (i.e. emissions are > 50 tons per year).

Given:

Capital Cost of Control Option = $1,500,000
Capital Recovery Factor (CFR) = .1627 (assuming 10% interest for 10 years)
Annual Operating and Maintenance Costs = $98,000
Uncontrolled emissions = 21 tons of NOx per year
Capture Efficiency = 100%
Control Efficiency = 80%

Equations:

$$\text{Cost-Effectiveness (\$/lb)} = \frac{\text{Annualized Costs}}{\text{Pounds of Pollutant Reduced}}$$

Annualized Costs ($) = (Capital Cost x CFR) + Annual Operating Costs

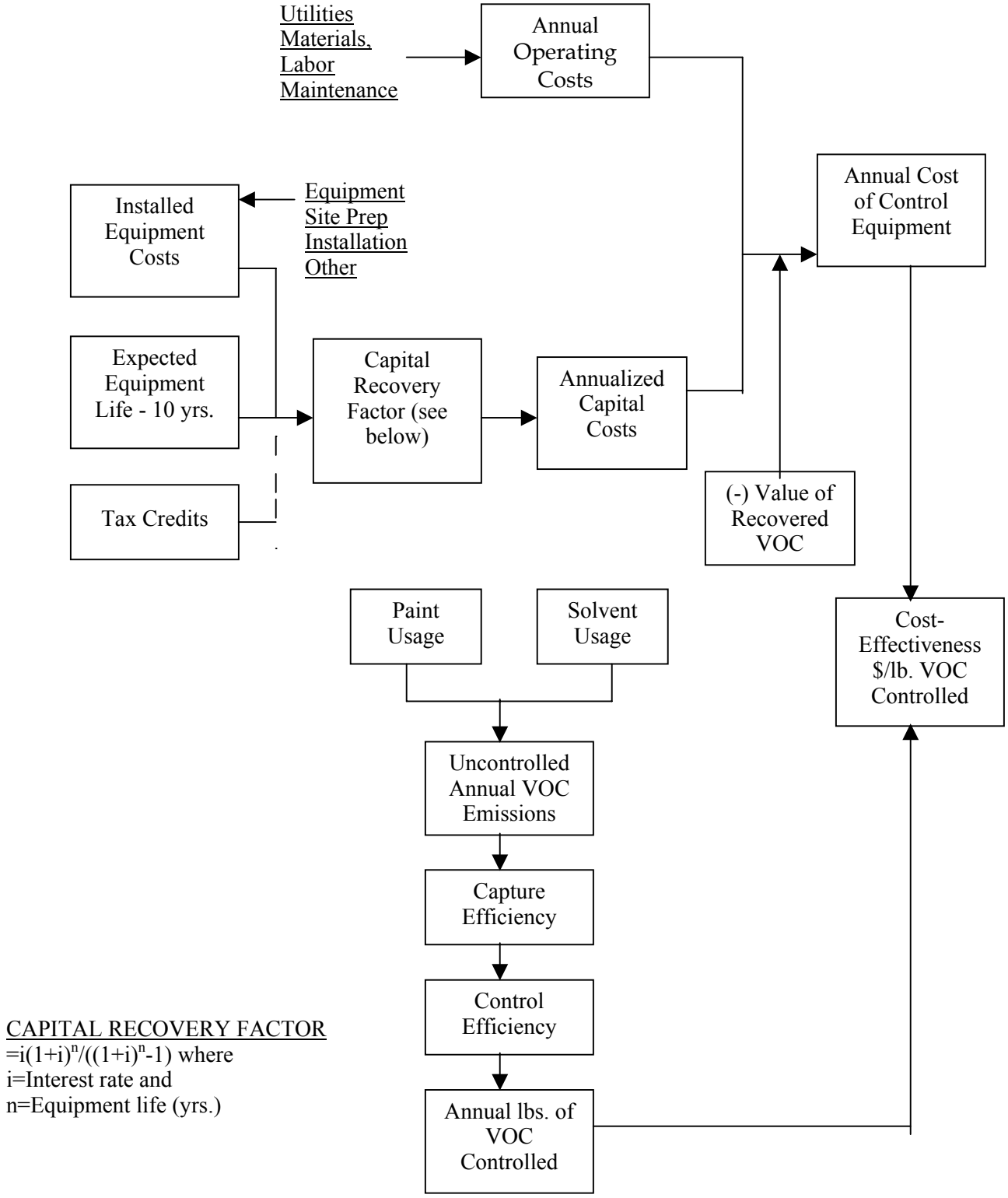
Pollutant Reduced (lbs) = (Uncontrolled Emissions x Capture Efficiency x Control Efficiency) x (2000 lbs/ton)

$$\text{Cost-Effectiveness} = \frac{\$1500000x.1627 + \$98000}{21\ ton\ x\ 1.0x.80x2000\ lbs/ton} = \$12.00 \text{ per pound}$$

The calculated cost-effectiveness for this proposed control option would then be compared to the cost-effective values determined by the District in Table 2.4. Since the calculated cost-effectiveness value of $12.00 is higher than the $9.00 value in the table for sources emitting > 15 tpy, this control option would not be considered cost-effective. The applicant would repeat this process for each of the remaining control options until a cost-effective option is determined, or the applied in practice (A/P) control option is the only option remaining.

Figure 2.5 provides an example flowchart of the cost-effectiveness calculation method for a VOC source. Applicants required to perform cost-effectiveness calculations should contact the Engineering Division at (858) 650-4700, if they need help with such calculations.

FIGURE 2.5
BACT COST-EFFECTIVENESS PROCESS FLOWCHART



2.6 DETERMINING ALTERNATIVE BACT CONTROL OPTIONS

There are various ways in which an applicant may propose an alternative control/reduction measure as BACT for their operation. This section outlines the specific circumstances and requirements for determining alternative BACT requirements.

Equivalent BACT Control Options

- If the Look-up Table contains BACT Emission Rates, then the applicant may propose an alternative control/reduction measure which will achieve the same emissions as the BACT Emission Rate. *(Can be pollutant specific.)*

- If the Look-up Table does not contain BACT Emission Rates, then the applicant may propose an alternative control/reduction measure which is demonstrated by the applicant to be equally as effective as the BACT Control Option identified in the Look-up Table.

In both cases, the applicant must submit with their permit application sufficient documentation showing that the alternative control/reduction measure meets the stated BACT Emission Rate or that it will reduce emissions to the same level as the listed BACT Control Option. A top-down BACT analysis is not required if the proposed alternative is at least as stringent as the listed BACT Control Option (i.e. meets the BACT Emission Rate or achieves equivalent reductions).

Less Stringent BACT Control Options

In those specific cases when the applicant has demonstrated the Look-up Table options are not cost-effective or not technologically feasible, the applicant must submit with their permit application sufficient documentation showing that the proposed alternative control/reduction measure is BACT:

- If the Look-up Table contains a BACT Emission Rate, and the applicant wants to propose an alternative control/reduction measure that does not meet the specified BACT Emission Rate, then the applicant must perform a top-down BACT analysis as outlined in Section 4. The top-down analysis must clearly support the proposed alternative. The applicant may be asked to supply supporting information regarding the technical and economic feasibility of the alternative control/reduction measure. The District will review the submitted top-down BACT analysis to determine whether the proposed technology is BACT.

- If the Look-up Table does not contain a BACT Emission Rate, and the applicant proposes an alternative control/reduction measure which provides less control than the listed BACT Control Option, then the applicant must demonstrate that potential emissions have been reduced to the greatest extent possible considering technical and economic feasibility.

  This alternative demonstration is a modified top-down BACT analysis that starts with the last listed BACT Control Option , then analyzes the next most effective control/reduction measure until a cost-effective measure is determined. (Cost-effectiveness calculations must be submitted with the application for Control Options not chosen.) The District will review the alternative BACT analysis and determine whether the proposed technology is BACT. The applicant may be asked to supply

supporting information regarding the technical and economic feasibility of the alternative control option.

2.7 HOW THESE TABLES WERE DEVELOPED

For smaller or less complex sources, only one BACT Control Option is provided within each Look-up Table. For larger and more complex sources, several BACT Control Options which are technologically feasible (T/F), as well as those applied in practice (A/P), are provided.

The BACT Look-up Tables which contain only one BACT Control Option were developed by the District. Generic top-down BACT analyses were performed for various categories of equipment to determine control/reduction measures which are cost-effective for each pollutant. (See Table 2.3 for the reference cost-effectiveness values used.)

The BACT Look-up Tables which contain several BACT Control Options were obtained from existing District BACT guidance, the ARB/CAPCOA BACT Clearinghouse, and the EPA BACT/LAER Clearinghouse. Each BACT Control Option was reviewed and listed by control efficiency from the most stringent to least stringent. The information provided in the Look-up Tables should reduce the time and effort required to select equipment which will meet the BACT requirements by allowing for an abbreviated top-down analysis.

SECTION 3

BACT LOOK-UP TABLES

3.1 LISTING OF BACT LOOK-UP TABLES

EQUIPMENT

Adhesive Material Application Operations (<10 gal/day)

Automotive Refinishing Operations (<5 gal/day)

Automotive Refinishing Operations

Boiler (<50 MM BTU/HR)

Boiler (50 to <250 MM BTU/HR)

Bulk Terminal Grain and Dry Chemical Transfer and Storage

Coffee Roasters

Concrete Batch Plants

Fiberglass Manufacturing Line (<10 tons/yr)

New Gasoline Service Station with Balance Phase II (>1,000,000 gal/yr) RESERVED

New Gasoline Service Station with Vacuum Assist Phase II (>1,000,000 gal/yr) RESERVED

General Surface Coating (<5 tons/yr) (No Specific Coating Category Rule Applies)

Graphics Arts Operations (<15 tons/yr)

Internal Combustion Engine - Non-Emerg. & Non-Cogen. Nat. Gas (Lean Burn) (≥2000 HP)

Internal Combustion Engine - Non-Emerg. & Non-Cogen. Nat. Gas (Rich Burn) (≥200 HP)

Internal Combustion Engine - Non-Emerg. & Non-Cogen. Diesel (200 HP – 750 HP)

Internal Combustion Engine - Non-Emerg. & Non-Cogen. Diesel (<200 HP)

Marine Coating Operations

Metal Parts & Products Coating (<10 gal/day

Pharmaceutical Manufacturing

Rock Crushers & Transfer Points

Sand, Rock & Aggregate Screens

Wood Products Coating (<10 gal/day)

ADHESIVE MATERIAL APPLICATION OPERATIONS (<10 gal/day) Fee Schedules 27 U, V, & W

Review the BACT Control Option listed below. The applicant must propose the Control Option listed or perform a Top-down BACT Analysis as described in Section 4 to justify the selection of another Control Option. The applicant will be required to provide documentation that the Control Option selected meets the requirements listed in the table.

	VOC	NOx	SOx	PM
BACT Emission Rate Limit	Not Determined	(N/A)	(N/A)	Not Determined
BACT Control Option	Compliance with Rule 67.21, Adhesive Material Application Operations (A/P)	(N/A)	(N/A)	Spray booth if used, shall be equipped with over spray filters. (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement

(This table does not apply to operations applying, on average, 10 or more gallons of adhesive application materials per day.)

AUTOMOTIVE REFINISHING OPERATIONS (<5 gal/day)
Fee Schedule 27R

Review the BACT Control Option listed below. The applicant must propose the Control Option listed or perform a Top-down BACT Analysis as described in Section 4 to justify the selection of another Control Option. The applicant will be required to provide documentation that the Control Option selected meets the requirements listed in the table.

	VOC	NOx	SOx	PM
BACT Emission Rate Limit	Not Determined	(N/A)	(N/A)	Not Determined
BACT Control Option	Compliance with Rule 67.20, Motor Vehicle and Mobile Equipment Refinishing Operations (A/P)	(N/A)	(N/A)	Spray booth equipped with overspray filters. (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

(This table does not apply to operations applying, on average, 5 or more gallons of coating per day.)

AUTOMOTIVE REFINISHING OPERATIONS
Fee Schedule 27S

The BACT Control Options which have been determined to be technologically feasible (T/F - demonstrated but not necessarily proven in field application) or have achieved the BACT emission rate limits in practice (A/P - demonstrated in use for the specific equipment category) are listed below. The BACT Control Options are listed in descending order of control stringency. If the top-listed T/F control option is proposed, no further analysis is required. If the first T/F control option is not chosen, then the applicant must review and determine the cost-effectiveness of each T/F control option in the order listed. The first control option determined to be cost-effective must be installed to meet the BACT requirement. A control option is considered cost-effective if the annualized cost of implementing that control option is equal to or less than the reference cost-effectiveness value for the same pollutant shown in Table 2-4. If none of the T/F control options are determined to be cost-effective, the applicant must propose the A/P control option, propose an alternative technology that meets the BACT emission rate limit or perform a full Top-down BACT Analysis as described in Section 4. The applicant is responsible for ensuring that the installed equipment meets the specified BACT Emission Rate Limit. (See Section 2 for further guidance.)

	VOC	NOx	SOx	PM
BACT Control Option	Collection System Vented to Carbon Adsorber or Afterburner with coatings complying with Rule 67.20, Motor Vehicle and Mobile Equipment Refinishing Operations (T/F) **BACT Emission Rate Limit -** emissions controlled to overall capture/ destruction efficiency ≥ 90% by weight	(N/A)	(N/A)	Spray booth equipped with overspray filters. (A/P)
BACT Control Option	Compliance with Rule 67.20, Motor Vehicle and Mobile Equipment Refinishing Operations (A/P)	(N/A)	(N/A)	Spray booth equipped with overspray filters. (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

BOILER (<50 MM BTU/HR)
Fee Schedule 13A

Review the BACT Control Option listed below. The applicant must propose the Control Option listed or perform a Top-down BACT Analysis as described in Section 4 to justify the selection of another Control Option. The applicant will be required to provide documentation that the Control Option selected meets the requirements listed in the table.

	VOC	NOx	SOx	PM
BACT Emission Rate Limit	Not Determined	12 PPM corrected to 3% O_2 NG or LPG	Not Determined	0.10 grain/dscf†
BACT Control Option (Using NG or LPG fuel only.)	NG or LPG fuel (A/P)	Low NOx burner, FGR, and oxygen controller. NG or LPG (A/P)	NG or LPG fuel (A/P)	NG or LPG fuel (A/P)
BACT Control Option (Using No. 2 oil as backup fuel.)	(N/A)	Low NOx burner, FGR, and oxygen controller. (A/P)	No. 2 fuel oil with <0.05% sulfur content (A/P)	Low ash fuel (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

NOTES:
FGR - Flue Gas Recirculation
LPG - Liquefied Petroleum Gas
NG - Natural Gas
† The District has determined that the use of Natural Gas ensures compliance with the PM BACT Emission Rate Limit of 0.1 gr/dscf. No further analysis is required for this pollutant.

BOILER (50 to <250 MM BTU/HR)
Fee Schedule 13B

The BACT Control Options which have been determined to be technologically feasible (T/F - demonstrated but not necessarily proven in field application) or have achieved the BACT emission rate limits in practice (A/P - demonstrated in use for the specific equipment category) are listed below. The BACT Control Options are listed in descending order of control stringency. If the top-listed T/F control option is proposed, no further analysis is required. If the first T/F control option is not chosen, then the applicant must review and determine the cost-effectiveness of each T/F control option in the order listed. The first control option determined to be cost-effective must be installed to meet the BACT requirement. A control option is considered cost-effective if the annualized cost of implementing that control option is equal to or less than the reference cost-effectiveness value for the same pollutant shown in Table 2-4. If none of the T/F control options are determined to be cost-effective, the applicant must propose the A/P control option, propose an alternative technology that meets the BACT emission rate limit or perform a full Top-down BACT Analysis as described in Section 4. The applicant is responsible for ensuring that the installed equipment meets the specified BACT Emission Rate Limit. (See Section 2 for further guidance.)

	VOC	NOx	SOx	PM
BACT Control Option	NG or LPG fuel (A/P)	SCR on NG or LPG fuel (duct burner may be required) (T/F) **BACT Emission Rate Limit** – 5 PPM corrected to 3% O_2/NG or LPG	NG or LPG fuel (A/P)	NG or LPG fuel (A/P) **BACT Emission Rate Limit** - 0.10 grain/dscf†
BACT Control Option (Using NG or LPG fuel only)	NG or LPG fuel (A/P)	Low NOx burner, FGR, and oxygen controller. NG or LPG (A/P) **BACT Emission Rate Limit** – 9 PPM corrected to 3% O_2/NG or LPG.	NG or LPG fuel (A/P)	NG or LPG fuel (A/P) **BACT Emission Rate Limit** - 0.10 grain/dscf†
BACT Control Option (Using No. 2 oil as backup fuel.)	(N/A)	Low NOx burner, FGR, and oxygen controller. No. 2 fuel oil (A/P) **BACT Emission Rate Limit** – 9 PPM corrected to 3% O_2 on NG or LPG. Lowest achievable but no greater than 170 PPM corrected to 3% O_2 on No. 2 fuel oil backup	No. 2 fuel oil with < 0.05% sulfur content (A/P)	Low ash fuel (A/P) **BACT Emission Rate Limit** - 0.10 grain/dscf†

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

NOTES:

FGR - Flue Gas Recirculation
LPG - Liquefied Petroleum Gas
NG - Natural Gas
SCR-Selective Catalytic Reduction

† The District has determined that the use of Natural Gas ensures compliance with the PM BACT Emission Rate Limit of 0.1 gr/dscf. No further analysis is required for this pollutant.

BULK TERMINAL GRAIN AND DRY CHEMICAL TRANSFER AND STORAGE
Fee Schedule 23 A & B

Review the BACT Control Option listed below. The applicant must propose the Control Option listed or perform a Top-down BACT Analysis as described in Section 4 to justify the selection of another Control Option. The applicant will be required to provide documentation that the Control Option selected meets the requirements listed in the table.

	VOC	NOx	SOx	PM*
BACT Emission Rate Limit	(N/A)	(N/A)	(N/A)	< 0.01 grain/dscf (Subpart DD)
BACT Control Option	(N/A)	(N/A)	(N/A)	99% control, storage, conveyors, elevators all vented to Baghouse 0 percent opacity (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

* The BACT emission rate limit is based on TSP which is used as a surrogate for PM10.

COFFEE ROASTERS
Fee Schedule 50A

Review the BACT Control Option listed below. The applicant must propose the Control Option listed or perform a Top-down BACT Analysis as described in Section 4 to justify the selection of another Control Option. The applicant will be required to provide documentation that the Control Option selected meets the requirements listed in the table.

	VOC	NOx	SOx	PM
BACT Emission Rate Limit	Not Determined	Not Determined	Not Determined	Not Determined
BACT Control Option	Afterburner (0.3 sec retention time at 1200 degrees F	Natural gas with heat recovery on afterburner exhaust to reduce fuel consumption (A/P)	Natural gas (A/P)	Natural gas with cyclone and afterburner (0.3 sec retention time at 1200 degrees F (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

CONCRETE BATCH PLANTS
Fee Schedule 08A

Review the BACT Control Option listed below. The applicant must propose the Control Option listed or perform a Top-down BACT Analysis as described in Section 4 to justify the selection of another Control Option. The applicant will be required to provide documentation that the Control Option selected meets the requirements listed in the table.

	VOC	NOx	SOx	PM*
BACT Emission Rate Limit	(N/A)	(N/A)	(N/A)	<0.008 grain/dscf
BACT Control Option	(N/A)	(N/A)	(N/A)	99% efficient Fabric or Cartridge type vent filters on silos. Enclosed aggregate and cement weigh hoppers, screw conveyors and concrete batcher vented to a 99% efficient fabric filter baghouse. Flexible shroud which seals to the truck along with a water sprinkler system used when dry products are mixed. Shroud vented to 99% efficient fabric filter baghouse Water spray system for sand and aggregate transfer points. Sand and aggregate storage piles adequately wet to maintain a minimum moisture content of 4% by weight. Open areas maintained adequately wet to prevent fugitive emissions in excess of 20 percent opacity or Ringlemann 1. (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

* The BACT emission rate limit is based on TSP which is used as a surrogate for PM10.

FIBERGLASS MANUFACTURING LINE (<10 tons/yr)
Fee Schedule 27F

Fiberglass Fabrication - Hand & spray layup

Review the BACT Control Option listed below. The applicant must propose the Control Option listed or perform a Top-down BACT Analysis as described in Section 4 to justify the selection of another Control Option. The applicant will be required to provide documentation that the Control Option selected meets the requirements listed in the table.

	VOC	NOx	SOx	PM
BACT Emission Rate Limit	Not Determined	(N/A)	(N/A)	Not Determined
BACT Control Option	Compliance with Rule 67.12, Polyester Resin Operations. (A/P)	(N/A)	(N/A)	Airless spray equipment & spray booth with mesh type filters. (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

(This table does not apply to fiberglass operations which emit less than an average of five pounds of VOCs or greater than an average of 50 pounds of VOCs per operating day for each calendar month.)

NEW GASOLINE SERVICE STATIONS WITH BALANCE PHASE II SYSTEMS (>1,000,000 gal/yr throughput)
Fee Schedule 26A

RESERVED

NEW GASOLINE SERVICE STATIONS WITH VACUUM ASSIST PHASE II SYSTEMS (>1,000,000 gal/yr throughput)
Fee Schedule 26F

RESERVED

GENERAL SURFACE COATING (<5 tons/yr)
(No Specific Coating Category Rule Applies)
Fee Schedule 27D

Review the BACT Control Option listed below. The applicant must propose the Control Option listed or perform a Top-down BACT Analysis as described in Section 4 to justify the selection of another Control Option. The applicant will be required to provide documentation that the Control Option selected meets the requirements listed in the table.

	VOC	NOx	SOx	PM
BACT Emission Rate Limit	Not Determined	(N/A)	(N/A)	Not Determined
BACT Control Option	Coatings with lower than typical VOC content [substrate specific] and aqueous or non-VOC surface preparation materials or use of HVLP, electrostatic spray or equivalent application equipment. (A/P)	(N/A)	(N/A)	Spray booth equipped with overspray filters. (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

(This table does not apply to operations applying, on average, 10 or more gallons of coating per day.)

GRAPHIC ARTS OPERATIONS (<15 tons/year)
Fee Schedule 27 N

Review the BACT Control Option listed below. The applicant must propose the Control Option listed or perform a Top-down BACT Analysis as described in Section 4 to justify the selection of another Control Option. The applicant will be required to provide documentation that the Control Option selected meets the requirements listed in the table.

	VOC	NOx	SOx	PM
BACT Emission Rate Limit	Not Determined	(N/A)	(N/A)	Not Determined
BACT Control Option	1. Use of low VOC fountain solution (< 6% VOC by volume), 2. Capture & recycle blanket and roller tray wash, 3. Use of cleanup solvent which has either less than 200 grams VOC per liter or vapor pressure of less than 5 mm HG at 20^{o}C, and 4. Use of inks which are kerosene-like oil based which have a VOC content of less than 300 grams per liter (2.5 lb/gal). (A/P)	(N/A)	(N/A)	(N/A)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

(This table does not apply to operations emitting ≥15 tons VOC/year.)

INTERNAL COMBUSTION ENGINE, PISTON TYPE NON-EMERGENCY & NON-COGENERATION - NATURAL GAS FUEL (LEAN BURN) (≥2000 H.P.) - Fee Schedule 34D

The BACT Control Options which have been determined to be technologically feasible (T/F - demonstrated but not necessarily proven in field application) or have achieved the BACT emission rate limits in practice (A/P - demonstrated in use for the specific equipment category) are listed below. The BACT Control Options are listed in descending order of control stringency. If the top-listed T/F control option is proposed, no further analysis is required. If the first T/F control option is not chosen, then the applicant must review and determine the cost-effectiveness of each T/F control option in the order listed. The first control option determined to be cost-effective must be installed to meet the BACT requirement. A control option is considered cost-effective if the annualized cost of implementing that control option is equal to or less than the reference cost-effectiveness value for the same pollutant shown in Table 2-4. If none of the T/F control options are determined to be cost-effective, the applicant must propose the A/P control option, propose an alternative technology that meets the BACT emission rate limit or perform a full Top-down BACT Analysis as described in Section 4. The applicant is responsible for ensuring that the installed equipment meets the specified BACT Emission Rate Limit. (See Section 2 for further guidance.)

Natural Gas Fuel[1]:

	VOC	NOx	SOx	PM
BACT Control Option [2]	Lean burn technology (T/F) **BACT Emiss Rate Limit** – 0.6 grams/ bhp-hr	Lean burn with selective catalytic reduction (SCR) (T/F) **BACT Emission Rate Limit-** 0.07grams/ bhp-hr	Low Sulfur Fuel 10 grains/100 cf natural gas (A/P)	PCV filter, engine design (A/P) **BACT Emission Rate Limit** - 0.1 grams/ bhp-hr
BACT Control Option	Lean Burn Technology (A/P) **BACT Emission Rate Limit** – 1.0 grams/ bhp-hr	Lean Burn with selective catalytic reduction (SCR) (A/P) **BACT Emission Rate Limit** – 0.15 grams/ bhp-hr	Low Sulfur Fuel 10 grains/100 cf natural gas (A/P)	PCV filter, engine design (A/P) **BACT Emission Rate Limit** - 0.1 grams/ bhp-hr

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

[1] This table does not apply to gasoline-powered engines

[2] Electric motors need not be considered as a control option for:

(a) Engines at stationary sources located more than 1/2 mile from utility service lines,

(b) Engines located at any site and providing direct or electrical power for a non-repeating activity or process which requires no more than 3,000 hours of engine operation.

(c) Engines mounted on moving equipment, such as cranes or drills, which are required to move around the facility during each workday as a function of that equipments purpose.

INTERNAL COMBUSTION ENGINE, PISTON TYPE NON-EMERGENCY & NON-COGENERATION - NATURAL GAS FUEL (RICH BURN) (≥200 H.P.) - Fee Schedule 34D

The BACT Control Options which have been determined to be technologically feasible (T/F - demonstrated but not necessarily proven in field application) or have achieved the BACT emission rate limits in practice (A/P - demonstrated in use for the specific equipment category) are listed below. The BACT Control Options are listed in descending order of control stringency. If the top-listed T/F control option is proposed, no further analysis is required. If the first T/F control option is not chosen, then the applicant must review and determine the cost-effectiveness of each T/F control option in the order listed. The first control option determined to be cost-effective must be installed to meet the BACT requirement. A control option is considered cost-effective if the annualized cost of implementing that control option is equal to or less than the reference cost-effectiveness value for the same pollutant shown in Table 2-4. If none of the T/F control options are determined to be cost-effective, the applicant must propose the A/P control option, propose an alternative technology that meets the BACT emission rate limit or perform a full Top-down BACT Analysis as described in Section 4. The applicant is responsible for ensuring that the installed equipment meets the specified BACT Emission Rate Limit. (See Section 2 for further guidance.)

Natural Gas Fuel[1]:

	VOC	NOx	SOx	PM
BACT Control Option [2]	Rich burn with non-selective catalytic reduction (NSCR) (T/F) **BACT Emission Rate Limit** – 0.15 grams/ bhp-hr	Rich burn with non-selective catalytic reduction (NSCR) (T/F) **BACT Emission Rate Limit** – 0.07 grams/ bhp-hr	Low Sulfur Fuel 10 grains/100 cf natural gas (A/P)	PCV filter, engine design (A/P) **BACT Emissi Rate Limit** - 0.1 grams/ bhp-hr
BACT Control Option	All Rich Burn (A/P) **BACT Emission Rate Limit** – 0.15 grams/ bhp-hr	Rich Burn with non-selective catalytic reduction (NSCR) **BACT Emission Rate Limit** – 0.15 grams/ bhp-hr	Low Sulfur Fuel 10 grains/100 cf natural gas (A/P)	PCV filter, engine design (A/P) **BACT Emission Rate Limit** - 0.1 grams/bhp-hr

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

[1] This table does not apply to gasoline powered engines

[2] Electric motors need not be considered as a control option for:

(a) Engines at stationary sources located more than 1/2 mile from utility service lines,

(b) Engines located at any site and providing direct or electrical power for a non-repeating activity or process which requires no more than 3,000 hours of engine operation.

(c) Engines mounted on moving equipment, such as cranes or drills, which are required to move around the facility during each workday as a function of that equipments purpose.

INTERNAL COMBUSTION ENGINE, PISTON TYPE NON-EMERGENCY & NON-COGENERATION - DIESEL FUEL (200 H.P.-750 H.P.) - Fee Schedule 34D

The BACT Control Options which have been determined to be technologically feasible (T/F - demonstrated but not necessarily proven in field application) or have achieved the BACT emission rate limits in practice (A/P - demonstrated in use for the specific equipment category) are listed below. The BACT Control Options are listed in descending order of control stringency. If the top-listed T/F control option is proposed, no further analysis is required. If the first T/F control option is not chosen, then the applicant must review and determine the cost-effectiveness of each T/F control option in the order listed. The first control option determined to be cost-effective must be installed to meet the BACT requirement. A control option is considered cost-effective if the annualized cost of implementing that control option is equal to or less than the reference cost-effectiveness value for the same pollutant shown in Table 2-4. If none of the T/F control options are determined to be cost-effective, the applicant must propose the A/P control option, propose an alternative technology that meets the BACT emission rate limit or perform a full Top-down BACT Analysis as described in Section 4. The applicant is responsible for ensuring that the installed equipment meets the specified BACT Emission Rate Limit. (See Section 2 for further guidance.)

Diesel:

	VOC	NOx	SOx	PM[4]
BACT Control Option [1,2]	Oxidation Catalyst (T/F)	California Clean diesel fuel and Selective Catalytic Reduction (SCR)[3] (T/F) **BACT Emission Rate Limit** – 90 % reduction	Low Sulfur Fuel (California Clean Diesel fuel) 0.05 % by weight (A/P)	Catalyst guard bed, PCV filter, engine design, diesel catalytic particulate filter (T/F) **BACT Emission Rate Limit** - 90 % reduction of uncontrolled particulate matter emission
BACT Control Option[2]	California Clean diesel fuel and EPA or ARB certified engine (A/P)	California Clean Diesel fuel and Turbocharger, Low Temperature Aftercooler, and Retardation of Fuel Injection Timing 4 Degrees from manufacturer's specification, EPA or ARB certified engine. (A/P) **BACT Emission Rate Limit** - 6.9 grams/ bhp-hr	Low Sulfur Fuel (California Clean Diesel fuel) 0.05 % by weight (A/P)	Low Sulfur Fuel (California Clean Diesel fuel) and PCV filter (A/P) **BACT Emission Rate Limit** - 0.1 grams/ bhp-hr

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

[1]Alternative controls for consideration include: gaseous fuel with NSCR or lean burn configuration or the use of electric motors using electricity from the serving utility.

Electric motors need not be considered as a control option for:

(a) Engines at stationary sources located more than 1/2 mile from utility service lines,

(b) Engines located at any site and providing direct or electrical power for a non repeating activity or process which requires no more than 3,000 hours of engine operation.

(c) Engines mounted on moving equipment, such as cranes or drills, which are required to move around the facility during each work day as a function of that equipments purpose.

[2] For engines from 300 to 600 bhp, the use of Tier II certified engine need not be considered as a control option if demonstrated not to be cost-effective.

[3]SCR may be cost-effective for units with an uncontrolled potential to emit greater than 10 tons per year

[4]This table addresses BACT. Further particulate controls may be required as T-BACT pursuant to Rule 1200 or a State Air Toxics Control Measure for Diesel Particulates.

INTERNAL COMBUSTION ENGINE, PISTON TYPE NON-EMERGENCY & NON-COGENERATION - DIESEL FUEL (<200 H.P.) - Fee Schedule 34G

The BACT Control Options which have been determined to be technologically feasible (T/F - demonstrated but not necessarily proven in field application) or have achieved the BACT emission rate limits in practice (A/P - demonstrated in use for the specific equipment category) are listed below. The BACT Control Options are listed in descending order of control stringency. If the top-listed T/F control option is proposed, no further analysis is required. If the first T/F control option is not chosen, then the applicant must review and determine the cost-effectiveness of each T/F control option in the order listed. The first control option determined to be cost-effective must be installed to meet the BACT requirement. A control option is considered cost-effective if the annualized cost of implementing that control option is equal to or less than the reference cost-effectiveness value for the same pollutant shown in Table 2-4. If none of the T/F control options are determined to be cost-effective, the applicant must propose the A/P control option, propose an alternative technology that meets the BACT emission rate limit or perform a full Top-down BACT Analysis as described in Section 4. The applicant is responsible for ensuring that the installed equipment meets the specified BACT Emission Rate Limit. (See Section 2 for further guidance.)

Diesel:

	VOC	NOx	SOx	PM
BACT Emission Rate Limit	1.5 grams/ bhp-hr	7.2 grams/ bhp-hr		0.40 grams/ bhp-hr
BACT Control Option [1]	California Clean diesel fuel; Engine design, (A/P)	California Clean diesel fuel; Turbocharger, Aftercooler, Air to Air Intercooler (or air to water) and Retardation of Fuel Injection Timing 4 Degrees from Manufacturers Specification (A/P)	Low Sulfur Fuel 0.05 % by weight (A/P)	Low Sulfur Fuel and PCV filter (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

[1] Alternative controls for consideration include: gaseous fuel with NSCR or lean burn configuration or the use of electric motors using electricity from the serving utility.

Electric motors need not be considered as a control option for:

(a) Engines at stationary sources located more than 1/2 mile from utility service lines,

(b) Engines located at any site and providing direct or electrical power for a non repeating activity or process which requires no more than 3,000 hours of engine operation.

(c) Engines mounted on moving equipment, such as cranes or drills, which are required to move around the facility during each work day as a function of that equipment's purpose.

MARINE COATING OPERATIONS
Fee Schedules 27A, B, & C

The BACT Control Options which have been determined to be technologically feasible (T/F - demonstrated but not necessarily proven in field application) or have achieved the BACT emission rate limits in practice (A/P - demonstrated in use for the specific equipment category) are listed below. The BACT Control Options are listed in descending order of control stringency. If the top-listed T/F control option is proposed, no further analysis is required. If the first T/F control option is not chosen, then the applicant must review and determine the cost-effectiveness of each T/F control option in the order listed. The first control option determined to be cost-effective must be installed to meet the BACT requirement. A control option is considered cost-effective if the annualized cost of implementing that control option is equal to or less than the reference cost-effectiveness value for the same pollutant shown in Table 2-4. If none of the T/F control options are determined to be cost-effective, the applicant must propose the A/P control option, propose an alternative technology that meets the BACT emission rate limit or perform a full Top-down BACT Analysis as described in Section 4. The applicant is responsible for ensuring that the installed equipment meets the specified BACT Emission Rate Limit. (See Section 2 for further guidance.)

	VOC	NOx	SOx	PM
BACT Emission Rate Limit	**For operations ≥10 gallons/day and feasible to apply coatings in a paint spray booth:** Collection system vented to carbon adsorber or afterburner with coatings complying with Rule 67. 18 - Marine Coating Operations (T/F) **BACT Emission Rate Limit -** emissions controlled to overall capture/ destruction efficiency > 90% by weight.	(N/A)	(N/A)	Spray booth if used, shall be equipped with overspray filters. (A/P)
BACT Control Option	**For operations emitting <140 lbs of VOC emissions/day, and not feasible to apply coatings in a paint spray booth:** Compliance with Rule 67.18 - Marine Coating Operations, except for the VOC content of the following coating categories with mil spec requirements: **Coating Category** — **VOC Limit (g/L)** High Temperature Coating — 420 Low Activation Interior Coating — 340 (A/P)			High transfer efficiency application equipment where feasible and shrouding. (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

(This table does not apply to operations emitting, on average, 140 or more pounds of VOC per day conducted outside of a paint spray booth.)

METAL PARTS & PRODUCTS COATING (<10 gal/day)
Fee Schedules 27J and 27K

Review the BACT Control Option listed below. The applicant must propose the Control Option listed or perform a Top-down BACT Analysis as described in Section 4 to justify the selection of another Control Option. The applicant will be required to provide documentation that the Control Option selected meets the requirements listed in the table.

	VOC	NOx	SOx	PM
BACT Emission Rate Limit	Not Determined	(N/A)	(N/A)	Not Determined
BACT Control Option	Compliance with Rule 67.3, Metal Parts & Products Coating Operations. (A/P)	(N/A)	(N/A)	Spray booth equipped with overspray filters. (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

(This table does not apply to operations applying, on average, 10 or more gallons of coating per day.)

PHARMACEUTICAL MANUFACTURING
Fee Schedule 54A

The BACT Control Options which have been determined to be technologically feasible (T/F - demonstrated but not necessarily proven in field application) or have achieved the BACT emission rate limits in practice (A/P - demonstrated in use for the specific equipment category) are listed below. The BACT Control Options are listed in descending order of control stringency. If the top-listed T/F control option is proposed, no further analysis is required. If the first T/F control option is not chosen, then the applicant must review and determine the cost-effectiveness of each T/F control option in the order listed. The first control option determined to be cost-effective must be installed to meet the BACT requirement. A control option is considered cost-effective if the annualized cost of implementing that control option is equal to or less than the reference cost-effectiveness value for the same pollutant shown in Table 2-4. If none of the T/F control options are determined to be cost-effective, the applicant must propose the A/P control option, propose an alternative technology that meets the BACT emission rate limit or perform a full Top-down BACT Analysis as described in Section 4. The applicant is responsible for ensuring that the installed equipment meets the specified BACT Emission Rate Limit. (See Section 2 for further guidance.)

	VOC	NOx	SOx	PM
BACT Control Option	Collection System Vented to Carbon Adsorber or Afterburner (T/F) **BACT Emission Rate Limit -** emissions controlled to overall capture/ destruction efficiency ≥ 90% by weight	(N/A)	(N/A)	Baghouse or Vent Filters. (A/P)
BACT Control Option	Low VOC content materials (A/P)	(N/A)	(N/A)	Baghouse or Vent Filters. (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

ROCK CRUSHERS & TRANSFER POINTS
Fee Schedule 07A & 07B

The BACT Control Options which have been determined to be technologically feasible (T/F - demonstrated but not necessarily proven in field application) or have achieved the BACT emission rate limits in practice (A/P - demonstrated in use for the specific equipment category) are listed below. The BACT Control Options are listed in descending order of control stringency. If the top-listed T/F control option is proposed, no further analysis is required. If the first T/F control option is not chosen, then the applicant must review and determine the cost-effectiveness of each T/F control option in the order listed. The first control option determined to be cost-effective must be installed to meet the BACT requirement. A control option is considered cost-effective if the annualized cost of implementing that control option is equal to or less than the reference cost-effectiveness value for the same pollutant shown in Table 2-4. If none of the T/F control options are determined to be cost-effective, the applicant must propose the A/P control option, propose an alternative technology that meets the BACT emission rate limit or perform a full Top-down BACT Analysis as described in Section 4. The applicant is responsible for ensuring that the installed equipment meets the specified BACT Emission Rate Limit. (See Section 2 for further guidance.)

	VOC	NOx	SOx	PM*
BACT Emission Rate Limit	(N/A)	(N/A)	(N/A)	< 0.02 grain/dscf
BACT Control Option	(N/A)	(N/A)	(N/A)	Charged fog sprays (T/F)
BACT Control Option	(N/A)	(N/A)	(N/A)	Covered screen, covered crusher, or covered transfer point vented to insertable or central fabric filter (A/P)
BACT Control Option	(N/A)	(N/A)	(N/A)	Covered screen, covered crusher, or covered transfer point with water spray system and surfactant added (A/P)
BACT Control Option	(N/A)	(N/A)	(N/A)	Water spray system with surfactant (A/P)
BACT Control Option	(N/A)	(N/A)	(N/A)	Water spray system (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

* The BACT emission rate limit is based on TSP which is used as a surrogate for PM10.

SAND, ROCK & AGGREGATE SCREENS
Fee Schedule 06A

Review the BACT Control Option listed below. The applicant must propose the Control Option listed or perform a Top-down BACT Analysis as described in Section 4 to justify the selection of another Control Option. The applicant will be required to provide documentation that the Control Option selected meets the requirements listed in the table.

	VOC	NOx	SOx	PM*
BACT Emission Rate Limit	(N/A)	(N/A)	(N/A)	< 0.02 grain/dscf
BACT Control Option	(N/A)	(N/A)	(N/A)	Water spray system (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

* The BACT emission rate limit is based on TSP which is used as a surrogate for PM10.

WOOD PRODUCTS COATING (<10 gal/day)
Fee Schedules 27L, 27M and 27Q[1]

Review the BACT Control Option listed below. The applicant must propose the Control Option listed or perform a Top-down BACT Analysis as described in Section 4 to justify the selection of another Control Option. The applicant will be required to provide documentation that the Control Option selected meets the requirements listed in the table.

	VOC	NOx	SOx	PM
BACT Emission Rate Limit	Not Determined	(N/A)	(N/A)	Not Determined
BACT Control Option (A/P)	Use of water-based coatings when compatible with the operation and compliance with all other provisions of Rule 67.11, Wood Products Coating Operations for the rest of the operation. (A/P)	(N/A)	(N/A)	Spray booth equipped with overspray filters. (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement.

(This table does not apply to operations applying, on average, 10 or more gallons of coating per day.)

[1] 27L (Sources/facilities <5 tons per year VOC emissions), 27M (Sources/facilities >5 tons per year VOC emissions), and 27Q (≤500 gallons per year)

SECTION 4

TOP-DOWN BACT ANALYSIS

4.1 INTRODUCTION

This section presents an alternate procedure for determining the BACT Emission Rate and/or BACT Control Option when:

1) no applicable BACT Look-up Table is available in Section 3, or
2) the applicant elects to propose a less stringent BACT Emission Rate than the value provided in the applicable BACT Look-up Table, or
3) the applicant elects to propose a less stringent BACT Control Option than the options listed in the applicable BACT Look-up Table, or
4) the applicant elects not to use limiting permit conditions to meet the required BACT Emission Rate.

Any permit application which proposes an emissions increase for a new, modified, relocated, or replacement emission unit which emits or has the potential to emit 10 lbs/day or more, must conduct a BACT analysis. If a Section 3 BACT Control Option or equivalent control/reduction measure is not proposed, a top-down BACT analysis is required to determine an acceptable BACT Control Option.

A top-down BACT analysis requires a comprehensive listing and evaluation of all available emission control technologies to determine which technologies will meet the BACT requirement. This requires more documentation and effort from both the applicant and District to evaluate, but allows for consideration of project-specific factors. The top-down analysis and requirements for supporting documentation are discussed in the pre-application meeting. This analysis should not be performed without first consulting the District Engineering Division at (858) 694-3307.

The case-by-case top-down BACT analysis described in this Section is generally performed by the applicant or a consultant. For each case-by-case BACT analysis, the quantity of reduced emissions and the costs associated with each control technology is evaluated by the applicant to determine the most effective control method which is cost-effective. The District will review the BACT analysis and provide a formal BACT determination for each application.

Based on the top-down BACT analysis, the District specifies an emission limitation, performance requirement or some other appropriate limitation for the emission unit. These limitations reflect the maximum degree of emission reduction achievable for each pollutant subject to BACT. A technology cannot be approved if it would violate any District rule, regulation or applicable standard of performance under 40 CFR Part 60 (New Source Performance Standards) or Part 61 and Part 63 (National Emission Standards for Hazardous Air Pollutants).

In brief, a top-down BACT analysis requires the identification of all available emission control technologies for each pollutant to which BACT is applicable. To be considered BACT, a control technology does not have to be proven in field application. The control technologies are then ranked in descending order of control efficiency and evaluated for technological feasibility. Starting with the most stringent control that is technologically feasible, the cost-effectiveness of

the control is calculated. The most stringent, or "top" control technology which is technologically feasible and cost-effective (as defined in Table 2.3) will be considered BACT.

4.2 SUMMARY OF TOP-DOWN BACT ANALYSIS PROCESS

This section is intended to be a summary only. The EPA Technology Transfer Network is one source of the detailed top-down BACT analysis process. Alternatively, the applicant can contact the District's Engineering Division.

Step 1: Identify All Control Technologies

The first step in a top-down BACT analysis is to identify all of the control options available for the emissions unit, process or activity. These include air pollution control technologies or techniques that can be obtained through commercial channels, such as the application of production processes or available methods, systems and techniques, including fuel cleaning/treatment or innovative fuel combustion techniques for control of a specific pollutant. This includes technologies employed outside of the United States. In some cases, lower-polluting processes may also be considered an available control option for BACT. The control options evaluated should also include controls applied to similar source categories or gas streams, and innovative control technologies. Technologies required under lowest achievable emission rate (LAER) must also be included as control alternatives. LAER technologies usually represent the most stringent emission control alternatives. References to LAER technology determinations are available at the District. However, the cost-effectiveness criteria for BACT is still applied to all control alternatives.

If the applicant chooses the "top" control option, it is not necessary to provide information on other alternatives. In this event, the applicant should simply document that the option chosen is the most stringent.

As the BACT analysis proceeds, options may be eliminated from consideration if they are demonstrated to be technically infeasible (including unacceptable energy or environmental impacts which make the control option infeasible) or not cost-effective on a case-by-case basis. However, all control options for the emissions unit under review should initially be identified.

Step 2: Eliminate Technically Infeasible Options

In the second step, the applicant should evaluate the technical feasibility of the control options identified in Step 1. Technically infeasible control options are eliminated from further consideration in the BACT analysis. For a control option to be deemed technically infeasible, the applicant must provide clear documentation of the technical difficulties based on physical, chemical and good engineering principles. Unacceptable and unmitigable energy and environmental impacts may also be considered in determining whether a control option is technically feasible.

For example, in cases where the control efficiency is not expected to be achieved in practice, supporting documentation showing why it is technically infeasible should be provided to eliminate that control efficiency (but not necessarily the technology) from further consideration. However, District specification of a certain technology or emission rate on a permit for a like emission unit may demonstrate that the specified control is technically feasible.

Step 3: Rank Remaining Technologies by Control Effectiveness
The applicant should rank the remaining technically feasible control alternatives by control efficiency, starting with the most stringent control alternative at the top of the list. A separate list is required for each pollutant and emission unit (or grouping of similar units) that is subject to a BACT analysis. The list should include the following information for each alternative:

- control efficiencies (percentage pollutant removed);
- expected emission rate (tons per year, pounds per hour);
- expected emissions reduction (tons per year);

Step 4: Determine the Cost-effective Values of the Most Efficient Controls
After identifying the technically feasible control options, the applicant should determine the cost-effectiveness of the most stringent control alternative. If the cost-effectiveness value is higher than the value found in Table 2.3, then the next most stringent control alternative is evaluated. This process proceeds until a cost-effective control technology is determined. The control technology which achieves the highest control efficiency and is cost-effective would be considered BACT.

Step 5: Select BACT
In the final step, the applicant proposes the most stringent remaining control option that has been evaluated as cost-effective for the pollutant and emission unit under review as BACT.

In the event that the most stringent control option which is technically feasible and cost-effective is not chosen, the applicant must justify this decision. The next most stringent alternative in the listing is then evaluated.

The applicant should submit the complete BACT analysis to the District for review. The analysis should include a list of all technologies that were considered, an explanation of why a control technology was determined to be technologically infeasible, the control efficiencies and cost-effectiveness (annualized dollars/tons per year of emissions reduced) of each technology evaluated, a statement proposing a specific technology as BACT and any other supporting documentation.

APPENDIX A

REFERENCES

CALIFORNIA AIR POLLUTION CONTROL OFFICERS ASSOCIATION (CAPCOA), *A Compilation of California BACT Determinations Received by the CAPCOA BACT Clearinghouse (Second Edition)*, Stationary Source Division, California Air Resources Board, California Environmental Protection Agency.

SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT, *Best Available Control Technology Clearinghouse,* Permit Services Division.

SOUTH COAST AIR QUALITY MANAGEMENT DIVISION, *Best Available Control Technology (BACT) Guidelines,* Office of Operations, Engineering Division.

U.S. ENVIRONMENTAL PROTECTION AGENCY, *RACT/BACT/LAER Clearinghouse: A Compilation of Control Technology Determinations,* Office of Air Quality Planning and Standards.

APPENDIX B

LIST OF COMMONLY USED ACRONYMS

A/C	Authority to Construct
A/P	Achieved in Practice
APCD	Air Pollution Control District
ARB	Air Resources Board
BACT	Best Available Control Technology
BTU	British Thermal Units
CAA	Clean Air Act
CAPCOA	California Air Pollution Control Officers Association
CFR	Code of Federal Regulations
CO	Carbon Monoxide
EPA	Environmental Protection Agency
FGR	Flue Gas Recirculation
I.C. Engine	Internal Combustion Engine
LAER	Lowest Achievable Emission Rate
NG	Natural Gas
NOx	Oxides of Nitrogen
NSR	New Source Review
PM	Particulate Matter
P/O	Permit to Operate
RACT	Reasonably Achievable Control Technology
SCAQMD	South Coast Air Quality Management District
SOx	Oxides of Sulfur
T/F	Technologically Feasible
VOC	Volatile Organic Compound

APPENDIX C

GLOSSARY OF TERMS

Emission Unit means any article, machine, equipment, contrivance, process or process line, which emit(s) or reduce(s) or may emit or reduce the emission of any air contaminant.

New Emission Unit means any of the following:

(i) Any emission unit not constructed or installed in San Diego County as of December 17, 1997, or which was constructed, installed or operated without a valid Authority to Construct or Permit to Operate from the District, except as provided for in Rule 20.1 Subsection (b)(1).

(ii) Any emission unit which was inactive for a one-year period or more and which did not hold a valid Permit to Operate during that period.

NSR Rules are the District New Source Review Rules, Rules 20.1 through 20.8.

Potential to Emit means the maximum quantity of air contaminant emissions, including fugitive emissions, that an emission unit is capable of emitting or permitted to emit, calculated pursuant to Rule 20.1 Section (d).