

SMAQMD BACT CLEARINGHOUSE

ACTIVE

CATEGORY Type:

BOILER

BACT Category: Small Emitter BACT (PTE < 10 lb/day)

BACT Determination Number: 353	BACT Determination Date: 5/1/2024
---------------------------------------	--

Equipment Information

Permit Number: N/A -- Generic BACT Determination
Equipment Description: BOILER > 5 MMBTU
Unit Size/Rating/Capacity: ≥ 5 to ≤ 20 MMBtu/hr Natural gas or LPG fired
Equipment Location:

BACT Determination Information

District Contact: Jeff Quok Phone No.: (279) 207-1145 email: jquok@airquality.org

ROCs	Standard:	PUC quality natural gas or propane with LPG backup
	Technology Description:	
	Basis:	Achieved in Practice
NOx	Standard:	See Technology Description and Comments for BACT Standards
	Technology Description:	Firetube Boilers: < 9.8 MMBtu/hr: 7 ppm at 3% O2 or 0.0085 lb/MMBtu ≥ 9.8 MMBtu/hr: 5 ppm at 3% O2 or 0.0061 lb/MMBtu
	Basis:	Achieved in Practice
SOx	Standard:	PUC quality natural gas or propane with LPG backup
	Technology Description:	
	Basis:	Achieved in Practice
PM10	Standard:	PUC quality natural gas or propane with LPG backup
	Technology Description:	
	Basis:	Achieved in Practice
PM2.5	Standard:	PUC quality natural gas or propane with LPG backup
	Technology Description:	
	Basis:	Achieved in Practice
CO	Standard:	400 ppm @ 3% O2
	Technology Description:	
	Basis:	Achieved in Practice
LEAD	Standard:	No Standard
	Technology Description:	
	Basis:	

Comments: BACT for NOx continued:
 All other boilers:
 < 7.6 MMBtu/hr: 9 ppm at 3% O2 or 0.011 lb/MMBtu
 ≥ 7.6 MMBtu/hr: 5 ppm at 3% O2 or 0.0061 lb/MMBtu

SMAQMD BACT CLEARINGHOUSE

ACTIVE

CATEGORY Type:

BOILER

BACT Category: Small Emitter BACT (PTE < 10 lb/day)

BACT Determination Number: 354	BACT Determination Date: 5/1/2024
---------------------------------------	--

Equipment Information

Permit Number: N/A -- Generic BACT Determination
Equipment Description: BOILER > 5 MMBTU
Unit Size/Rating/Capacity: Rental, ≥ 5 to ≤ 20 MMBtu/hr Natural gas or LPG fired
Equipment Location:

BACT Determination Information

District Contact: Jeff Quok Phone No.: (279) 207-1145 email: jquok@airquality.org

ROCs	Standard:	PUC quality natural gas or propane with LPG backup
	Technology Description:	
	Basis:	
NOx	Standard:	See Technolgy Description for BACT Standards
	Technology Description:	Firetube Boilers: 7 ppm at 3% O2 or 0.0085 lb/MMBtu All Other Boilers: 9 ppm at 3% O2 or 0.011 lbs/MMBtu
	Basis:	
SOx	Standard:	PUC quality natural gas or propane with LPG backup
	Technology Description:	
	Basis:	
PM10	Standard:	PUC quality natural gas or propane with LPG backup
	Technology Description:	
	Basis:	
PM2.5	Standard:	PUC quality natural gas or propane with LPG backup
	Technology Description:	
	Basis:	
CO	Standard:	400 ppm @ 3% O2
	Technology Description:	
	Basis:	
LEAD	Standard:	No Standard
	Technology Description:	
	Basis:	

Comments: This is a generic BACT determination based on BACT determinations made, and published, by other air agencies in California and/or other States.



BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

DETERMINATION NOS.: 353 & 354
DATE: 5/1/2024
ENGINEER: Jeffrey Quok

Category/General Equip Description: Boiler/Heater – Natural Gas or LPG Fired

#353 – Boiler/heater natural gas or LPG fired, ≥ 5 MMBtu/hr to ≤ 20 MMBtu/hr

Equipment Specific Description: **#354** – Rental Boiler/Heater Natural Gas or LPG Fired, ≥ 5 MMBtu/hr to ≤ 20 MMBtu/hr

Equipment Size/Rating: Small Emitter BACT

Previous BACT Det. No.: N/A

This determination will focus on both stationary and rental natural gas and LPG boilers/heaters, 5 MMBtu/hr to 20 MMBtu/hr, which include external combustion equipment used to produce hot water or steam and units which transfer heat from combustion gases to water or process streams. Heaters do not include any dryer in which the material being dried is in direct contact with the products of combustion, cement or lime kilns, glass melting furnaces, or smelters. Rental boilers are units that are rented out to provide facilities temporary support to increase capacity or to provide temporary support while boilers are under repair or replacement.

The District’s Small Emitter and “Otherwise-Exempt Equipment” BACT Determinations policy (dated 5/16/2019) states that units which are classified as small emitters (less than 10 lbs/day of VOC, NOx, SOx, PM10, or PM2.5 and less than 550 lbs/day of CO) and are located at non-major stationary sources are only required to meet BACT standards that have been achieved in practice. Therefore, this BACT determination will only be based on what is achieved in practice and will only be applied to small emitters at non-major sources. BACT will be evaluated on a case-by-case basis for units that do not fit these criteria.

BACT/T-BACT ANALYSIS

A. ACHIEVED IN PRACTICE (Rule 202, §205.1a):

The following control technologies are currently employed as BACT/T-BACT for boilers/heaters 5 MMBtu/hr to 20 MMBtu/hr by the following air pollution control districts:

US EPA

BACT

Source: [EPA RACT/BACT/LAER Clearinghouse](#) (See Attachment A)

RBLC ID: [KY-0115](#)

For Natural Gas, 18.0 MMBtu/hr Boiler	
VOC	0.0055 lb/MMBtu (Good combustion practices)
NOx	0.05 lb/MMbtu (41 ppm @ 3% O ₂) (Good combustion practices, low NOx burner)
SOx	0.006 lb/MMBtu (Good combustion practices)
PM10	0.0076 lb/MMBtu (Good combustion practices)
PM2.5	0.0076 lb/MMBtu (Good combustion practices)
CO	0.084 lb/MMBtu (Good combustion practices)

This BACT determination was found to be the most stringent Achieved in Practice BACT determination published in the EPA clearinghouse. See Attachment A for more information.

Note: The BACT emission limits for VOC, SOx, PM10, PM2.5, and CO are based on good combustion practices and not verified through testing. Therefore, BACT will be considered good combustion practices.

T-BACT

There are no T-BACT standards published in the clearinghouse for this category.

RULE REQUIREMENTS:

[40 CFR 60 Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units](#)

This regulation applies to steam generating units rated at between 10-100 MMBtu/hr. However, no standards within the subpart are applicable to units fired by natural gas or LPG only. Therefore, this NSPS is not applicable.

California Air Resource Board (CARB)

BACT

Source: [ARB BACT Clearinghouse](#)

[CARB BACT Guidelines Search](#)

There are no applicable BACT standards published in the clearinghouse for this category. The BACT Guidelines search contained BACTs from BAAQMD, SMAQMD, and SCAQMD that will be reviewed in the specific District evaluations in this Determination.

T-BACT

Source: [ARB BACT Clearinghouse](#)
[CARB BACT Guidelines Search](#)

There are no T-BACT standards published in the clearinghouse for this category.

RULE REQUIREMENTS:

None.

Sacramento Metropolitan AQMD

BACT

Source: [SMAQMD BACT Clearinghouse](#)

BACT #283 Boilers 5 MMBtu/hr to 20 MMBtu/hr, natural gas or LPG fired	
VOC	Good combustion practice and natural gas or LPG fuel
NOx	Firetube boilers: 7 ppm at 3% O ₂ or 0.0085 lbs/10 ⁶ Btu Non-atmospheric units: 9 ppmvd at 3% O ₂ or 0.011 lbs/10 ⁶ Btu Atmospheric units and thermal fluid heaters: 12 ppmvd at 3% O ₂ or 0.015 lbs/10 ⁶ Btu
SOx	Good combustion practice and natural gas or LPG fuel
PM10	Good combustion practice and natural gas or LPG fuel
PM2.5	Good combustion practice and natural gas or LPG fuel
CO	Firetube Boilers: 50 ppmvd at 3% O ₂ Watertube Boilers: 100 ppmvd at 3% O ₂

T-BACT

No T-BACT Determinations for this category in the Clearinghouse.

RULE REQUIREMENTS:

[Rule 411 – NOx from Boilers, Process Heaters, and Steam Generators](#) (8-23-2007)

For units with a rating of ≥ 5 and ≤ 20 MMBTU/hr, emissions shall not exceed the following levels:

1. 15 ppmvd of NOx corrected to 3% O₂
2. 400 ppmvd of CO corrected to 3% O₂

South Coast AQMD

BACT

Source: [SCAQMD BACT Guidelines for Non-Major Polluting Facilities, page 13 & 14 \(9/2/2022\)](#)

For natural gas fired with a rating of > 2 and < 20 MMBTU/hr :	
VOC	No Standard
NOx	Compliance with SCAQMD Rules 1146 or 1146.1 (12-02-2016)
SOx	Natural Gas
PM10	Natural Gas
PM2.5	No standard
CO	Firetube Boiler: 50 ppmvd corrected to 3% O ₂ Watertube Boiler: 100 ppmvd corrected to 3% O ₂

SCAQMD's BACT Guidelines Overview (<https://www.aqmd.gov/docs/default-source/bact/bact-guidelines/overview.pdf>), page 10 explains that CO is not subject to NSR or BACT. The guideline explains that BACT is only triggered when emission increases exceed or equal 1.0 pound per day for any nonattainment air contaminant, any ozone depleting compound, or ammonia. Since CO is in attainment in SCAQMD, not an ozone depleting compound, or ammonia, CO is not subject to BACT.

For propane fired with a rating of > 2 and < 20 MMBTU/hr :	
VOC	No Standard
NOx	Compliance with SCAQMD Rules 1146 or 1146.1 (12-02-2016)
SOx	No Standard
PM10	No Standard
PM2.5	No standard
CO	Firetube Boiler: 50 ppmvd corrected to 3% O ₂ Watertube Boiler: 100 ppmvd corrected to 3% O ₂

For Atmospheric^(A) unit with a rating of > 2 and ≤ 10 MMBTU/hr :	
VOC	No Standard
NOx	Compliance with SCAQMD Rules 1146 or 1146.1 (12-02-2016) (12 ppm corrected to 3% O ₂ or 0.015 lbs/10 ⁶ BTU)
SOx	No Standard
PM10	No Standard
PM2.5	No standard
CO	Compliance with SCAQMD Rules 1146 or 1146.1 (12-02-2016) (400 ppm corrected to 3% O ₂ or 0.3 lbs/10 ⁶ BTU)

(A) Atmospheric unit is defined as natural gas fired unit with a heat input less than or equal to 10 MMBtu/hr with a non-sealed combustion chamber in which natural draft is used to exhaust combustion gases.

T-BACT

There are no T-BACT standards published in the clearinghouse for this category.

RULE REQUIREMENTS:

[Reg XI, Rule 1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters \(12-4-2020\)](#)

Requirements Table 1146-1

Category	NOx Limit for Units ≥ 5 MMBTU/hr
Atmospheric Units	12 ppmvd @ 3% O ₂ or 0.015 lbs/10 ⁶ BTU
Group III Units ^(A) (Fire-tube boilers, excluding units with a previous NOx limit less than or equal to 12 ppm and greater than 9 ppm prior to 12/7/18)	7 ppm @ 3% O ₂ or 0.0085 lbs/10 ⁶ Btu
Group III Units ^(A) (All Others)	9 ppm @ 3% O ₂ or 0.011 lbs/10 ⁶ Btu
Thermal Fluid Heaters	12 ppm @ 3% O ₂ or 0.015 lbs/10 ⁶ Btu

(A) GROUP III UNIT means any unit burning gaseous fuels, excluding digester and landfill gases, with a rated heat input less than 20 million Btu per hour down to and including 5 million Btu per hour, and all units operated at schools and universities greater than or equal to 5 million Btu per hour, excluding atmospheric units and thermal fluid heaters.

(B) Atmospheric unit is defined as any natural gas fired unit with a heat input less than or equal to 10 million Btu per hour with a non-sealed combustion chamber in which natural draft is used to exhaust combustion gases.

All units rated greater than or equal to 5 MMBtu/hr must have CO emissions ≤ 400 ppmvd @ 3% O₂.

San Joaquin Valley APCD

BACT

Source: [SJVAPCD BACT Guideline 1.1.1 \(11/30/22\)](#)

For natural gas or propane fired boilers/steam generators with heat input rate greater than 5 MMBtu/hr and less than or equal to 20 MMBTU/hr:	
VOC	PUC quality natural gas or propane with LPG backup
NOx	5 ppm @ 3% O ₂ (0.0061 lb/MMBtu)
SOx	PUC quality natural gas or propane with LPG backup
PM10	PUC quality natural gas or propane with LPG backup
PM2.5	No Standard
CO	50 ppm @ 3% O ₂ (0.037 lb/MMBtu)

SJVAPCD has a BACT trigger level of 2.0 lbs/day for all criteria pollutants except CO. Therefore, the 5 ppm at 3% O₂ NOx standard should only apply if the boiler emits greater than 2.0 lbs/day NOx.

After discussions with R.F. MacDonald Company, it was found that current boiler rental fleets in this size category can only meet 9 ppm NOx at 3% O₂ (See Attachment B). Since no rental boilers in this size category can currently meet the 5 ppm NOx standards, SJVAPCD's NOx standard will be considered not achieved in practice for rental boilers.

SJVAPCD's BACT trigger level for CO is 200,000 lbs/year and greater for the post project stationary source potential to emit. This is equivalent to SMAQMD's Major Source and Major Modification thresholds. For a 20 MMBtu/hr boiler at 400 ppmv CO, the annual Potential to Emit is 51,807 lbs/year. Since this is a small emitter BACT determination, the 50 ppm @ 3% O₂ standard for CO will not be considered achieved in practice for this BACT analysis.

T-BACT

There are no T-BACT standards published in the clearinghouse for this category.

RULE REQUIREMENTS:

[Rule 4306 – Boilers, Steam Generators, and Process Heaters – Phase 3 \(12-17-2020\)](#)

This rule applies to any gaseous fuel or liquid fuel boiler, steam generator, or process heater with a total rated heat input greater than 5 MMBtu/hr.

Until 12/31/23

Type (Gaseous Fuel Fired)	NOx Limit ppmvd @ 3% O ₂	CO Limit ppmvd @ 3% O ₂
Units with a rated heat input equal to or less than 20.0 MMBtu/hr except categories oilfield steam generators, refinery units, load following units, and units limited to an annual heat input of 9 billion Btu/year to 30 billion Btu/year	15 or 0.018 lb/MMBtu	400
Units limited to an annual heat input of 9 billion Btu/year to 30 billion Btu/year	30 or 0.036 lb/MMBtu	400

After 12/31/23

Units with a total rated heat input > 5.0 MMBtu/hr and ≤ 20.0 MMBtu/hr, except for categories C through E		
Type (Gaseous Fuel Fired)	NOx Limit ppmvd @ 3% O ₂	CO Limit ppmvd @ 3% O ₂
Fire Tube Boilers	7 or 0.0085 lb/MMBtu	400
Units at Schools	9 or 0.011 lb/MMBtu	400
Thermal Fluid Heaters	9 or 0.011 lb/MMBtu	400
All other units	9 or 0.011 lb/MMBtu	400

[Rule 4320 – Advanced Emission Reduction Options for Boilers, Steam Generators, and Process Heaters Greater than 5.0 MMBtu/hr \(12-17-2020\)](#)

This rule applies to any gaseous fuel or liquid fuel boiler, steam generator, or process heater with a total rated heat input greater than 5 MMBtu/hr.

An operator of a unit(s) subject to this rule shall comply with all applicable requirements of the rule and one of the following, on a unit-by-unit basis:

1. Operate the unit to comply with the emission limits specified in Sections 5.2 and 5.4; or
2. Pay an annual emissions fee to the District as specified in Section 5.3 and comply with the control requirements specified in Section 5.4; or
3. Comply with the applicable Low-use Unit requirements of Section 5.5.

Section 5.2, Table 2 NOx Emission Limits:

Units with a total rated heat input > 5.0 MMBtu/hr and ≤ 20.0 MMBtu/hr, except for categories C through E		
Type (Gaseous Fuel Fired)	NOx Limit ppmvd @ 3% O ₂	CO Limit ppmvd @ 3% O ₂
Fire Tube Boilers	5 or 0.0061 lb/MMBtu	400

Units with a total rated heat input > 5.0 MMBtu/hr and ≤ 20.0 MMBtu/hr, except for categories C through E		
Type (Gaseous Fuel Fired)	NOx Limit ppmvd @ 3% O₂	CO Limit ppmvd @ 3% O₂
Units at Schools	9 or 0.011 lb/MMBtu	400
Thermal Fluid Heaters	9 or 0.011 lb/MMBtu	400
All other units	5 or 0.0061 lb/MMBtu	400

Section 5.3: Annual Fee Calculation

On and after January 1, 2010, an operator with units that will comply with the requirements of Section 5.1.2 in lieu of complying with Section 5.2 Table 1 SJVUAPCD 4320 – 10 12/17/2020 shall pay a total annual fee to the District based on the total NOx emissions from those units.

Section 5.4: Particulate Matter Control Requirements

5.4.1 To limit particulate matter emissions, an operator shall comply with one of the following requirements:

5.4.1.1 On and after the applicable NOx Compliance Deadline specified in Section 5.2 Table 1, operators shall fire units exclusively on PUC-quality natural gas, commercial propane, butane, or liquefied petroleum gas, or a combination of such gases;

5.4.1.2 On and after the applicable NOx Compliance Deadline specified in Section 5.2 Table 1, operators shall limit fuel sulfur content to no more than five (5) grains of total sulfur per one hundred (100) standard cubic feet; or

5.4.1.3 On and after the applicable NOx Compliance Deadline specified in Section 5.2 Table 1, operators shall install and properly operate an emission control system that reduces SO₂ emissions by at least 95% by weight; or limit exhaust SO₂ to less than or equal to 9 ppmv corrected to 3.0% O₂.

5.4.1.4 Notwithstanding the compliance deadlines indicated in Sections 5.4.1.1 through 5.4.1.3, refinery units, which require modification of refinery equipment to reduce sulfur emissions, shall be in compliance with the applicable requirement in Section 5.4.1 no later than July 1, 2013.

Section 5.5: Low-use Unit

This exemption only applies to “each unit was installed prior to January 1, 2009 and is limited to less than or equal to 1.8 billion Btu per calendar year heat input pursuant to a District Permit to Operate”.

Rule 4320 has lower NOx limits than Rule 4306. However, Rule 4320 has an alternate compliance option of paying an annual emissions fee instead of meeting the NOx limits of Section 5.2. SJVAPCD’s Public Permits Information Portal (<https://apps.valleyair.org/PublicPermits/Search/Permit>) was searched and no boilers in this

BACT Category are permitted at 5 ppm NOx. Therefore, the NOx standards of Rule 4320 won't be considered Achieved in Practice.

San Diego County APCD

BACT

Source: [NSR Requirements for BACT, page 3-5 \(6/2011\)](#)

For boiler with a rating of < 50 MMBTU/hr :	
VOC	NG or LPG fuel (If using NG or LPG fuel)
NOx	1. 9 ppmvd corrected to 3% O ₂ 2. Low NOx burner, FGR, and oxygen controller (If using NG or LPG fuel) 3. Low NOx burner, FGR, and oxygen controller (If using No. 2 oil as a backup fuel)
SOx	1. NG or LPG fuel (If using NG or LPG fuel) 2. No. 2 fuel oil with < 0.05% sulfur content (If using No. 2 oil as a backup fuel)
PM10	1. 0.10 gr/dscf (verified by use of NG or LPG fuel) 2. NG or LPG fuel (If using NG or LPG fuel) 3. Low ash fuel (If using No. 2 oil as a backup fuel)
PM2.5	Natural gas or LPG fuel
CO	No Standard

SDCAPCD has a BACT threshold of 10.0 lbs/day. Therefore, SDAPCD's BACT standards should only apply if the boiler emits greater than 10.0 lbs/day of the applicable pollutant type.

At 9 ppm NOx at 20.0 MMBtu/hr boiler would emit 5.2 lbs/day. Therefore, this BACT would not be applicable for this size category range for this BACT.

T-BACT

There are no T-BACT standards published in the clearinghouse for this category.

RULE REQUIREMENTS:

[Regulation 4, Rule 69.2 – Industrial and Commercial Boilers, Process Heaters and Steam Generators \(9-27-1994\)](#)

This rule applies to any unit with a heat input rating of 5 MMBtu/hr or more.

Equipment Type	Fuel	Heat Input Rating (Btu per hour)	Concentration of NOx (ppmv at 3% O₂)	Concentration of CO (ppmv at 3% O₂)
New Unit	Gaseous Fuel	Greater than or equal to 5 MMBtu/hr	30	400

Bay Area AQMD

BACT

Source: [BAAQMD BACT Workbook](#)

<u>BACT Guideline 17.1.1 (8/4/2010)</u>	
For boiler with a rating of 5 to < 33.5 MMBTU/hr :	
VOC	Good Combustion Practice
NOx	Low NOx burners and Flue Gas Recirculation
SOx	Natural gas with \leq 100 ppmvd total reduced sulfur
PM10	Natural gas
PM2.5	Natural gas
CO	Firetube Boiler: 50 ppmvd corrected to 3% O ₂ Watertube Boiler: 100 ppmvd corrected to 3% O ₂

BAAQMD has a BACT threshold of 10.0 lbs/day. Therefore, BAAQMD's BACT standards should only apply if the boiler emits greater than 10.0 lbs/day of the applicable pollutant type.

T-BACT

There are no T-BACT standards published in the clearinghouse for this category.

RULE REQUIREMENTS:

[Regulation 9, Rule 7 – Nitrogen Oxides and Carbon Monoxide from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters \(5-4-2011\)](#)

For units with a rating of greater than 5 MMBtu/hr and less than 20 MMBtu/hr:

1. NOx limit of 15 ppmvd corrected to 3% O₂
2. CO limit of 400 ppmvd corrected to 3% O₂

For units with a rating of 20 MMBtu/hr and less than 75 MMBtu/hr:

1. NOx limit of 9 ppmvd corrected to 3% O₂
2. CO limit of 400 ppmvd corrected to 3% O₂

Summary of Achieved in Practice Control Technologies

The following control technologies have been identified and are ranked based on stringency:

SUMMARY OF ACHIEVED IN PRACTICE CONTROL TECHNOLOGIES	
VOC	<ol style="list-style-type: none"> 1. PUC quality natural gas or propane with LPG backup – [SJVACPD] 2. Good combustion practice and natural gas or LPG fuel – [SMAQMD] 3. Good combustion practice – [BAAQMD, US EPA] 4. NG or LPG fuel (If using NG or LPG fuel) – [SDCAPCD] 5. No standard – [CARB, SCAQMD]
NOx	<p><u>For Stationary Boilers</u></p> <ol style="list-style-type: none"> 1. 5 ppm at 3% O₂ or 0.0061 lb/MMBtu, if PTE is ≥ 2.0 lbs/day For Firetube boilers: 7 ppmvd or 0.0085 lb/MMBtu at 3% O₂ For all other units: 9 ppmvd or 0.011 lb/MMBtu at 3% O₂ [SJVAPCD]^(A) 2. For Firetube boilers: 7 ppm at 3% O₂ or 0.0085 lbs/10⁶ Btu For Atmospheric Units or Thermal Fluid Heaters: 12 ppm at 3% O₂ or 0.015 lbs/10⁶ Btu For all others: 9 ppm at 3% O₂ or 0.011 lbs/10⁶ Btu [SMAQMD, SCAQMD] 3. 15 ppmvd corrected to 3% O₂ – [BAAQMD] 4. 0.05 lb/MMBtu (41 ppmvd @ 3% O₂) [US EPA] 5. Low NOx burner, FGR, and oxygen controller (If using NG or LPG fuel) – [SDCAPCD] 6. Low NOx burner, FGR, and oxygen controller (If using No. 2 oil as a backup fuel) – [SDCAPCD] <p><u>For Rental Boilers^(B)</u></p> <ol style="list-style-type: none"> 1. For Firetube boilers: 7 ppmvd or 0.0085 lb/MMBtu at 3% O₂ For all other units: 9 ppmvd or 0.011 lb/MMBtu at 3% O₂ [SJVAPCD] 2. 15 ppmvd corrected to 3% O₂ – [BAAQMD] 3. 0.05 lb/MMBtu (41 ppmvd @ 3% O₂) [US EPA] 4. Low NOx burner, FGR, and oxygen controller (If using NG or LPG fuel) – [SDCAPCD] 5. Low NOx burner, FGR, and oxygen controller (If using No. 2 oil as a backup fuel) – [SDCAPCD]
SOx	<ol style="list-style-type: none"> 1. PUC quality natural gas or propane with LPG backup – [SJVAPCD] 2. Good combustion practice and natural gas or LPG fuel [SMAQMD, US EPA] 3. Use of natural gas or LPG fuel^(C) (If using NG or LPG fuel) – [SCAQMD, SDCAPCD] 4. Natural gas or treated refinery gas fuel with ≤ 100 ppmv total reduced sulfur – [BAAQMD] 5. No. 2 fuel oil with < 0.05% sulfur content (If using No. 2 oil as a backup fuel) – [SDCAPCD]

SUMMARY OF ACHIEVED IN PRACTICE CONTROL TECHNOLOGIES	
PM10	1. PUC quality natural gas or propane with LPG backup – [SJVAPCD] 2. Good combustion practice and use of natural gas or LPG fuel – [SMAQMD, US EPA] ^(C) 3. 0.10 gr/dscf (verified by use of NG or LPG fuel) – [SDCAPCD] ^(D) 4. Natural gas or treated refinery gas fuel – [BAAQMD] 5. Low ash fuel (If using No. 2 oil as a backup fuel) – [SDCAPCD] 6. No standard – [SCAQMD]
PM2.5^(E)	1. PUC quality natural gas or propane with LPG backup – [SJVAPCD] 2. Good combustion practice and use of natural gas or LPG fuel – [SMAQMD, US EPA] ^(C) 3. 0.10 gr/dscf (verified by use of NG or LPG fuel) – [SDCAPCD] ^(D) 4. Natural gas or treated refinery gas fuel – [BAAQMD] 5. Low ash fuel (If using No. 2 oil as a backup fuel) – [SDCAPCD] 6. No standard – [SCAQMD]
CO	1. 400 ppm of CO corrected to 3% O ₂ – [SDCAPCD, BAAQMD] 2. Good combustion practices [US EPA]

- (A) SJVAPCD has a BACT threshold of 2.0 lbs/day. Therefore, the 5 ppm at 3% O₂ NO_x standard should only apply if the boiler emits greater than 2.0 lbs/day NO_x.
- (B) The SJVAPCD prohibitory rule standards would be the most stringent achieved in practice standards for rental boilers. They don't have a separate standard for rental boilers in the rule.
- (C) Pursuant to the SCAQMD's BACT Clean Fuel Guidelines, the use of LPG is equivalent to natural gas.
- (D) The 0.10 gr/dscf limit has not been demonstrated to be achieved in practice by source testing, it has only been assumed to be achievable by the use of natural gas or LPG. Therefore, the use of natural gas or LPG when natural gas is not available will be considered Achieved in Practice BACT.
- (E) PM2.5 BACT will be considered equivalent to PM10 BACT.

The following control technologies have been identified as the most stringent, achieved in practice control technologies:

Since 2.0 lbs/day is the BACT threshold for SJVAPCD, BACT for NO_x is based on SJVAPCD's BACT standard for units emitting 2.0 lbs/day of NO_x or greater. For units emitting less than 2.0 lbs/day of NO_x, BACT is based on the next most stringent BACT standard from SMAQMD and SCAQMD.

The stationary boiler ratings where the SMAQMD and SCAQMD BACT standards would apply are 9.8 MMBtu/hr for firetube boilers and 7.6 MMBtu/hr for all other boilers. These thresholds were calculated using the firetube boiler standard of 7 ppm NO_x and all other boiler standard of 9 ppm NO_x to find the unit rating where 2.0 lbs/day of NO_x is emitted (these were the previous BACT standards for NO_x determined by SMAQMD).

BEST CONTROL TECHNOLOGIES ACHIEVED		
Pollutant	Standard	Source
VOC	PUC quality natural gas or propane with LPG backup	SJVAPCD
NOx	<p><u>For Stationary Boilers</u></p> <p><u>Firetube Boilers</u> < 9.8 MMBtu/hr: 7 ppm at 3% O₂ or 0.0085 lb/MMBtu ≥ 9.8 MMBtu/hr: 5 ppm at 3% O₂ or 0.0061 lb/MMBtu</p> <p><u>All Other Boilers</u> < 7.6 MMBtu/hr: 9 ppm at 3% O₂ or 0.011 lb/MMBtu ≥ 7.6 MMBtu/hr: 5 ppm at 3% O₂ or 0.0061 lb/MMBtu</p>	SJVAPCD
	<p><u>For Rental Boilers</u></p> <p><u>Firetube Boilers</u> 7 ppm at 3% O₂ or 0.0085 lb/MMBtu</p> <p><u>All Other Boilers</u> 9 ppm at 3% O₂ or 0.011 lbs/MMBtu</p>	SJVAPCD
SOx	PUC quality natural gas or propane with LPG backup	SJVAPCD
PM10	PUC quality natural gas or propane with LPG backup	SJVAPCD
PM2.5	PUC quality natural gas or propane with LPG backup	SJVAPCD
CO	400 ppm at 3% O ₂	SDAPCD BAAQMD

B. TECHNOLOGICALLY FEASIBLE AND COST EFFECTIVE (Rule 202, §205.1.b.):

As stated previously, the District’s Small Emitter and “Otherwise-Exempt Equipment” BACT Determinations policy (dated 5/16/2019) states that units which are classified as small emitters (less than 10 lbs/day of VOC, NOx, SOx, PM10, or PM2.5 and less than 550 lbs/day of CO) and are located at non-major stationary sources are only required to meet BACT standards that have been achieved in practice. Therefore, this BACT determination will only be based on what is achieved in practice and will only be applied to small emitters at non-major sources. BACT will be evaluated on a case-by-case basis for units that do not fit these criteria.

C. SELECTION OF BACT:

Based on the above analysis, BACT for VOC, NOx, SOx, PM10, and CO will remain at what is currently achieved in practice and BACT for PM2.5 will be set to be the same as for PM10.

BACT #353 for Boiler/heater natural gas or LPG fired ≥ 5 MMBtu/hr to ≤ 20 MMBtu/hr		
Pollutant	Standard	Source
VOC	PUC quality natural gas or propane with LPG backup	SJVUAPCD
NOx	<u>Firetube Boilers</u> < 9.8 MMBtu/hr: 7 ppm at 3% O ₂ or 0.0085 lb/MMBtu ≥ 9.8 MMBtu/hr: 5 ppm at 3% O ₂ or 0.0061 lb/MMBtu <u>All other boilers</u> < 7.6 MMBtu/hr: 9 ppm at 3% O ₂ or 0.011 lb/MMBtu ≥ 7.6 MMBtu/hr: 5 ppm at 3% O ₂ or 0.0061 lb/MMBtu	SJVUAPCD
SOx	PUC quality natural gas or propane with LPG backup	SJVUAPCD
PM10	PUC quality natural gas or propane with LPG backup	SJVUAPCD
PM2.5	PUC quality natural gas or propane with LPG backup	SJVUAPCD
CO	400 ppm @ 3% O ₂	SDAPCD BAAQMD

BACT #354 for Rental Boiler/heater natural gas or LPG fired ≥ 5 MMBtu/hr to ≤ 20 MMBtu/hr		
Pollutant	Standard	Source
VOC	PUC quality natural gas or propane with LPG backup	SJVUAPCD
NOx	<u>Firetube Boilers</u> 7 ppm at 3% O ₂ or 0.0085 lb/MMBtu <u>All Other Boilers</u> 9 ppm at 3% O ₂ or 0.011 lbs/MMBtu	SJVUAPCD
SOx	PUC quality natural gas or propane with LPG backup	SJVUAPCD
PM10	PUC quality natural gas or propane with LPG backup	SJVUAPCD
PM2.5	PUC quality natural gas or propane with LPG backup	SJVUAPCD
CO	400 ppm @ 3% O ₂	SDAPCD BAAQMD

D: SELECTION OF T-BACT:

Toxics are in the form of VOCs and particulate matter. Since toxic emissions from natural gas fired boilers in the 5 MMBtu/hr to 20 MMBtu/hr size range are so small and the cancer risk is expected to be well below 1 in a million, T-BACT was not evaluated for this determination.

APPROVED BY: *Brian F Krebs*

DATE: 05-01-2024

Attachment A

Review of BACT Determinations published by EPA

List of BACT determinations published in EPA's RACT/BACT/LAER Clearinghouse (RBLC) for Commercial/Institutional-Sized Boilers/Furnaces < 100 Million BTU/H - Natural Gas (includes propane & liquefied petroleum gas) (Process Code 13.310):

RBLC	Permit Date	Process Code ^(A)	Process/Equipment	Pollutant	Standard	Control Technology	Case-By-Case Basis
MI-0420	6/3/16	13.310	Boiler 6.0 MMBtu/hr	NOx	14 ppmvd at 15% O ₂ (0.0516 lb/MMBtu)	Ultra Low NOx Burner	BACT-PSD
				CO	0.08 lb/MMBtu	Good combustion Practices and pipeline quality natural gas	BACT-PSD
				PM10	0.0075 lb/MMBtu	Good combustion Practices and pipeline quality natural gas	BACT-PSD
FL-0356	3/9/16	13.310	Heater 10.0 MMBtu/hr	NOx	0.1 lb/MMBtu	N/A	BACT-PSD
				SO2	2.0 gr.s/100 scf gas	Use of low-sulfur fuel	BACT-PSD
FL-0364	3/21/18	13.310	Heater 9.90 MMBtu/hr	VOC	0.005 lb/MMBtu	N/A	BACT-PSD
OH-0379	2/6/19	13.310	Boiler 15.17 MMBtu/hr	NOx	0.0418 lb/MMBtu	Low NOx Burners, good combustion practices, natural gas fuel	BACT-PSD
				PM	0.113 lb/hr (0.0075 lb/MMBtu)	Good combustion practices and natural gas fuel	BACT-PSD
AR-0171	2/14/19	13.310	Boiler 15.0 MMBtu/hr	NOx	0.1 lb/MMBtu	Low NOx Burners	BACT-PSD
				CO	0.084 lb/MMBtu	Good combustion practices	BACT-PSD
				PM10/2.5	0.0076 lb/MMBtu	Good combustion practices	BACT-PSD
				VOC	0.0055 lb/MMBtu	Good combustion practices	BACT-PSD
				SOx	0.006 lb/MMBtu	Good combustion practices	BACT-PSD
WI-0292	4/1/19	13.310	Space Heater 20.0 MMBtu/hr	VOC	0.0055 lb/MMBtu	Good combustion practices	BACT-PSD

RBLC	Permit Date	Process Code ^(A)	Process/Equipment	Pollutant	Standard	Control Technology	Case-By-Case Basis
WI-0297	12/10/19	13.310	Space Heater 8.5 MMBtu/hr	VOC	0.0055 lb/MMBtu	Good combustion practices	BACT-PSD
KY-0115	4/19/21	13.310	Boiler 18.0 MMBtu/hr	NOx	0.05 lb/MMBtu	Good combustion practices, low NOx burner	BACT-PSD
				CO	0.084 lb/MMBtu	Good combustion practices	BACT-PSD
				PM10/2.5	0.0076 lb/MMBtu	Good combustion practices	BACT-PSD
				VOC	0.0055 lb/MMBtu	Good combustion practices	BACT-PSD
				SOx	0.006 lb/MMBtu	Good combustion practices	BACT-PSD

(A) Process Code 13.310 includes commercial and industrial natural gas (includes propane and LPG) boilers < 100 million BTU/hr.

 = Selected as the most stringent BACT determination achieved in practice.

Attachment B

R.F. MacDonald Contact Rental Boiler Email

From: Anthony Marino <Anthony.Marino@RFMacDonald.com>
Sent: Friday, September 29, 2023 10:06 AM
To: Jeff Weiss <JWeiss@airquality.org>
Subject: RE: Temporary Boiler for Ampac Fine Chemicals

***** THIS EMAIL ORIGINATED OUTSIDE AIRQUALITY.ORG *****

No it will not. It will be hard pressed to find one at 5ppm at this point...
Most rental boilers are currently permitted at 9ppm. For rental purposes I feel that 9ppm would be a good place as they are only for temporary use and readily available. 7 ppm and 5ppm options are being developed and will be generally available in 2024 but it is at a significant cost to upgrade. As of now we only have units permitted to 9ppm.

Thanks,

Anthony Marino
R.F.MacDonald Co.
1016 North Market Blvd
Sacramento, CA 95834
209.747.1817 cell
916.696.6758 Sacramento Office
anthony.marino@RFMacDonald.com

From: Jeff Weiss <JWeiss@airquality.org>
Sent: Friday, September 29, 2023 10:04 AM
To: Anthony Marino <Anthony.Marino@RFMacDonald.com>
Subject: RE: Temporary Boiler for Ampac Fine Chemicals

Anthony,
Our BACT determination for boilers of this size category expired a few weeks ago, and a new BACT determination will likely be issued within a few weeks. I'm writing to give you a "heads-up" that the new BACT determination will likely require a boiler that emits no more than 5 ppm NOx at 3% oxygen. The main driver of this is a San Joaquin Valley APCD BACT that limits boiler to 5 ppm. Is your proposed 9 ppm boiler capable of emitting no more than 5 ppm NOx at 3% oxygen?

Thank you for your help,

Jeff Weiss
Associate Air Quality Engineer
Engineering and Compliance Division
Sac Metro AQMD
Phone: (279) 207-1155
www.AirQuality.org