

SMAQMD BACT CLEARINGHOUSE

ACTIVE

CATEGORY Type:

MISCILANEOUS

BACT Category: MINOR SOURCE BACT

BACT Determination Number: 329	BACT Determination Date: 12/28/2023
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Equipment Information

Permit Number: N/A -- Generic BACT Determination
Equipment Description: TANK DEGASSING
Unit Size/Rating/Capacity: ALL
Equipment Location:

BACT Determination Information

District Contact: VENK REDDY Phone No.: (279) 207-1146 email: vreddy@airquality.org

ROCs	Standard:	50 ppmv @ 3% O2 or 99% control
	Technology Description:	Carbon, Oxidizer
	Basis:	Achieved in Practice
NOx	Standard:	Various based on fuel and temp
	Technology Description:	Low NOx burner
	Basis:	Achieved in Practice
SOx	Standard:	95% reduction or 2 lbs/day
	Technology Description:	SOx capture technology
	Basis:	Achieved in Practice
PM10	Standard:	Propane or Natural Gas
	Technology Description:	Use of clean fuels
	Basis:	Achieved in Practice
PM2.5	Standard:	Propane or Natural Gas
	Technology Description:	Use of clean fuels
	Basis:	Achieved in Practice
CO	Standard:	1,000 ppmv
	Technology Description:	Low NOx burner
	Basis:	Achieved in Practice
LEAD	Standard:	N/A
	Technology Description:	
	Basis:	

Comments: NOx for Natural gas fuel is 20 ppmv @ 3% O2 or 0.024 lb/mmbtu
 NOx for all other fuels and fuel mixtures is 60 ppmv @ 3% O2



BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

DETERMINATION NOS.: 329
DATE: 3/3/2023
ENGINEER: Venk Reddy

Category/General Equip Description: Tank/Pipeline Degassing System
Equipment Specific Description: Thermal Oxidizing Unit - Portable with NOx emissions greater than 1 lb/day.
Equipment Size/Rating: Minor & Major Source BACT
Previous BACT Det. No.: 213

This BACT determination will be made for a portable thermal oxidizing unit serving a tank/pipeline at a refinery, bulk terminal, or fuel storage unit. This BACT determination will update determination #213.

The District reviewed all previously reviewed BACT clearinghouses and rules (EPA, CARB, SMAQMD, SCAQMD, SJVAPCD, SDCAPCD, SBAPCD, VCAPCD, BAAQMD, and Texas Commission on Environmental Quality) to determine if there have been any updates.

This determination will also include Best Available Control Technology for Toxics (T-BACT) for the hazardous air pollutants (HAP) associated with gaseous fuel combustion.

BACT/T-BACT ANALYSIS

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

The following control technologies are currently employed as BACT/T-BACT by the following agencies and air pollution control districts:

US EPA

BACT

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

From 1/1/2000 to 3/3/2023 there were 9 determinations entered that contain the search term degassing. Six of these determinations have to do with tank degassing for petroleum operations, which is typical for the application of this BACT. Of those nine, most do not have an emission limit but list a control efficiency of 98% destruction efficiency. Of the ones that have a VOC emission standard (LA-0315 for Methanol Degassing), the standard is 11.2 lb/hr of VOCs and (CA-1048) 50 PPMVD.

Degassing Operations		
Pollutant	Standard	RBLC ID
VOC	50 ppmv as Hexane	CA-1048
NOx	No standard	N/A
SOx	No standard	N/A
PM10	No standard	N/A
PM2.5	No standard	N/A
CO	No standard	N/A

RULE REQUIREMENTS:

None

California Air Resource Board (CARB)

BACT

Source: [CARB BACT Clearinghouse](#)

Degassing Operations		
Pollutant	Standard	Source
VOC	50 ppmv as hexane [SCAQMD]	South Coast District ID 384630
NOx	No standard	N/A
SOx	No standard	N/A
PM10	No standard	N/A
PM2.5	No standard	N/A
CO	No standard	N/A

T-BACT

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

RULE REQUIREMENTS:

None

Sacramento Metropolitan AQMD

BACT

Source: [SMAQMD BACT Clearinghouse](#)

Degassing Operations		
Pollutant	Standard	Source
VOC	50 ppmv as Hexane; the operation of the thermal oxidizer shall continue until the gaseous VOC concentration within the tank/pipeline is reduced to 5,000 ppmv, measured as methane, for at least one hour after degassing operations have ceased.	BACT 213
NOx	Low NOx burner with emission concentration of 60 ppm @ 3% O ₂ or 0.073 lb/MMBtu	BACT 213
SOx	Use of natural gas or propane/LPG as supplemental fuel; 40 ppmv as H ₂ S at inlet	BACT 213
PM10	Use of natural gas or propane/LPG as supplemental fuel	BACT 213
PM2.5	Use of natural gas or propane/LPG as supplemental fuel	BACT 213
CO	Use of natural gas or propane/LPG as supplemental fuel	BACT 213

T-BACT

The toxics at issue with this technology are VOCs. The control of VOCs through meeting the BACT standard will also control toxic VOCs. Therefore, the BACT VOC controls are also the T-BACT controls.

RULE REQUIREMENTS:

[Rule 420 Sulfur Content of Fuels \(8/13/81\)](#)

Section 301 limits the sulfur content of any gaseous fuel to 50 gr/scf, calculated as H₂S at standard conditions (equivalent to 809 ppmv as H₂S).

[Rule 419 NOx from Miscellaneous Combustion Units \(10/25/18\)](#)

This rule is applicable to miscellaneous combustion units with a total rated heat input capacity of 5 MMBtu/hr or greater located at a non-major stationary source and to units rated at 2 MMBtu/hr or greater located at a major source. Section 112 exempts air pollution control devices from the requirements of this rule. The thermal oxidizer is a control device and is therefore not subject to the requirements of this rule.

South Coast AQMD

BACT

Source: [SCAQMD Tank Degassing BACT for A/N 384630](#)

Degassing Operations	
Pollutant	Standard
VOC	50 ppmv as Hexane (A)
NOx	N/A
SOx	N/A
PM10	N/A
PM2.5	N/A
CO	N/A

(A) Pursuant to the evaluation for Permit No. 344630, this limit corresponds to a control efficiency of 99%.

T-BACT

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

RULE REQUIREMENTS:

[Regulation XI, Rule 1147 NOx Reductions from Miscellaneous Sources \(5/6/22\)](#)

From Table 2 of Rule 1147	NOx Emission Limit (A) PPMV @ 3% O ₂ , dry or Pound/MMBtu heat input	CO Emission Limits PPMV @ 3% O ₂ , dry
Natural Gas Fuel-Fired Degassing Equipment with no mixing of degassing vapors prior to the burner	20 ppmv or 0.024 lb/MMBTU	1,000 ppmv
All other fuels including propane either mixed or not mixed with degassing vapors prior to the burner. Natural gas mixed with degassing vapor prior to the burner is exempt from any NOx standard.	No Standard	No Standard

(A) Emission limit applies to burners in units fueled by 100% natural gas that are used to incinerate air toxics, VOCs, or other vapors; or to heat a unit. The emission limit applies solely when

burning 100% natural gas fuel and not when the fuel is mixed with air toxics, VOCs, or other vapors prior to the burner per section (m)(3)(E). The unit shall be tested or certified to meet the emission limit while fueled with natural gas.

The gaseous emission standards of Rule 1147 only apply to natural gas not propane. In addition, these limits apply to burners that are only fueled on 100% natural gas. The rule does not cover the situation where the vapors of the tank or piping are introduced prior to the burner. Burners that are fueled on 100% natural gas and are used for five minutes or less to bring a unit up to operating temperature are exempt from these limits per Section (m)(3)(B). Also, these limits do not apply to burners that are fueled on process gas and supplemental gas per Section (m)(3)(E). Pursuant to Rule 1147 Section (m)(3)(B), pilots are also exempt from the requirements of this rule.

Regulation XI, Rule 1149 Storage Tank and Pipeline Cleaning and Degassing (5/2/08)

Section 1149(c)(1)(B) requires the VOC concentration of the degassed tanks to be reduced to less than 5,000 ppmv, measured as methane at least 1 hour after degassing has ceased. Section 1149(c)(8) requires the VOC concentration in the exhaust stream of any control device to be less than 500 ppmv, measured as methane. This is equivalent to a control device efficiency of 90%.

Rule 431.1 Sulfur Content of Gaseous Fuels (6/12/98)

Section (c)(2) limits the sulfur content of a gaseous fuel to 40 ppmv as H₂S.

San Joaquin Valley APCD

BACT

Source: [SJVAPCD BACT Guideline 7.1.8. \(2/4/21\)](#)

Tank Degassing		
Pollutant	Achieved In Practice	Technologically Feasible
VOC	VOC reduced by 98% by weight or less than 20 ppm @ 3% O ₂ , dry basis as hexane. (A)	N/A
NO _x	N/A	N/A
SO _x	Reduction in collected vapors by a minimum of 95% or to no greater than 2.0 lb-SO _x /day through the use of treated carbon canisters, caustic scrubber or an equivalent control device	N/A
PM ₁₀ (B)	N/A	N/A
PM _{2.5}	N/A	N/A
CO	<u>N/A</u>	N/A

(A) Tanks, vapor piping and processing equipment maintained leak free (as defined in Rule

4623) and vented to a vapor collection and control system that is designed and operated to reduce the VOC in the vapor by 98 weight percent or to an VOC outlet concentration of less than 20 ppmv, dry basis as hexane at 3% O₂. VOC control device shall be carbon adsorption (at least two carbon canister in series), thermal or catalytic oxidizer, smokeless air assist flare or IC engine with three-way catalyst. Auxiliary fuel used in any control device shall be either natural gas or LPG.

T-BACT

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

RULE REQUIREMENTS:

[Rule 4623 Storage of Organic Liquids \(5/19/05\)](#)

Sections 5.6.1.2 and 5.7.5.4.5 set a control efficiency requirement of 95% for control devices serving tank degassing operations. Section 5.7.5.4.1 requires the operation of the degassing equipment until the organic vapor concentration is 5,000 ppmv or less or is 10% or less of the lower explosion limit (LEL), whichever is less.

San Diego County APCD

BACT

The SDCAPCD does not have a BACT determination for this source category.

T-BACT

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

RULE REQUIREMENTS:

[Rule 62 Sulfur Content of Fuels \(10/21/81\)](#)

Section (b)(1) requires any gaseous fuel to contain no more than 10 grains of sulfur compounds, calculated as hydrogen sulfide, per 100 cubic feet of dry gaseous fuel at standard conditions (equivalent to 162 ppmv as H₂S).

Bay Area AQMD

BACT

The BAAQMD does not have a BACT determination for this source category.

T-BACT

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

RULE REQUIREMENTS:

[Regulation 8 Organic Compounds Rule 5 Storage of Organic Liquids \(11/3/21\)](#)

Section 328.1 Requires control devices used for tank degassing purposes to meet an abatement efficiency of at least 90% by weight and operate the degassing equipment until the concentration of organic compounds in the tank is less than 10,000 ppm expressed as methane.

Santa Barbara APCD

BACT

The SBAPCD does not have a BACT determination for this source category.

T-BACT

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

RULE REQUIREMENTS:

[Rule 343 Petroleum Storage Tank Degassing \(12/14/93\)](#)

Section D.1. sets a control efficiency of 90% for control devices used in degassing storage tanks. Section E.2.a. sets a length of time for the venting of displaced gases into a control system based on the following equation:

$$t = \frac{2.3 V}{Q}$$

Where: t = time (hours)

V = the physical volume of the headspace (cubic feet)

Q = flow rate through condenser (ft³/hr)

[Rule 311 Sulfur Content of Fuels \(10/23/78\)](#)

Section B limits the sulfur content of any gaseous fuel to 15 grains per 100 cubic feet (calculated as H₂S) at standard conditions (equivalent to 239 ppmv as H₂S).

Ventura County APCD

BACT

The Ventura County APCD does not have a published BACT determination for this source category.

T-BACT

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

RULE REQUIREMENTS:

[Rule 74.27 Gasoline and ROC Tank Degassing Operations \(11/8/94\)](#)

Section B.1.b. sets a control efficiency of 95% for control devices used in degassing storage tanks and requires the operation of the degassing equipment until the vapor concentration in the tank is less than 10,000 ppmv, measured as methane, for at least one hour.

[Rule 64 Sulfur Content of Fuels \(4/13/99\)](#)

Section (B)(1) limits the sulfur compounds of a gaseous fuel to 50 grains/100 scf (788 ppmv), calculated as H₂S at standard conditions.

[Rule 74.34 NOx Reductions from Miscellaneous Sources \(12/13/16\)](#)

This rule is applicable to miscellaneous combustion units with a total rated heat input capacity of 5 MMBtu/hr or greater. Section C.1.a exempts air pollution control devices from the requirements of this rule. The thermal oxidizer is a control device and is therefore not subject to the requirements of this rule.

Texas Commission on Environmental Quality

BACT

The TCEQ does not have a published BACT determination for this source category.

T-BACT

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

RULE REQUIREMENTS:

[Title 30 Environmental Quality](#)

[Part 1 Texas Commission on Environmental Quality](#)

[Chapter 115 Control of Air Pollution from Volatile Organic Compounds](#)

[Subchapter F Miscellaneous Industrial Sources](#)

[Division 3 Degassing of Storage Tanks, Transport Vessels, and Marine Vessels \(2/17/11\)](#)

Section 115.542(a)(1) sets control device efficiency of 90% for tank degassing operations. Section 115.542(b) requires the operation of the degassing equipment until the VOC concentration is less than 34,000 ppmv expressed as methane or less than 50% of the lower explosive limit (LEL).

Summary of Achieved in Practice Control Technologies

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

stringency:

Achieved in Practice Standards for VOC					
Rank	Standard	Technology Description	Source	Year	Comments
1	50 ppmvd @ 3% O ₂ as Hexane or 99% control efficiency; the operation of the thermal oxidizer shall continue until the gaseous VOC concentration within the tank/pipeline is reduced to 5,000 ppmv, measured as methane, for at least one hour after degassing operations have ceased.	Thermal degassing systems	SMAQMD SCAQMD	2021	Current SMAQMD BACT and a combination of SCAQMD BACT and rules
2	Reduced by 98% by weight or less than 20 ppm @ 3% O ₂ , dry basis as hexane	carbon absorption, thermal or catalytic oxidizer, smokeless air assist flare or IC engine with three-way catalyst	SJVAPCD BACT	2021	Guideline 7.1.8
3	The displaced gas shall remain vented to the control system for a length of time determined by the following relationship (C): $t = 2.3 V/Q$ Where: t = time (hours) V = headspace volume (ft ³) Q = flowrate (ft ³ /hr)	Various	SBAPCD Rule 343	1993	Rule Guidance

Achieved in Practice Standards for VOC					
Rank	Standard	Technology Description	Source	Year	Comments
4	The operation of the thermal oxidizer shall continue until the gaseous VOC concentration within the tank/pipeline is reduced to 10,000 ppmv.	Thermal Oxidizer	BAAQMD BACT	2021	Rule Guidance
5	The operation of the thermal oxidizer shall continue until the gaseous VOC concentration within the tank/pipeline is reduced to 34,000 ppmv, measured as methane, or less than 50% of the LEL.	Thermal Oxidizer	TCEQ	2011	Rule Guidance

Achieved in Practice Standards for SOx					
Rank	Standard	Technology Description	Source	Year	Comments
1	Reduction in collected vapors by a minimum of 95% or to no greater than 2.0 lb-SOx/day through the use of treated carbon canisters, caustic scrubber or an equivalent control device	carbon canisters, caustic scrubber or an equivalent control device	SJVAPCD	2021	Guideline 7.1.8
2	40 ppmv as H ₂ S at inlet	N/A	SMAQMD BACT 213 SCAQMD Rule 431.1	2019	Standard applies to fuel source

Achieved in Practice Standards for NOx & CO					
Rank	Standard	Technology Description	Source	Year	Comments
1	Natural gas with no mixing of degassing vapors prior to the burner. NOx 20 ppmv @ 3% O ₂ or 0.024 lb/MMBTU CO 1,000 ppmv	Low NOx burner	SCAQMD	2022	Rule 1147
2	Natural gas with mixing of degassing vapors prior to the burner and other fuels with or without mixing degassing vapors prior to the burner. NOx: 60 ppm @ 3% O ₂ or 0.073 lb/MMBTU CO: Use of natural gas or propane/LPG as supplemental fuel	Low NOx burner	SMAQMD BACT 213	2019	BACT 213

Achieved in Practice Standards for PM10/PM2.5					
Rank	Standard	Technology Description	Source	Year	Comments
1	Use of propane or natural gas as supplemental fuel	fuel selection	SMAQMD	2019	BACT 213

Toxics

HAPs are emitted as VOC and the same control technologies that control VOCs also control the HAPs and, therefore, the achieved in practice standards for HAPs are the same as for VOC.

Summary Table

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

Best Control Technologies Achieved in Practice			
Pollutant	Equipment/Operation Sub Category	Standard	Source
VOC	All control methods	50 ppmvd @ 3% O ₂ as Hexane or 99% control efficiency; the operation of the thermal oxidizer shall continue until the gaseous VOC concentration within the tank/pipeline is reduced to 5,000 ppmv, measured as methane, for at least one hour after degassing operations have ceased.	SJVAPCD BACT SMAQMD BACT
NOx & CO	All control methods	For natural gas with no premixing of the fuel with the degassing vapors prior to the burner. NOx: 20 ppmv @ 3% O ₂ or 0.024 lb/MMBTU CO: 1,000 ppmv Natural gas with mixing of degassing vapors prior to the burner and other fuels with or without mixing degassing vapors prior to the burner. NOx: 60 ppm @ 3% O ₂ or 0.073 lb/MMBTU CO: Use of natural gas or LPG as supplemental fuel, for any gaseous fuel mixture	SCAQMD Rule 1147 & SMAQMD BACT 213
SOx	All control methods	Reduction in collected vapors by a minimum of 95% or to no greater than 2.0 lb-SOx/day through the use of treated carbon canisters, caustic scrubber or an equivalent control device	SJVAPCD BACT Guideline 7.1.8
PM10	Fuel source	Use of propane or natural gas as supplemental fuel	SMAQMD BACT 213
PM2.5	Fuel source	Use of propane or natural gas as supplemental fuel	SMAQMD BACT 213
CO	Natural gas fuel source	1,000 ppmv at 3% O ₂	SCAQMD Rule 1147

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

Technologically Feasible Alternatives:

Any alternative basic equipment, fuel, process, emission control device or technique, singly or in combination, determined to be technologically feasible by the Air Pollution Control Officer.

The table below shows the technologically feasible alternatives identified as capable of reducing emissions beyond the levels determined to be “Achieved in Practice” as per Rule 202, §205.1.a.

Pollutant	Technologically Feasible Alternatives
VOC	Use of natural gas or LPG as supplemental fuel
NOx	No other technologies have been identified
SOx	No other technologies have been identified
PM10	No other technologies have been identified
PM2.5	No other technologies have been identified
CO	No other technologies have been identified

Cost Effectiveness Determination:

A cost effectiveness determination is not required.

C. SELECTION OF BACT:

Best Control Technologies			
Tank Degassing – Thermal Oxidizer - Portable with NOx Emissions Greater Than 1 lb/day.			
Pollutant	Equipment/Operation Sub Category	Standard	Source
VOC	All control methods	50 ppmvd @ 3% O ₂ as Hexane or 99% control efficiency; the operation of the thermal oxidizer shall continue until the gaseous VOC concentration within the tank/pipeline is reduced to 5,000 ppmv, measured as methane, for at least one hour after degassing operations have ceased.	SMAQMD BACT

Best Control Technologies			
Tank Degassing – Thermal Oxidizer - Portable with NOx Emissions Greater Than 1 lb/day.			
Pollutant	Equipment/Operation Sub Category	Standard	Source
NOx	All control methods	For natural gas with no mixing of the fuel with degassing vapors prior to the burner. NOx at 20 ppmv @ 3% O ₂ or 0.024 lb/MMBTU 60 PPMVD @ 3% O ₂	SCAQMD Rule 1147 SMAQMD BACT 213
SOx	All control methods	Reduction in collected vapors by a minimum of 95% or to no greater than 2.0 lb-SOx/day through the use of treated carbon canisters, caustic scrubber or an equivalent control device	SJVAPCD BACT Guideline 7.1.8
PM10	Fuel source	Use of propane or natural gas as supplemental fuel	SMAQMD BACT 213
PM2.5	Fuel source	Use of propane or natural gas as supplemental fuel	SMAQMD BACT 213
CO	Fuel Source	1,000 ppmv at 3% O ₂ for Natural Gas Use of propane as supplemental fuel	SCAQMD Rule 1147 SMAQMD BACT 213

T-BACT

The toxics at issue with this technology are VOCs. The control of VOCs through meeting the BACT standard will also control toxic VOCs. Therefore, the BACT for VOC controls are also the T-BACT controls.

APPROVED BY: Brian F Krebs DATE: 12-28-2023