

CATEGORY:

TANK/PIPELINE DEGASSING SYSTEM

BACT Size: Minor Source BACT

THERMAL OXIDIZING UNIT - PORTABLE

BACT Determination Number: 213		BACT Determination Date: 2/22/2019	
Equipment Information			
Permit Number: N/A -- Generic BACT Determination Equipment Description: THERMAL OXIDIZING UNIT - PORTABLE Unit Size/Rating/Capacity: ALL Equipment Location:			
BACT Determination Information			
ROCs	Standard:	50 ppmvd @ 3% O2 as Hexane	
	Technology Description:	Use of natural gas or propane/LPG as supplemental fuel	
	Basis:	Achieved in Practice	
NOx	Standard:	60 ppmvd @ 3% O2 or 0.073 lb/MMBtu	
	Technology Description:	Use of natural gas or propane/LPG as supplemental fuel	
	Basis:	Achieved in Practice	
SOx	Standard:	40 ppmv as H2S	
	Technology Description:	Use of natural gas or propane/LPG as supplemental fuel	
	Basis:	Achieved in Practice	
PM10	Standard:		
	Technology Description:	Use of natural gas or propane/LPG as supplemental fuel	
	Basis:	Achieved in Practice	
PM2.5	Standard:		
	Technology Description:	Use of natural gas or propane/LPG as supplemental fuel	
	Basis:	Achieved in Practice	
CO	Standard:		
	Technology Description:	Use of natural gas or propane/LPG as supplemental fuel	
	Basis:	Achieved in Practice	
LEAD	Standard:		
	Technology Description:		
	Basis:		

Comments: See BACT Determination Evaluation: VOC: 50 ppmvd @ 3% O2 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. NOx: Low NOx burner with emission concentration of 60 ppm @ 3% O2 or 0.073 lb/MMBtu. T-BACT is equivalent to BACT.

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**BEST AVAILABLE CONTROL TECHNOLOGY & TOXIC BEST AVAILABLE
CONTROL TECHNOLOGY DETERMINATION**

DETERMINATION NO.: 213
DATE: 02/22/19
ENGINEER: Felix Trujillo, Jr.

Category/General Equip Description: Tank/Pipeline Degassing System
Equipment Specific Description: Thermal Oxidizing Unit - Portable
Equipment Size/Rating: Minor Source BACT
Previous BACT Det. No.: 121

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 #121.

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. The District found no changes or any new rules that would apply to this type of operation, other than SMAQMD's Rule 419 - NOx from Miscellaneous Combustion Units (10/25/18) and VCAPCD's Rule 74.34 - NOx Reductions from Miscellaneous Sources (12/13/16). There were no degassing operations that operated in Sacramento County under the previous BACT (#121). Therefore, all considerations made under the previous BACT will remain the same, unless otherwise noted.

BACT ANALYSIS

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

The following control technologies are currently employed as BACT for tank degassing systems by the following air pollution control districts:

District/Agency	Best Available Control Technology (BACT) Requirements														
US EPA	<p><u>BACT</u> Source: EPA RACT/BACT/LAER Clearinghouse RBLC ID CA-1048 (5/24/01)</p> <table border="1"> <tr> <td colspan="2">For Portable Tank Degassing System</td></tr> <tr> <td>VOC</td><td>50 ppmv as hexane [SCAQMD]</td></tr> <tr> <td>NOx</td><td>N/A – No BACT determinations found</td></tr> <tr> <td>SOx</td><td>N/A – No BACT determinations found</td></tr> <tr> <td>PM10</td><td>N/A – No BACT determinations found</td></tr> <tr> <td>PM2.5</td><td>N/A – No BACT determinations found</td></tr> <tr> <td>CO</td><td>N/A – No BACT determinations found</td></tr> </table> <p><u>RULE REQUIREMENTS:</u> None</p>	For Portable Tank Degassing System		VOC	50 ppmv as hexane [SCAQMD]	NOx	N/A – No BACT determinations found	SOx	N/A – No BACT determinations found	PM10	N/A – No BACT determinations found	PM2.5	N/A – No BACT determinations found	CO	N/A – No BACT determinations found
For Portable Tank Degassing System															
VOC	50 ppmv as hexane [SCAQMD]														
NOx	N/A – No BACT determinations found														
SOx	N/A – No BACT determinations found														
PM10	N/A – No BACT determinations found														
PM2.5	N/A – No BACT determinations found														
CO	N/A – No BACT determinations found														
ARB	<p><u>BACT</u> Source: ARB BACT Clearinghouse SCAQMD Permit No. 384630 (5/24/01) Note: BACT determination published in the ARB BACT Clearinghouse is at least 13 years old.</p> <table border="1"> <tr> <td colspan="2">ARB BACT Clearinghouse</td></tr> <tr> <td>VOC</td><td>50 ppmv as hexane [SCAQMD]</td></tr> <tr> <td>NOx</td><td>No standard</td></tr> <tr> <td>SOx</td><td>No standard</td></tr> <tr> <td>PM10</td><td>No standard</td></tr> <tr> <td>PM2.5</td><td>No standard</td></tr> <tr> <td>CO</td><td>No standard</td></tr> </table> <p><u>RULE REQUIREMENTS:</u> None</p>	ARB BACT Clearinghouse		VOC	50 ppmv as hexane [SCAQMD]	NOx	No standard	SOx	No standard	PM10	No standard	PM2.5	No standard	CO	No standard
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District/Agency	Best Available Control Technology (BACT) Requirements															
SMAQMD	<p><u>BACT</u> <u>Source: SMAQMD BACT Clearinghouse (last updated: 3/8/16)</u></p> <table border="1" data-bbox="430 420 1388 1281"> <tr> <th colspan="2">For Portable Tank Degassing System</th></tr> <tr> <td data-bbox="430 483 527 630">VOC</td><td data-bbox="527 483 1388 630">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.</td></tr> <tr> <td data-bbox="430 630 527 1008" rowspan="2">NOx</td><td data-bbox="527 630 1388 829"> Burners fired on mixture of process gas and supplemental fuel: <ol style="list-style-type: none"> 1. Use of natural gas or propane as supplemental fuel for process temperatures ≤ 800 °F. 2. NOx emission limit of 60 ppm @ 3% O₂ or 0.073 lb/MMBtu for process temperatures of > 800 °F. (A) </td></tr> <tr> <td data-bbox="527 829 1388 1008"> Burners fired on 100% Natural gas or Propane: <ol style="list-style-type: none"> 3. NOx emission limit of 30 ppm at 3% O₂ for process temperatures ≤ 800 °F. 4. NOx emission limit of 60 ppm @ 3% O₂ or 0.073 lb/MMBtu for process temperatures of > 800 °F. </td></tr> <tr> <td data-bbox="430 1008 527 1102">SOx</td><td data-bbox="527 1008 1388 1102">Use of natural gas or propane as supplemental fuel; 40 ppmv as H₂S at inlet</td></tr> <tr> <td data-bbox="430 1102 527 1165">PM10</td><td data-bbox="527 1102 1388 1165">Use of natural gas or propane as supplemental fuel</td></tr> <tr> <td data-bbox="430 1165 527 1228">PM2.5</td><td data-bbox="527 1165 1388 1228">Use of natural gas or propane as supplemental fuel</td></tr> <tr> <td data-bbox="430 1228 527 1281">CO</td><td data-bbox="527 1228 1388 1281">Use of natural gas or propane as supplemental fuel</td></tr> </table> <p>(A) The facility has source tested these types of units at the South Coast AQMD while operating on propane and process gas fuel mixture and have met this emission limit.</p> <p>Upon further review of tank degassing operations with the use of thermal oxidizers in Sacramento County, none have operated at a temperature lower than 800 °F. In order to achieve the low VOC concentration, the burner would need to operate at a temperature greater than 800 °F. As noted by footnote A of the above table, SCAQMD has tested low NOx combustors and they have met the 60 ppm @ 3% O₂ concentration or 0.073 lb/MMBtu on process gas. Therefore, low NOx combustors should be able to meet the 60 ppm @ 3% O₂ NOx concentration or 0.073 lb/MMBtu on natural gas. The applicable NOx BACT requirement will therefore be reduced to item 2 from the above table and will be deemed achieved in practice due to the source test results included in Appendix B.</p>	For Portable Tank Degassing System		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.	NOx	Burners fired on mixture of process gas and supplemental fuel: <ol style="list-style-type: none"> 1. Use of natural gas or propane as supplemental fuel for process temperatures ≤ 800 °F. 2. NOx emission limit of 60 ppm @ 3% O₂ or 0.073 lb/MMBtu for process temperatures of > 800 °F. (A) 	Burners fired on 100% Natural gas or Propane: <ol style="list-style-type: none"> 3. NOx emission limit of 30 ppm at 3% O₂ for process temperatures ≤ 800 °F. 4. NOx emission limit of 60 ppm @ 3% O₂ or 0.073 lb/MMBtu for process temperatures of > 800 °F. 	SOx	Use of natural gas or propane as supplemental fuel; 40 ppmv as H ₂ S at inlet	PM10	Use of natural gas or propane as supplemental fuel	PM2.5	Use of natural gas or propane as supplemental fuel	CO	Use of natural gas or propane as supplemental fuel
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District/Agency	Best Available Control Technology (BACT) Requirements														
SMAQMD	<p><u>RULE REQUIREMENTS:</u></p> <p>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).</p> <p>Rule 419 NO_x 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.</p>														
South Coast AQMD	<p><u>BACT</u> Source: <u>SCAQMD LAER/BACT Determinations</u> SCAQMD Permit No. 384630 (5/24/01)</p> <table border="1" data-bbox="428 852 1386 1318"> <tr> <th colspan="2">For Portable Tank Degassing System</th></tr> <tr> <td>VOC</td><td>50 ppmv as hexane [SCAQMD] (A)</td></tr> <tr> <td>NO_x</td><td>No standard</td></tr> <tr> <td>SO_x</td><td>No standard</td></tr> <tr> <td>PM₁₀</td><td>No standard</td></tr> <tr> <td>PM_{2.5}</td><td>No standard</td></tr> <tr> <td>CO</td><td>No standard</td></tr> </table> <p>(A) Pursuant to the evaluation for Permit No. 344630, this limit corresponds to a control efficiency of 99%.</p>	For Portable Tank Degassing System		VOC	50 ppmv as hexane [SCAQMD] (A)	NO_x	No standard	SO_x	No standard	PM₁₀	No standard	PM_{2.5}	No standard	CO	No standard
For Portable Tank Degassing System															
VOC	50 ppmv as hexane [SCAQMD] (A)														
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District/Agency	Best Available Control Technology (BACT) Requirements															
South Coast AQMD	<u>RULE REQUIREMENTS:</u>															
	Regulation XI, Rule 1147 NOx Reductions from Miscellaneous Sources (9/9/11) Requirements Table Rule 1147															
	<table><tr><th rowspan="2">Table 1 – NOx Emission Limit Equipment Category(ies)</th><th colspan="3">NOx Emission Limit PPM @ 3% O2, dry or Pound/mmBtu heat input</th></tr><tr><th colspan="3">Process Temperature</th></tr><tr><th>Gaseous Fuel- Fired Equipment</th><th>≤ 800° F</th><th>> 800 ° F and < 1200° F</th><th>≥ 1200 ° F</th></tr><tr><td>Afterburner, Degassing Unit, Remediation Unit, Thermal Oxidizer, Catalytic Oxidizer or Vapor Incinerator (A)</td><td>30 ppm or 0.036 lb/mmBtu</td><td>60 ppm or 0.073 lb/mmBtu</td><td>60 ppm or 0.073 lb/mmBtu</td></tr></table>	Table 1 – NOx Emission Limit Equipment Category(ies)	NOx Emission Limit PPM @ 3% O2, dry or Pound/mmBtu heat input			Process Temperature			Gaseous Fuel- Fired Equipment	≤ 800° F	> 800 ° F and < 1200° F	≥ 1200 ° F	Afterburner, Degassing Unit, Remediation Unit, Thermal Oxidizer, Catalytic Oxidizer or Vapor Incinerator (A)	30 ppm or 0.036 lb/mmBtu	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu
	Table 1 – NOx Emission Limit Equipment Category(ies)		NOx Emission Limit PPM @ 3% O2, dry or Pound/mmBtu heat input													
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Gaseous Fuel- Fired Equipment	≤ 800° F	> 800 ° F and < 1200° F	≥ 1200 ° F													
Afterburner, Degassing Unit, Remediation Unit, Thermal Oxidizer, Catalytic Oxidizer or Vapor Incinerator (A)	30 ppm or 0.036 lb/mmBtu	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu													
(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% fuel and not when the burner is incinerating air toxics, VOCs, or other vapors. The unit shall be tested or certified to meet the emission limit while fueled with natural gas.																
These limits apply to burners that are only fueled on 100% natural gas. 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 (g)(3)(B). Also, these limits do not apply to burners that are fueled on process gas and supplemental gas per Section (g)(3)(E). Pursuant to Rule 1147 Section g(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.

District/Agency	Best Available Control Technology (BACT) Requirements														
San Diego County APCD	<p><u>BACT</u> The SDCAPCD does not have a BACT determination for this source category.</p> <p><u>RULE REQUIREMENTS:</u> Rule 62 Sulfur Content of Fuels (10/21/81)</p> <p>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).</p>														
Bay Area AQMD	<p><u>BACT</u> The BAAQMD does not have a BACT determination for this source category.</p> <p><u>RULE REQUIREMENTS:</u> Regulation 8 Organic Compounds Rule 5 Storage of Organic Liquids (10/18/06)</p> <p>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.</p>														
San Joaquin Valley APCD	<p><u>BACT</u> Source: <u>SJVAPCD BACT Guideline 7.1.13 (5/24/02)</u></p> <p>SJVAPCD BACT Guideline 7.1.13 does not include any Achieved in Practice technologies. The only technology that is listed under the technologically feasible category is a 98% destruction of exhausted vapors (thermal or catalytic oxidizer or equal).</p> <p><u>RULE REQUIREMENTS:</u> Rule 4311 Flares (6/18/2009) This rule is applicable to refinery and non-refinery flares, except those operated at municipal waste landfills. Section 5.7 sets the NO_x limit for ground-level enclosed flares to the following standards:</p> <table border="1"> <thead> <tr> <th>Type of Flare and Heat Release Rate in MMBtu/hr</th><th>NO_x (lb/MMBtu)</th></tr> </thead> <tbody> <tr> <td>Without Steam-assist</td><td></td></tr> <tr> <td>< 10 MMBtu/hr</td><td>0.0952</td></tr> <tr> <td>10-100 MMBtu</td><td>0.1330</td></tr> <tr> <td>> 100 MMBtu</td><td>0.5240</td></tr> <tr> <td>With Steam-assist</td><td></td></tr> <tr> <td>All</td><td>0.068</td></tr> </tbody> </table>	Type of Flare and Heat Release Rate in MMBtu/hr	NO _x (lb/MMBtu)	Without Steam-assist		< 10 MMBtu/hr	0.0952	10-100 MMBtu	0.1330	> 100 MMBtu	0.5240	With Steam-assist		All	0.068
Type of Flare and Heat Release Rate in MMBtu/hr	NO _x (lb/MMBtu)														
Without Steam-assist															
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With Steam-assist															
All	0.068														

District/Agency	Best Available Control Technology (BACT) Requirements
San Joaquin Valley APCD	<p>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.</p>
Santa Barbara APCD	<p><u>BACT</u> The SBAPCD does not have a BACT determination for this source category.</p> <p><u>RULE REQUIREMENTS:</u> 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 base on the following equation:</p> $t = \frac{2.3 V}{Q}$ <p>Where: t = time (hours) V = the physical volume of the headspace (cubic feet) Q = flow rate through condenser (ft³/hr)</p> <p>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).</p>
Ventura County APCD	<p><u>BACT</u> The VCAPCD does not have a BACT determination for this source category.</p> <p><u>RULE REQUIREMENTS:</u> 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.</p> <p>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.</p> <p>Rule 74.34 NOx Reductions from Miscellaneous Sources 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.</p>

District/Agency	Best Available Control Technology (BACT) Requirements
Texas Commission on Environmental Quality	<p><u>BACT</u> The TCEQ does not have a BACT determination for this source category.</p> <p><u>RULE REQUIREMENTS:</u> Title 30 Environmental Quality Part 1 Texeas Commission on Environmental Quality Chapter 115 Control of Air Pollution from Volatile Organic Compounds</p> <p>Subchapter F Miscellaneous Industrial Sources Division 3 Degassing of Storage Tanks, Transport Vessels, and Marine Vessels (2/17/11)</p> <p>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).</p>

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

BEST CONTROL TECHNOLOGIES ACHIEVED		
Pollutant	Standard	Source
VOC	<p>50 ppmv as Hexane; and</p> <ol style="list-style-type: none"> 1. 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 (A). 2. The operation of the thermal oxidizer shall continue until the gaseous VOC concentration within the tank/pipeline is reduced to 5,000 ppmv or less, or is 10% or less of the lower explosion limit (LEL), whichever is less (B). 3. The displaced gas shall remain vented to the control system for a length of time determined by the following relationship (C): $t = 2.3 V/Q$ <p>Where: t = time (hours) V = headspace volume (ft³) Q = flowrate (ft³/hr)</p> 4. The operation of the thermal oxidizer shall continue until the gaseous VOC concentration within the tank/pipeline is reduced to 10,000 ppmv. 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. 	<p>SCAQMD (BACT) SCAQMD (Rule 1149)</p> <p>SJVAPCD (Rule 4623)</p> <p>SBAPCD (Rule 343)</p> <p>BAAQMD (Regulation 8 Rule 5)</p> <p>TCEQ (Title 30, Part 1, Chapter 115, Subchapter F, Division 3)</p>
NOx	Low NOx burner with emission concentration of 60 ppm @ 3% O ₂ or 0.073 lb/MMBtu	SMAQMD
SOx	40 ppmv as H ₂ S at inlet	SCAQMD (Rule 431.1)
PM10	No standard	
PM2.5	No standard	
CO	No standard	

(A) Items 1 - 5 are based on requirements of the degassing rules of the associated air districts/stage agencies. SMAQMD does not have a tank degassing rule or degassing requirements in District Rule 446 Storage of Petroleum Products (11-16-93). In order to ensure a safe working environment, the District will incorporate through the BACT mechanism a limit that reduces the concentration in the containers prior to venting into the atmosphere.

- (B) Based on the SCAQMD Rule 1149 Staff Report page 7 (<http://www.aqmd.gov/home/governing-board/agendas-minutes>, 4/08), the 5,000 ppm vapor concentration translates to a ten percent LEL already met by many degassing operations. SCAQMD Rule 1149 page 4 states that if a tank is taken out of service for maintenance, repair or removal, the California Code of Regulations title 8 Section 5157 prohibits entry into a hazardous atmosphere which includes flammable gas, vapor or mist in excess of 10 percent of its lower LEL. Therefore, according to the Rule 1149 staff report the 5,000 ppm concentration and 10% LEL are equivalent.
- (C) SCAQMD Rule 1149 was amended on 4/08 to remove this requirement from the rule and was replaced with the 5,000 ppm vapor concentration requirement. According to the 4/08 staff report, the 5,000 ppm concentration limit is more conservative. The time requirement equations assumes that the storage tanks contains no product or sludge when the degassing begins. The 5,000 ppm vapor concentration limit will better capture emissions from sludge and product residual remaining in the tanks, since it will take longer to achieve the 5,000 ppm concentration than the time calculated by the time equation. The vapor concentration standard will capture the majority of emissions created by product residual and sludge.

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	No other technologies have been identified
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

C. SELECTION OF BACT:

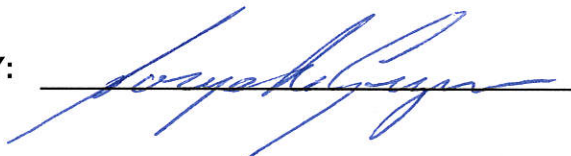
BACT for all other pollutants will be to require the use of natural gas or LPG as supplemental fuel because it will maintain pollutants at their current levels and no other technologically feasible alternatives were identified.

BACT FOR PORTABLE TANK/PIPELINE DEGASSING SYSTEM		
Pollutant	Standard	Source
VOC	50 ppmvd @ 3% O ₂ 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.	Achieved in Practice
NO _x	Low NO _x burner with emission concentration of 60 ppm @ 3% O ₂ or 0.073 lb/MMBtu	Achieved in Practice
SO _x	Use of natural gas or propane/LPG as supplemental fuel; 40 ppmv as H ₂ S at inlet	Achieved in Practice
PM ₁₀	Use of natural gas or propane/LPG as supplemental fuel	Achieved in Practice
PM _{2.5}	Use of natural gas or propane/LPG as supplemental fuel	Achieved in Practice
CO	Use of natural gas or propane/LPG as supplemental fuel	Achieved in Practice

D. SELECTION OF T-BACT:

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

APPROVED BY:



DATE:

2/22/19

Attachment A

Review of BACT Determinations published by Other Agencies

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 7.1.9*

Last Update 3/19/1999

**Petroleum Production - Mobile Degassing Operation for Storage
Tank with low H₂S content, using a Thermal Oxidizer as a control device**

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC		98% or greater control efficiency with 1. Thermal Oxidizer, 2. Catalytic Oxidizer, or 3. Carbon Adsorption System.	

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a state implementation plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

*This is a Summary Page for this Class of Source

Section I: AQMD BACT Determinations
Application No.: 384630
Equipment Category – Tank Degassing System

1. GENERAL INFORMATION		DATE: 3/1/2003	
A. MANUFACTURER:			
B. TYPE:		C. MODEL:	
D. STYLE: Vacuum line and blowers			
E. APPLICABLE AQMD REGULATION XI RULES: 1149			
F. COST: \$ (2000)		SOURCE OF COST DATA:	
G. OPERATING SCHEDULE:		24 HRS/DAY	7 DAYS/WK
			WKS/YR

2. EQUIPMENT INFORMATION		APP. NO.: 384630	
A. FUNCTION: Portable tank degassing system.			
B. SIZE/DIMENSION/CAPACITY: 2500 scfm max. air pull rate.			
C. BLOWERS:		D. TOTAL FLOW RATE: 2500 scfm	
E. MATERIAL STORED/PROCESSED/HANDLED: air plus tank vapors			
F. THROUGHPUT/PROCESS RATE/USAGE RATE: 2500 scfm max.			

3. COMPANY INFORMATION		APP. NO.: 384630	
A. NAME: Envent Corp.		B. SIC CODE: 8711	
C. ADDRESS: 2187 Walnut Ave.			
CITY: Signal Hill		STATE: CA	ZIP: 90806
D. CONTACT PERSON: Thomas L. Kerscher		E. PHONE NO.: 562-997-9465	

4. PERMIT INFORMATION		APP. NO.: 384630	
A. AGENCY: SCAQMD		B. APPLICATION TYPE: new construction	
C. AGENCY CONTACT PERSON: Hui Sung Choe		D. PHONE NO.: 909-396-2259	
E. PERMIT TO CONSTRUCT/OPERATE INFORMATION:		P/C NO.: F39976	ISSUANCE DATE: 5/24/2001
<input type="checkbox"/> CHECK IF NO P/C		P/O NO.: F39976	ISSUANCE DATE: 5/24/2001
F. START-UP DATE: June 2001			

5. EMISSION INFORMATION		APP. NO.: 384630	
A. PERMIT			
A1. PERMIT LIMIT: Restricted to degassing of tanks containing non-chlorinated petroleum hydrocarbon vapors, with exception of trace (<0.1 ppm) chlorinated hydrocarbons. VOC at outlet not to exceed 50 ppmv as hexane (measured hourly). Temperature at outlet of oxidizer to be at least 1400F in thermal mode, 600F in catalytic mode. Benzene at outlet not to exceed (ppmv limits based on distance, in meters, to nearest receptor): 25<50 .03, 50<75 .06, 75<100 0.11, 100<150 0.18, 150<200 0.28, 200<500 0.65, 500 or more 3.4. Minimum degassing time = $2.3 \times V/Q$, where V=tank volume and Q= volumetric suction rate (Rule 1149).			
A2. BACT/LAER DETERMINATION: Permit limits on VOC and oxidizer temperatures			
A3. BASIS OF THE BACT DETERMINATION: The VOC concentration limit is consistent with 5000 ppm max. vapor concentration in the tank and 99.9% destruction efficiency, with a factor of 10 margin. The 99.9% destruction efficiency was based on AQMD's knowledge of similar oxidizers used in soil vapor recovery systems.			
B. CONTROL TECHNOLOGY			
B1. MANUFACTURER/SUPPLIER: Envent			
B2. TYPE: Thermal oxidizer and catalytic oxidizer, Model EMTOS 2500			
B3. DESCRIPTION: Natural gas or LPG fired with EPCON Model 3-DF-2500-H-T Low Nox Burner			
B4. CONTROL EQUIPMENT PERMIT APPLICATION DATA:		P/C NO.: F39976 P/O NO.: F39976	ISSUANCE DATE: 5/24/2001 ISSUANCE DATE: 5/24/2001
B5. WASTE AIR FLOW TO CONTROL EQUIPMENT:		FLOW RATE: 2500 scfm	
ACTUAL CONTAMINANT LOADING:		BLOWER HP:	
B6. WARRANTY:			
B7. PRIMARY POLLUTANTS: VOC			
B8. SECONDARY POLLUTANTS: NOx, CO			
B9. SPACE REQUIREMENT:			
B10. LIMITATIONS:			B11. UNUSED
B12. OPERATING HISTORY: The owner reports that the system has been used on 5 or 6 tanks to date, and the 50 ppmv VOC limit has been met in all cases.			
B13. UNUSED		B14. UNUSED	
C. CONTROL EQUIPMENT COSTS			
C1. CAPITAL COST: <input type="checkbox"/> CHECK IF INSTALLATION COST IS INCLUDED IN CAPITAL COST			
EQUIPMENT: \$		INSTALLATION: \$ (2000)	SOURCE OF COST DATA:
C2. ANNUAL OPERATING COST: \$ (2000)		SOURCE OF COST DATA:	
D. DEMONSTRATION OF COMPLIANCE			
D1. STAFF PERFORMING FIELD EVALUATION:			
ENGINEER'S NAME:		INSPECTOR'S NAME:	DATE:
D2. COMPLIANCE DEMONSTRATION:			

5. EMISSION INFORMATION		APP. NO.: 384630
D3. VARIANCE:	NO. OF VARIANCES: 0	DATES:
CAUSES:		
D4. VIOLATION:	NO. OF VIOLATIONS: None since this P/C date	DATES:
CAUSES:		
D5. MAINTENANCE REQUIREMENTS:	D6. UNUSED	
D7. SOURCE TEST/PERFORMANCE DATA RESULTS AND ANALYSIS:		
DATE OF SOURCE TEST:		CAPTURE EFFICIENCY:
DESTRUCTION EFFICIENCY:		OVERALL EFFICIENCY:
SOURCE TEST/PERFORMANCE DATA:		
OPERATING CONDITIONS:		
TEST METHODS:		

6. COMMENTS	APP. NO.: 384630
<p>TBACT was considered to be use of a thermal oxidizer. The original date of this listing was 12/18/01. An administrative change (A/N 405426, AQMD Permit reissued 9/6/2002) was added 3/1/2003, changing name of oxidizer manufacturer from EPCON to ENVENT..</p>	



http://cfpub.epa.gov/rblc/index.cfm?action=PermitDetail.ProcessInfo&facility_id=26108&PROCESS_ID=104329
Last updated on 9/14/2015

Technology Transfer Network

[Clean Air Act Information](#) [National Emission Inventory](#) [RACT/BACT/LAER Clearinghouse](#) [Technology Transfer Network](#) [Clean Air Technology Center](#)
[RACT/BACT/LAER Clearinghouse](#) [RBLC Basic Search](#) [RBLC Search Results](#) [Process Information - Details](#)

Process Information - Details

For information about the pollutants related to this process, click on the specific pollutant in the list below.

[Home](#) [New Search](#) [Search Results](#) [Facility Information](#) [Topics List](#) [Process Information](#)

[Help](#)

FINAL

RBLC ID: CA-1048
Corporate/Company: ENVENT CORP
Facility Name: ENVENT CORP
Process: TANK DEGASSING SYSTEM

Primary Fuel: NATURAL GAS
Throughput:
Process Code: 99,999

Pollutant Information - List of Pollutants

[Help](#)

Pollutant	Primary Emission Limit	Basis	Verified
Hexane	50,0000 PPMVD	BACT- PSD	UNKNOWN

Process Notes:

http://cfpub.epa.gov/rblc/index.cfm?

action=PermitDetail.PollutantInfo&Facility_ID=26108&Process_ID=104329&Pollutant_ID=1016&Per_Control_Equipment_Id=140038 updated on 9/14/2015



Technology Transfer Network

Clearinghouse RBLC Basic Search RBLC Search Results Pollutant Information RACT/BACT/LAER Clearinghouse

Pollutant Information

Click on the Process Information button to see more information about the process associated with this pollutant.

Or click on the Process List button to return to the list of processes.

[Pollutant Info](#)
[New Search](#)
[Search Results](#)
[Facility Information](#)
[Process List](#)
[Process Information](#)

Help

FINAL

RBLC ID: CA-1048

Corporate/Company: ENVENT CORP

Facility Name: ENVENT CORP

Process: TANK DEGASSING SYSTEM

Pollutant: Hexane

CAS Number: 110-54-3

Pollutant Group(s): Hazardous Air Pollutants
 (HAP), Organic Compounds
 (all), Volatile Organic
 Compounds (VOC),

Substance Registry System: Hexane

Pollution Prevention/Add-on Control Equipment/Both/No Controls Feasible: A

P2/Add-on Description: THERMAL OXIDIZER AND CATALYTIC OXIDIZER

Test Method:

Unspecified

EPA/OSAR Methods

API Ethanol Methods

Percent Efficiency:

0

Compliance Verified:

Unknown

EMISSION LIMITS:

Case-by-Case Basis:

BACT-PSD

Other Applicable Requirements:

N/A

Other Factors Influence Decision:

Unknown

Emission Limit 1:

50.0000 PPMVD

Emission Limit 2:

0

Standard Emission Limit:

0

COST DATA:

Cost Verified?

No

Dollar Year Used in Cost Estimates:

2005

Cost Effectiveness:

0 \$/ton

Incremental Cost Effectiveness:

0 \$/ton

Pollutant Notes:

COMPREHENSIVE REPORT
Report Date:09/14/2015[Previous Page](#)**Facility Information**

RBLC ID:	CA-1048 (final)	Date Determination Last Updated:	11/04/2005
Corporate/Company Name:	ENVENT CORP	Permit Number:	384630
Facility Name:	ENVENT CORP	Permit Date:	05/24/2001 (actual)
Facility Contact:		FRS Number:	NOT FOUND
Facility Description:		SIC Code:	
Permit Type:	A: New/Greenfield Facility	NAICS Code:	812990
Permit URL:		COUNTRY:	USA
EPA Region:	9		
Facility County:	LOS ANGELES		
Facility State:	CA		
Facility ZIP Code:	90806		
Permit Issued By:	SOUTH COAST AQMD, CA (Agency Name) MR. AL BAEZ(Agency Contact) (909)396-2516 abaez@aqmd.gov		
Other Agency Contact Info:	SOUTH COAST AQMD, MARTIN KAY, 909-396-3115, MKAY@AQMD.GOV		
Permit Notes:	CARB ID: 651.0, OPERATING PERMIT DATE: 05-24-2001, STARTUP DATE: 06-01-2001 NEW CONSTR MODIFICATION: NEW CONSTRUCTION TECH STATUS: BACT DETERMINATION NO SOURCE TEST AVAILABLE		

Process/Pollutant Information**PROCESS NAME:** TANK DEGASSING SYSTEM**Process Type:** 99.999 (Other Miscellaneous Sources)**Primary Fuel:** NATURAL GAS**Throughput:****Process Notes:**

POLLUTANT NAME:	Hexane
CAS Number:	110-54-3
Test Method:	Unspecified
Pollutant Group(s):	(Hazardous Air Pollutants (HAP) , Organic Compounds (all) , Volatile Organic Compounds (VOC))
Emission Limit 1:	50.0000 PPMVD
Emission Limit 2:	
Standard Emission:	
Did factors, other than air pollution technology considerations influence the BACT decisions:	U
Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	N/A
Control Method:	(A) THERMAL OXIDIZER AND CATALYTIC OXIDIZER
Est. % Efficiency:	
Cost Effectiveness:	0 \$/ton
Incremental Cost Effectiveness:	0 \$/ton
Compliance Verified:	Unknown
Pollutant/Compliance Notes:	

[Previous Page](#)



California Environmental Protection Agency
Air Resources Board

BACT Determination Detail

Category

Source Category: Tank Degassing System

SIC Code

NAICS Code 81299

Emission Unit Information

Manufacturer: Epcon

Type:

Model: EMTOS 2500

Equipment Description: 2500 scfm max. air pull rate

Capacity / Dimensions

Fuel Type	Natural Gas
Multiple Fuel Types	Or LPG fired
Operating Schedule (hours/day)/(days/week)/ (weeks/year)e	Variable (24/7/)
Function of Equipment	Portable tank degassing system
VOC Limit	50
VOC Limit Units	ppmv as hexane
VOC Average Time	
VOC Control Method	
VOC Control Method Desc	Thermal Oxidizer and catalytic oxidizer
VOC Percent Control Efficiency	
VOC Cost Effectiveness (%/ton)	
VOC Incremental Cost Effectiveness (%/ton)	
VOC Cost Verified (Y/N)	

VOC Dollar Year

Project / Permit Information

Application/Permit No.: 384630

Application Completeness
Date:

New
Construction/Modification: New Construction

ATC Date: 05-24-2001

PTO Date: 05-24-2001

Startup Date: 06-01-2001

Technology Status: BACT Determination

Source Test Available: No

Source Test Results:

Facility / District Information

Facility Name: Envent Corp

Facility Zip Code: 90806

Facility County: Los Angeles

District Name: South Coast AQMD

District Contact: Martin Kay

Contact Phone No.: 909-396-3115

Contact E-Mail: mkay@aqmd.gov

Notes

Notes:

[Report Error In Determination](#)

Attachment B

SCAQMD Source Test Results

Revised Table 4-1
VC-301 Summary of Detailed Results
Temperature Set Point 1500 °F
PSC Industrial Outsourcing

Test Number Date (Run Time)	Run 1 Inlet 7/10/14 1130-1230	Run 2 Inlet 7/10/14 1319-1439	Run 3 Inlet 7/10/14 1629-1722	Run 1 Inlet 7/10/14 1130-1230	Run 2 Inlet 7/10/14 1319-1439	Run 3 Inlet 7/10/14 1629-1722	Exhibit Average
O ₂ , % volume dry	14.0	13.9	13.8	20.9	20.9	20.9	13.9
O ₂ , % volume wet	13.1	13.0	13.0	20.6	20.7	20.7	13.0
CO ₂ , % volume dry	4.4	4.5	4.5	0.05	0.05	0.05	4.5
CO ₂ , % volume wet	4.1	4.2	4.2	0.0	0.0	0.0	4.2
NO _x , ppm volume dry	6.3	4.6	5.0				5.3
NO _x , ppm volume wet	5.9	4.3	4.7				5.0
NO _x , ppmvd @ 3% O ₂	16.2	11.8	12.6				13.6
NO _x , lb/hr as NO ₂	0.24	0.17	0.20				0.2
NO _x , lb/day as NO ₂	5.76	4.15	4.79				4.9
NO _x , lb/MMBtu as NO ₂	0.02	0.01	0.02				0.0
CO, ppm volume dry	23.91	13.3	18.0				18.4
CO, ppm volume wet	22.3	12.4	16.9				17.2
CO, ppmvd @ 3% O ₂	61.8	33.8	45.6				47.0
CO, lb/hr	0.36	0.30	0.44				0.4
CO, lb/day	13.34	7.21	10.52				10.4
CO, lb/MMBtu	0.03	0.02	0.03				0.0
VOC, ppm volume dry as C	6.42	6.41	6.40	67,958	65,764	67,273	6.4
VOC, ppm volume wet as C	6.00	6.00	6.00	67,023	65,061	66,477	6.0
VOC, ppm volume wet as Propane	2.0	2.0	2.0	22,341	21,687	22,159	2.0
VOC, lb/hr as C	0.0642	0.0627	0.0671	288	283	281	0.06
VOC, lb/day as C	1.540	1.506	1.610	6,913	6,794	6,743	1.35
% DE VOC, lb/hr as C	99.98	99.98	99.98				99.98
% DE VOC, lb/day as C	99.98	99.98	99.98				99.98
Vol flow rate (Q _{std}) scfm - pilot	5,331	5,223	5,589	2,261	2,296	2,233	5,381
Firing Rate MMBtu/Hr - pilot	12.175	12.042	13.008				12.4

Revised Table 4-1
VC-303 Summary of Detailed Results
Temperature Set Point 1500 °F
PSC Industrial Outsourcing

Test Analyte	Run 1 Onset Date Fuel Flow	Run 1 Offset 12:30 1511-1911	Run 2 Onset Date Fuel Flow	Run 2 Offset 14:04 1511-1910	Run 3 Onset Date Fuel Flow	Run 3 Offset 15:35 1511-1912	Run 4 Onset Date Fuel Flow	Run 4 Offset 17:00 1511-1910	External Average
O ₂ , % volume dry		14.3	14.2	14.2	20.9	20.9	20.9	14.2	
O ₂ , % volume wet		13.4	13.4	13.4	20.5	20.7	20.7	13.4	
CO ₂ , % volume dry		4.2	4.3	4.3	0.05	0.05	0.05	4.3	
CO ₂ , % volume wet		4.0	4.0	4.0	0.0	0.0	0.0	4.0	
NO _x , ppm volume dry		16.0	17.2	14.3					
NO _x , ppm volume wet		15.0	16.2	13.5					15.8
NO _x , ppmvd @ 3% O ₂		43.1	46.1	38.4					42.5
NO _x , lb/hr as NO ₂		0.38	0.42	0.36					0.4
NO _x , lb/day as NO ₂		9.10	10.13	8.54					9.3
NO _x , lb/MMBtu as NO ₂		0.05	0.06	0.05					0.052
CO, ppm volume dry		28.26	19.6	29.4					
CO, ppm volume wet		26.6	18.4	27.7					25.8
CO, ppmvd @ 3% O ₂		76.2	32.5	78.8					24.2
CO, lb/hr		0.41	0.29	0.44					69.2
CO, lb/day		9.79	7.02	10.68					0.4
CO, lb/MMBtu		0.06	0.04	0.06					9.2
VOC, ppm volume dry as C		6.38	6.38	6.36	72,682	71,950	72,968		0.051
VOC, ppm volume wet as C		6.00	6.00	6.00	71,375	71,316	72,231		6.4
VOC, ppm volume wet as Propane		2.0	2.0	2.0	23,792	23,772	24,077		6.0
VOC, lb/hr as C		0.0395	0.0408	0.0413	160	153	160		2.0
VOC, lb/day as C		0.949	0.980	0.991	3,840	3,681	3,836		0.041
% DE VOC, lb/hr as C		99.98	99.97	99.97	NA	NA	NA		0.973
% DE VOC, lb/day as C		99.98	99.97	99.97	NA	NA	NA		99.97
Vol flow rate (Q _{std}) dscfm - pilot		3,313	3,421	3,470	1,177	1,140	1,171		3,401
Firing Rate MMBtu/Hr - pilot		7.249	7.539	7.637					7.48

Attachment C

Conversion from gr/100 scf to ppmv

Conversion from gr/100 scf to ppmv

Molecular Wt. for H_2S = 34 lb/lb-mole

District Standard Conditions are: Temp = 68 °F (SMAQMD, VCAPCD), Pressure = 14.7 psia
= 60 °F (SBACPD)

Molar Specific Volume of a gas at 68 °F = $T * R/P$

$$= [(459.6 + 68 \text{ °F}) * (10.7316 \text{ ft}^3 * \text{psi}/\text{°R} * \text{lb-mol})]/14.7 \text{ psi}$$

$$= 385.2 \text{ scf/lb-mole}$$

$$\text{ppmv as } \text{H}_2\text{S} = \frac{50 \text{ gr } \text{H}_2\text{S}/100 \text{ scf} \times (10^6 \text{ scf fuel/MM scf fuel}) \times (\text{lb } \text{H}_2\text{S}/7000 \text{ gr } \text{H}_2\text{S}) \times (385.2 \text{ scf } \text{H}_2\text{S}/\text{lb-mole } \text{H}_2\text{S})}{(34 \text{ lb } \text{H}_2\text{S}/\text{lb-mole } \text{H}_2\text{S})}$$

$$= 809 \text{ ppmv as } \text{H}_2\text{S}$$