

CATEGORY:

ASPHALT PLANT

BACT Size: Minor Source BACT

ASPHALT PLANT

BACT Determination Number: 194	BACT Determination Date: 9/7/2018
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Equipment Information

Permit Number: 25615
Equipment Description: ASPHALT PLANT
Unit Size/Rating/Capacity: 140 MMBtu/hr
Equipment Location: GEORGE REED, INC.
 900 W. ELKHORN BLVD
 RIO LINDA, CA

EXPIRED

BACT Determination Information

ROCs	Standard:	
	Technology Description:	See BACT #194 evaluation for requirements
	Basis:	Achieved in Practice
NOx	Standard:	<= 36 ppmvd @ 3% O2
	Technology Description:	
	Basis:	Achieved in Practice
SOx	Standard:	
	Technology Description:	PUC quality natural gas or LPG as a primary fuel
	Basis:	Achieved in Practice
PM10	Standard:	
	Technology Description:	See BACT #194 evaluation for requirements
	Basis:	Achieved in Practice
PM2.5	Standard:	
	Technology Description:	See BACT #194 evaluation for requirements
	Basis:	
CO	Standard:	<=400 ppmvd @ 3% O2
	Technology Description:	
	Basis:	Achieved in Practice
LEAD	Standard:	
	Technology Description:	
	Basis:	

Comments: T-BACT is equivalent to BACT. This BACT determination is for a drum mix hot mix asphalt plant.

District Contact: Felix Trujillo Phone No.: (916) 874 - 7357 email: ftrujillo@airquality.org



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

DETERMINATION NO.: 194

DATE: September 7, 2018

ENGINEER: Felix Trujillo, Jr.

EXPIRED

Category/General Equip Description: Asphalt Batch Plant

Equipment Specific Description: Drum Mix, Material Handling, Asphalt Storage, Stockpiles

Equipment Size/Rating: Minor Source

Previous BACT Det. No.: 90

This BACT determination will be made for a stationary drum mix hot mix asphalt (HMA) plant. There are two categories of HMA facilities: drum mix and batch mix. There are differences in equipment between these two types of plants. The main difference being that in the batch mix process, the aggregate, asphalt cement and RAP are mixed in a pugmill. For drum mix, the aggregate, asphalt cement and RAP are mixed within the drum. AP-42 Hot Mix Asphalt Plants (3/04) also makes a distinction between the two types of plants, as it provides separate emission factors for these types of plants. The San Joaquin Valley Air Pollution Control District (SJVAPCD) and Bay Area Air Quality Management District (BAAQMD) have established BACT guidelines for each type of asphalt plant. This BACT is being determined under the project for A/C 25615, which is for a drum mix type batch plant. Therefore, this BACT will be determined for a drum mix asphalt plant.

BACT ANALYSIS

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

The following control technologies are currently employed as BACT for hot mix asphalt plants – drum mix:

District/Agency	Best Available Control Technology (BACT) Requirements														
US EPA	<p><u>BACT</u> Source: EPA RACT/BACT/LAER Clearinghouse; RBLC ID:NV-0047</p> <table border="1" data-bbox="488 386 1440 730"> <tr> <td colspan="2" data-bbox="488 386 1440 428">Hot Mix Asphalt Plant – Drum Mix (A)</td> </tr> <tr> <td data-bbox="488 428 597 470">VOC</td> <td data-bbox="597 428 1440 470">0.0320 lb/ton</td> </tr> <tr> <td data-bbox="488 470 597 512">NOx</td> <td data-bbox="597 470 1440 512">0.0550 lb/ton</td> </tr> <tr> <td data-bbox="488 512 597 554">SOx</td> <td data-bbox="597 512 1440 554">1.3800 lb/hr</td> </tr> <tr> <td data-bbox="488 554 597 596">PM10</td> <td data-bbox="597 554 1440 596">90 mg/dscm (equivalent to 0.04 gr/dscf)</td> </tr> <tr> <td data-bbox="488 596 597 638">PM2.5</td> <td data-bbox="597 596 1440 638">No standard</td> </tr> <tr> <td data-bbox="488 638 597 730">CO</td> <td data-bbox="597 638 1440 730">0.1300 lb/ton</td> </tr> </table> <p>(A) Only PM10 was verified and will be the only achieved in practice pollutant.</p> <p><u>RULE REQUIREMENTS:</u> 40 CFR 60 Subpart I – Standards of Performance for Hot Mix Asphalt Facilities</p> <p>This regulation applies to a hot mix asphalt facility that commenced construction or modification after June 11, 1973. This regulation applies to all types of hot mix asphalt plants.</p> <p>This regulation sets a particulate matter standard of 0.04 gr/dscf.</p>	Hot Mix Asphalt Plant – Drum Mix (A)		VOC	0.0320 lb/ton	NOx	0.0550 lb/ton	SOx	1.3800 lb/hr	PM10	90 mg/dscm (equivalent to 0.04 gr/dscf)	PM2.5	No standard	CO	0.1300 lb/ton
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ARB	<p><u>BACT</u> Source: ARB BACT Clearinghouse</p> <table border="1" data-bbox="488 1184 1354 1486"> <tr> <td colspan="2" data-bbox="488 1184 1354 1226">ARB BACT Clearinghouse</td> </tr> <tr> <td data-bbox="488 1226 597 1268">VOC</td> <td data-bbox="597 1226 1354 1268">No standard</td> </tr> <tr> <td data-bbox="488 1268 597 1310">NOx</td> <td data-bbox="597 1268 1354 1310">0.088 lb/MMBtu (equivalent to 72.5 ppmvd @ 3% O₂)¹</td> </tr> <tr> <td data-bbox="488 1310 597 1352">SOx</td> <td data-bbox="597 1310 1354 1352">No standard</td> </tr> <tr> <td data-bbox="488 1352 597 1394">PM10</td> <td data-bbox="597 1352 1354 1394">No standard</td> </tr> <tr> <td data-bbox="488 1394 597 1436">PM2.5</td> <td data-bbox="597 1394 1354 1436">No standard</td> </tr> <tr> <td data-bbox="488 1436 597 1486">CO</td> <td data-bbox="597 1436 1354 1486">0.412 lb/MMBtu (equivalent to 557 ppmvd @ 3% O₂)¹</td> </tr> </table> <p>(A) According to the ARB BACT Clearinghouse, source tests were not available. Therefore, this BACT will not be deemed achieved in practice.</p> <p><u>RULE REQUIREMENTS:</u> None</p>	ARB BACT Clearinghouse		VOC	No standard	NOx	0.088 lb/MMBtu (equivalent to 72.5 ppmvd @ 3% O ₂) ¹	SOx	No standard	PM10	No standard	PM2.5	No standard	CO	0.412 lb/MMBtu (equivalent to 557 ppmvd @ 3% O ₂) ¹
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¹ lb/MMBtu = ppmvd x F-Factor x Molecular Wt. x O₂ reference state correction x MMBtu/10⁶ Btu ÷ Molar Specific Volume

Natural Gas or LPG F-Factor at 68 °F = 8710 dscf/MMBtu
 Molar Specific Volume of a gas at 68 °F = 385.2 dscf/lb-mole

District/Agency	Best Available Control Technology (BACT) Requirements														
<p align="center">SMAQMD</p>	<p><u>BACT</u> Source: <u>SMAQMD BACT Clearinghouse</u></p> <table border="1" data-bbox="483 359 1430 936"> <tr> <td colspan="2" data-bbox="483 359 1430 422">Hot Mix Asphalt Plant (A)</td> </tr> <tr> <td data-bbox="483 422 586 506">VOC</td> <td data-bbox="586 422 1430 506">Natural gas or LPG as primary fuel; and enclosed hot mix silos and loadout operation vented to the rotary-dryer burner</td> </tr> <tr> <td data-bbox="483 506 586 558">NOx</td> <td data-bbox="586 506 1430 558">≤ 36 ppmvd @ 3% O₂</td> </tr> <tr> <td data-bbox="483 558 586 621">SOx</td> <td data-bbox="586 558 1430 621">PUC Quality Natural GAS or LPG</td> </tr> <tr> <td data-bbox="483 621 586 779">PM10</td> <td data-bbox="586 621 1430 779">99% control efficiency (Rotary drum vents to fabric collector or Venturi scrubber with centrifugal separator) and enclosed conveyors; hot mix storage silos enclosed all vent to oil mist collectors; and natural gas or LPG as a primary fuel</td> </tr> <tr> <td data-bbox="483 779 586 842">PM2.5</td> <td data-bbox="586 779 1430 842">Same control technology as PM10</td> </tr> <tr> <td data-bbox="483 842 586 936">CO</td> <td data-bbox="586 842 1430 936">133 ppmvd @ 15% O₂ for Natural Gas combustion or 265 ppmvd @15% O₂ regardless of fuel</td> </tr> </table> <p data-bbox="483 961 1453 1182">(A) This BACT determination (#90) incorporated the worst case standards from drum mix and batch mix asphalt plants into one determination. The standards established under this guideline were based on the BACT guidelines from the SCAQMD, SDAPCD, BAAQMD and SJVAPCD. This determination will reevaluate the BACT guidelines for drum mix asphalt plants from the aforementioned districts in order to Determine BACT for the SMAQMD region. Therefore, BACT determination #90 will not be referenced for this determination.</p> <p data-bbox="483 1209 776 1241"><u>RULE REQUIREMENTS:</u></p> <p data-bbox="483 1241 540 1272">None</p>	Hot Mix Asphalt Plant (A)		VOC	Natural gas or LPG as primary fuel; and enclosed hot mix silos and loadout operation vented to the rotary-dryer burner	NOx	≤ 36 ppmvd @ 3% O ₂	SOx	PUC Quality Natural GAS or LPG	PM10	99% control efficiency (Rotary drum vents to fabric collector or Venturi scrubber with centrifugal separator) and enclosed conveyors; hot mix storage silos enclosed all vent to oil mist collectors; and natural gas or LPG as a primary fuel	PM2.5	Same control technology as PM10	CO	133 ppmvd @ 15% O ₂ for Natural Gas combustion or 265 ppmvd @15% O ₂ regardless of fuel
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<p align="center">South Coast AQMD</p>	<p><u>BACT</u> Source: <u>SCAQMD BACT Guidelines for Non-Major Polluting Facilities, page 13</u></p> <table border="1" data-bbox="483 1404 1411 1766"> <tr> <td colspan="2" data-bbox="483 1404 1411 1467">Hot Mix Asphalt Plant (A)</td> </tr> <tr> <td data-bbox="483 1467 586 1520">VOC</td> <td data-bbox="586 1467 1411 1520">No standard</td> </tr> <tr> <td data-bbox="483 1520 586 1572">NOx</td> <td data-bbox="586 1520 1411 1572">Natural gas with low NOx burner ≤ 36 ppmvd @ 3% O₂</td> </tr> <tr> <td data-bbox="483 1572 586 1625">SOx</td> <td data-bbox="586 1572 1411 1625">No standard</td> </tr> <tr> <td data-bbox="483 1625 586 1677">PM10</td> <td data-bbox="586 1625 1411 1677">Baghouse</td> </tr> <tr> <td data-bbox="483 1677 586 1730">PM2.5</td> <td data-bbox="586 1677 1411 1730">No standard</td> </tr> <tr> <td data-bbox="483 1730 586 1766">CO</td> <td data-bbox="586 1730 1411 1766">No standard</td> </tr> </table> <p data-bbox="483 1793 1453 1887">(A) This determination does not specify the type of asphalt plant. But the standards listed would apply to drum mix and batch mix type of plants, since only NOx and PM10 emissions exhausting from the drum are listed.</p>	Hot Mix Asphalt Plant (A)		VOC	No standard	NOx	Natural gas with low NOx burner ≤ 36 ppmvd @ 3% O ₂	SOx	No standard	PM10	Baghouse	PM2.5	No standard	CO	No standard
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District/Agency	Best Available Control Technology (BACT) Requirements																								
<p>South Coast AQMD</p>	<p><u>RULE REQUIREMENTS:</u> SCAQMD Rule 1147 sets a NOx emission limit of 40 ppm @ 3% O₂ for asphalt manufacturing operations with a process temperature of less than or equal to 800 degrees Fahrenheit.</p> <p>SCAQMD Rule 1157 (PM10 Emission Reductions from Aggregate and Related Operations) limits fugitive dust into the atmosphere from aggregate equipment to 20% opacity through the use of dust suppressing equipment. The rule allows the use of water spray equipment on conveyors, screens and storage piles in order to meet such limit.</p>																								
<p>San Diego County APCD</p>	<p><u>BACT</u> Source: <u>NSR Requirements for BACT</u></p> <p>The SDCAPCD does not have a BACT determination for this source category.</p> <p><u>RULE REQUIREMENTS:</u> None</p>																								
<p>Bay Area AQMD</p>	<p><u>BACT</u> Source: <u>BAAQMD BACT Guideline Document 10A.1 (3/6/01)</u></p> <table border="1" data-bbox="477 1045 1377 1423"> <thead> <tr> <th colspan="2">Asphalt (Hot Mix) Drum Mix Facilities - Dryer</th> </tr> </thead> <tbody> <tr> <td>VOC</td> <td>No standard</td> </tr> <tr> <td>NOx</td> <td>12 ppmvd @ 15% O₂ (equivalent to 36 ppmvd @ 3% O₂)</td> </tr> <tr> <td>SOx</td> <td>Natural gas</td> </tr> <tr> <td>PM10</td> <td>≤ 0.01 gr/dscf</td> </tr> <tr> <td>PM2.5</td> <td>No standard</td> </tr> <tr> <td>CO</td> <td>133 ppmvd @ 15% O₂ (equivalent to 400 ppmvd @ 3% O₂)</td> </tr> </tbody> </table> <p>Source: <u>BAAQMD BACT Guideline Document 10.2 (8/12/91)</u></p> <table border="1" data-bbox="477 1541 1393 1885"> <thead> <tr> <th colspan="2">Asphalt Batch Plant – Material Handling</th> </tr> </thead> <tbody> <tr> <td>VOC</td> <td>No standard</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>Water spray w/chemical suppressants of materials on conveyors, transfer points, storage piles, and site road surfaces; Enclosure of size reduction and classification equipment and vent to a baghouse w/ ≤0.01 gr/dscf (A)</td> </tr> </tbody> </table>	Asphalt (Hot Mix) Drum Mix Facilities - Dryer		VOC	No standard	NOx	12 ppmvd @ 15% O ₂ (equivalent to 36 ppmvd @ 3% O ₂)	SOx	Natural gas	PM10	≤ 0.01 gr/dscf	PM2.5	No standard	CO	133 ppmvd @ 15% O ₂ (equivalent to 400 ppmvd @ 3% O ₂)	Asphalt Batch Plant – Material Handling		VOC	No standard	NOx	No standard	SOx	No standard	PM10	Water spray w/chemical suppressants of materials on conveyors, transfer points, storage piles, and site road surfaces; Enclosure of size reduction and classification equipment and vent to a baghouse w/ ≤0.01 gr/dscf (A)
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District/Agency	Best Available Control Technology (BACT) Requirements	
Bay Area AQMD	PM2.5	No standard
	CO	No standard
	<p>(A) This BACT guideline has not been revised since 1991. George Reed, Inc. and Granite Construction were contacted about the use of chemical surfactants potentially being introduced into the dryer. Both facilities had concerns that the introduction of such chemicals may interfere with the specs of the asphalt. The CALTRANS specification document (Section 39 Asphalt Concrete 6/5/09) states the aggregate must be clean and free from deleterious substances (file:///C:/Users/felixj/Downloads/SECTION%2039%20%20HMA%20(4).pdf). The BAAQMD required the use of a baghouse on a scalping screen from an asphalt plant based on another BACT guideline. Therefore, this BACT will not be referenced for material handling equipment.</p>	
	Source: <u>BAAQMD BACT Guideline Document 10B.1 (8/1/12)</u>	
	Asphalt (Hot Mix) Drum and Batch Mix Facilities, Asphalt Material Handling (Conveyors and Storage Silos; and Loadout Operations)	
	VOC	a) Conveyors and storage silos enclosed and abated by a blue smoke recovery/capture system or vented to a blue smoke filter pack b) Truck Loadout operations enclosed on three sides (tunnel) and vented to 1) rotary-dryer burner or 2) blue smoke filter pack
	VOC	
	NOx	No standard
	SOx	No standard
	PM10	Same as VOC
PM2.5	No standard	
CO	No standard	
Source: <u>BAAQMD BACT Guideline Document 12.1 (11/8/91)</u>		
Asphalt Storage Tank		
VOC	No standard	
NOx	No standard	
SOx	No standard	
PM10	Cool gases to < 120 °F and vent to a fiberglass or steel wool filter	
PM2.5	No standard	
CO	No standard	
The BAAQMD has a BACT trigger level of 10 lb/day.		

District/Agency	Best Available Control Technology (BACT) Requirements														
Bay Area AQMD	<u>RULE REQUIREMENTS:</u> None														
San Joaquin Valley APCD	<p><u>BACT</u> Source: <u>SJVUAPCD BACT Guideline 6.3.1 (5/21/01)</u></p> <table border="1" data-bbox="483 499 1425 1010"> <tr> <td colspan="2" data-bbox="483 499 1425 552">Hot Mix Asphalt Plant – Drum Mix, $\geq 2,000$ ton/day or ≥ 75.6 MMBtu/hr burner</td> </tr> <tr> <td data-bbox="483 558 589 636">VOC</td> <td data-bbox="594 558 1425 636">Natural gas or LPG as a primary fuel; and enclosed hot mix silos and loadout operation vented to the rotary-dryer burner</td> </tr> <tr> <td data-bbox="483 642 589 720">NOx</td> <td data-bbox="594 642 1425 720">0.088 lb/MMBtu Low-NOx burner and either natural gas or LPG as the primary fuel</td> </tr> <tr> <td data-bbox="483 726 589 783">SOx</td> <td data-bbox="594 726 1425 783">PUC quality natural gas or LPG as a primary fuel</td> </tr> <tr> <td data-bbox="483 789 589 909">PM10</td> <td data-bbox="594 789 1425 909">99% control efficiency (Rotary drum vents to fabric collector or venture scrubber with centrifugal separator) and enclosed conveyors, hot mix storage silos enclosed all vent to oil mist collectors: and natural gas or LPG as a primary fuel</td> </tr> <tr> <td data-bbox="483 915 589 961">PM2.5</td> <td data-bbox="594 915 1425 961">No standard</td> </tr> <tr> <td data-bbox="483 968 589 1010">CO</td> <td data-bbox="594 968 1425 1010">Natural gas or LPG as a primary fuel</td> </tr> </table> <p>The SJVAPCD BACT trigger level is 2 lb/day.</p> <p><u>RULE REQUIREMENTS:</u> SJVAPCD Rule 4309 (Dryers, Dehydrators and Ovens (12/15/05)) applies to gaseous fired ovens with a rating of 5.0 MMBtu/hr or greater. The rule sets a NOx limit of 4.3 ppm @ 19% O₂ (equivalent to 40 ppmvd @ 3% O₂) and CO limit of 42 ppmv @ 3% O₂ (equivalent to 40 ppmvd @ 3% O₂) equfor asphalt plants.</p>	Hot Mix Asphalt Plant – Drum Mix, $\geq 2,000$ ton/day or ≥ 75.6 MMBtu/hr burner		VOC	Natural gas or LPG as a primary fuel; and enclosed hot mix silos and loadout operation vented to the rotary-dryer burner	NOx	0.088 lb/MMBtu Low-NOx burner and either natural gas or LPG as the primary fuel	SOx	PUC quality natural gas or LPG as a primary fuel	PM10	99% control efficiency (Rotary drum vents to fabric collector or venture scrubber with centrifugal separator) and enclosed conveyors, hot mix storage silos enclosed all vent to oil mist collectors: and natural gas or LPG as a primary fuel	PM2.5	No standard	CO	Natural gas or LPG as a primary fuel
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PM2.5	No standard														
CO	Natural gas or LPG as a primary fuel														

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

BEST CONTROL TECHNOLOGIES ACHIEVED		
Pollutant	Standard	Source
VOC	Dryer: Natural gas or LPG as a primary fuel; Post Dryer: a) Conveyors and storage silos enclosed and abated by a blue smoke recovery/capture system (enclosure and vented to the rotary-dryer burner) or vented to a blue smoke filter pack b) Truck Loadout operations enclosed on three sides (tunnel) and vented to 1) rotary-dryer burner or 2) blue smoke filter pack; Asphalt cement storage tanks: Cool gases to < 120° F and vent to a fiberglass or steel wool filter	SJVAPCD, BAAQMD
NOx	Dryer: ≤36 ppmvd @ 3% O ₂	SCAQMD, BAAQMD, SJVAPCD
SOx	Dryer: PUC quality natural gas or LPG as a primary fuel	SJVAPCD
PM10	Dryer: 0.01 gr/dscf Pre Dryer: Conveyors, transfer points, screen and stockpiles served by water sprays as necessary to show compliance with 20% opacity. Post Dryer: a) Conveyors and storage silos enclosed and abated by a blue smoke recovery/capture system (enclosure and vented to rotary-dryer burner) or vented to a blue smoke filter pack b) Truck Loadout operations enclosed on three sides (tunnel) and vented to 1) rotary-dryer burner or 2) blue smoke filter pack	BAAQMD, SCAQMD
PM2.5	No standard	
CO	Dryer: ≤400 ppmvd @ 3% O ₂	BAAQMD, SJVAPCD

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	Afterburner
NOx	Not applicable
SOx	Not applicable
PM10	Not applicable
PM2.5	Same as achieved in practice PM10 (A)
CO	Not applicable

(A) The referenced determinations do not include a standard for PM2.5. Therefore, equivalent requirements as PM10 are considered to be technologically feasible.

Cost Effectiveness Analysis Summary

The cost analysis was processed in accordance with the EPA OAQPS Air Pollution Control Cost Manual (Sixth Edition). The sales tax rate was based on the District's standard rate of 8.5% as approved on 10/17/16. The electricity (11.24 cents/kWh) and natural gas (6.41 dollars/1,000 cf) usage rates were based on an industrial application as approved by the District on 10/17/16. The life (20 years) of the equipment was based on the EPA cost manual recommendation. The interest rate (5%) was based on the previous 6-month (Feb – July/2018) average interest rate on United States Treasury Securities (based on the life of the equipment) and addition of two percentage points and rounding up the next higher integer rate. The labor (Occupation Code 51-9051: Operators of Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders) and maintenance (Occupation Code 49-9099: Installation, maintenance, and repair workers, all others) rates were based on data from the Bureau of Labor Statistics.

Background:

BAAQMD BACT Document 10A.1 – Hot Mix Asphalt, Drum Mix Facilities, includes the use of an afterburner for VOC control as technologically feasible. A cost effectiveness determination will be performed in order to determine if it is cost effective to vent the emissions from the asphalt plant to an afterburner. The EPA cost manual will be used to determine the cost of the afterburner.

Equipment Life = 20 years

Total Capital Investment = \$603,995 (provided by the applicant)

Annualized Total Capital Investment = \$4,903.53 per year

Direct Annual Cost = \$560,606.49 per year

Indirect Annual Cost = \$204,318.54 per year

Total Annual Cost = \$764,925.03 per year

VOC Removed = 10.1 tons per year

Cost of VOC Removal = \$76,011.36 per ton reduced

A detailed calculation of the cost effectiveness for VOC removal with a baghouse is shown in Appendix A. As shown above, the cost of an afterburner is greater than \$17,500 per ton of VOCs reduced and therefore not cost effective.

C. SELECTION OF BACT:

Minor source and small emitter BACT (< 10 lb/day) for a drum mix asphalt batch plant is the following:

BACT FOR DRUM MIX ASPHALT BATCH PLANT		
Pollutant	Standard	Source
VOC	Dryer: Natural gas or LPG as a primary fuel; Post Dryer: a) Conveyors and storage silos enclosed and abated by a blue smoke recovery/capture system (enclosure and vented to the rotary-dryer burner) or vented to a blue smoke filter pack b) Truck Loadout operations enclosed on three sides (tunnel) and vented to 1) rotary-dryer burner or 2) blue smoke filter pack; Asphalt cement storage tanks: Cool gases to < 120° F and vent to a fiberglass or steel wool filter	SJVAPCD, BAAQMD
NOx	Dryer: ≤ 36 ppmvd @ 3% O ₂	SCAQMD, BAAQMD, SJVAPCD
SOx	Dryer: PUC quality natural gas or LPG as a primary fuel	SJVAPCD
PM10	Dryer: 0.01 gr/dscf Pre Dryer: Conveyors, transfer points, screen and stockpiles served by water sprays as necessary to show compliance with 20% opacity. Post Dryer: a) Conveyors and storage silos enclosed and abated by a blue smoke recovery/capture system (enclosure and vented to rotary-dryer burner) or vented to a blue smoke filter pack b) Truck Loadout operations enclosed on three sides (tunnel) and vented to 1) rotary-dryer burner or 2) blue smoke filter pack	BAAQMD, SCAQMD
PM2.5	Same as PM10	Technologically Feasible
CO	Dryer: ≤400 ppmvd @ 3% O ₂	BAAQMD, SJVAPCD

D. SELECTION OF T-BACT:

There are no Federal NESHAP's nor State ATCM's for this source category. There is an applicable NSPS (40 CFR Subpart I – Hot Mix Asphalt Facilities) that sets a particulate matter standard of 0.04 gr/dscf and opacity limitation of 20 percent for asphalt plants. BAAQMD BACT Document 10A.1 listed T-BACT as being the use of an afterburner. The District contacted the BAAQMD and asked if they had required this as T-BACT. They were unable to identify any projects that required this control as T-BACT. The District will not require the use of an afterburner as T-BACT. Therefore, T-BACT standards will be considered as meeting the PM10 and/or VOC standards identified above, as applicable.

REVIEWED BY: _____ DATE: _____

APPROVED BY:  _____ DATE: 9/7/18

Attachment A

Afterburner Cost-Effectiveness Analysis

COST EFFECTIVENESS ANALYSIS FOR THERMAL INCINERATION

This cost effectiveness analysis was performed using EPA's OAQPS Control Cost Manual
EPA publication no. 450/3-90-006

FACILITY NAME: George Reed, Inc.
LOCATION: 900 W. Elkhorn Blvd., Rio Linda, CA
PERMIT NO.: 25815
EQUIPMENT DESCRIPTION: Asphalt Batch Plant

VOC Parameters

	Toluene
VOC of concern	92.13
Molecular weight of VOC (see Control Cost Manual, p 3-63)	17,601
Heat of combustion (Btu/lb - see Control Cost Manual, p 3-63)	4,074
Heating value of VOC (Btu/scf)	12.79
Emission rate (lb/hr - inlet)	44
Inlet concentration (ppm)	

Gas Parameters

Total gas flow rate (scfm - inlet)	20000
Total gas pressure (psi - Inlet)	14.7
Inlet gas temperature (deg F)	71

Equipment Parameters

Level of energy recovery (0%, 35%, 50% or 70%)	70%
Control efficiency (%)	98.0%
Equipment life (years)	20

Operating Parameters

Hours per day	24
Days per week	5
Weeks per year	52
Shifts per day	2

Incinerator Parameters

Volumetric heat of combustion of effluent (Btu/scf)	0.18
Heat of combustion per pound of effluent (Btu/lb)	2.45
Temperature Required for incineration (deg F)	1,500.00
Gas temperature at exit of pre-heater (deg F)	1,071.30
Effluent gas temperature (deg F)	499.7

Electricity Usage

Price of electricity (\$/kWh)	\$0.11
System fan (kWh/yr)	462,384.00
Total Power Used (kWh/yr)	462,384.00

Gas Usage

Price of gas (\$/1000 cu.ft.)	\$6.41
Auxiliary fuel required (scfm)	216.33

CAPITAL COST

Direct Costs:

Incinerator	\$603,995
Auxiliary equipment (if not included above)	\$0
Equipment Cost (A)	<u>\$603,995</u>
Instrumentation (0.1A if not included above)	\$60,400
Sales taxes (0.085A)	\$51,340
Freight (0.05A)	\$30,200
Total Equipment Cost (B)	<u>\$745,934</u>

Direct Installation Costs:

Foundation & Supports (0.08B)	\$59,675
Handling & erection (0.14B)	\$104,431
Electrical (0.04B)	\$29,897
Piping (0.02B)	\$14,919
Insulation for duct work (0.01B)	\$7,459
Painting (0.01B)	\$7,459
Direct Installation Cost	<u>\$223,780</u>
Site preparation	\$0
Facilities & buildings	\$0

Total Direct Costs **\$969,714**

Indirect Costs (Installation)

Engineering (0.10B)	\$74,593
Construction & field expenses (0.05B)	\$37,297
Contractor fees (0.10B)	\$74,593
Start-up (0.02B)	\$14,919
Performance test (0.01B)	\$7,459
Contingencies (0.03B)	\$22,378

Total Indirect Costs **\$231,239**

TOTAL CAPITAL INVESTMENT **\$1,200,953**

ANNUAL COST

Direct Annual Costs

Operating Cost	
Operator (@ \$14.88/hr & .5 hr per shift)	\$3,868.80
Supervisor (15% of operator)	\$580.32
Operating materials	\$0.00
Maintenance	
Labor (@\$17.77/hr & .5 hr per shift)	\$4,620.20
Material (same as labor)	\$4,620.20
Utilities	
Price of electricity (\$/kWh)	\$0.11
Price of gas (\$/1000 cu.ft.)	\$6.41
Electricity (\$/yr)	\$27,743.04
Natural Gas (\$/yr)	\$519,173.93
Total Direct Costs	\$560,606.49

Indirect Annual Costs

Overhead	\$8,213.71
Administrative charges	\$24,019.07
Property taxes	\$12,009.53
Insurance	\$12,009.53
Interest rate (%)	5%
Equipment life (years)	20
CRF	0.1233
Capital recovery	\$148,066.69
Total Indirect Costs	\$204,318.54

TOTAL ANNUAL COST : : : : : \$764,925.03

Annual Cost (\$/yr)	\$764,925.03
Annual Emissions Uncontrolled (lbs/year)	20,537
Annual Emissions Reductions (tons/yr)	10.1
(annual emissions based on BACT determination limit for add	

COST PER TON OF VOCs REDUCED (\$/ton) : : : : : \$76,011.36

Attachment B

Review of BACT Determination



Technology Transfer Network
Clean Air Technology Center - RACT/BACT/LAER Clearinghouse

Process Information - Details

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

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

HELP

FINAL

RBLC ID: NV-0047
Corporate/Company: 99 CIVIL ENGINEER SQUADRON OF USAF
Facility Name: NELLIS AIR FORCE BASE
Process: ASPHALT CONCRETE MANUFACTURING

Pollutant Information - List of Pollutants

HELP

Primary Fuel: N/A
Throughput:
Process Code: 90.003

Pollutant	Primary Emission Limit	Basis	Verified
<u>Carbon Monoxide</u>	0.1300 LB/T PRODUCTION	Other Case-by-Case	NO
<u>Nitrogen Oxides (NOx)</u>	0.0550 LB/T PRODUCTION	Other Case-by-Case	NO
<u>Particulate matter filterable < 10 µ (FPM10)</u>	90.0000 MG/DSCM	Other Case-by-Case	YES
<u>Sulfur Dioxide (SO2)</u>	1.3800 LB/H	BACT-PSD	NO
<u>Volatile Organic Compounds (VOC)</u>	0.0320 LB/T PRODUCTION	Other Case-by-Case	NO

Process Notes: THE ASPHALT CONCRETE MANUFACTURING PROCESS CONSISTS OF EIGHT (8) EMISSION UNITS INCLUDING THE TWO DIESEL GENERATORS. THE MAIN PLANT, WHICH IS UNIT A005 (ASTEC DRUM, M/N: PDM-636-C, S/N: 85151), IS SELECTED TO SHOW THE BACT DETERMINATIONS. PRODUCTION IS LIMITED TO 125 TONS/HR AND 18,000 TONS/YR.



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BACT Determination Detail

Category

Source Category: Asphalt (Hot Mix) Drum Mix Facilities
SIC Code 1442
NAICS Code 32412

Emission Unit Information

Manufacturer: Genco
Type: Asphalt Drum Mix Plant
Model:
Equipment Description:
Capacity / Dimensions 135 MMBtu/Hr heat input
Fuel Type Propane
Multiple Fuel Types

Operating Schedule (hours/day)/(days/week)/ (weeks/year)e	Variable (//)
Function of Equipment	Production of Asphalt Concrete

Bact Information

NOx Limit	0.088
NOx Limit Units	lb/MMBtu
NOx Average Time	Three 40 min test runs
NOx Control Method	Add-on
NOx Control Method Desc.	low NOx burner and flue gas recirculation
NOx Percent Control Efficiency	
NOx Cost Effectiveness (%/ton)	
NOx Incremental Cost Effectiveness (%/ton)	
NOx Cost Verified (Y/N)	
NOx Dollar Year	
CO Limit	0.412
CO Limit Units	lb/MMBtu
CO Average Time	Three 40 min test runs

CO Control Method Add-on

CO Control Method Desc low NOx burner and flue gas recirculation

CO Percent Control Efficiency

CO Cost Effectiveness (%/ton)

CO Incremental Cost Effectiveness (%/ton)

CO Cost Verified (Y/N)

CO Dollar Year

Project / Permit Information

Application/Permit No.: C-09-89

Application Completeness Date:

New Construction/Modification: New Construction

ATC Date: 01-22-2010

PTO Date:

Startup Date:

Technology Status: BACT Determination

Source Test Available: No

Source Test Results:

Facility / District Information

Facility Name: Granite Construction Company
Facility Zip Code: 95627
Facility County: Yolo
District Name: Yolo/Solano AQMD
District Contact: Kyle Rohlfing
Contact Phone No.: 530-757-3672
Contact E-Mail: krohlfing@ysaqmd.org

Notes

Notes:

[Report Error In Determination](#)

SMAQMD BACT CLEARINGHOUSE

CATEGORY: **ASPHALT PLANT**
 BACT Size: Minor Source BACT ASPHALT BATCH PLANT

BACT Determination Number: 90 BACT Determination Date: 11/20/2014

Equipment Information

Permit Number: N/A -- Generic BACT Determination
 Equipment Description: ASPHALT BATCH PLANT
 Unit Size/Rating/Capacity: All
 Equipment Location:

BACT Determination Information

ROCs	Standard:	
	Technology Description:	Natural Gas or LPG as primary fuel; and enclosed hot mix silos and loadout operation vented to the rotary-dryer burner
	Basis:	Achieved in Practice
NOx	Standard:	≤86 ppmvd @ 3% O ₂
	Technology Description:	Low NOx Burner
	Basis:	Achieved in Practice
SOx	Standard:	
	Technology Description:	Purc Quality Natural Gas or LPG
	Basis:	Achieved in Practice
PM10	Standard:	
	Technology Description:	99% control efficiency (Rotary Drum Vents to fabric collector or Venturi scrubber with centrifugal separator) and enclosed conveyor hot mix storage silos enclosed all vent to oil mist collectors/ natural gas or LPG as primary fuel
	Basis:	Achieved in Practice
PM2.5	Standard:	
	Technology Description:	99% control efficiency (Rotary Drum Vents to fabric collector or Venturi scrubber with centrifugal separator) and enclosed conveyor hot mix storage silos enclosed all vent to oil mist collectors/ natural gas or LPG as primary fuel
	Basis:	Achieved in Practice
CO	Standard:	133 ppmvd @ 15% O ₂ for Natural gas combustion
	Technology Description:	
	Basis:	Achieved in Practice
LEAD	Standard:	
	Technology Description:	
	Basis:	

Comments: CO BACT: 133 ppmvd @ 15% O₂ for Natural Gas combustion or 265 @ 15% O₂ regardless of fuel.

District Contact: Venk Reddy Phone No.: (916) 874 - 4861 email: vreddy@airquality.org

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 6.3.1*

Last Update: 05/21/2001

**Asphaltic Concrete - Drum Mix Plant, = or > 2,000 ton/day or
= or > 75.6 MMBtu/hr burner**

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Natural gas or LPG as a primary fuel; and enclosed hot mix silos and loadout operation vented to the rotary-dryer burner.	Enclosed hot mix silos and loadout operation vented to an afterburner.	
SOx	PUC-quality natural gas or LPG as a primary fuel.		
PM10	99% control efficiency (Rotary drum vents to fabric collector or Venturi scrubber with centrifugal separator) and enclosed conveyors; hot mix storage silos enclosed all vent to oil mist collectors; and natural gas or LPG as a primary fuel.	99% control efficiency (Rotary drum vents to fabric collector or Venturi scrubber with centrifugal separator) and enclosed drag slat conveyor; hot mix storage silos and truck loadout enclosed on two sides; all vent to blue smoke control comprised of electrostatic precipitator or filter pack; and natural gas or LPG as a primary fuel.	
NOx	0.088 lb/MMBtu Low-NOx burner and either natural gas or LPG as the primary fuel.		
CO	Natural gas or LPG as a primary fuel.		

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**

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
Best Available Control Technology (BACT) Guideline

Source Category

Source:	Hot Mix Asphalt, Drum Mix Facilities	Revision:	1
Class:	All	Document #:	1047
		Date:	03/06/01

Determination

POLLUTANT	BACT	TYPICAL TECHNOLOGY
	1. Technologically Feasible/ Cost Effective 2. Achieved in Practice	
POC	1. Afterburner w/ >0.3 sec. retention time at >1400°F ^{a,c} 2. n/a	1. BAAQMD Approved Design and Operation ^d 2. Good Combustion Practice ^e
NOx	1. n/a 2. 12 ppmv @ 15% O ₂ Dry ^{a,b,c}	1. n/a 2. Natural Gas + Low NOx Combustion System ^{a,b,c}
SO ₂	1. n/a 2. Natural gas ^{a,b,c}	1. n/a 2. Fuel Selection ^{a,b,c}
CO	1. n/a 2. 133 ppmv @ 15% O ₂ Dry ^{a,b,c}	1. n/a 2. Good Combustion Practice ^e
PM ₁₀	1. n/a 2. <0.01 g/dscf ^{a,c}	1. n/a 2. Baghouse ^e
NPOC	1. n/a 2. n/a	1. n/a 2. n/a

References

a. BAAQMD
b. BACT is 12 ppmvd NOx @ 15% O₂ and 265 ppmvd CO @ 15% O₂, regardless of fuel. However, for special situations such as temporary operations and/or remote locations where natural gas is not available, liquefied petroleum gas or fuel oil < 0.05 wt. % sulfur may be permitted to emit at higher levels as specified below:
1) "Temporary operations" using exclusively liquefied petroleum gas shall not remain at any single plant for a period in excess of 12 consecutive months following the date of initial operation, and may be permitted up to 38 ppmvd NOx @ 15% O₂ and 265 ppmvd CO @ 15% O₂. [Basis: Monterey Bay Unified APCD A/C #10287]
2) "Temporary operations" using exclusively fuel oil < 0.05 wt. % sulfur shall not remain at any single plant for a period in excess of 3 consecutive months following the date of initial operation, and may be permitted up to 55 ppmvd NOx @ 15% O₂ and 265 ppmvd CO @ 15% O₂. [Basis: Reference a. above]
3) For remote locations where natural gas is not available, liquefied petroleum gas may be permitted up to 38 ppmvd NOx @ 15% O₂ and 265 ppmvd CO @ 15% O₂ and fuel oil < 0.05 wt. % sulfur may be permitted up to 55 ppmvd NOx @ 15% O₂ and 265 ppmvd CO @ 15% O₂. [Basis: Monterey Bay APCD A/C #10287 and Reference a. above]
c. BAAQMD A #17860
d. BACT
e. BACT

**BAY AREA AIR QUALITY MANAGEMENT DISTRICT
Best Available Control Technology (BACT) Guideline**

Source Category

Source: <i>Asphalt Batch Plant (Material Handling)</i>	Revision: <i>1</i>
	Document #: <i>10.2</i>
Class: <i>All</i>	Date: <i>08/12/91</i>

Determination

POLLUTANT	BACT		TYPICAL TECHNOLOGY
	1. Technologically Feasible/ Cost Effective 2. Achieved in Practice		
POC	1. <i>n/a</i>		1. <i>n/a</i>
	2. <i>n/a</i>		2. <i>n/a</i>
NOx	1. <i>n/a</i>		1. <i>n/a</i>
	2. <i>n/a</i>		2. <i>n/a</i>
SO ₂	1. <i>n/a</i>		1. <i>n/a</i>
	2. <i>n/a</i>		2. <i>n/a</i>
CO	1. <i>n/a</i>		1. <i>n/a</i>
	2. <i>n/a</i>		2. <i>n/a</i>
PM ₁₀	1. <i>Enclosure of conveyors, transfer points, size reduction and classification equipment, and vent to baghouse(s) w/ <math>\leq 0.01 \text{ gr/dscf}</math>; Water spray w/ chemical suppressants of storage piles; Paving of site road surfaces^{a,b,T}</i>		1. <i>BAAQMD Approved Design and Operation</i>
	2. <i>Water spray w/ chemical suppressants of materials on conveyors, transfer points, storage piles, and site road surfaces; Enclosure of size reduction and classification equipment and vent to a baghouse w/ <math>\leq 0.01 \text{ gr/dscf}</math>^{b,T}</i>		2. <i>BAAQMD Approved Design and Operation</i>
NPOC	1. <i>n/a</i>		1. <i>n/a</i>
	2. <i>n/a</i>		2. <i>n/a</i>

References

- a. BAAQMD*
- b. BAAQMD A #5376 & #5841*
- T. TBACT*

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Best Available Control Technology (BACT) Guideline

Source Category

Source:	<i>Hot Mix Asphalt, Drum and Batch Mix Facilities; Material Handling (Conveyors and Storage Silos; and Loadout Operations)</i>	Revision:	1
		Document #:	10B.1
Class:		Date:	08/01/2012

Determination

Pollutant	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice	TYPICAL TECHNOLOGY
POC	1. Afterburner w/ >0.3 sec. retention time at > 1400F ^a 2. a) Conveyors and storage silos enclosed and abated by a blue smoke recovery/capture system or vented to a blue smoke filter pack. ^b b) Truck loadout operations enclosed on three sides (tunnel) and vented to 1) rotary-dryer burner or 2) blue smoke filter pack. ^c	1. BAAQMD Approved Design and Operation ^a 2. Blue smoke recovery/capture system (enclosure and vented to the rotary-dryer burner). ^b Blue smoke filter pack must be designed to capture both POC and PM10 (oils).
NOx	1. n/a 2. n/a	1. n/a 2. n/a
SO₂	1. n/a 2. n/a	1. n/a 2. n/a
CO	1. n/a 2. n/a	1. n/a 2. n/a
PM₁₀	1. Afterburner w/ >0.3 sec. retention time at > 1400F ^a 2. a) Conveyors and	1. BAAQMD Approve Design and Operation ^a

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
Best Available Control Technology (BACT) Guideline

Source Category

Source:	<i>Asphalt Storage Tank</i>	Revision:	<i>1</i>
Class:	<i>All</i>	Document #:	<i>12.1</i>
		Date:	<i>11/08/91</i>

Determination

POLLUTANT	BACT		TYPICAL TECHNOLOGY
	1. Technologically Feasible/ Cost Effective 2. Achieved in Practice		
POC	1. <i>n/a</i>		1. <i>n/a</i>
	2. <i>n/a</i>		2. <i>n/a</i>
NO _x	1. <i>n/a</i>		1. <i>n/a</i>
	2. <i>n/a</i>		2. <i>n/a</i>
SO ₂	1. <i>n/a</i>		1. <i>n/a</i>
	2. <i>n/a</i>		2. <i>n/a</i>
CO	1. <i>n/a</i>		1. <i>n/a</i>
	2. <i>n/a</i>		2. <i>n/a</i>
PM ₁₀	1. <i>n/d</i>		1. <i>n/d</i>
	2. <i>Cool gases to <120° F and vent to a fiberglass or steel wool filter</i>		2. <i>BAAQMD Approved Design and Operation</i>
NPOC	1. <i>n/a</i>		1. <i>n/a</i>
	2. <i>n/a</i>		2. <i>n/a</i>

References

b. BAAQMD

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
Best Available Control Technology (BACT) Guidelines for Non-Major Polluting Facilities*

10-20-2000 Rev. 0

Equipment or Process: Asphalt Batch Plant

Rating/Size	Criteria Pollutants				
	VOC	NOx	SOx	CO	PM ₁₀
All		Natural Gas with Low NOx Burner ≤ 36 ppmyd @ 3% O ₂ (10-20-2000)			PM ₁₀ Background (1990)
					Inorganic

* Means those facilities that are minor facilities as defined by Rule 1302 - Definitions
 BACT Guidelines - Part D