

**COVERED SOURCE PERMIT REVIEW  
COVERED SOURCE PERMIT NO. 0258-01-CT  
Permit Application for Renewal and Minor Modification No. 0258-08**

**Applicant:** Grace Pacific LLC

**Facility:** 325 TPH Hot Mix Asphalt Plant

**Initial Location:** Honolkohau Quarry, 74-4925-D Queen Kaahumanu Hwy  
UTM: 813,323 m East, 2,179,334 m North (Zone 4, NAD-83)

**SIC Code:** 2951 (Asphalt Paving Mixtures & Blocks)

**Mailing Address:** P.O. Box 78  
Honolulu, HI 96810

| Contact                     | Name            | Title                                      | Phone          |
|-----------------------------|-----------------|--|----------------|
| <b>Responsible Official</b> | David Takaguchi | Outer Islands Manager of Paving Operations | (808) 674-8383 |
| <b>Other Contact</b>        | Scott Sevadjian | Project Environmental Scientist            | (808) 203-2814 |

## 1. BACKGROUND

Grace Pacific LLC, formerly Grace Pacific Corporation submitted an application for renewal and minor modification for the CSP No. 0258-01-C issued on January 7, 2016, and August 20, 2018, for its 325 ton per hour (TPH) hot mix asphalt (HMA) plant.

The plant produces HMA from virgin aggregate, reclaimed asphalt pavement (RAP), and liquid asphalt cement. Virgin aggregate and RAP are hauled from storage piles to cold feed bins and then transported to a scalping screen and then to the drum mixer. Liquid asphalt cement is added to the aggregate and RAP blends in the drum mixer. The final product is conveyed from the drum mixer to the storage silos.

Existing permit conditions limit HMA production to 260,000 tons per any rolling twelve (12) month period. The drum mixer is permitted to burn fuel oil No. 2 or Ecodiesel with a maximum sulfur content not to exceed 0.5% by weight for each oil. The hot oil heater shall only be fired on fuel oil No. 2 with a maximum sulfur content of 0.5% by weight. The 1,065 hp diesel engine generator (DEG) provides the primary power for the plant. It is permitted to burn fuel oil No. 2 with a maximum sulfur content not to exceed 0.0015% by weight.

### ***Proposed Changes:***

Grace Pacific LLC will replace the existing virgin aggregate cold feed bins and scalping screen with a new set of cold feed bins and scalping screen. This replacement will not result in any changes to the facility's production capacity or emissions.

Grace Pacific LLC is also proposing to add cooking oil, biodiesel, grease trap oil, liquid propane gas (LPG), natural gas, renewable natural gas, and synthetic natural gas (SNG) as allowable fuels for the drum mixer burner and hot oil heater. The addition of allowable fuel will not trigger a signification modification of the current permit.

This modification is considered a minor modification since it:

- a. Does not increase the emissions of any air pollutant above the permitted emission limits;
- b. Does not result in or increase the emissions of any air pollutant not limited by permit to levels equal to or above:
  - i. Five hundred (500) pounds per year of a hazardous air pollutant, except lead;
  - ii. Three hundred (300) pounds per year of lead;
  - iii. Twenty-five (25) percent of significant amounts of emission as defined in HAR, Section 11-60.1-1, paragraph (1) in the definition of "significant"; or
  - iv. Two (2) tons per year of each regulated pollutant not already identified above.
- c. Does not violate any applicable requirement;
- d. Does not involve significant changes to existing monitoring requirements or any relaxation or significant change to existing reporting or recordkeeping requirements in the permit. Any change to the existing monitoring, reporting, or recordkeeping requirements that reduces the enforceability of the permit is considered a significant change;
- e. Does not require or change a case-by-case determination of an emission limitation or other standard, a source-specific determination for temporary sources of ambient impacts, or a visibility or increment analysis;
- f. Does not seek to establish or change a permit term or condition for which there is no corresponding underlying applicable requirement, and that the source has assumed to avoid an applicable requirement to which the source would otherwise be subject. Such terms and conditions include:
  - i. A federally enforceable emission cap assumed to avoid classification as a modification pursuant to any provision of Title I of the Act or Subchapter 7; and
  - ii. An alternative emissions limit approved pursuant to regulations promulgated pursuant to Section 112(i)(5) of the Act or Subchapter 9.
- g. Is not a modification pursuant to any provision of Tile I of the Act.

In addition, Grace Pacific LLC is requesting to convert the current CSP from a stationary source to temporary source with no moving plan submitted yet. The permittee will submit a change of location request when the plant moving become necessary.

## 2. EQUIPMENT DESCRIPTION

| <u>Unit</u>        | <u>Equipment Description</u>  |
|--------------------|---|
| Drum Mixer         | 325 TPH Stansteel parallel flow drum mixer, Model No. DM732, Serial No. 732, with 129 MMBTU/hr burner, Stansteel cyclone, and Astec RAP collar;                   |
| Baghouse           | Astec baghouse, Model No. RBH-43-SP, Serial No. 93-154-437; servicing the drum mixer/dryer;   |
| DEG                | 1,065 hp Cummins DEG, Model No. QST30-G5 NR2, Serial No. 37224352;  |
| Hot Oil Heater     | 1.25 MMBtu/hr Heatec hot oil heater, Model No. HCS-120, Serial No. 94268;   |
| Scalping Screen    | Astec 4' by 8' RAP scalping screen, Model No. SS-408-1; Astec virgin aggregate scalping screen, Model No. RSS-412-1, Serial No. to be determined;                 |
| HMA Storage System | Four-compartment cold feed system; Two (2) two hundred (200) ton asphalt concrete storage silos; Two-compartment (thirty (30) ton each) RAP cold feed system; and |
| Conveyor           | Various conveyor belts.   |

## 3. AIR POLLUTION CONTROLS

The drum mixer/dryer is equipped with a baghouse to control particulate matter (PM) emissions. Typically, the PM collected in the baghouse is recycled back into the mix. Certain paving mix design specifications require that the PM collected in the baghouse be removed from the process, in which case it is mixed with water and removed as a slurry. Water suppression will be used as necessary to control fugitive dust.

## 4. APPLICABLE REQUIREMENTS

### 4.1. Hawaii Administrative Rules (HAR)

Chapter 11-59, Ambient Air Quality Standards

Chapter 11-60.1, Air Pollution Control

Subchapter 1, General Requirements

Subchapter 2, General Prohibitions

11-60.1-31, Applicability

11-60.1-32, Visible Emissions

11-60.1-33, Fugitive Dust

11-60.1-38, Sulfur Oxides from Fuel Combustion

Subchapter 5, Covered Sources

Subchapter 6, Fees for Covered Sources, Noncovered Sources, and Agricultural Burning

11-60.1-111 Definitions

11-60.1-112 General Fee Provisions for Covered Sources

11-60.1-113 Application Fees for Covered Sources

11-60.1-114 Annual Fees for Covered Sources

11-60.1-115 Basis of Annual Fees for Covered Sources

Subchapter 8, Standards of Performance for Stationary Sources  
 11-60.1-161 New Source Performance Standards  
 Subchapter 9, Hazardous Air Pollutant Sources  
 Subchapter 10, Field Citations

#### 4.2. Department of Health (DOH) In-house Annual Emissions Reporting

DOH requests annual emissions reporting from those facilities that have facility-wide emissions exceeding in-house reporting levels and for all covered sources. Annual emissions reporting is required because this facility is a covered source.

| Pollutant       | Total Emissions (TPY) <sup>1</sup><br>[260,000 TPY] | DOH Reporting Levels<br>(TPY) |
|-----------------|---|-------------------------------|
| CO              | 19.3  | 250                           |
| NO <sub>x</sub> | 23.9  | 25                            |
| SO <sub>2</sub> | 17.7  | 25                            |
| PM              | 11.9  | 25                            |
| PM-10           | 6.4   | 25                            |
| PM-2.5          | 4.2   | -                             |
| VOC             | 9.2   | 25                            |
| HAP             | 1.4   | 5                             |

<sup>1</sup> See Project Emissions section.

#### 4.3. New Source Performance Standards (NSPS), 40 Code of Federal Regulations (CFR) Part 60

*Subpart I — Standards of Performance for Hot Mix Asphalt Facilities*

40 CFR Part 60, Subpart I is applicable to the 325 TPH HMA facility because the plant commenced construction or modification after June 11, 1973.

*Subpart IIII — Standards of Performance for Stationary Compression Ignition Internal Combustion Engines*

40 CFR Part 60, Subpart IIII is applicable to the 1,065 hp DEG because its construction commenced after July 11, 2005, and the engine was manufactured after April 1, 2006. For purposes of Subpart IIII, the date that construction commences is the date the engine is ordered. The engines must meet the emissions standards and certification requirements of this subpart. According to the manufacturer, this DEG is an EPA certified Tier 2 engine.

#### 4.4. National Emission Standards for Hazardous Air Pollutants for Source Categories (Maximum Achievable Control Technology (MACT)), 40 CFR Part 63

*Subpart ZZZZ — National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*

The 1,065 hp DEG is subject to this standard. It was constructed on or after June 12, 2006, and is a non-emergency stationary RICE of greater than five hundred (500) hp, hence is considered a new stationary RICE located at an area source of hazardous air pollutant (HAP)

emissions. As a new, non-emergency stationary RICE located at an area source of HAPs, the DEG will automatically comply with subpart by complying with 40 CFR Part 60, Subpart IIII.

## 5. NON-APPLICABLE REQUIREMENTS

### 5.1. Air Emission Reporting Requirements (AERR)

AERR determines the annual emissions reporting frequency based on the potential emissions (with the exception of lead, which is based on actual emissions) of each pollutant from the facility that emits at or above the triggering levels. As shown in the table below, potential emissions from the facility is less than the triggering levels and thus, the facility is not subject to annual emission reporting under AERR.

| Pollutant       | Total Emissions (TPY) <sup>1</sup><br>[260,000 TPY] | AERR Triggering Levels (TPY)     |                                  |
|-----------------|---|----------------------------------|----------------------------------|
|                 |   | 1 year cycle<br>(type A sources) | 3 year cycle<br>(type B sources) |
| CO              | 19.3  | 2500                             | 1000                             |
| NO <sub>x</sub> | 23.9  | 2500                             | 100                              |
| SO <sub>2</sub> | 17.7  | 2500                             | 100                              |
| PM              | 11.9  | -                                | -                                |
| PM-10           | 6.4   | 250                              | 100                              |
| PM-2.5          | 4.2   | 250                              | 100                              |
| VOC             | 9.2   | 250                              | 100                              |

<sup>1</sup> See Project Emissions section.

### 5.2. Prevention of Significant Deterioration (PSD), 40 CFR 52.21

PSD review applies to new major stationary sources and major modifications to these types of sources. This facility is not subject to a PSD review because it is not a major stationary source as defined and listed in HAR Title 11, Chapter 60.1, Subchapter 7 and 40 CFR Part 52, §52.21.

### 5.3. National Emission Standards for Hazardous Air Pollutants (NESHAPS), 40 CFR Part 61

The facility is not a major source of HAPs and is not subject to any NESHAPS requirements under 40 CFR Part 61.

### 5.4. Compliance Assurance Monitoring (CAM), 40 CFR Part 64

The purpose of CAM is to provide a reasonable assurance that compliance is being achieved with large emissions units that rely on air pollution control device equipment to meet an emissions limit or standard. Pursuant to 40 CFR Part 64, for CAM to be applicable, the emissions unit must:

- (1) Be located at a major source;
- (2) Be subject to an emissions limit or standard;
- (3) Use a control device to achieve compliance;
- (4) Have potential pre-control emissions that are one hundred percent (100%) of the major source level; and
- (5) Not otherwise be exempt from CAM.

This source is not subject to CAM since the facility is not a major source.

### 5.5. Best Available Control Technology (BACT)

A BACT analysis is required for new sources or modifications to sources that have the potential to emit or increase emissions above significant levels considering any limitations as defined in HAR, Section 11-60.1-1. The facility is not subject to a BACT analysis since the proposed modification will not cause an increase of emissions above significant levels. See Project Emissions section.

### 5.6. Synthetic Minor Source

A synthetic minor source is a facility that is potentially major as defined in HAR, Section 11-60.1-1, but is made non-major through federally enforceable permit conditions. This facility is a synthetic minor source because potential CO, sulfur dioxide (SO<sub>2</sub>) and nitrogen oxide (NO<sub>x</sub>) emissions exceed major source thresholds when the facility is operated without limitations for 8,760 hours/year. However, this facility is not an SM-80 source since potential emissions of each pollutant is below eighty (80) percent of the threshold defined for major source. See Project Emissions section.

### 5.7. Mandatory Greenhouse Gas Reporting, 40 CFR Part 98

The facility is not subject to the greenhouse gas reporting requirements specified in 40 CFR Part 98 because the total greenhouse gas emissions (biogenic and non-biogenic) on a CO<sub>2</sub> equivalent (CO<sub>2</sub>e) basis are less than 25,000 metric tons per year. The CO<sub>2</sub>e emissions determined from the global warming potential (GWP) of each GHG are shown in the table below.

| GHG                               | GWP | Mass-Based Emissions<br>(metric tons/yr) | CO <sub>2</sub> e Based Emissions<br>(metric tons/yr) |
|-----------------------------------|-----|--|---|
| Carbon Dioxide (CO <sub>2</sub> ) | 1   | 6,918                                    | 6,918   |
| Methane (CH <sub>4</sub> )        | 25  | 1.5                                      | 38  |
| Nitrous Oxide (N <sub>2</sub> O)  | 298 | 0.2                                      | 49  |
| Total Emissions (metric tons/yr): |     |  | <b>7,005</b>  |

## 6. INSIGNIFICANT ACTIVITIES/EXEMPTIONS

Insignificant activities identified by the applicant that meet the criteria specified in HAR §11-60.1-82(f) are listed as follows:

| <u>Basis for Exemption</u> | <u>Description</u>   |
|----------------------------|--|
| §11-60.1-82(f)(1)          | <ol style="list-style-type: none"> <li>1. Five (5) fuel oil tanks with storage capacities of 200-gallon, 500-gallon, 2,000-gallon, 3,000-gallon, and 8,000-gallon for each;</li> <li>2. Three (3) 300-gallon petroleum tanks, each containing hydraulic oil, motor oil, and used oil;</li> <li>3. One (1) 25,000-gallon liquid asphalt cement storage tank; and</li> <li>4. One (1) 4,500-gallon asphalt emulsion tank.</li> </ol> |
| §11-60.1-82(f)(2)          | <ol style="list-style-type: none"> <li>1. One (1) 72 kW Cummins Tier 4 DEG, Model No. 6BTA5.9-G4; and</li> <li>2. Eight (8) portable Power Flame asphalt tank burners, Model No. PF-1.</li> </ol>  |
| §11-60.1-82(f)(7)          | Slurry Screw <sup>1</sup> .  |

<sup>1</sup>According to the applicant, the resulting slurry is completely saturated with water, and emissions are expected to be negligible.

Combined emissions from the insignificant activities and equipment listed in the permit are less than major source levels.

## 7. ALTERNATE OPERATING SCENARIOS

The permittee may replace the DEG with a temporary replacement unit of similar size with equal or lesser emissions if any repair reasonably warrants the removal of the DEG from operation (i.e., equipment failure, engine overhaul, or any major equipment problems requiring maintenance for efficient operation).

## 8. PROJECT EMISSIONS

Emissions from the drum mixer, the DEG, silo filling, truck load-out, aggregate handling, and paved roads were calculated. The results are summarized in this section. Emissions from equipment qualifying as insignificant activities pursuant to HAR §11-60.1-82 (f) are not included.

### 8.1. Emissions from the Drum Mixer through Baghouse

Emissions are based on the maximum capacity of the drum mixer to process 325 TPH of HMA with a limited annual production of 260,000 TPY. Emission factors (lb/ton) of CO, NO<sub>x</sub>, PM, PM<sub>10</sub>, PM<sub>2.5</sub>, volatile organic compound (VOC), and HAPs for liquid fuel (No. 2 fuel oil, waste-oil, cooking oil, biodiesel, and grease trap oil) and natural gas (natural gas, renewable natural gas, and SNG) are from AP-42 Section 11.1 (3/04) – *Hot Mix Asphalt Plants*. Emission factors (lb/ton) for LPG (propane) are derived from LPG to natural gas emission factor conversion ratios which are developed by comparing natural gas emission factors in AP-42 Section 1.4 (07/98) - *Natural Gas Combustion* and LPG emission factors in AP-42 Section 1.5 (07/08) - *Liquefied Petroleum Gas Combustion*. SO<sub>2</sub> emission factor is calculated from AP-42 Section 1.3 (5/10) - *Fuel Oil Combustion* for fuel oil No. 2 with the permitted sulfur content limit (0.5% weight percentage) and footnote c of AP-42

Section 11.1 (3/04) – *Hot Mix Asphalt Plants*, Table 11.1-7. The sulfur content of biodiesel is below 0.5% according to the applicant. NO<sub>x</sub> emissions from biodiesel was increased by ten (10) percent over fuel oil No. 2 based on EPA's report, *A Comprehensive Analysis of Biodiesel Impacts on Exhaust Emissions, October 2002*. Emissions are determined by the emission factors for each of the permitted and proposed fuels. The table below summarizes the worst-case emissions from these fuels. Detailed calculations are included in Enclosure 1a, 1b, and 1c.

| Drum Mixer        |                 |             |
|-------------------|-----------------|-------------|
| Pollutant         | Emissions (TPY) |             |
|                   | 260,000 TPY     | 8,760 hr/yr |
| CO                | 16.90           | 185.06      |
| NO <sub>x</sub>   | 7.87            | 86.12       |
| SO <sub>2</sub>   | 14.55           | 159.28      |
| PM                | 4.40            | 48.23       |
| PM <sub>10</sub>  | 3.07            | 33.62       |
| PM <sub>2.5</sub> | 2.94            | 32.15       |
| VOC               | 6.75            | 73.86       |
| Lead (Pb)         | 0.002           | 0.021       |
| HAPs              | 1.37            | 14.95       |

### 8.2. Emissions from 1,065 hp DEG

The DEG is fired on fuel oil No. 2 with a maximum sulfur content of 0.0015% by weight. Total fuel consumption limit for the DEG is 153,000 gallons in any rolling twelve (12) month period. The criteria pollutant emissions were calculated based on emission factor from manufacturer exhaust emission data sheet. HAP emissions are based on fuel oil No. 2 emission factors from AP-42 Section 3.3 (10/96) – *Large Stationary Diesel and All Stationary Dual-fuel Engines*. Detailed calculations are included in Enclosures 2.

| Pollutant         | 1,065 Cummins DEG |                                   |                                |
|-------------------|-------------------|-----------------------------------|--------------------------------|
|                   | Emissions (lb/hr) | Emissions (TPY)<br>153,000 gal/hr | Emissions (TPY)<br>8,760 hr/yr |
| CO                | 1.06              | 1.58                              | 4.63                           |
| NO <sub>x</sub>   | 9.23              | 13.84                             | 40.42                          |
| SO <sub>2</sub>   | 0.23              | 0.35                              | 1.03                           |
| PM                | 0.28              | 0.42                              | 1.23                           |
| PM <sub>10</sub>  | 0.27              | 0.41                              | 1.19                           |
| PM <sub>2.5</sub> | 0.25              | 0.38                              | 1.11                           |
| VOC               | 0.09              | 0.32                              | 0.93                           |
| HAPs              | 0.011             | 0.016                             | 0.047                          |

### 8.3. Emissions from HMA Silo Filling and Truck Load-Out

Emissions from HMA silo filling and truck load-out operations are estimated using emission factors from AP-42, Section 11.1 (3/04) – *Hot Mix Asphalt Plants*. Emissions are summarized in the table below. Detailed calculations are included in Enclosures 3 and 4.



| Pollutant         | Silo Filling Emissions (TPY) |             | Truck Load-out Emissions (TPY) |             |
|-------------------|------------------------------|-------------|--------------------------------|-------------|
|                   | 260,000 TPY                  | 8,760 hr/yr | 260,000 TPY                    | 8,760 hr/yr |
| CO                | 0.15                         | 1.68        | 0.18                           | 1.92        |
| NO <sub>x</sub>   | -                            | -           | -                              | -           |
| SO <sub>2</sub>   | -                            | -           | -                              | -           |
| PM                | 0.0762                       | 0.834       | 0.0679                         | 0.743       |
| PM <sub>10</sub>  | 0.0762                       | 0.834       | 0.0679                         | 0.679       |
| PM <sub>2.5</sub> | 0.0762                       | 0.834       | 0.0679                         | 0.679       |
| VOC               | 1.58                         | 17.35       | 0.51                           | 5.57        |
| Lead (Pb)         | -                            | -           | -                              | -           |
| HAPs              | 0.024                        | 0.267       | 0.011                          | 0.123       |

#### 8.4. Fugitive Emissions

Emissions due to aggregate handling, wind erosion from aggregate stockpiles, transferring to cold-feed bins and truck travelling on unpaved roads are summarized in the table below. A seventy (70) percent control efficiency is assumed for water suppression.

Aggregate handling includes truck unloading to storage piles, RAP scalping screens, and conveyor transfer points. Particulate emissions are estimated using AP-42, Section 11.19.2 (8/04) – *Crushed Stone Processing and Pulverized Mineral Processing*. Detailed calculations are included in Enclosure 5.

Windblown fugitive dust emissions from aggregate stockpiles are determined using EF from Table 4-1 in AP-42 Section 11.19.1 Background Document – *Emission Factor Documentation for AP-42 Section 11.19.1 Sand and Gravel Processing Final Report*. Detailed calculations are shown in Enclosure 6.

Emissions from transferring to cold-feed bins are determined using AP-42 Section 13.2.4 (11/06) – *Aggregate Handling and Storage Piles*. Detailed calculations are included in Enclosure 7. Particulate emissions from vehicle travelling on paved roads are estimated using AP-42, Section 13.2.2 (11/06) – *Unpaved Roads*. Detailed calculations are included in Enclosure 8.

| Pollutant         | Emissions (TPY)    |             |              |                                |             |                                   |             |
|-------------------|--------------------|-------------|--------------|--------------------------------|-------------|-----------------------------------|-------------|
|                   | Aggregate Handling |             | Wind Erosion | Transferring to Cold-Feed Bins |             | Truck Travelling on Unpaved Roads |             |
|                   | 260,000 TPY        | 8,760 hr/yr | 8,760 hr/yr  | 260,000 TPY                    | 8,760 hr/yr | 260,000 TPY                       | 8,760 hr/yr |
| PM                | 1.91               | 20.94       | 2.15         | 1.17                           | 12.84       | 1.55                              | 16.95       |
| PM <sub>10</sub>  | 0.68               | 7.48        | 1.09         | 0.55                           | 6.07        | 0.39                              | 4.32        |
| PM <sub>2.5</sub> | 0.29               | 3.14        | 0.32         | 0.08                           | 0.92        | 0.04                              | 0.43        |

## 8.5. Emissions from the Hot Oil Heater

Emission factors for No. 2 fuel oil, LPG (propane) and natural gas (natural gas, renewable natural gas, and synthetic natural gas (SNG)) are from AP-42 Sections 1.3 (5/10) - *Fuel Oil Combustion*, 1.4 (07/98) - *Natural Gas Combustion* and 1.5 (07/08) - *Liquefied Petroleum Gas Combustion*. Emissions are determined by the emission factors for each of the permitted and proposed fuels. The table below summarizes the worst-case emissions from these fuels. Detailed calculations are included in Enclosure 9.

| Pollutant         | Hot Oil Heater    |                 |
|-------------------|-------------------|-----------------|
|                   | Emissions (lb/hr) | Emissions (TPY) |
| CO                | 0.45              | 0.45            |
| NO <sub>x</sub>   | 0.18              | 0.78            |
| SO <sub>2</sub>   | 0.63              | 2.78            |
| PM                | 0.03              | 0.13            |
| PM <sub>10</sub>  | 0.01              | 0.04            |
| PM <sub>2.5</sub> | 0.01              | 0.04            |
| VOC               | 0.01              | 0.05            |
| Lead (Pb)         | 1.13E-05          | 4.93E-05        |
| HAPs              | 7.06E-04          | 3.09E-03        |

## 8.6. Total Emissions

The total potential emissions from this facility are summarized below. The detailed calculations are shown in Enclosure 9.

### 1. Criteria Pollutant and HAP Emissions

| Emissions (TPY)     | Pollutant     |                 |                 |               |                  |                   |              |             |              |
|---------------------|---------------|-----------------|-----------------|---------------|------------------|-------------------|--------------|-------------|--------------|
|                     | CO            | NO <sub>x</sub> | SO <sub>2</sub> | PM            | PM <sub>10</sub> | PM <sub>2.5</sub> | VOC          | Lead (Pb)   | HAPs         |
| Limited (Proposed)  | 19.26         | 23.87           | 17.67           | 11.88         | 6.39             | 4.23              | 9.20         | 0.002       | 1.42         |
| Limited (Current)   | 19.01         | 23.87           | 17.67           | 11.76         | 6.31             | 4.15              | 6.58         | 0.002       | 1.42         |
| Limited (Change)    | 0.24          | 0               | 0               | 0.12          | 0.09             | 0.08              | 2.62         | 0           | 0            |
| Min. Mod. Threshold | 25            | 10              | 10              | 6.25          | 3.75             | 2.5               | 10           | 0.15        |              |
| <b>8,780 hr/yr</b>  | <b>193.73</b> | <b>131.36</b>   | <b>163.08</b>   | <b>104.05</b> | <b>55.39</b>     | <b>39.70</b>      | <b>97.75</b> | <b>0.37</b> | <b>15.39</b> |

### 2. Green House Gas (GHG)

| GHG                               | GWP | GHG CO <sub>2</sub> e Based Emissions (metric TPY) |               |
|-----------------------------------|-----|--|---------------|
|                                   |     | Limited  | 8,780 hr/yr   |
| Carbon Dioxide (CO <sub>2</sub> ) | 1   | 6,918  | 54963         |
| Methane (CH <sub>4</sub> )        | 25  | 38   | 403           |
| Nitrous Oxide (N <sub>2</sub> O)  | 298 | 49   | 355           |
| Total Emissions:                  |     | <b>7,005</b>                                       | <b>55,721</b> |

## 9. AIR QUALITY ASSESSMENT

Since the proposed change is not a significant modification, an ambient air quality analysis (AAQA) is not required.

## 10. SIGNIFICANT PERMIT CONDITIONS

### 1. Fuel Limits

a. The drum mixer/dryer shall be fired only on the following fuels:

- i. Fuel oil No. 2, Unitek Ecodiesel, Grease trap oil, cooking oil, or biodiesel with a maximum sulfur content not to exceed 0.5% by weight for each fuel;
- ii. Any combination thereof;
- iii. LPG, natural gas, renewable natural gas, or SNG; or
- iv. Specification used oil from Hawaii Petroleum Distributors which shall meet the following limit:

| Constituent/Property | Limit            |
|----------------------|------------------|
| Arsenic              | ≤ 5 ppm          |
| Cadmium              | ≤ 2 ppm          |
| Chromium             | ≤ 10 ppm         |
| Lead                 | ≤ 100 ppm        |
| Total Halogens       | ≤ 1,000 ppm      |
| Sulfur               | ≤ 0.5% by weight |
| Flash Point          | ≥ 100 °F         |
| PCBs                 | < 2 ppm          |

b. The DEG shall be fired only on fuel oil No. 2 with the following specifications:

- i. Maximum sulfur content not to exceed 0.0015% by weight; and
- ii. Minimum cetane index of forty (40) or maximum aromatic content of thirty-five (35) volume percent.

c. The hot oil heater shall be fired only on the following fuels:

- i. Fuel oil No. 2 with a maximum sulfur content not to exceed 0.5% by weight; or
- ii. LPG, natural gas, renewable natural gas, or SNG.

Reason: Drum mixer/dryer and hot oil heater: These permit conditions reflect the proposed change in allowable fuels and comply with NAQQS and SAQQS.

DEG: Incorporate 40 CFR Part 60, Subpart IIII, fuel requirements for the DEG.

### 2. Change of Location Requirements

Reason: Incorporate change of location requirements for temporary source.

### 3. All other conditions will be carried over from the current temporary CSP.

## 11. CONCLUSION AND RECOMMENDATION

The calculations of emissions have shown the proposed changes qualify for a minor modification and this facility will continue to be in compliance with NAQQS and SAQQS with the proposed changes.

Recommend issuance of the modified covered source permit subject to the incorporation of the significant permit conditions, a thirty (30) day public comment period, and a forty-five (45) day EPA review period.

Review by :       Chenyan Song  
Date:               November 16, 2018, Initial  
                      January 4, 2019, Second

**Enclosure 1a: 325 TPH Drum Mixer through Baghouse, Liquid Fuels**

AP-42 Section 11.1 (3/04) - Hot Mix Asphalt Plants

Emission (lb/hr) = Drum Mixer Capacity (ton/hr) x Emission Factor (lb/ton)

Emission (g/s) = Emission (lb/hr) x 453.6 (g/lb) / 3600 (s) for 1, 8, & 24 hr AAQIA input

Emission (g/s) = Emission (lb/hr) x Operation Hour (1616.8 hr/yr) / 8760 hr/yr x 453.6 (g/lb) / 3600 (s) for annual AAQIA input

|                                | Value   | Unit                      | Notes                         |
|--------------------------------|---------|---------------------------|-------------------------------|
| HMA Production Limit           | 260,000 | TPY                       | Permit Limit                  |
| Drum Mixer Capacity            | 325     | TPH                       |                               |
| Burner Heat Input Capacity     | 129     | MMBtu/hr                  |                               |
| LPG Heating Value              | 140     | MMBtu/10 <sup>3</sup> gal |                               |
| Fuel Oil Sulfur Content        | 0.5     | %                         | Permit Limit                  |
| Fuel Consumption Rate Capacity | 2.84    | gal/ton                   |                               |
| Fuel Consumption               | 921.43  | gal/hr                    |                               |
| Operation Hour                 | 800.00  | hour                      | Based on HMA production limit |

| Pollutant                                | EF (lb/ton) | Emissions (lb/hr) | Emissions (TPY) |             | Current Emissions |          |
|--|-------------|-------------------|-----------------|-------------|-------------------|----------|
|  |             |                   | 260,000 TPY     | 8,760 hr/yr | lb/hr             | TPY      |
| CO <sup>1</sup>                          | 0.13        | 42.25             | 16.90           | 185.06      | 42.25             | 16.90    |
| NO <sub>x</sub> <sup>1</sup>             | 0.055       | 17.88             | 7.15            | 78.29       | 17.88             | 7.15     |
| NO <sub>x</sub> (Biodiesel) <sup>2</sup> | 0.061       | 19.66             | 7.87            | 86.12       | 19.66             | 7.87     |
| SO <sub>2</sub> <sup>1,3</sup>           | 0.112       | 36.36             | 14.55           | 159.28      | 36.36             | 14.55    |
| PM <sup>4</sup>                          | 0.033       | 10.73             | 4.29            | 46.98       | 10.73             | 4.29     |
| PM-10 <sup>4</sup>                       | 0.023       | 7.48              | 2.99            | 32.74       | 7.48              | 2.99     |
| PM-2.5 <sup>5</sup>                      | 0.022       | 7.15              | 2.86            | 31.32       | 7.15              | 2.86     |
| VOC <sup>6</sup>                         | 0.032       | 10.40             | 4.16            | 45.55       | 10.40             | 4.16     |
| CO <sub>2</sub> <sup>1</sup>             | 33          | 10,725.00         | 4,290.00        | 46,975.50   | 10,725.00         | 4,290.00 |
| CH <sub>4</sub> <sup>6</sup>             | 0.012       | 3.90              | 1.56            | 17.08       | 3.90              | 1.56     |
| N <sub>2</sub> O <sup>7</sup>            | 7.37E-04    | 0.24              | 0.10            | 1.05        | 7.37E-04          | 0.00     |

1. EFs are based on no. 2 fuel oil- or waste oil-fired dryer with fabric filter from AP-42 Table 11.1-3, 11.1-4, 11.1-7, and 11.1-8, for whichever is bigger

2. NO<sub>x</sub> emissions from biodiesel on by 10% over fuel oil no. 2 based on EPA's report,

A Comprehensive Analysis of Biodiesel Impacts on Exhaust Emissions, October 2002.

3. SO<sub>2</sub> EF can be estimated using EF from AP-42 Table 1.3-1 (5/10). SO<sub>2</sub> (lb/10<sup>3</sup> gal) = 142S, where S = % sulfur in fuel oil.

According to footnote c of Table 11.1-7, EF should take the bigger one of the following:

SO<sub>2</sub> (lb/ton) = SO<sub>2</sub> (lb/103 gal)/95% x 0.5 x Fuel Consumption (gal/ton)/1000 and

SO<sub>2</sub> (lb/ton) = SO<sub>2</sub> (lb/103 gal)/95% x Fuel Consumption (gal/ton)/1000 - 0.1 lb/ton.

According to AP-42 1.3.3.2, more than 95% of fuel sulfur is converted to SO<sub>2</sub>.

Therefore, calculated SO<sub>2</sub> (lb/103 gal) is assumed to be covered from the 95% of fuel-bound sulfur here.

4. EFs are based on no. 2 fuel oil-fired dryer with fabric filter from AP-42 Table 11.1-3

5. EF of PM-2.5 = 0.0029 + 0.0074 + 0.012 = 0.022 (lb/ton). 0.0029 lb/ton (Filterable PM) is from Table 11.1-4.

0.0074 lb/ton (Inorganic condensable PM) and 0.012 lb/ton (Organic condensable PM) are from Table 11.1-3.

6. EFs are based on no. 2 fuel oil- or waste oil-fired dryer with fabric filter from AP-42 Table 11.1-8.

7. N<sub>2</sub>O EF (0.26 lb/10<sup>3</sup> gal) is from AP-42 Table 1.3-8 (5/10). N<sub>2</sub>O (lb/ton) = N<sub>2</sub>O (lb/10<sup>3</sup> gal) x Fuel Consumption (gal/ton)/1000.

| Hazardous Air Pollutant (HAP) | EF <sup>1</sup> (lb/ton) | Emissions (lb/hr) | Emissions (TPY) |             | Current Emissions |          |
|-------------------------------|--------------------------|-------------------|-----------------|-------------|-------------------|----------|
|                               |                          |                   | 260,000 TPY     | 8,760 hr/yr | lb/hr             | TPY      |
| Total non-PAH HAPs            | 9.50E-03                 | 3.09E+00          | 1.24E+00        | 1.35E+01    | 3.09E+00          | 1.24E+00 |
| Total PAH HAPs                | 8.80E-04                 | 2.86E-01          | 1.14E-01        | 1.25E+00    | 2.86E-01          | 1.14E-01 |
| Total PCDD/PCDF               | 1.20E-10                 | 3.90E-08          | 1.56E-08        | 1.71E-07    | 3.90E-08          | 1.56E-08 |
| Arsenic                       | 5.60E-07                 | 1.82E-04          | 7.28E-05        | 7.97E-04    | 1.82E-04          | 7.28E-05 |
| Beryllium                     | 0                        | 0                 | 0               | 0           | 0                 | 0        |
| Cadmium                       | 4.10E-07                 | 1.33E-04          | 5.33E-05        | 5.84E-04    | 1.33E-04          | 5.33E-05 |
| Chromium                      | 5.50E-06                 | 1.79E-03          | 7.15E-04        | 7.83E-03    | 1.79E-03          | 7.15E-04 |
| Cobalt                        | 2.60E-08                 | 8.45E-06          | 3.38E-06        | 3.70E-05    | 8.45E-06          | 3.38E-06 |
| Hexavalent chromium           | 4.50E-07                 | 1.46E-04          | 5.85E-05        | 6.41E-04    | 1.46E-04          | 5.85E-05 |
| Lead                          | 1.50E-05                 | 4.88E-03          | 1.95E-03        | 2.14E-02    | 4.88E-03          | 1.95E-03 |
| Manganese                     | 7.70E-06                 | 2.50E-03          | 1.00E-03        | 1.10E-02    | 2.50E-03          | 1.00E-03 |
| Mercury                       | 2.60E-06                 | 8.45E-04          | 3.38E-04        | 3.70E-03    | 8.45E-04          | 3.38E-04 |
| Nickel                        | 6.30E-05                 | 2.05E-02          | 8.19E-03        | 8.97E-02    | 2.05E-02          | 8.19E-03 |
| Phosphorus                    | 2.80E-05                 | 9.10E-03          | 3.64E-03        | 3.99E-02    | 9.10E-03          | 3.64E-03 |
| Selenium                      | 3.50E-07                 | 1.14E-04          | 4.55E-05        | 4.98E-04    | 1.14E-04          | 4.55E-05 |
| Total HAPs                    |                          | 3.41              | 1.37            | 14.95       | 3.41              | 1.37     |

1. EFs are based on no. 2 fuel oil- or waste oil-fired dryer with fabric filter from AP-42 Table 11.1-10 and 11.1-12, whichever is higher.

| Green House Gas (GHG) | GWP | Limited Emissions (metric TPY) |                         | Unlimited Emissions (metric TPY) |                         |
|-----------------------|-----|--------------------------------|-------------------------|----------------------------------|-------------------------|
|                       |     | Mass-Based                     | CO <sub>2</sub> e Based | Mass-Based                       | CO <sub>2</sub> e Based |
| CO <sub>2</sub>       | 1   | 3,891.03                       | 3,891.03                | 42,606.78                        | 42,606.78               |
| CH <sub>4</sub>       | 25  | 1.41                           | 35.37                   | 15.49                            | 387.33                  |
| N <sub>2</sub> O      | 298 | 0.09                           | 25.90                   | 0.95                             | 283.62                  |
| Total                 |     |                                | 3,952.30                |                                  | 43,277.73               |

**Enclosure 1b: 325 TPH Drum Mixer through Baghouse, NG**

AP-42 Section 11.1 (3/04) - Hot Mix Asphalt Plants

Emission (lb/hr) = Drum Mixer Capacity (ton/hr) x Emission Factor (lb/ton)

Emission (g/s) = Emission (lb/hr) x 453.6 (g/lb) / 3600 (s) for 1, 8, & 24 hr AAQIA input

Emission (g/s) = Emission (lb/hr) x Operation Hour (1616.8 hr/yr) / 8760 hr/yr x 453.6 (g/lb) / 3600 (s) for annual AAQIA input

|                                | Value   | Unit                   | Notes                         |
|--------------------------------|---------|------------------------|-------------------------------|
| HMA Production Limit           | 260,000 | TPY                    | Permit Limit                  |
| Drum Mixer Capacity            | 325     | TPH                    |                               |
| Burner Heat Input Capacity     | 129     | MMBtu/hr               |                               |
| NG Heating Value               | 1,020   | Btu/scf                |                               |
| NG Sulfur Content              | 2000    | gr/10 <sup>6</sup> scf | AP-42 Table 1.4-2             |
| Fuel Consumption Rate Capacity | 389.14  | scf/ton                |                               |
| Fuel Consumption               |         | gal/ton                |                               |
| Operation Hour                 | 800.00  | hour                   | Based on HMA production limit |

| Pollutant                                | EF (lb/ton) | Emissions (lb/hr) | Emissions (TPY) |             | AAQIA Input Emissions (g/s) |        |
|--|-------------|-------------------|-----------------|-------------|-----------------------------|--------|
|  |             |                   | 260,000 TPY     | 8,760 hr/yr | 1, 8, & 24 hr               | annual |
| CO <sup>1</sup>                          | 0.13        | 42.25             | 16.90           | 185.06      | 5.32                        |        |
| NO <sub>x</sub> <sup>1</sup>             | 0.026       | 8.45              | 3.38            | 37.01       | 1.06                        | 0.10   |
| NO <sub>x</sub> (Biodiesel) <sup>2</sup> |             |                   |                 |             |                             |        |
| SO <sub>2</sub> <sup>3</sup>             | 0.003       | 1.11              | 0.44            | 4.84        | 0.14                        | 0.01   |
| PM <sup>4</sup>                          | 0.033       | 10.73             | 4.29            | 46.98       |                             |        |
| PM-10 <sup>4</sup>                       | 0.023       | 7.48              | 2.99            | 32.74       | 0.94                        | 0.09   |
| PM-2.5 <sup>5</sup>                      | 0.022       | 7.15              | 2.86            | 31.32       | 0.90                        | 0.08   |
| VOC <sup>6</sup>                         | 0.032       | 10.40             | 4.16            | 45.55       |                             |        |
| CO <sub>2</sub> <sup>1</sup>             | 33          | 10,725.00         | 4,290.00        | 46,975.50   |                             |        |
| CH <sub>4</sub> <sup>6</sup>             | 0.012       | 3.90              | 1.56            | 17.08       |                             |        |
| N <sub>2</sub> O <sup>7</sup>            | 8.56E-04    | 0.28              | 0.11            | 1.22        |                             |        |

1. EFs are based on no. 2 fuel oil-fired dryer with fabric filter from AP-42 Table 11.1-3, 11.1-4, 11.1-7, and 11.1-8.

1. EFs are based on no. 2 fuel oil-fired dryer with fabric filter from AP-42 Table 11.1-7.

2. NO<sub>x</sub> emissions from biodiesel was increased by 10% over fuel oil no. 2 based on EPA's report,

A Comprehensive Analysis of Biodiesel Impacts on Exhaust Emissions, October 2002.

3. SO<sub>2</sub> EF is estimated using EF from AP-42 Table 1.3-1 (5/10). SO<sub>2</sub> (lb/10<sup>3</sup> gal) = 142S, where S = % sulfur in fuel oil.

According to footnote c of Table 11.1-7, EF should take the bigger one of the following:

SO<sub>2</sub> (lb/ton) = SO<sub>2</sub> (lb/103 gal) x 0.5 x Fuel Consumption (gal/ton)/1000 and

SO<sub>2</sub> (lb/ton) = SO<sub>2</sub> (lb/103 gal) x Fuel Consumption (gal/ton)/1000 - 0.1 lb/ton.

4. EFs are based on no. 2 fuel oil-fired dryer with fabric filter from AP-42 Table 11.1-3

5. EF of PM-2.5 = 0.0029 + 0.0074 + 0.012 = 0.022 (lb/ton). 0.0029 lb/ton (Filterable PM) is from Table 11.1-4.

0.0074 lb/ton (Inorganic condensable PM) and 0.012 lb/ton (Organic condensable PM) are from Table 11.1-3.

6. EFs are based on no. 2 fuel oil-fired dryer with fabric filter from AP-42 Table 11.1-8.

7. N<sub>2</sub>O EF (2.2 lb/10<sup>6</sup> scf) is from AP-42 Table 1.4-2 (7/98). N<sub>2</sub>O (lb/ton) = N<sub>2</sub>O (lb/10<sup>6</sup> scf) x Fuel Consumption (scf/ton)/1000000.

| Hazardous Air Pollutant (HAP) | EF <sup>1</sup> (lb/ton) | Emissions (lb/hr) | Emissions (TPY) |             |
|-------------------------------|--------------------------|-------------------|-----------------|-------------|
|                               |                          |                   | 260,000 TPY     | 8,760 hr/yr |
| Total non-PAH HAPs            | 5.10E-03                 | 1.66E+00          | 6.63E-01        | 7.26E+00    |
| Total PAH HAPs                | 1.90E-04                 | 6.18E-02          | 2.47E-02        | 2.70E-01    |
| Total PCDD/PCDF               | 0.00E+00                 | 0.00E+00          | 0.00E+00        | 0.00E+00    |
| Arsenic                       | 5.60E-07                 | 1.82E-04          | 7.28E-05        | 7.97E-04    |
| Beryllium                     | 0                        | 0                 | 0               | 0           |
| Cadmium                       | 4.10E-07                 | 1.33E-04          | 5.33E-05        | 5.84E-04    |
| Chromium                      | 5.50E-06                 | 1.79E-03          | 7.15E-04        | 7.83E-03    |
| Cobalt                        | 2.60E-08                 | 8.45E-06          | 3.38E-06        | 3.70E-05    |
| Hexavalent chromium           | 4.50E-07                 | 1.46E-04          | 5.85E-05        | 6.41E-04    |
| Lead                          | 6.20E-07                 | 2.02E-04          | 8.06E-05        | 8.83E-04    |
| Manganese                     | 7.70E-06                 | 2.50E-03          | 1.00E-03        | 1.10E-02    |
| Mercury                       | 2.40E-07                 | 7.80E-05          | 3.12E-05        | 3.42E-04    |
| Nickel                        | 6.30E-05                 | 2.05E-02          | 8.19E-03        | 8.97E-02    |
| Phosphorus                    | 2.80E-05                 | 9.10E-03          | 3.64E-03        | 3.99E-02    |
| Selenium                      | 3.50E-07                 | 1.14E-04          | 4.55E-05        | 4.98E-04    |
| Total HAPs                    |                          | 1.75              | 0.70            | 7.68        |

1. EFs are based on no. 2 fuel oil- or waste oil-fired dryer with fabric filter from AP-42 Table 11.1-10 and 11.1-12, whichever is higher.

| Green House Gas (GHG) | GWP | Limited Emissions (metric TPY) |                         | Unlimited Emissions (metricTPY) |                         |
|-----------------------|-----|--------------------------------|-------------------------|---------------------------------|-------------------------|
|                       |     | Mass-Based                     | CO <sub>2</sub> e Based | Mass-Based                      | CO <sub>2</sub> e Based |
| CO <sub>2</sub>       | 1   | 3,891.03                       | 3,891.03                | 42,606.78                       | 42,606.78               |
| CH <sub>4</sub>       | 25  | 1.41                           | 35.37                   | 15.49                           | 387.33                  |
| N <sub>2</sub> O      | 298 | 0.10                           | 30.08                   | 1.11                            | 329.39                  |
| Total                 |     |                                | 3,956.48                |                                 | 43,323.50               |

**Enclosure 1c: 325 TPH Drum Mixer through Baghouse, LPG (Propane)**

AP-42 Section 1.4 (07/98) - Natural Gas Combustion

AP-42 Section 1.5 (07/08) - Liquefied Petroleum Gas Combustion

Emission (lb/hr) = Drum Mixer Capacity (ton/hr) x Emission Factor (lb/ton)

Emission (g/s) = Emission (lb/hr) x 453.6 (g/lb) / 3600 (s) for 1, 8, & 24 hr AAQIA input

Emission (g/s) = Emission (lb/hr) x Operation Hour (1616.8 hr/yr) / 8760 hr/yr x 453.6 (g/lb) / 3600 (s) for annual AAQIA input

|                                | Value   | Unit                      | Notes                         |
|--------------------------------|---------|---------------------------|-------------------------------|
| HMA Production Limit           | 260,000 | TPY                       | Permit Limit                  |
| Drum Mixer Capacity            | 325     | TPH                       |                               |
| Burner Heat Input Capacity     | 129     | MMBtu/hr                  |                               |
| Propane Heating Value          | 91.5    | MMBtu/10 <sup>3</sup> gal |                               |
| LPG Heating Value              | 1,020   | Btu/scf                   |                               |
| LPG Sulfur Content             | 0.18    | gr/100sfc                 | AP-42 Table 1.5-1             |
| Fuel Consumption Rate Capacity | 4.34    | lb/ton                    |                               |
| Fuel Consumption               | 1.41    | 10 <sup>3</sup> gal/hr    |                               |
| Operation Hour                 | 800.00  | hour                      | Based on HMA production limit |

| Pollutant        | NG EF <sup>1</sup>     |             | LPG EF <sup>1</sup>    |             | LPG to NG EF Conversion Factor |
|------------------|------------------------|-------------|------------------------|-------------|--------------------------------|
|                  | lb/10 <sup>6</sup> scf | lb/MMBtu    | lb/10 <sup>3</sup> gal | lb/MMBtu    |                                |
| CO               | 84                     | 0.082352941 | 7.5                    | 0.081967213 | 1.00                           |
| NO <sub>x</sub>  | 100                    | 0.098039216 | 13                     | 0.142076503 | 1.45                           |
| SO <sub>2</sub>  | 0.600                  | 0.000588235 | 0.018                  | 0.000196721 | 0.33                           |
| PM               | 7.6                    | 0.00745098  | 0.7                    | 0.007650273 | 1.03                           |
| PM-10            | 7.6                    | 0.00745098  | 0.7                    | 0.007650273 | 1.03                           |
| PM-2.5           | 7.6                    | 0.00745098  | 0.7                    | 0.007650273 | 1.03                           |
| VOC              | 5.5                    | 0.005392157 | 0.8                    | 0.008743169 | 1.62                           |
| CO <sub>2</sub>  | 120000                 | 117.6470588 | 12500                  | 136.6120219 | 1.16                           |
| CH <sub>4</sub>  | 2.3                    | 0.002254902 | 0.2                    | 0.002185792 | 0.97                           |
| N <sub>2</sub> O | 2.20E+00               | 0.002156863 | 9.00E-01               | 0.009836066 | 4.56                           |

| Pollutant                     | NG EF <sup>3</sup> (lb/ton) | LPG EF (lb/ton) | Emissions (lb/hr) | Emissions (TPY) |             | Input Emissions (g/s) |        |
|-------------------------------|-----------------------------|-----------------|-------------------|-----------------|-------------|-----------------------|--------|
|                               |                             |                 |                   | 260,000 TPY     | 8,760 hr/yr | 1, 8, & 24 hr         | annual |
| CO                            | 0.13                        | 0.129           | 42.05             | 16.82           | 184.19      | 5.30                  |        |
| NO <sub>x</sub>               | 0.026                       | 0.038           | 12.25             | 4.90            | 53.64       | 1.54                  | 0.14   |
| SO <sub>2</sub>               | 0.003                       | 0.001           | 0.37              | 0.15            | 1.62        | 0.05                  | 0.00   |
| PM                            | 0.033                       | 0.034           | 11.01             | 4.40            | 48.23       |                       |        |
| PM-10                         | 0.023                       | 0.024           | 7.67              | 3.07            | 33.62       | 0.97                  | 0.09   |
| PM-2.5                        | 0.022                       | 0.023           | 7.34              | 2.94            | 32.15       | 0.92                  | 0.08   |
| VOC                           | 0.032                       | 0.052           | 16.86             | 6.75            | 73.86       |                       |        |
| CO <sub>2</sub>               | 33                          | 38.320          | 12453.89          | 4,981.56        | 54,548.05   |                       |        |
| CH <sub>4</sub>               | 0.012                       | 0.012           | 3.78              | 1.51            | 16.56       |                       |        |
| N <sub>2</sub> O <sup>7</sup> | 9.54E-06                    | 4.35E-05        | 1.41E-02          | 5.66E-03        | 0.06        |                       |        |

1. EFs are from AP-42 Tables 1.4-1 and 1.4-2.

2. EFs are from AP-42 Table 1.5-1.

3. EFs are From Enclosure 1b.

4. EFs are calculated from LPG to NG EF Conversion Factor and NG EF.

7. N<sub>2</sub>O EF (2.2 lb/10<sup>6</sup> scf) is from AP-42 Table 1.4-2 (7/98). N<sub>2</sub>O (lb/ton) = N<sub>2</sub>O (lb/10<sup>6</sup> scf) x Fuel Consumption (scf/ton)/1000000.

| Green House Gas (GHG) | GWP | Limited Emissions (metric TPY) |                         | Unlimited Emissions (metricTPY) |                         |
|-----------------------|-----|--------------------------------|-------------------------|---------------------------------|-------------------------|
|                       |     | Mass-Based                     | CO <sub>2</sub> e Based | Mass-Based                      | CO <sub>2</sub> e Based |
| CO <sub>2</sub>       | 1   | 4,518.27                       | 4,518.27                | 49,475.08                       | 49,475.08               |
| CH <sub>4</sub>       | 25  | 1.37                           | 34.29                   | 15.02                           | 375.46                  |
| N <sub>2</sub> O      | 298 | 0.01                           | 1.53                    | 0.06                            | 16.75                   |
| Total                 |     |                                | 4,554.09                |                                 | 49,867.29               |

**Enclosure 2: 1,060 hp Diesel Engine Generator, Cummins 900DQFAD**

AP-42 Section 3.4 (10/96) - Large Stationary Diesel & All Stationary Dual-fuel Engines

Emission (lb/hr) = DEG Heat Input Rate (MMBtu/hr) x Emission Factor (lb/MMBtu)

Emission (lb/hr) = DEG Power (hp) x Emission Factor (g/hp-hr)(1 lb/453.6 g)

|                               | Value   | Unit                      | Notes                            |
|-------------------------------|---------|---------------------------|----------------------------------|
| Fuel Limit                    | 153,000 | gal/yr                    |                                  |
| Operating Hour Limit          | 3,000   | hr/yr                     |                                  |
| Max. Fuel Consumption         | 51      | gal/hr                    | Manufacturer's data              |
| DEG Horsepower                | 1,065   | bhp                       | Manufacturer's data              |
| Fuel Oil No. 2 Sulfur Content | 0.0015  | %                         | Permit limit                     |
| Fuel Oil No. 2 Heating Value  | 140     | MMBtu/10 <sup>3</sup> gal |                                  |
| DEG Heat Input Rate           | 7.14    | MMBtu/hr                  | Fuel Consumption x Heating Value |

| Pollutant                                | EF (g/hp-hr) | EF (lb/MMBtu) | Emissions (lb/hr) | Emissions (TPY) |             |
|--|--------------|---------------|-------------------|-----------------|-------------|
|  |              |               |                   | 153,000 gal/yr  | 8,760 hr/yr |
| CO <sup>1</sup>                          | 4.50E-01     |               | 1.06              | 1.58            | 4.63        |
| NO <sub>x</sub> <sup>1</sup>             | 3.93         |               | 9.23              | 13.84           | 40.42       |
| NO <sub>x</sub> (Biodiesel) <sup>2</sup> | 4.32         |               | 10.15             | 15.22           | 44.46       |
| SO <sub>2</sub> <sup>3</sup>             | 0.10         |               | 0.23              | 0.35            | 1.028       |
| PM <sup>1</sup>                          | 0.120        |               | 0.282             | 0.42            | 1.234       |
| PM-10 <sup>4</sup>                       | 0.115        |               | 0.270             | 0.41            | 1.185       |
| PM-2.5 <sup>4</sup>                      | 0.108        |               | 0.254             | 0.38            | 1.111       |
| VOC/TOC <sup>5</sup>                     | 0.09         |               | 0.21              | 0.32            | 0.93        |
| CO <sub>2</sub> <sup>5</sup>             |              | 165           | 1,178.10          | 1767.15         | 5,160.08    |

1. CO, NO<sub>x</sub>, PM, and VOC/TOC EFs (g/hp-hr) are from manufacturer's specifications.
2. NO<sub>x</sub> EF is increased by 10% for biodiesel based on EPA report.
3. SO<sub>2</sub> EF is from AP-42 Table 3.4-1. SO<sub>2</sub> (lb/MMBtu) = 1.01S, where S = % sulfur in fuel oil.
4. Assume PM-10 = 96% of PM and PM-2.5 = 90% of PM, AP-42 Appendix B.2, Table B.2-2 (01/95)
5. EF is from AP-42 Table 3.4-1.

| Hazardous Air Pollutant (HAP) | EF <sup>1</sup> (lb/MMBtu) | Emissions (lb/hr) | Emissions (TPY) |             |
|-------------------------------|----------------------------|-------------------|-----------------|-------------|
|                               |                            |                   | Limited         | 8,760 hr/yr |
| Benzene                       | 7.76E-04                   | 5.54E-03          | 8.31E-03        | 2.43E-02    |
| Toluene                       | 2.81E-04                   | 2.01E-03          | 3.01E-03        | 8.79E-03    |
| Xylenes                       | 1.93E-04                   | 1.38E-03          | 2.07E-03        | 6.04E-03    |
| Formaldehyde                  | 7.89E-05                   | 5.63E-04          | 8.45E-04        | 2.47E-03    |
| Acetaldehyde                  | 2.52E-05                   | 1.80E-04          | 2.70E-04        | 7.88E-04    |
| Acrolein                      | 7.88E-06                   | 5.63E-05          | 8.44E-05        | 2.46E-04    |
| Naphthalene                   | 1.30E-04                   | 9.28E-04          | 1.39E-03        | 4.07E-03    |
| Total HAPs                    |                            | 0.011             | 1.60E-02        | 0.047       |

1. EFs are from AP-42 Table 3.4-3 and 3.4-4

| Green House Gas (GHG) | GWP | Applied EF <sup>1</sup> (kg/MMBtu) | Mass-Based Emissions (kg/hr) | Emissions (metric TPY) |                         |             |                         |
|-----------------------|-----|------------------------------------|------------------------------|------------------------|-------------------------|-------------|-------------------------|
|                       |     |                                    |                              | Mass-Based             | CO <sub>2</sub> e Based | Mass-Based  | CO <sub>2</sub> e Based |
|                       |     |                                    |                              | Limited                |                         | 8,760 hr/yr |                         |
| CO <sub>2</sub>       | 1   | 75.10                              | 536.21                       | 1,608.64               | 1,767.2                 | 4,697.23    | 5,160.1                 |
| CH <sub>4</sub>       | 25  | 3.00E-03                           | 0.02                         | 0.06                   | 1.6                     | 0.19        | 4.7                     |
| N <sub>2</sub> O      | 298 | 6.00E-04                           | 0.00                         | 0.01                   | 3.8                     | 0.04        | 11.2                    |
| Total                 |     |                                    |                              |                        | <b>1,772.6</b>          |             | <b>5,176.0</b>          |

1. EF from the Mandatory Greenhouse Gas Reporting rule (40 CFR §98, Tables C-1 and C-2).



**Enclosure 3: HMA Silo Filling Operation**

AP-42 Section 11.1 (03/04) - Hot Mix Asphalt Plants

Emission (lb/hr) = Drum Mixer Capacity (ton/hr) x Emission Factor (lb/ton)

|                         | Value   | Unit | Notes                             |
|-------------------------|---------|------|-----------------------------------|
| HMA Production Limit    | 260,000 | TPY  | Permit limit                      |
| Drum Mixer Capacity     | 325     | TPH  |                                   |
| Asphalt Volatility (V)  | -0.5    | -    | AP-42 Table 11.1-14 default value |
| HMA Mix Temperature (T) | 325     | °F   | AP-42 Table 11.1-14 default value |
| Operation Hour Limit    | 800     | hr   | Calculated                        |

| Pollutant  | Emission Factor Equations (Silo Filling) <sup>1</sup>            |
|------------|--|
| Total PM   | $EF = 0.000332 + 0.00105(-V)e^{\gamma(0.0251)(T + 460) - 20.43}$ |
| Organic PM | $EF = 0.00105(-V)e^{\gamma(0.0251)(T + 460) - 20.43}$            |
| TOC        | $EF = 0.0504(-V)e^{\gamma(0.0251)(T + 460) - 20.43}$             |
| CO         | $EF = 0.00488(-V)e^{\gamma(0.0251)(T + 460) - 20.43}$            |

Notes:

1. EF equations are from AP-42 Table 11.1-14.

| Pollutant                    | EF <sup>1</sup><br>(lb/ton) | Control<br>Efficiency | Emissions<br>(lb/hr) | Emissions (TPY) |             |
|------------------------------|-----------------------------|-----------------------|----------------------|-----------------|-------------|
|                              |                             |                       |                      | 260,000 TPY     | 8,760 hr/yr |
| Total PM <sup>2</sup>        | 5.86E-04                    | 0%                    | 0.190                | 0.0762          | 0.834       |
| Organic PM <sup>2</sup>      | 2.54E-04                    | 0%                    | 0.083                | 0.033           | 0.36        |
| TOC                          | 1.22E-02                    | 0%                    | 3.961                | 1.58            | 17.35       |
| CO                           | 1.18E-03                    | -                     | 0.38                 | 0.15            | 1.68        |
| VOC <sup>3</sup>             | 1.22E-02                    | 0%                    | 3.961                | 1.58            | 17.35       |
| PM-10 <sup>2,4</sup>         | 5.86E-04                    | 0%                    | 0.190                | 0.0762          | 0.834       |
| PM-2.5 <sup>2,4</sup>        | 5.86E-04                    | 0%                    | 0.190                | 0.0762          | 0.834       |
| CH <sub>4</sub> <sup>5</sup> | 3.17E-05                    | -                     | 0.010                | 0.0041          | 0.045       |

1. EFs are from Tables 11.1-14 and 11.1-16.

2. As per manufacturer's specs, the blue smoke mist eliminator has 0% control efficiency, except for CO.

3. VOC = 100% of TOC (Table 11.1-16).

4. Total PM is assumed to be predominately PM-2.5 (AP-42 Table 11.1-14, footnote b).

5. CH<sub>4</sub> = 0.26% of TOC (Table 11.1-16).

| Hazardous Air Pollutant (HAP) | Speciation <sup>1</sup><br>(%) | Emissions<br>(lb/hr) | Emissions (TPY) |             |
|-------------------------------|--------------------------------|----------------------|-----------------|-------------|
|                               |                                |                      | 260,000 TPY     | 8,760 hr/yr |
| Total PAH HAPs                | 11.40%                         | 9.41E-03             | 3.76E-03        | 4.12E-02    |
| Total Volatile Organic HAPs   | 1.30%                          | 5.15E-02             | 2.06E-02        | 2.26E-01    |
| Total HAPs                    |                                | 0.061                | 0.024           | 0.267       |

1. Speciation profiles (%) are from AP-42 Table 11.1-15 and 11.1-16.

| Green House Gas (GHG) | GWP | Limited Emissions<br>(metricTPY)<br>(260,000 TPY) |                         | Unlimited Emissions<br>(metric TPY)<br>(8,760 hr/yr) |                         |
|-----------------------|-----|---|-------------------------|--|-------------------------|
|                       |     | Mass-Based  | CO <sub>2</sub> e Based | Mass-Based   | CO <sub>2</sub> e Based |
| CO <sub>2</sub>       | 1   |   |                         |  |                         |
| CH <sub>4</sub>       | 25  | 0.0037  | 0.09                    | 0.041  | 1.02                    |
| N <sub>2</sub> O      | 298 |   |                         |  |                         |
| Total                 |     |   | 0.09                    |  | 1.02                    |

**Enclosure 4: HMA Truck Load-out Operation**

AP-42 Section 11.1 (03/04) - Hot Mix Asphalt Plants

Emission (lb/hr) = Drum Mixer Capacity (ton/hr) x Emission Factor (lb/ton)

|                         | Value   | Unit | Notes                             |
|-------------------------|---------|------|-----------------------------------|
| HMA Production Limit    | 260,000 | TPY  | Permit limit                      |
| Drum Mixer Capacity     | 325     | TPH  |                                   |
| Asphalt Volatility (V)  | -0.5    | -    | AP-42 Table 11.1-14 default value |
| HMA Mix Temperature (T) | 325     | °F   | AP-42 Table 11.1-14 default value |
| Operation Hour Limit    | 800     | hr   | Calculated                        |

| Pollutant  | Emission Factor Equations (Load-out) <sup>1</sup>                   |
|------------|---|
| Total PM   | $EF = 0.000181 + 0.00141(-V)e^{\lambda((0.0251)(T + 460) - 20.43)}$ |
| Organic PM | $EF = 0.00141(-V)e^{\lambda((0.0251)(T + 460) - 20.43)}$            |
| TOC        | $EF = 0.0172(-V)e^{\lambda((0.0251)(T + 460) - 20.43)}$             |
| CO         | $EF = 0.00558(-V)e^{\lambda((0.0251)(T + 460) - 20.43)}$            |

Note:

1. EF equations are from AP-42 Table 11.1-14.

| Pollutant                    | EF <sup>1</sup><br>(lb/ton) | Control<br>Efficiency | Emissions<br>(lb/hr) | Emissions (TPY) |             |
|------------------------------|-----------------------------|-----------------------|----------------------|-----------------|-------------|
|                              |                             |                       |                      | 260,000 TPY     | 8,760 hr/yr |
| Total PM <sup>2</sup>        | 5.22E-04                    | 0%                    | 0.170                | 0.0679          | 0.743       |
| Organic PM <sup>2</sup>      | 3.41E-04                    | 0%                    | 0.111                | 0.044           | 0.49        |
| TOC                          | 4.16E-03                    | 0%                    | 1.352                | 0.54            | 5.92        |
| CO                           | 1.35E-03                    | -                     | 0.44                 | 0.18            | 1.92        |
| VOC <sup>3</sup>             | 3.91E-03                    | 0%                    | 1.271                | 0.51            | 5.57        |
| PM-10 <sup>2,4</sup>         | 5.22E-04                    | 0%                    | 0.170                | 0.0679          | 0.743       |
| PM-2.5 <sup>2,4</sup>        | 5.22E-04                    | 0%                    | 0.170                | 0.0679          | 0.743       |
| CH <sub>4</sub> <sup>5</sup> | 2.70E-04                    | -                     | 0.088                | 0.0351          | 0.385       |

1. EFs are from Tables 11.1-14 and 11.1-16.

2. As per manufacturer's specs, the blue smoke mist eliminator has 0% control efficiency, except for CO.

3. VOC = 94% of TOC (Table 11.1-16).

4. Total PM is assumed to be predominately PM-2.5 (AP-42 Table 11.1-14, footnote b).

5. CH<sub>4</sub> = 6.5% of TOC (Table 11.1-16).

| Hazardous Air Pollutant (HAP) | Speciation <sup>1</sup> | Emissions<br>(lb/hr) | Emissions (TPY) |             |
|-------------------------------|-------------------------|----------------------|-----------------|-------------|
|                               |                         |                      | 260,000 TPY     | 8,760 hr/yr |
| Total PAH HAPs                | 5.93%                   | 6.57E-03             | 2.63E-03        | 2.88E-02    |
| Phenol                        | 1.18%                   | 1.31E-03             | 5.23E-04        | 5.73E-03    |
| Total Volatile Organic HAPs   | 1.50%                   | 2.03E-02             | 8.11E-03        | 8.88E-02    |
| Total HAPs                    |                         | 0.028                | 0.011           | 0.123       |

1. Speciation profiles (%) are from AP-42 Table 11.1-15 and 11.1-16.

| Green House Gas (GHG) | GWP | Limited Emissions<br>(metricTPY)<br>(260,000 TPY) |                         | Unlimited Emissions<br>(metric TPY)<br>(8,760 hr/yr) |                         |
|-----------------------|-----|---|-------------------------|--|-------------------------|
|                       |     | Mass-Based  | CO <sub>2</sub> e Based | Mass-Based   | CO <sub>2</sub> e Based |
| CO <sub>2</sub>       | 1   |   |                         |  |                         |
| CH <sub>4</sub>       | 25  | 0.0351  | 0.88                    | 0.385  | 9.62                    |
| N <sub>2</sub> O      | 298 |   |                         |  |                         |
| Total                 |     |   | <b>0.88</b>             |  | <b>9.62</b>             |

**Enclosure 5: Aggregate Handling - Scalping Screens & Conveyors**

AP-42 Section 11.19.2 (08/04) - Crushed Stone Processing and Pulverized Mineral Processing

Emission (lb/hr) = Drum Mixer Capacity (ton/hr) x Emission Factor (lb/ton)

|                               | Value   | Unit | Notes  |
|-------------------------------|---------|------|--|
| HMA Production Limit          | 260,000 | TPY  | Permit limit                                       |
| Drum Mixer Capacity           | 325     | TPH  |  |
| # of Conveyor Transfer Points | 8       |      | GP-05 in submitted Emission Points Flowchart, Fig. |
| Operation Hour Limit          | 800     | hr   | Calculated   |

| PM-10                         | EF <sup>1</sup><br>(lb/ton) | Control<br>Efficiency <sup>3</sup> | Emissions<br>(lb/hr) | Emissions (TPY) |             |
|-------------------------------|-----------------------------|------------------------------------|----------------------|-----------------|-------------|
|                               |                             |                                    |                      | 260,000 TPY     | 8,760 hr/yr |
| Truck Unload to Storage Piles | 1.60E-05                    | 70%                                | 0.0016               | 0.0006          | 0.0068      |
| RAP Scalping Screen           | 0.0087                      | 70%                                | 0.85                 | 0.34            | 3.72        |
| Conveyor Transfer Points      | 0.0011                      | 70%                                | 0.86                 | 0.34            | 3.76        |
| Total PM-10                   |                             |                                    | 1.71                 | 0.68            | 7.48        |

| PM   | EF<br>(lb/ton) | Control<br>Efficiency <sup>3</sup> | Emissions<br>(lb/hr) | Emissions (TPY) |             |
|--|----------------|------------------------------------|----------------------|-----------------|-------------|
|  |                |                                    |                      | 260,000 TPY     | 8,760 hr/yr |
| Truck Unload to Storage Piles <sup>2</sup> | 3.14E-05       | 70%                                | 0.0031               | 0.0012          | 0.01        |
| RAP Scalping Screen <sup>1</sup>           | 0.025          | 70%                                | 2.44                 | 0.98            | 10.68       |
| Conveyor Transfer Points <sup>1</sup>      | 0.0030         | 70%                                | 2.34                 | 0.94            | 10.25       |
| Total PM                                   |                |                                    | 4.78                 | 1.91            | 20.94       |

| PM-2.5                        | EF <sup>2</sup><br>(lb/ton) | Control<br>Efficiency <sup>3</sup> | Emissions<br>(lb/hr) | Emissions (TPY) |             |
|-------------------------------|-----------------------------|------------------------------------|----------------------|-----------------|-------------|
|                               |                             |                                    |                      | 260,000 TPY     | 8,760 hr/yr |
| Truck Unload to Storage Piles | 4.71E-06                    | 70%                                | 0.00046              | 0.00018         | 0.0020      |
| RAP Scalping Screen           | 0.00375                     | 70%                                | 0.37                 | 0.15            | 1.60        |
| Conveyor Transfer Points      | 0.00045                     | 70%                                | 0.35                 | 0.14            | 1.54        |
| Total PM-2.5                  |                             |                                    | 0.72                 | 0.29            | 3.14        |

1. EFs (uncontrolled) are from AP-42 Table 11.19.2-2

2. Assume PM-10 = 51% of PM and PM-2.5 = 15% of PM when data is not available (AP-42 Appendix B.2 (01/95), Figure B.2-1).

3. 70% control efficiency is assumed for water suppression (AP-42 Sec. 11.19.1.2 (11/95)).

**Enclosure 6: Aggregate Storage Piles - Wind Erosion**

| Pollutant           | EF <sup>1</sup><br>(lb/ton) | Control<br>Efficiency <sup>2</sup> | Emissions<br>(TPY) |
|---------------------|-----------------------------|------------------------------------|--------------------|
| PM                  | 0.33                        | 95%                                | 2.145              |
| PM-10 <sup>3</sup>  | 0.1683                      | 95%                                | 1.094              |
| PM-2.5 <sup>3</sup> | 0.0495                      | 95%                                | 0.322              |

1. AP-42, Section 11.19.1, Background, Final report, Table 4-1

2. Assume a control efficiency of 95% per guidance from South Coast Air Quality Management District

3. Assume PM-10 = 51% of PM and PM-2.5 = 15% of PM when data is not available (AP-42 Appendix B.2 (01/95)).

**Enclosure 7: Emissions from Transferring to Cold-Feed Bins**

AP-42 Section 13.2.4 (11/06) - Aggregate Handling and Storage Piles

Emission (lb/hr) = Drum Mixer Capacity (ton/hr) x Emission Factor (lb/ton)

|                      | Value   | Unit  | Notes                             |
|----------------------|---------|-------|-----------------------------------|
| HMA Production Limit | 260,000 | TPY   |                                   |
| Drum Mixer Capacity  | 325     | TPH   |                                   |
| Operating Hour Limit | 800     | hr/yr | Production Limit ÷ Mixer Capacity |

**Emission Factors**

$$EF = k \cdot 0.0032 \cdot (U/5)^{1.3} / (M/2)^{1.4}$$

where: EF = particulate emission factor (lb/ton),  
 k = particle size multiplier for particle size range (lb/ton),  
 U = mean wind speed (mph), and  
 M = moisture content (%) .

|   | Value  |       |      | Unit   | Notes   |
|---|--------|-------|------|--------|---|
|   | PM-2.5 | PM-10 | PM   |        |   |
| k | 0.053  | 0.35  | 0.74 | lb/ton | AP-42 Section 13.2.4                          |
| U | 11.4   |       |      | mph    | AP-42 Table 7.1-9 (11/06) for Honolulu        |
| M | 0.7    |       |      | %      | AP-42 Table 13.2.4-1 (11/06) for crushed lime |

| Pollutant | EF (lb/ton) | Control Efficiency <sup>1</sup> | Emissions (lb/hr) | Emissions (TPY) |             |
|-----------|-------------|---------------------------------|-------------------|-----------------|-------------|
|           |             |                                 |                   | 260,000 TPY     | 8,760 hr/yr |
| PM        | 0.0301      | 70%                             | 2.93              | 1.17            | 12.84       |
| PM-10     | 0.0142      | 70%                             | 1.39              | 0.55            | 6.07        |
| PM-2.5    | 0.0022      | 70%                             | 0.21              | 0.08            | 0.92        |

1. 70% control efficiency is assumed for water suppression (AP-42 Sec. 11.19.1.2 (11/95)).

4. Previous review 11-270review.ms didn't include the emissions from Transferring to Cold-Feed Bins

**Enclosure 8 Truck Travelling on Unpaved Road**

AP-42 Section 13.2.2 (11/06) - Unpaved Roads

Emissions (lb/hr) = Vehicle Miles Traveled (VMT/hr) x Emission Factor (lb/VMT)

**Vehicle Miles Traveled (VMT)**

|                                | Value   | Unit     | Notes                                  |
|--------------------------------|---------|----------|--|
| HMA Production Limit           | 260,000 | TPY      |  |
| Drum Mixer Capacity            | 325     | TPH      |  |
| Operating Hour Limit           | 800     | hr/yr    | Production Limit ÷ Mixer Capacity      |
| Truck Load Capacity            | 21      | ton      | Estimate                               |
| Travel Distance Roundtrip      | 0.25    | mile     | Estimate based on site plan            |
| Total Miles Travelled per hour | 3.87    | VMT/hr   | Mixer Capacity ÷ Truck Load x Distance |
| Total Miles Travelled per year | 3,095   | VMT/year | VMT/hr x Hour Limit                    |

**Mean Vehicle Weight**

|                                  | Value | Unit | Notes |
|----------------------------------|-------|------|-------|
| Mean Vehicle Weight <sup>1</sup> | 26.5  | tons |       |

1. Mean vehicle weight assumed average tare weight of 16 tons and average gross weight of 37 tons.

**Emission Factors**

For vehicles traveling on unpaved road at industry sites

$$EF = k(s/12)^a \times (W/3)^b$$

- where: EF = particulate emission factor (lb/VMT),  
 k = particle size multiplier for particle size range (lb/VMT),  
 s = surface material silt conten (%)), and  
 W = average weight of the vehicles traveling the road (tons).

$$EF_{ext} = EF \times [(365-P)/365]$$

- where: EF<sub>ext</sub> = annual or other long-term average emission factor (lb/VMT),  
 P = number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period. And  
 N = number of days in the averaging period.

|   | Value  |       |      | Unit   | Notes   |
|---|--------|-------|------|--------|---|
|   | PM-2.5 | PM-10 | PM   |        |   |
| k | 0.15   | 1.5   | 4.9  | lb/VMT | AP-42 Table 13.2.2-2  |
| s | 4.8    |       |      | %      | AP-42 Table 13.2.2-3  |
| a | 0.9    | 0.9   | 0.7  |        | AP-42 Table 13.2.2-2  |
| b | 0.45   | 0.45  | 0.45 |        | AP-42 Table 13.2.2-2  |
| P | 188    |       |      | day    | Kainaliu Station ( <a href="http://www.wrcc.dri.edu/htmlfiles/hi/hi">www.wrcc.dri.edu/htmlfiles/hi/hi</a> ) |

| Pollutant | EF (lb/VMT) | EFext (lb/VMT) | Control Efficiency | Emissions (lb/hr) | Emissions (TPY) |             |
|-----------|-------------|----------------|--------------------|-------------------|-----------------|-------------|
|           |             |                |                    |                   | 260,000 TPY     | 8,760 hr/yr |
| PM        | 6.88        | 3.33           | 70%                | 3.87              | 1.55            | 16.95       |
| PM-10     | 1.75        | 0.85           | 70%                | 0.99              | 0.39            | 4.32        |
| PM-2.5    | 0.18        | 0.08           | 70%                | 0.10              | 0.04            | 0.43        |

- 70% control efficiency is assumed for water suppression (AP-42 Sec. 11.19.1.2 (11/95)).
- Assume s=4.8% per guidance from South Coast Air Quality Management District
- Previous review 11-270review.ms likely calculated emissions from paved roads instead of unpaved roads.

**Enclosure 9 Hot Oil Heater**

AP-42 Section 1.3 (5/10) - Fuel Oil Combustion  
 AP-42 Section 1.4 (07/98) - Natural Gas Combustion  
 AP-42 Section 1.5 (07/08) - Liquefied Petroleum Gas Combustion

Emission (lb/hr) = Fuel Consumption (gal/hr) x Emission Factor (lb/10<sup>3</sup> gal)  
 Emission (lb/hr) = Heat Input Rate (MMBtu/hr) x Emission Factor (lb/MMBtu)

|                                 | Value   | Unit                   | Notes                           |
|---------------------------------|---------|------------------------|---------------------------------|
| Hour Limit                      | 8,760   | hr/yr                  |                                 |
| Heat Input Rate                 | 1.25    | MMBtu/hr               |                                 |
| Fuel Oil No. 2 Sulfur Content   | 0.5     | %                      |                                 |
| Fuel Oil No. 2 Heating Value    | 0.14    | MMBtu/gal              |                                 |
| Max. Fuel Oil No. 2 Consumption | 8.9     | gal/hour               | Heat Input Rate ÷ Heating Value |
| LPG Sulfur Content              | 0.18    | gr/100scf              | AP-42 Table 1.5-1               |
| LPG Heating Value               | 0.0915  | MMBtu/gal              |                                 |
| Max. LPG Consumption            | 13.7    | gal/hour               | Heat Input Rate ÷ Heating Value |
| Nature Gas Sulfur Content       | 2,000   | gr/10 <sup>6</sup> scf | AP-42 Table 1.4-2               |
| Nature Gas Heating Value        | 1,020   | Btu/scf                |                                 |
| Max. Nature Gas Consumption     | 1.2E-03 | 10 <sup>6</sup> scf/hr | Heat Input Rate ÷ Heating Value |

| Pollutant                    | Oil No. 2 EF <sup>1</sup><br>(lb/10 <sup>3</sup> gal) | LPG EF <sup>2</sup><br>(lb/10 <sup>3</sup> gal) | Nature Gas EF <sup>3</sup><br>(lb/10 <sup>6</sup> scf) | Proposed Emissions |          | Current Emissions |          |
|------------------------------|---|---|--|--------------------|----------|-------------------|----------|
|                              |   |   |  | lb/hr              | TPY      | lb/hr             | TPY      |
| CO                           | 5   | 7.5   | 84   | 0.10               | 0.45     | 0.04              | 0.20     |
| NO <sub>x</sub>              | 20  | 13  | 100  | 0.18               | 0.78     | 0.18              | 0.78     |
| SO <sub>2</sub> <sup>4</sup> | 71  | 0.018   | 0.6  | 0.63               | 2.78     | 0.63              | 2.78     |
| PM <sup>5</sup>              | 3.3   | 0.7   | 7.6  | 0.03               | 0.129    | 0.03              | 0.129    |
| PM-10 <sup>6</sup>           | 1.08  | 0.7   | 7.6  | 0.01               | 0.042    | 0.01              | 0.042    |
| PM-2.5 <sup>5</sup>          | 0.83  | 0.7   | 7.6  | 0.01               | 0.042    | 0.007             | 0.032    |
| VOC (NMTOC) <sup>7</sup>     | 0.34  | 0.8   | 5.5  | 0.011              | 0.048    | 0.003             | 0.013    |
| Lead (Pb) <sup>8</sup>       | 9   |   | 5.00E-04   | 1.13E-05           | 4.93E-05 | 1.13E-05          | 4.93E-05 |
| CO <sub>2</sub>              | 22,300  | 12,500  | 120,000  | 199.11             | 872.09   | 199.11            | 872.09   |
| CH <sub>4</sub>              | 0.216   | 0.2   | 2.3  | 2.73E-03           | 0.012    | 1.93E-03          | 0.008    |
| N <sub>2</sub> O             | 0.26  | 0.9   | 2.2  | 0.01               | 0.054    | 2.32E-03          | 0.010    |

1. EFs are from AP-42 Tables 1.3-1, 1.3-2, 1.3-3, 1.3-7, 1.3-8, and 1.3-12.
2. EFs are from AP-42 Tables 1.5-1.
3. EFs are from AP-42 Tables 1.4-1 and 1.4-2.
4. SO<sub>2</sub> EF for oil no. 2= 142S, where S = sulfur content (%) and SO<sub>2</sub> EF for LPG= 0.1xS, where S = sulfur content (g/100scf).
5. Total PM=Filterable PM + Condensable PM
6. PM-10 and PM-2.5 EFs for LPG and NG = PM
7. Non-methane TOC.
8. EF for Oil No.2 Lead is in lb/10<sup>12</sup> Btu.

| Hazardous Air Pollutant (HAP)   | Oil No. 2 EF <sup>1</sup><br>(lb/10 <sup>12</sup> Btu) | Oil No. 2 EF <sup>1</sup><br>(lb/10 <sup>3</sup> gal) | Nature Gas EF <sup>2</sup><br>(lb/10 <sup>6</sup> scf) | Proposed Emissions |          | Current Emissions |          |
|---------------------------------|--|---|--|--------------------|----------|-------------------|----------|
|                                 |  |   |  | lb/hr              | TPY      | lb/hr             | TPY      |
| Polycyclic Organic Matter (POM) |  | 0.0033  | 0.0000882  | 2.95E-05           | 1.29E-04 |                   |          |
| Formaldehyde (HCOH)             |  | 0.061   | 7.50E-02   | 5.45E-04           | 2.39E-03 |                   |          |
| Arsenic (As)                    | 4  |   |  | 5.00E-06           | 2.19E-05 | 5.00E-06          | 2.19E-05 |
| Beryllium (Be)                  | 3  |   |  | 3.75E-06           | 1.64E-05 | 3.75E-06          | 1.64E-05 |
| Cadmium (Cd)                    | 3  |   |  | 3.75E-06           | 1.64E-05 | 3.75E-06          | 1.64E-05 |
| Chromium (Cr)                   | 3  |   |  | 3.75E-06           | 1.64E-05 | 3.75E-06          | 1.64E-05 |
| Lead (Pb)                       | 9  |   |  | 1.13E-05           | 4.93E-05 | 1.13E-05          | 4.93E-05 |
| Mercury (Hg)                    | 3  |   |  | 3.75E-06           | 1.64E-05 | 3.75E-06          | 1.64E-05 |
| Manganese (Mn)                  | 6  |   |  | 7.50E-06           | 3.29E-05 | 7.50E-06          | 3.29E-05 |
| Nickel (Ni)                     | 3  |   |  | 3.75E-06           | 1.64E-05 | 3.75E-06          | 1.64E-05 |
| Selenium (Se)                   | 15   |   |  | 1.88E-05           | 8.21E-05 | 1.88E-05          | 8.21E-05 |
| Benzene                         |  | 2.14E-04  | 2.10E-03   | 1.91E-06           | 8.37E-06 |                   |          |
| Ethylbenzene                    |  | 6.36E-05  |  | 5.68E-07           | 2.49E-06 |                   |          |
| Hexane                          |  |   | 1.8  | 2.21E-09           | 9.66E-09 |                   |          |
| Naphthalene                     |  | 1.13E-03  | 6.10E-04   | 1.01E-05           | 4.42E-05 |                   |          |
| 1,1,1-Trichloroethane           |  | 2.36E-04  |  | 2.11E-06           | 9.23E-06 |                   |          |
| Toluene                         |  | 6.20E-03  | 3.40E-03   | 5.54E-05           | 2.42E-04 |                   |          |
| o-Xylene                        |  | 1.09E-04  |  | 9.73E-07           | 4.26E-06 |                   |          |
| Total HAPs                      |  |   |  | 7.06E-04           | 3.09E-03 | 6.13E-05          | 2.68E-04 |

1. EFs are from AP-42 Table 1.3-8 and 1.3-10.

| Green House Gas (GHG) | GWP | Emissions (metric TPY) |                         |
|-----------------------|-----|------------------------|-------------------------|
|                       |     | Mass-Based             | CO <sub>2</sub> e Based |
| CO <sub>2</sub>       | 1   | 790.98                 | 790.98                  |
| CH <sub>4</sub>       | 25  | 0.01                   | 0.27                    |
| N <sub>2</sub> O      | 298 | 0.05                   | 14.56                   |
| Total                 |     |                        | <b>805.81</b>           |

**Enclosure 9: Total Facility Emissions**

**1. Limited Emissions without insignificant activities (Proposed)**

| Pollutant       | Drum Mixer (260,000 TPY) | 1,065 hp DEG (153,000 gal/yr) | HMA Silo Filling (260,000 TPY) | HMA Load-out (260,000 TPY) | Aggregate Handling (260,000 TPY) | Wind Erosion | Transfer to Cold-Feed Bins (260,000 TPY) | Unpaved Roads (260,000 TPY) | Hot Oil Heater (8,760 hr/yr) | Limited Emissions (TPY) |
|-----------------|--------------------------|-------------------------------|--------------------------------|----------------------------|----------------------------------|--------------|--|-----------------------------|------------------------------|-------------------------|
| CO              | 16.90                    | 1.58                          | 0.15                           | 0.18                       | -                                | -            | -  | -                           | 0.45                         | 19.26                   |
| NO <sub>x</sub> | 7.87                     | 15.22                         | -                              | -                          | -                                | -            | -  | -                           | 0.78                         | 23.87                   |
| SO <sub>2</sub> | 14.55                    | 0.35                          | -                              | -                          | -                                | -            | -  | -                           | 2.78                         | 17.67                   |
| PM              | 4.40                     | 0.42                          | 0.076                          | 0.068                      | 1.91                             | 2.15         | 1.172                                    | 1.55                        | 0.13                         | 11.88                   |
| PM-10           | 3.07                     | 0.41                          | 0.076                          | 0.068                      | 0.68                             | 1.09         | 0.555                                    | 0.39                        | 0.04                         | 6.39                    |
| PM-2.5          | 2.94                     | 0.38                          | 0.076                          | 0.068                      | 0.29                             | 0.32         | 0.084                                    | 0.04                        | 0.04                         | 4.23                    |
| VOC             | 6.75                     | 0.32                          | 1.58                           | 0.508                      | -                                | -            | -  | -                           | 0.05                         | 9.20                    |
| Pb              | 0.002                    | -                             | -                              | -                          | -                                | -            | -  | -                           | 4.93E-05                     | 2.00E-03                |
| HAPs            | 1.37                     | 0.02                          | 0.024                          | 0.011                      | -                                | -            | -  | -                           | 0.003                        | 1.42                    |

**2. Limited Emissions without insignificant activities (Current)**

| Pollutant       | Drum Mixer (260,000 TPY) | 1,065 hp DEG (153,000 gal/yr) | HMA Silo Filling | HMA Load-out | Aggregate Handling | Wind Erosion | Transfer to Cold-Feed Bins | Unpaved Roads | Hot Oil Heater (8,760 hr/yr) | Limited Emissions |
|-----------------|--------------------------|-------------------------------|------------------|--------------|--------------------|--------------|----------------------------|---------------|------------------------------|-------------------|
| CO              | 16.90                    | 1.58                          | 0.15             | 0.18         | -                  | -            | -                          | -             | 0.20                         | 19.01             |
| NO <sub>x</sub> | 7.87                     | 15.22                         | -                | -            | -                  | -            | -                          | -             | 0.78                         | 23.87             |
| SO <sub>2</sub> | 14.55                    | 0.35                          | -                | -            | -                  | -            | -                          | -             | 2.78                         | 17.67             |
| PM              | 4.29                     | 0.42                          | 0.076            | 0.068        | 1.91               | 2.15         | 1.172                      | 1.55          | 0.13                         | 11.76             |
| PM-10           | 2.99                     | 0.41                          | 0.076            | 0.068        | 0.68               | 1.09         | 0.555                      | 0.39          | 0.04                         | 6.31              |
| PM-2.5          | 2.86                     | 0.38                          | 0.076            | 0.068        | 0.29               | 0.32         | 0.084                      | 0.04          | 0.03                         | 4.15              |
| VOC             | 4.16                     | 0.32                          | 1.58             | 0.508        | -                  | -            | -                          | -             | 0.01                         | 6.58              |
| Pb              | 0.002                    | -                             | -                | -            | -                  | -            | -                          | -             | 4.93E-05                     | 2.00E-03          |
| HAPs            | 1.37                     | 0.02                          | 0.024            | 0.011        | -                  | -            | -                          | -             | 2.683E-04                    | 1.42              |

**2. Unlimited Emissions without insignificant activities**

| Pollutant       | Drum Mixer (8,760 hr/yr) | 1,065 hp DEG (8,760 hr/yr) | HMA Silo Filling (8,760 hr/yr) | HMA Load-out (8,760 hr/yr) | Aggregate Handling (8,760 hr/yr) | Wind Erosion | Transfer to Cold-Feed Bins (8,760 hr/yr) | Unpaved Roads (8,760 hr/yr) | Hot Oil Heater (8,760 hr/yr) | Unlimited Emissions (TPY) |
|-----------------|--------------------------|----------------------------|--------------------------------|----------------------------|----------------------------------|--------------|--|-----------------------------|------------------------------|---------------------------|
| CO              | 185.06                   | 4.63                       | 1.68                           | 1.92                       | -                                | -            | -  | -                           | 0.45                         | 193.73                    |
| NO <sub>x</sub> | 86.12                    | 44.46                      | -                              | -                          | -                                | -            | -  | -                           | 0.78                         | 131.36                    |
| SO <sub>2</sub> | 159.28                   | 1.03                       | -                              | -                          | -                                | -            | -  | -                           | 2.78                         | 163.08                    |
| PM              | 48.23                    | 1.23                       | 0.834                          | 0.743                      | 20.94                            | 2.15         | 12.84                                    | 16.95                       | 0.13                         | 104.05                    |
| PM-10           | 33.62                    | 1.18                       | 0.834                          | 0.743                      | 7.48                             | 1.09         | 6.07                                     | 4.32                        | 0.04                         | 55.39                     |
| PM-2.5          | 32.15                    | 1.11                       | 0.834                          | 0.743                      | 3.14                             | 0.32         | 0.92                                     | 0.43                        | 0.04                         | 39.70                     |
| VOC             | 73.86                    | 0.93                       | 17.35                          | 5.565                      | -                                | -            | -  | -                           | 0.05                         | 97.75                     |
| Pb              | 0.021                    | -                          | -                              | -                          | -                                | -            | -  | -                           | 0.00                         | 0.02                      |
| HAPs            | 14.95                    | 0.047                      | 0.267                          | 0.123                      | -                                | -            | -  | -                           | 0.003                        | 15.39                     |

**Greenhouse Gas Emissions**

| GHG              | GWP | Limited Emissions        |                                   | Unlimited Emissions      |                                   |
|------------------|-----|--------------------------|-----------------------------------|--------------------------|-----------------------------------|
|                  |     | GHG Mass-Based Emissions | CO <sub>2</sub> e Based Emissions | GHG Mass-Based Emissions | CO <sub>2</sub> e Based Emissions |
| CO <sub>2</sub>  | 1   | 6,917.90                 | 6,917.90                          | 54,963.30                | 54,963.30                         |
| CH <sub>4</sub>  | 25  | 1.53                     | 38.22                             | 16.12                    | 402.94                            |
| N <sub>2</sub> O | 298 | 0.16                     | 48.47                             | 1.19                     | 355.13                            |
| Total            |     |                          | 7,004.59                          |                          | 55,721.37                         |