**PROPOSED**

**PERMIT APPLICATION REVIEW**
**Minor Modification to Covered Source Permit (CSP) No. 0045-02-CT**

**Application File No.:** 0045-24

**Applicant:** Grace Pacific Corporation

**Facility:** 334 TPH Asphalt Plant

**SIC Code:** 2951 (asphalt paving mixtures & blocks)

**Location:** 91-920 Farrington Highway, Kapolei, Oahu

**UTM Coordinates:** 596,953 m East and 2,361,208 m North

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## I. Background

Grace Pacific Corporation (Grace Pacific) submitted an application for a minor modification for its existing 334 TPH asphalt plant in Makakilo. The application and $100 filing fee were received by the Department of Health (DOH) on 2/22/07 and 3/27/07, respectively.

Proposed Modification
Grace Pacific proposes to replace its existing main DEG with a new 900 kW unit. Although the new DEG has a higher power generating capacity and higher maximum fuel feed rate (69.3 gph), it is Tier 2 certified, and based on manufacturer's emission test data, potential emissions are less than those of the existing main or back-up DEG.

In order to accommodate the higher fuel feed rate of the new DEG, Grace Pacific proposes to convert the current heat input limit of 14,722 MMBTU/yr to an equivalent hourly limit of 2,700 hr/yr.

Previous Modifications

The existing, main DEG is a 725 kW unit, de-rated to 544 kW. This DEG was originally limited to 107,460 gal/yr of fuel oil no. 2, equivalent to a 2,700 hr/yr limit, based on a maximum fuel feed rate of 39.8 gal/hr.

Synthetic natural gas (SNG) and liquefied petroleum gas (LPG), relatively clean fuels that have less PM and $SO_2$ emissions than fuel oil no. 2, were later added to the list of permitted DEG fuels. Since SNG and LPG are measured in units other than gallons, the 107,460 gal/yr limit was converted to a 14,722 MMBTU/yr limit based on the fuel oil no. 2 heating value of 0.137 MMBTU/gal.

A back-up DEG, identical to the main DEG in make and size, was then added to the list of permitted equipment, and the operating limit was revised to limit the *combined* total heat input of both DEGs (main and back-up) to 14,722 MMBTU/yr.

Since a new DEG with a higher fuel feed rate will now replace the existing unit, the heat input limit will be converted to an equivalent hourly limit. Combined, total operating hours for both DEGs shall be limited to 2,700 hr/yr. Table 1 lists the recent changes in DEG operating limits.

**Table 1: Equivalent DEG Operating Limits**

| Applic. No. | Permit Issued | DEG Operating Limit | DEG Allowed Fuels |
|---|---|---|---|
| 0045-14 | 11/9/2004 | 107,460 gallons per year for one DEG | FO2 |
| 0045-19 | 11/2/2005 | 14,722 MMBTU/yr for one DEG | FO2, SNG, LPG |
| 0045-23 | Under review | 14,722 MMBTU/yr total for two DEGs | FO2, SNG, LPG, biodiesel |
| 0045-24 | Under review | 2,700 hr/yr total for two DEGs | FO2, SNG, LPG, biodiesel |

Note: FO2 = fuel oil no. 2; SNG = synthetic natural gas; LPG = liquefied petroleum gas

## II. Equipment Description

Table 2 provides information on the new DEG. The appendix contains manufacturer's literature.

**Table 2: New DEG**

| | |
|---|---|
| Manufacturer & Date | Cummins, 2007 |
| Model | 100DQFAD |
| Serial no. | to be assigned |
| Capacity | 900 kW, prime |
| Max Fuel Feed Rate | 63.9 gal/hr |
| Engine Volume Displacement | 30.5 liters |
| No. of Engine Cylinders | 12 |
| Displacement per Cylinder | 2.54 L/cylinder |
| Stack Height | 13' - 9" |
| Stack Diameter | 10" = .254 m |
| Exhaust Temperature | 873 F |
| Exhaust Volumetric Flow | 6950 cfm |

Table 3 lists the facility equipment.

| Table 3: Facility Equipment | | | | | |
|---|---|---|---|---|---|
| **Description** | **Capacity** | **Manuf.** | **Model No.** | **Serial No.** | **Manuf. Date** |
| Drum mixer | 334 TPH | Astec | PDDC-835C | 92-152 | |
| New DEG | 986 kW | Cummins | 1000DQFAD | to be assigned | 2007 |
| Back-up DEG | 725 kW derated to 544 KW | Caterpillar | 3412 | 2WJ00863 | 1996 |
| Baghouse | 58,255 CFM | Astec | RBH-58:DB | 92-152437 | 12/92 |
| Fiberbed Mist Collector | 12,000 CFM | Astec | BSC-16-FBF | 06-041 | 2006 |
| Crusher | 96 TPH | Telsmith | HSI-3036 | 232M337 | |
| Screen | 275 TPH | Telsmith | VK481 | 363M474 | |
| Screen | 4' x 12'1", single deck | Diester | USM-1412 | 579262 | 11/92 |

## III. Air Pollution Controls

No changes proposed. Table 4 lists the facility's existing pollution controls.

| Table 4: Air Pollution Controls | | | |
|---|---|---|---|
| **Emission Source** | **Control Measure** | **Control Efficiency** | **Control Efficiency Reference** |
| Drum mixer | Baghouse | 99% | AP-42, App. B, Table B.2-3, 1/95. |
| Silos & Truck load-out | Fiberbed mist collector | 95% for PM | CECO filter manufacturer |
| Aggregate piles & roads | Water spray | 70% for PM | AP-42 §11.19.1.2, par. 3, 11/95. |

## IV. Applicable Requirements

1. Hawaii Administrative Rules (HAR), Title 11
   - Chapter 59, Ambient Air Quality Standards
   - Chapter 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 10 - Field Citations

2. PSD Requirements
PSD requirements do not apply because this facility is not considered a major stationary source and is not proposing any modifications to trigger a major modification as defined in 40 CFR 52.21 and HAR Title 11, Chapter 60.1, Subchapter 7.

3. NSPS Requirements
The following subparts of 40 CFR 60 - Standards of Performance for New Stationary Sources (NSPS) apply to this facility:

Subpart A - General Provisions
Subpart I - Standards of Performance for Hot Mix Asphalt Facilities

The 900 kW DEG is subject to *Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines (CI ICE)* because it was manufactured after April 1, 2006. For a CI ICE with a displacement of less than 30 liters per cylinder, §60.4204(b) states that owners of 2007 model year units must comply with emission standards in §60.4201, *Emission Standards for Manufacturers.*

For a CI ICE with maximum power <= 2,237 kW and a displacement less than 10 liters per cylinder, §60.4201(a) states that engine manufacturers must certify the engine per 40 CFR 89.112, 89.113, and 1039, as applicable. For engines greater than 560 kW, 40 CFR §89.112, Table 1, provides Tier 2 emission limits in g/kW-hr. These limits are shown in Table 5, below, along with manufacturer's emission test results.

**Table 5: Tier 2 DEG Emission Limits & Manufacturer's Data**

| Pollutant | 40 CFR §89.112, Table 1, Tier 2 | | Manufacturer's Data |
|---|---|---|---|
| | (g/hp-hr) | (g/kW-hr) | (g/kW-hr) |
| CO | 2.61 | 3.50 | 0.58 |
| NMHC + NOx | 4.77 | 6.40 | 4.08 |
| PM | 0.15 | 0.20 | 0.11 |

The applicant (owner) has provided DOH with the Cummin's EPA Tier 2 Exhaust Emission Compliance Statement for its new CI ICE, demonstrating that applicable emission standards have been met.

The 544 kW back-up DEG is not subject to *Subpart IIII* because it was manufactured before April 1, 2006 and was not modified or reconstructed after July 11, 2005.

4. NESHAP Requirements
These requirements do not apply because no standard covering the facility's operation or equipment has been promulgated under 40 CFR 61.

5. MACT Requirements
These requirements do not apply because this facility is not a major source of hazardous air pollutants and does not belong to a source category or subcategory for which a standard has been promulgated under 40 CFR 63.

6. BACT Requirements
A BACT review is required for new or modified sources which generate a net emissions increase that is "significant," as defined in HAR §11-60.1-1. Since there is no emissions increase, a BACT review is not required.

**Table 6: Emissions & Triggering Levels (tpy)**

| Pollutant | Current Emissions | Net Increase | Significant Level | CERR Type B | DOH Level |
|---|---|---|---|---|---|
| CO | 42.04 | 0 | 100 | 1000 | 250 |
| NOx | 41.94 | 0 | 40 | 100 | 25 |
| PM | 27.01 | 0 | 25 | N/A | 25 |
| PM-10 | 12.16 | 0 | 15 | 100 | 25 |
| PM-2.5 | 6.06 | 0 | - | 100 | - |
| SOx | 28.70 | 0 | 40 | 100 | 25 |
| VOC | 13.65 | 0 | 40 | 100 | 25 |
| HAPs | 0.00 | 0 | 0.6 | 5 | 5 |

Note: No increase in emissions.

7. CAM Requirements (40 CFR 64)
The purpose of Compliance Assurance Monitoring (CAM) is to provide 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 Code of Federal Regulations, 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 100% of the major source level; and (5) not otherwise be exempt from CAM. Since this facility is not a major source and does not meet all five criteria, CAM does not apply.

8. CER Requirements
Consolidated Emissions Reporting (CER) requirements apply if emissions from the facility equal or exceed levels provided in 40 CFR 51, Subpart A, Appendix A shown in Table 6. CER requirements do not apply because the facility's emissions are below the CER threshold levels.

The Department of Health (DOH) requires emissions reporting if total facility emissions of a particular pollutant exceed the DOH levels shown in Table 6.

9. Annual Emissions Reporting
   Emissions reporting is required because facility-wide emissions of NOx, PM, and SO2 exceed the DOH reporting levels shown in Table 6.

10. Major Source Determination
    A major source, as defined in HAR 11-60.1-1, emits or has the potential to emit any hazardous air pollutant in the aggregate of 10 tpy, 25 tpy or more of any combination of HAPs, or 100 tpy of any pollutant. This facility is not a major source since potential emissions, considering operating limits and pollution controls, are below these levels.

11. Synthetic Minor Determination
    A synthetic minor is a facility that is potentially major (as defined in HAR §11-60.1-1) but is made non-major through federally enforceable permit conditions. The facility is a synthetic minor because without operational limits, emissions of CO, NOx, PM, and SO2 would equal or exceed 100 tpy. (Reference: Review of Application 0045-14, 6/3/04, page 8).

## V. Insignificant Activities / Exemptions

No changes proposed. Table 7 lists existing activities designated as *insignificant activities* and the corresponding HAR paragraph reference upon which this determination is based.

**Table 7: Insignificant Activities**

| Quantity | Description | HAR Section Ref. |
|---|---|---|
| 1 | 1.5 MMBtu/hr hot oil heater, Heatec HC-120 | 11-60.1-82(f)(7) |
| 1 | Specification used oil tank < 10,000 gallons | 11-60.1-82(f)(1) |
| 3 | Fuel oil storage tanks - 3,000, 4,000, & 10,000 gallons | 11-60.1-82(f)(1) |
| 2 | Liquid asphalt cement storage tanks - 30,000 gallons | 11-60.1-82(f)(1) |
| 1 | Cold mix tank - 6,000 gallons | 11-60.1-82(f)(1) |

## VI. Alternate Operating Scenario

No new scenarios proposed.

## VII. Project Emissions

Table 8 shows potential emissions for the new 900 kW DEG, based on manufacturer's exhaust emission data. In order to account for the worst-case increase in NOx emissions due to combustion of biodiesel, the NOx emission rate, based on manufacturer's data and combustion of fuel oil no. 2, was increased by 15%.

Potential emissions from the new DEG are less than those of either of the existing DEGs. Table 9 compares emission rates of the new 900 kW DEG to the 544 kW DEG which will remain at the facility and be used if the 900 kW DEG breaks down. Emission rates for the 1996 back-up DEG are based on *AP-42: Section 3.4, Large Stationary Diesel and all Stationary Dual-fuel Engines, Table 3.4-1 (10/96),* since no manufacturer's data is available.

**Table 8: New DEG Emissions**

| | Emission Factors | | | | Emissions (tpy) | |
|---|---|---|---|---|---|---|
| Pollutant | (g/hp-hr) | (lb/hr) | Biodiesel (lb/hr) | (g/sec) | at 8,760 hr/yr | at 2,700 hr/yr |
| CO | 0.580 | 1.69 | | **0.213** | 7.40 | 2.282 |
| NOx | 4.000 | 11.66 | 13.41 | **1.689** | 58.72 | 18.099 |
| PM | 0.110 | 0.32 | | 0.040 | 1.40 | 0.433 |
| PM-10 | 0.106 | 0.31 | | **0.039** | 1.35 | 0.415 |
| PM-2.5 | 0.099 | 0.29 | | 0.036 | 1.26 | 0.390 |
| SO2 | 0.100 | 0.29 | | **0.037** | 1.28 | 0.393 |
| VOC | 0.080 | 0.23 | | 0.029 | 1.02 | 0.315 |

Notes:

1. Reference: Cummins 1000 DQFAD Exhaust Emission Data Sheet.
2. NOx emission factor increased by 15% to account for biodiesel use.
3. PM-10 and PM-2.5 emission factors based on AP-42, Appendix B.2, Category 1.
4. Bolded g/sec values are used in the air quality assessment.

**Table 9: Comparison of Emission Rates (lb/hr)**

| Pollutant | 900 kW New DEG | 544 kW Existing Back-up DEG |
|---|---|---|
| CO | 1.7 | 4.6 |
| NOx | 13.4 | 20.1 |
| PM | 0.3 | 0.6 |
| PM-10 | 0.3 | 0.5 |
| PM-2.5 | 0.3 | 0.5 |
| SO2 | 0.3 | 2.8 |
| VOC | 0.2 | 0.5 |

Note: Emission rates for the back-up DEG based on Review of Application No. 0045-23 , Table 7, dated 1/31/07.

Since the back-up DEG has greater potential emissions than the new unit, the worst-case scenario is based on use of the back-up DEG, and facility emissions, shown in Table 10, remain unchanged from the last application review dated 1/31/07 (Application No. 0045-23).

| Table 10: Facility Emissions (tpy) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Pollutant** | **Drum Mixer** | **RAP System** | **Material Conveying** | **DEG** | **Agg Handling, Paved Roads** | **Load-Out** | **Silo-Filling** | **Total** |
| CO | 35.10 | | | 6.26 | | 0.36 | 0.32 | 42.04 |
| NOx | 14.85 | | | 27.09 | | | | 41.94 |
| PM | 8.91 | 1.75 | 3.50 | 0.74 | 12.09 | 0.01 | 0.01 | 27.01 |
| PM-10 | 6.21 | 0.84 | 1.67 | 0.42 | 3.00 | 0.01 | 0.01 | 12.16 |
| PM-2.5 | 0.78 | 0.61 | 1.23 | 0.42 | 3.00 | 0.01 | 0.01 | 6.06 |
| SO2 | 24.92 | | | 3.78 | | | | 28.70 |
| VOC/TOC | 8.64 | | | 0.66 | | 1.06 | 3.29 | 13.65 |
| Lead | 4.05E-03 | | | | | | | 4.05E-03 |
| Total HAPs | 2.40 | | | 0.03 | | 0.02 | 0.05 | 2.50 |

Notes:
1. DEG NOx emissions based on Review of Application No. 0045-23, 1/31/07, page 8, Table 8.
2. Emissions other than those for Load-Out & Silo-Filling based on Review of Application No. 0045-14, 6/3/04, page 12, Table 2.
3. Load-Out & Silo-Filling emissions based on Review of Application No. 0045-22, 6/28/06, page 7, Table 5.

## VIII. Air Quality Assessment

An Ambient Air Quality Impact Assessment (assessment) is generally performed for new or modified sources. Although the new DEG has reduced emission rates, an assessment was performed to ensure compliance with federal and state air quality standards. The initial stack height proposed by the applicant was increased to 13'-9" which is equivalent to the stack height of the existing back-up DEG.

An assessment of the new DEG was based on the following assumptions:

- Screen3 model.
- Operating limits of 2,700 hr/yr and 20 hr/day.
- Stack parameters as shown in Table 11.
- Flat terrain.
- Rural area.
- Default meteorology.
- Critical building for downwash is the DEG housing (26'L 12'W, 12'H).
- Ambient temperature of 298 K (76 F).
- 1 gm/sec of pollutant.
- Regulatory default cavity.
- EPA scaling factors of 0.9, 0.7, 0.4, and state scaling factor of 0.2 for the 3-hr, 8-hr, 24-hr, and annual concentrations, respectively.

Table 11 shows stack parameters for the new 900 kW DEG.

| Table 11: Stack Parameters & Emission Rates | | | |
|---|---|---|---|
| Height | 13'-9" = 4.19 m | CO emission rate (g/sec) | 0.213 |
| Diameter | 10" = .25 m | NOx emission rate (g/sec) | 1.689 |
| Exhaust velocity | 29.71 m/s | PM-10 emission rate (g/sec) | 0.039 |
| Exhaust temperature | 873 F | SO2 emission rate (g/sec) | 0.037 |
| Exhaust gas flow | 6950 cfm | | |

Results shown in Table 12 indicate compliance with federal and state air quality standards.

**Table 12: Ambient Air Quality Assessment Results**

| Pol. | Avg. Time | Emis-sions (g/sec) | Time Factor | Oper. Limit Factor | Pred. Conc. (ug/m3) | Bkgrd. Conc. (ug/m3) | Total Impact (ug/m3) | SAAQS (ug/m3) | NAAQS (ug/m3) | Percent SAAQS |
|---|---|---|---|---|---|---|---|---|---|---|
| CO | 1 hr | 0.213 | 1.0 | 1.00 | 136 | 1710 | 1846 | 10000 | 40000 | 18% |
| CO | 8 hr | 0.213 | 0.7 | 1.00 | 95 | 1055 | 1150 | 5000 | 10000 | 23% |
| NO2 | annual | 1.689 | 0.2 | 0.31 | 50 | 9 | 59 | 70 | 100 | 84% |
| PM10 | 24 hr | 0.039 | 0.4 | 0.83 | 8 | 53 | 61 | 150 | 150 | 41% |
| PM10 | annual | 0.039 | 0.2 | 0.31 | 2 | 15 | 17 | 50 | 50 | 33% |
| SO2 | 3 hr | 0.037 | 0.9 | 1.00 | 21 | 64 | 85 | 1300 | - | 7% |
| SO2 | 24 hr | 0.037 | 0.4 | 0.83 | 8 | 21 | 29 | 365 | 365 | 8% |
| SO2 | annual | 0.037 | 0.2 | 0.31 | 1 | 2 | 3 | 80 | 80 | 4% |

Notes:
1. The Screen3 maximum predicted concentration is 638 ug/m3 located 30 meters from the source.
2. NOx concentration based on Tier 2 = 66 * 0.75 = 50.
3. Annual concentration adjusted by operating limit factor = 2,700 / 8760 for the 2,700 hr/yr limit.
4. 24-hr concentrations adjusted by operating limit factor = 20 / 24 for the 20 hr per day limit.
5. Background concentration levels are the highest recorded levels from the 2005 Kapolei station data.

## IX. Significant Permit Conditions

1. Both DEGs (new and back-up units) shall only be fired on fuel oil no. 2, biodiesel, synthetic gas, or liquefied petroleum gas.

    Purpose: Emission calculations based on use of the above fuels, as proposed by the applicant.

2. The two DEGs shall not operate simultaneously.

    Purpose: Air quality assessment based on this assumption.

3. Total combined operating hours for both DEGs (new and back-up units) shall not exceed 2,700 hours in any rolling 12-month period.

Purpose: Emission calculations and air quality assessment based on this limit, as proposed by the applicant.

4. Total combined operating hours for both DEGs (new and back-up units) shall not exceed 20 hours per day.

Purpose: This limit was previously imposed on the main, existing DEG to meet air quality standards and it now applies to the back-up DEG which is identical in make to the main, existing unit. Since the new and back-up DEGs are allowed to operate at different times on the same day, the new DEG will also be subject to the 20-hour per day limit.

## X. Conclusion

Grace Pacific proposes to replace its main 544 kW DEG with a new Tier 2 certified 900 kW DEG with reduced pollutant emission rates. Potential emissions are based on a 2,700 hr/yr operating limit. Actual facility emissions should be less than indicated in this review because calculated emissions are based on the worst-case emission rates of the various fuels. Also, calculated NOx emissions from biodiesel were based on the worst-case increase (15%) rather than average increase (10%) in NOx emissions for biodiesel combustion in the DEG, compared to fuel oil no. 2.

Issuance of an amended covered source permit is recommended based on review of information provided by the applicant and subject to significant permit conditions and EPA review.

April Matsumura
March 23, 2007