

Covered Source Permit No. 0691-02-CT

Application No.: Application for an initial covered source permit no. 0691-03

Organization Name: Road and Highway Builders, LLC

Equipment Location: Various Temporary Locations
Initial Location: Saddle Road (between Mile Posts 12 – 20)
Hilo, Hawaii 96720
UTM Coordinates: 259,550 m E; 2,178,216 m N
NAD-83
Zone 5

Responsible Official: Mr. John Portman
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SIC Code: 1429 Crushed and Broken Stone, Not Elsewhere Classified

Proposed Project:

The facility consists of a 340 ton per hour portable mobile crusher and a 350 hp diesel engine on the crusher which both propels the crusher and crushes rock.

This crusher was previously rated at 140 tons per hour and permitted under noncovered source permit no. 0691-01-N issued on September 12, 2008.

The applicant is proposing a diesel engine operating limit of 2,080 hours per rolling twelve month period to demonstrate compliance with the ambient air quality standards for the annual averaging periods for SO₂, NO_x, and PM_{2.5}. The proposed limit also limits throughput of the rock crusher since the diesel engine provides the only power to crush rock.

Equipment:

1. 340 ton per hour Extec C-12 Mobile Jaw Crusher
Serial no. 9966
2. 350 HP CAT C-9 diesel engine
Serial no. MBD 01404
18.3 gallons per hour
Fuel oil no. 2 with a maximum fuel sulfur content of 0.5% by weight
(note: the diesel engine is not subject to the requirements of 40 CFR Part 60, Subpart IIII or 40 CFR Part 63, Subpart ZZZZ because it is a nonroad engine)

Air Pollution Control:

The crusher is equipped with a water tank and water sprays at the jaw and conveyor for dust control and water trucks control onsite fugitive dust.

Applicable Requirements:

Applicable 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
 - Subchapter 8, Standards of Performance for Stationary Sources
 - 11-60.1-161 New Source Performance Standards
 - Subchapter 10, Field Citations

NSPS Applicability (portable stone processing plant): The mobile crusher is subject to 40 CFR Part 60, Subpart OOOO – Standards of Performance for Nonmetallic Mineral Processing Plants. The crusher meets the applicability trigger of being a portable nonmetallic mineral processing plant with a capacity greater than 150 tons per hour. The crusher and conveyor(s) are subject to the regulation.

BACT Applicability: Emissions of all pollutants from the crushing plant and diesel engine are below significant levels. The crushing plant and diesel engine are not subject to a BACT analysis.

Non-Applicable Requirements:

PSD Applicability: The facility is not subject to review of PSD applicability because the potential to emit from the facility is less than 100 tons per year of each criteria pollutant.

NSPS/NESHAP/MACT Applicability: The diesel engine is not subject to 40 CFR Part 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines or 40 CFR Part 60 Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines. Subpart IIII applies to stationary CI ICE and Subpart ZZZZ applies to stationary RICE.

Stationary ICE and stationary RICE are not nonroad engines as defined at 40 CFR, 1068.30, and are not used to propel a motor vehicle or a vehicle used solely for competition. From 40 CFR, 1068.30, nonroad engine means an internal combustion engine that is or will be used in or on a piece of equipment that is self-propelled or serves a dual purpose by both propelling itself and performing another function. The crusher’s diesel engine is located on the crusher and is used both to propel the crusher as well as crush rock.

There is no applicable standard for the diesel engine or stone processing equipment under 40 CFR Part 61 (MACT).

Compliance Assurance Monitoring Applicability: 40 CFR Part 64 Compliance Assurance Monitoring (CAM) rule. The facility is not subject to the CAM rule since it is not a major source of emissions.

Part 51, Subpart A, Emission Inventory Reporting Requirements – Consolidated Emissions Reporting Rule: CERR determines the applicability of compliance emissions reporting on the emissions of each air pollutant from the facility.

Minimum Point Source Reporting Thresholds by Pollutant			
Pollutant	Annual Cycle type A sources	Three-year cycle type B sources	Facility Emissions ^a
	tons/year	tons/year	tons/year
SO _x	≥ 2500	≥ 100	1.34
VOC	≥ 250	≥ 100	1.98E-01
NO _x	≥ 2500	≥ 100	2.46
CO	≥ 2500	≥1000	1.98
Pb		≥ 5	not available
PM ₁₀	≥ 250	≥ 100	2.00E-01
PM _{2.5}	≥ 250	≥ 100	1.87E-01
Ammonia	≥ 250	≥ 100	not anticipated

^a Detailed emissions from the portable crusher with diesel engine are in the **Project Emissions** section.

The facility is not subject to CERR requirements.

Synthetic minor status: A synthetic minor source 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. This facility is not a synthetic minor based on potential emissions less than 100 tons per year of each criteria pollutant when the equipment is operated for 8,760 hours per year. See the **Project Emissions** section for details.

Alternate Operating Scenarios: The applicant is not proposing any alternate operating scenarios.

Insignificant Activities/Exempt Equipment: The applicant does not identify any insignificant activities or exempt equipment.

Project Emissions:

**350 HP Diesel Engine
Criteria Pollutant Emissions**

pollutant	emission rate ^a	emission rate	emission rate 2,080 hrs/yr	emission rate 8,760 hrs/yr
	lbs/hr	g/sec	tons/yr	tons/yr
NO _x	2.37	2.99E-01	2.46	10.38
CO	1.9	2.39E-01	1.98	8.32
PM	0.2	2.52E-02	2.08E-01	0.88
PM ₁₀	0.192	2.42E-02	2.00E-01	0.84
PM _{2.5}	0.18	2.27E-02	1.87E-01	0.79
SO ₂	1.29	1.63E-01	1.34	5.65
HC	0.19	2.39E-02	1.98E-01	0.83

^a NO_x, CO, PM, and HC emission rates based on “Not to exceed data” from the manufacturer for the diesel engine and represent the highest emission rate of the five loads presented.

PM₁₀ and PM_{2.5} emission rates are based on Table B.2-2 Description of Particle Size Categories for Stationary Internal Combustion Engines (9/90) where 96% of PM is PM₁₀ and 90% of PM is PM_{2.5}.

SO₂ emission rate based on: 18.3 gal/hr x 7.05 lbs/gal x 0.005 = 0.645 lbs sulfur x 2 = 1.29 lbs SO₂ per hour

**350 HP Diesel Engine
Hazardous Air Pollutant Emissions**

pollutant	heat input ^a	emission rate	emission rate	emission rate 2,080 hrs/yr	emission rate 8,760 hrs/yr
	MMBtu/hr	lb/MMBtu	lb/hr	tons/yr	tons/yr
Benzene	2.56	9.33E-04	2.39E-03	2.48E-03	1.05E-02
Toluene	2.56	4.09E-04	1.05E-03	1.09E-03	4.59E-03
Xylene	2.56	2.85E-04	7.30E-04	7.59E-04	3.20E-03
1,3-Butadiene	2.56	3.91E-05	1.00E-04	1.04E-04	4.38E-04
Formaldehyde	2.56	1.18E-03	3.02E-03	3.14E-03	1.32E-02
Acetaldehyde	2.56	7.67E-04	1.96E-03	2.04E-03	8.60E-03
Acrolein	2.56	9.25E-05	2.37E-04	2.46E-04	1.04E-03
PAH	2.56	1.68E-04	4.30E-04	4.47E-04	1.88E-03
Total				1.03E-02	4.34E-02

^a 18.3 gal/hr x 0.14 MMBtu/gal = 2.56 MMBtu/hr

PROPOSED

Fugitive Dust PM Emissions from Stone Processing

Description	Controlled Emissions Factor	Material Throughput	Controlled Emissions	Controlled Emissions 2,080 hrs/yr	Controlled Emissions 8,760 hrs/yr
	lb/ton	tons/hr	lb/hr	tons/yr	tons/yr
grizzly feeder to jaw crusher	1.40E-04	340	4.76E-02	4.95E-02	2.08E-01
jaw crusher	1.06E-03	340	3.60E-01	3.75E-01	1.58
jaw crusher to conveyor	1.40E-04	340	4.76E-02	4.95E-02	2.08E-01
conveyor to stockpile	1.40E-04	340	4.76E-02	4.95E-02	2.08E-01
				5.23E-01	2.20

Fugitive Dust PM₁₀ Emissions from Stone Processing

Description	Controlled Emissions Factor	Material Throughput	Controlled Emissions	Controlled Emissions 2,080 hrs/yr	Controlled Emissions 8,760 hrs/yr
	lb/ton	tons/hr	lb/hr	tons/yr	tons/yr
grizzly feeder to jaw crusher	4.60E-05	340	1.56E-02	1.63E-02	6.85E-02
jaw crusher	5.40E-04	340	1.84E-01	1.91E-01	0.80
jaw crusher to conveyor	4.60E-05	340	1.56E-02	1.63E-02	6.85E-02
conveyor to stockpile	4.60E-05	340	1.56E-02	1.63E-02	6.85E-02
				2.40E-01	1.01

Fugitive Dust PM_{2.5} Emissions from Stone Processing

Description	Controlled Emissions Factor	Material Throughput	Controlled Emissions	Controlled Emissions 2,080 hrs/yr	Controlled Emissions 8,760 hrs/yr
	lb/ton	tons/hr	lb/hr	tons/yr	tons/yr
grizzly feeder to jaw crusher	1.30E-05	340	4.42E-03	4.60E-03	1.94E-02
jaw crusher	1.59E-04	340	5.41E-02	5.62E-02	0.24
jaw crusher to conveyor	1.30E-05	340	4.42E-03	4.60E-03	1.94E-02
conveyor to stockpile	1.30E-05	340	4.42E-03	4.60E-03	1.94E-02
				7.00E-02	0.29

Fugitive Dust Emissions from Storage Piles

hours of operation per year	PM emissions uncontrolled	PM ₁₀ emissions uncontrolled	PM _{2.5} emissions uncontrolled	control efficiency	PM emissions controlled	PM ₁₀ emissions controlled	PM _{2.5} emissions controlled
	tons/yr	tons/yr	tons/yr		tons/yr	tons/yr	tons/yr
2,080	2.52	1.19	0.18	70%	0.76	0.36	0.05
8,760	10.61	5.02	0.76	70%	3.18	1.51	0.23

^a PM, PM₁₀, and PM_{2.5} emission factors for storage piles are based on AP42 Section 13.2.4 Aggregate Handling and Storage Piles equation (1), (11/06):

$$(1) E = k(0.0032)[(U/5)^{1.3}/(M/2)^{1.4}]$$

	<30	<10	<2.5
k particle size multiplier, dimensionless	0.74	0.35	0.053
U mean wind speed, mph	15	15	15
M material moisture content, %	2.525	2.525	2.525
E emission factor, lb/ton	7.13E-03	3.37E-03	5.10E-04

Tons of material processed per year:

340 tons/hr x 2,080 hrs of operation/yr = 707,200 tons of material processed per year with the limit

340 tons/hr x 8,760 hrs of operation/yr = 2,978,400 tons of material processed per year without the limit

Ton/yr emissions = E x tons of material processed per year ÷ 2,000 lbs/ton

There are no fugitive dust emissions from vehicle traffic travel on paved or unpaved roads at the current location, which is the reconstruction of Saddle Road between mile posts 12 through 20. The mobile crusher follows the construction of the roadway. Rocks encountered during construction of the roadway are crushed in the mobile crusher and used in the construction of the roadway. No trucks are used to deliver or remove rock from the work site.

Summary of Facility Emissions

	NO _x	SO ₂	CO	VOC	PM	PM10	PM2.5	HAPs
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr
2,080 hours of operation per year								
diesel engine	2.46	1.34	1.98	1.98E-01	2.08E-01	2.00E-01	1.87E-01	1.03E-02
stone processing	none	none	none	none	5.23E-01	2.40E-01	7.00E-02	none
storage piles	none	none	none	none	0.76	0.36	0.05	none
Total	2.46	1.34	1.98	0.20	1.49	0.80	0.31	0.01
8,760 hours of operation per year								
diesel engine	10.38	5.65	8.32	0.83	0.88	0.84	0.79	4.34E-02
stone processing	none	none	none	none	2.20	1.01	0.29	none
storage piles	none	none	none	none	3.18	1.51	0.23	none
Total	10.38	5.65	8.32	0.83	6.27	3.36	1.31	4.34E-02

Air Quality Assessment:

The applicant performed an ambient air quality analysis using ISCST3 with screening meteorology to demonstrate compliance with all of the ambient air quality standards except for the 1-hour standard for NO_x. The Department of Health performed a refined modeling analysis using AERMOM with five years of meteorological data from Hilo Airport to demonstrate the diesel engines compliance with the NO_x 1-hour standard.

PROPOSED

The facility is modeled with the diesel engine operating at 100% capacity. The applicant has proposed an operating limit of 2,080 hours per rolling twelve-month period to demonstrate compliance with the annual averaging period standards for SO₂, NO_x, and PM_{2.5}.

Background Air Quality Data Collected in 2008

- SO₂ concentrations are from the Kona monitoring station.
- NO_x, PM₁₀, PM_{2.5} (98th percentile value averaged over three years, 2006-2008), and CO concentrations are from the Kapolei monitoring station.
- Ozone concentration from the Sand Island monitoring station.

Terrain and Receptor Placement

Terrain data was obtained from the US Geological Survey digitized elevation model (DEM) file for Upper Piihonua, Hawaii with a horizontal datum of NAD-83. Receptors are placed at a 30 meter spacing.

Building Input Data

The EPA Building Profile Input Program was used to derive direction specific building dimensions for importing into the model. The crusher was used in the model as a potential source of downwash effects.

Stack Parameters and Emission Rates Input into the Model

stack	emission rate						stack parameter			
	SO ₂ (g/s)	NO _x (g/s)	CO (g/s)	PM ₁₀ (g/s)	PM _{2.5} (g/s)	Pb (g/s)	height (m)	temp (K)	vel (m/s)	diam (m)
diesel engine	0.163	0.299	0.239	0.024	0.023	NA	3.96	737.7	58.41	0.152

Ambient Air Quality Impacts from the Diesel Engine

pollutant	averaging period	scaling factor	1-hour averaging period concentration ($\mu\text{g}/\text{m}^3$ per g/sec)	background concentration ($\mu\text{g}/\text{m}^3$)	total impact ($\mu\text{g}/\text{m}^3$)	ambient air quality standards ($\mu\text{g}/\text{m}^3$)	percentage of standard
SO ₂	3-Hour	0.9	368.85	325	657 ^a	1,300	51%
	24-Hour	0.4	368.85	142	290 ^a	365	79%
	Annual	0.2	368.85	23	41 ^c	80	51%
NO _x	1-hour	1	155.42	56.44	183 ^b	188	97%
	Annual	0.2	677.65	8	40 ^c	70	57%
CO	1-Hour	1	543.27	2,508	3051 ^a	10,000	31%
	8-hour	0.7	543.27	798	1178 ^a	5,000	24%
PM ₁₀	24-Hour	0.4	54.9	61	83 ^a	150	55%
	Annual	0.2	54.9	18	21 ^c	50	41%
PM _{2.5}	24-Hour	0.4	51.47	12 ^d	33 ^a	35	93%
	Annual	0.2	51.47	5	7 ^c	15	50%
Pb	Quarterly	0.4	not available	not available	---	1.5	---

^a Total impact for the SO₂ 3-hour and 24-hour, CO 1-hour and 8-hour, PM₁₀ 24-hour, PM_{2.5} 24-hour averaging periods:

$$= \text{scaling factor} \times \text{1-hour averaging period concentration} + \text{background concentration}$$

^b Total impact for the NO_x 1-hour averaging period using the ozone limiting method:

The 1-hour averaging period concentration is the 5-year average of the 98th %ile value.

$$\begin{aligned} \text{The 2008 1-hour O}_3 \text{ concentration} &= 59 \text{ ppb} = 0.059 \text{ ppm,} \\ 0.059 \text{ ppm} \times 48 \text{ gram moles} \div 24.45 &= 0.1158 \text{ mg}/\text{m}^3 = 115.8 \mu\text{g}/\text{m}^3 \end{aligned}$$

$$= \text{1-hour averaging period concentration} \times 0.10 + \text{1 hour O}_3 \text{ concentration} \times (46/48) + \text{background concentration}$$

$$\begin{aligned} &= 155.42 \mu\text{g}/\text{m}^3 \times 0.10 + 115.8 \mu\text{g}/\text{m}^3 \times (46/48) + 56.44 \mu\text{g}/\text{m}^3 \\ &= 183 \mu\text{g}/\text{m}^3 \end{aligned}$$

^c Total impact for the annual averaging period for SO₂, NO_x, PM₁₀, and PM_{2.5} is based on operation of the diesel engine for 2,080 hours per rolling twelve-month period.

$$= \text{scaling factor} \times \text{1-hour averaging period concentration} \times 2,080 \text{ hrs} \div 8,760 \text{ hrs} + \text{background concentration}$$

The ambient air quality standards shown above are the most stringent of the state or federal standards.

The diesel engine is projected to operate in compliance with both state and federal ambient air quality standards. This is based on operation of the diesel engine for a maximum of 2,080 hours of operation per rolling twelve-month period.

Significant Permit Conditions:

1. Condition: The permittee shall not cause to be discharged into the atmosphere from the crusher, fugitive emissions which exhibit greater than fifteen (15) percent opacity.

NSPS opacity limit for affected facilities that commenced construction, modification, or reconstruction after August 31, 1983 but before April 22, 2008. The crusher was manufactured in 2006.

2. Condition: The permittee shall not cause to be discharged into the atmosphere from any transfer point on the belt conveyors or from any other affected facility, fugitive emissions which exhibit greater than ten (10) percent opacity.

NSPS opacity limit for affected facilities that commenced construction, modification, or reconstruction after August 31, 1983 but before April 22, 2008. The crusher was manufactured in 2006.

3. Condition: The total operating hours of the diesel engine shall not exceed 2,080 hours in any rolling twelve-month (12-month) period.

Operating limit proposed by the applicant to demonstrate compliance with the long term ambient air quality standards for SO₂, NO_x, and PM_{2.5}.

4. Condition: The diesel engine shall be fired only on fuel oil no. 2 with a maximum sulfur content not to exceed 0.5% by weight.

The diesel engine is a nonroad engine exempt from the requirements of 40 CFR Part 60, Subpart IIII and 40 CFR Part 63, Subpart ZZZZ.

5. Condition: The stack height for the diesel engine shall each be at least 13 feet above base elevation.

The applicant originally proposed a stack height of 11 feet and did not demonstrate compliance with the ambient air quality standards. A stack height of 13 feet was then proposed and compliance with the ambient air quality standards was demonstrated.

Conclusion: Road and Highway Builders is proposing to operate a 340 tph mobile crusher and 350 hp diesel engine (used to propel the crusher and crush rock) as a temporary source. The applicant has proposed an operating limit of 2,080 hours per rolling twelve-month period to demonstrate compliance with the long term ambient air quality standard for SO₂, NO_x, and PM_{2.5}. The diesel engine is not subject to 40 CFR Part 60, Subpart IIII or 40 CFR Part 63, Subpart ZZZZ because it is a nonroad engine which are exempt from the subject regulations.

The ambient air quality analysis performed by the applicant and DOH demonstrates the diesel engine, as proposed in the application, will operate in compliance with the state and federal ambient air quality standards.

Issuance of a Covered Source Permit is recommended based on the review of the information provided in the application and subject to the conditions of the permit, any comments received during the 30-day public comment and EPA 45-day review periods.