

**PERMIT APPLICATION REVIEW**  
**Temporary Covered Source Permit (CSP) No. 0595-01-CT**

**Applicant:** CTS Earthmoving, Inc.  
**Facility:** 357 TPH Portable Crushing Plant  
**Located at:** Various Temporary Sites, State of Hawaii  
**Initial Location:** CTS Earthmoving baseyard, Holualoa, Hawaii  
**UTM Coordinates:** 2,170,710 m North; 191,540 m East

**Equipment:** The CSP encompasses the following equipment and associated appurtenances:

- a. Aggregate Machinery, Inc. 357 TPH Thunderbird II jaw crusher, manufacture date 1999, Model no. 3042 (J2DH), Serial no. 10090-01.
- b. 362 hp Caterpillar diesel engine, manufacture date 1999, Model no. 3306, Serial no. 64Z27461, Servicing the crusher, feeder, and associated conveyors.

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**1. Background and Project Description.**

1.1 The application for the covered source permit was received on July 14, 2005 from CTS Earthmoving, Inc. with a fee of \$1,000.

1.2 The applicant proposes to use the 357 TPH crushing plant to process and crush basalt rock and concrete rubble for construction projects, backfill material and recycling. The crushing process involves depositing raw material into the feeder by a front-end loader. Undersized material falls through the feeder bars onto a conveyor belt, and oversize material enters the jaw crusher. After crushing, the material is conveyed onto the same conveyor belt and deposited in a stockpile. The crushing plant is equipped with wheels and may be deployed by trailer to other job sites as necessary. It is powered by a built-in 362 HP Caterpillar diesel engine.

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1.3 Operations will be irregular depending on job availability and contractors' requirements. Typically, the crushing plant will be operated 8-10 hr/day, 5 days/week, 52 weeks/year. In addition, there are times when the plant will sit idle. As such, the applicant proposed an operational limit of 2,500 hr/yr for the crushing plant. Monitoring of this hour limit will be done with the hour meter on the diesel engine.

1.4 Standard Industrial Classification Code for this facility is 1429 (Crushed and Broken Stone, Not Elsewhere Classified).

### 2. Air Pollution Controls:

2.1 Air pollution control (70% efficiency) on the crushing system will be accomplished by water sprays at the following points:

- a. At the crusher;
- b. At the transfer point to the conveyor belt; and
- c. Water sprays from a water truck is used to control fugitive dust from the stock piles, access roads, and facility grounds.

2.2 Air pollution control on the diesel engine will be accomplished by:

- a. Good maintenance to reduce CO, VOC and PM emissions; and
- b. Use of low sulfur fuel (less than 0.5% by wt.)

### 3. Applicable Requirements.

3.1. Hawaii Administrative Rules (HAR)

Title 11 Chapter 59, Ambient Air Quality Standards

Title 11 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

Subchapter 8 - Standards of Performance for Stationary Sources

11-60.1-161(27) Standards of Performance for Non-metallic

Mineral Processing Plants

Subchapter 10 - Field Citations

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3.2 The 357 TPH crusher is subject to the following **New Source Performance Standards (NSPS)**:

- 40 CFR Part 60 - Standards of Performance for New Stationary Sources
  - Subpart A - General Provisions
  - Subpart OOO - Standards of Performance for Non-metallic Mineral Processing Plants

40 CFR Part 60 Subpart OOO applies to portable crushed stone plants with capacities greater than 150 TPH that commence construction, reconstruction, or modification after August 31, 1983. The crushing plant was manufactured in 1999 and has a capacity of 357 TPH; therefore, it is subject to Subpart OOO.

Annual source performance testing and monthly visible emissions observations shall be required for crusher. Monitoring, recordkeeping, notification, and reporting requirements will be included in the permit to ensure monthly V.E. observations, as well as to ensure annual source performance testing of the equipment.

3.3 The facility is not a major stationary source for hazardous air pollutants and is not subject to **National Emissions Standards for Hazardous Air Pollutants (NESHAPS)** or **Maximum Achievable Control Technology (MACT)** requirements under 40 CFR, Parts 61 and 63.

3.4 The purpose of **Compliance Assurance Monitoring (CAM)** is to provide reasonable assurance that compliance is being achieved with large emission 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 precontrol emissions that are greater than the major source level; and (5) not otherwise be exempt from CAM. CAM is not applicable to equipment at this facility because the facility is not a major source.

3.5 **Prevention of Significant Deterioration (PSD)** review applies to new major stationary sources and major modifications to these types of sources. The facility is not a major source for any single air pollutant. As such, a PSD review is not required.

3.6 **Consolidated Emissions Reporting Rule (CERR) Applicability:** 40 CFR Part 51, Subpart A - Emission Inventory Reporting Requirements, determines CERR based on facility wide emissions of each air pollutant at the CERR triggering levels shown below. This facility does not have any emissions at the CERR triggering levels. Therefore, CERR requirements are not applicable.

Although CERR for the facility is not triggered, the Clean Air Branch requests **annual emissions reporting** from those facilities that have facility-wide emissions of a single air pollutant exceeding in-house triggering levels. Annual emissions from these facilities are used within the Department and are not inputted into the AIRS database. Total combined emissions from this facility do not exceed these levels. However, annual emissions reporting is required for all covered sources.

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3.7 A **Best Available Control Technology (BACT)** analysis is required for new sources and significant modifications to sources that have the potential to emit or increase emissions above “significant levels”, as defined in HAR, Section 11.60.1-1, considering any limitations, enforceable by the director, on the source to emit a pollutant. This facility is a new covered source and its potential emissions at any location were calculated to be less than the “significant” thresholds (see table below). Therefore, a BACT analysis was not performed at this time.

<b>Maximum Emissions Compared to Significant Levels, CER, and "In-house" Thresholds ( All Values in TPY)</b>					
Pollutant	Facility-Wide Emissions <sup>a</sup>	Significant Levels	CERR Triggering Levels (TPY)		"In-house" Reporting Levels
			1-Year Cycle (Type A Sources)	3-year Cycle (Type B Sources)	
NOx	10.42	40	> 250	> 100	≥ 25
CO	2.25	100	≥ 2500	≥ 1000	≥ 250
SO2	1.21	40	≥ 2500	≥ 100	≥ 25
PM-10 <sup>b</sup>	3.29	15	≥ 250	≥ 100	≥ 25
PM <sup>b</sup>	6.49	25	--	--	≥ 25
VOC	0.83	40	≥ 250	≥ 100	≥ 25
Pb	--	--	--	--	≥ 5

<sup>a</sup> Based on 357 TPH Crusher and the 362 HP D.E. operating 2,500 hr/yr.

<sup>b</sup> Does not include PM emissions from vehicle travel on unpaved roads.

3.8 **Major source/ Synthetic minor source applicability:** A synthetic minor source is a facility that is potentially major (as defined in HAR 11-60.1-1), but is made nonmajor through federally enforceable permit conditions (e.g., limiting the facility’s hours of operation and limiting the facility’s production rate). This facility is not a synthetic minor based on emission levels less than “major” levels (< 100 TPY) and HAPs less than 10 TPY when the crushing plant and diesel engine are operated at 8,760 hr/yr.

<b>FACILITY-WIDE EMISSIONS (TPY)-- Crusher Operating 8,760 Hr/yr</b>					
Pollutant	362 HP Diesel Engine	357 TPH Crusher	Stockpile	Vehicle Travel	Total Emissions
NOx	36.52	--	--	--	36.52
CO	7.87	--	--	--	7.87
SO2	4.26	--	--	--	4.26
PM-2.5	2.41	1.02	1.98	3.09	8.49
PM-10	2.57	2.68	6.28	20.14	31.67
PM	2.67	6.77	13.30	68.24	90.98
VOC	2.90	--	--	--	2.90
HAPs	5.28E-02	--	--	--	5.28E-02

**4. Insignificant Activities.**

A 235 gallon diesel fuel tank that stores fuel for the diesel engine is an insignificant activity in accordance with HAR 11-60.1-82(f)(1) because it is less than 40,000 gallons and is not subject to any standard or other requirement pursuant to Section 111 or 112 of the CAA. This tank is not subject to NESHAPS as there are no standards in 40 CFR Part 61 applicable to this source.

It is also not subject to NSPS as there are no applicable regulations in 40 CFR Part 60 pertaining to this fuel tank.

**5. Alternate Operating Scenarios.**

The applicant requested an alternate operating scenario in the event of a breakdown or major overhaul of the permitted diesel engine. In this scenario, the 362 HP diesel engine may be temporarily replaced with an engine of the same or smaller size and which has equal or lower emissions than the primary diesel engine.

**6. Project Emissions.**

**6.1 Rock Crushing Operations.** Particulate matter emissions from the crushed stone processing are summarized below and calculations are shown in Enclosure (1). Emission calculations were based on the maximum capacity of the crusher (357 TPH) operating unrestricted at 8,760 hr/yr, and at 2,500 hr/yr, per the applicant's proposal.

**SUMMARY- Rock Crushing Operations**

Pollutant	Emissions (TPY) <sup>a</sup>	
	8,760 hr/yr	2,500 hr/yr
PM-2.5	1.02	0.29
PM-10	2.68	0.77
PM	6.77	1.93

<sup>a</sup> AP-42, 11.19.2 (8/04), Crushed Stone Processing

**6.2 Stockpiles.** Worst case emissions from aggregate handling and storage piles were based on the maximum production rate of the crusher (357 TPH) operating unrestricted at 8,760 hr/yr, and at 2,500 hr/yr, per the applicant's proposal. Particulate emissions are summarized below and shown in Enclosure (2).

Pollutant	Stockpile Emissions (TPY)	
	8,760 hr/yr	2,500 Hr/yr
PM-2.5	1.98	0.56
PM-10	6.28	1.79
PM	13.30	3.80

<sup>a</sup> AP-42, Section 13.2.4 (1/95), Aggregate Handling and Storage Piles.

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**6.3 Vehicle Travel on Unpaved Roads.** Particulate emissions from vehicle travel on unpaved roads were calculated using AP-42, Section 13.2.2 (12/03), "Unpaved Roads." Worst-case emission rates were based on the following assumptions:

- a. Calculations for vehicle miles traveled (VMT) per year were based 0.5 miles round-trip travel per truckload into and out of a typical temporary facility, an average truck's load capacity of 21 tons, and the maximum production rate of the crusher (357 TPH), 2,500 hr/yr and 8,760 hr/yr operation, and 26.5 tons as the average weight of the trucks. Vehicle miles traveled per year (VMT/yr) at the facility was calculated to be 74,460 mi/yr and 21,250 mi/yr for 8,760 hr/yr and 2,500 hr /yr, respectively.
- b. k (particle size multiplier) values for PM, PM-10, and PM-2.5 of 4.9, 1.5 and 0.23, respectively, based on updated information from AP-42.
- c. An s (silt content of road) value of 10% for a processing plant road.
- e. A p (# of days with 0.01" of rain/year) value of 171 based on available data from the Opihihale Observatory station ([www.wrcc.dri.edu/cgi-bin](http://www.wrcc.dri.edu/cgi-bin)) .
- f. A 70% control efficiency was applied to account for dust control from the water truck.
- g. Based on the above, particulate matter emissions from vehicle travel on unpaved roads are summarized below and detailed in Enclosure (3).
- h. These fugitive emissions were not counted toward the applicability of BACT, CERR, Annual Emissions and synthetic minor determination.

Pollutant	EF (lb/VMT)	Unlimited (8,760 hr/yr)		Limited (2,500 hr/yr)	
		VMT (miles/yr)	Emission (TPY)	VMT (miles/yr)	Emission (TPY)
<b>PM-2.5</b>	0.277	74,460	<b>3.09</b>	21,250	0.88
<b>PM-10</b>	1.803	74,460	<b>20.14</b>	21,250	5.75
<b>PM</b>	6.110	74,460	<b>68.24</b>	21,250	19.48

AP-42, Section 13.2.2 (12/03), "Unpaved Roads"

**6.4 Diesel Engine Emissions.** Emissions from the crusher's 300 HP Caterpillar diesel engine are based on the following and are shown in enclosure (4) and summarized in the table below:

- Fuel consumption rate of 13.8 gal/hr.
- Diesel fuel heating value of 137,000 BTU/gal and 0.5% Sulfur content.
- SO<sub>2</sub> emissions were based on the mass balance method
- All other criteria pollutants and HAPs were based on AP 42 emission factors.

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**Emissions from 362 HP Caterpillar Diesel Engine**

Pollutant	Emission Factor (lb/MMBtu) <sup>a</sup>	Emission (lb/hr)	Emission (TPY)	
			8,760 hr/yr	2,500 hr/yr
NO <sub>x</sub>	4.41	8.338	36.518	10.42
CO	0.95	1.796	7.867	2.25
SO <sub>2</sub>	mass balance	0.972	4.257	1.21
PM-2.5 <sup>b</sup>	0.29	0.549	2.407	0.69
PM-10	0.31	0.586	2.567	0.73
PM <sup>c</sup>	0.32	0.611	2.674	0.76
Aldehydes	0.07	0.132	0.580	0.17
TOC	0.35	0.662	2.898	0.83
Benzene	9.33E-04	1.76E-03	7.73E-03	2.20E-03
Toluene	4.09E-04	7.73E-04	3.39E-03	9.67E-04
Xylenes	2.85E-04	5.39E-04	2.36E-03	6.74E-04
Propylene	2.58E-03	4.88E-03	2.14E-02	6.10E-03
1,3 Butadiene	3.91E-05	7.39E-05	3.24E-04	9.24E-05
Formaldehyde	1.18E-03	2.23E-03	9.77E-03	2.79E-03
Acetaldehyde	7.67E-04	1.45E-03	6.35E-03	1.81E-03
Acrolein	9.25E-05	1.75E-04	7.66E-04	2.19E-04
Naphthalene	8.48E-05	1.60E-04	7.02E-04	2.00E-04
Total PAHs	1.68E-04	3.18E-04	1.39E-03	3.97E-04
TOTAL HAPS (shaded)			5.28E-02	1.51E-02

<sup>a</sup> EFs from AP-42, Tables 3.3-1 and -2 (10/96)

<sup>b</sup> PM-2.5 = 90% of PM (AP 42, Appendix B-2, pg B.2-11, 9/90)

<sup>c</sup> PM-10 = 96 % of PM (AP 42, Appendix B-2, pg B.2-11, 9/90); therefore, PM = (PM-10) / 0.96

**6.5 Facility Wide Emissions** Facility-wide emissions from the facility operating 8,760 hr/yr and 2,500 hr/yr are tabulated below and at enclosure (5). A major source as defined in Section 11-60.1-1 of HAR Title 11, has the potential to emit any HAP of 10 TPY or more, or 25 TPY or more of any combination of HAPs, or 100 TPY or more of any air pollutant. Calculated emissions do not meet these limits and thus, this facility is not classified as a major source, in compliance with regulations for temporary sources.

**FACILITY-WIDE EMISSIONS (TPY)-- Crusher Operating 8,760 Hr/yr**

Pollutant	362 HP Diesel Engine	357 TPH Crusher	Stockpile	Vehicle Travel	Total Emissions
NO <sub>x</sub>	36.52	--	--	--	36.52
CO	7.87	--	--	--	7.87
SO <sub>2</sub>	4.26	--	--	--	4.26
PM-2.5	2.41	1.02	1.98	3.09	8.49
PM-10	2.57	2.68	6.28	20.14	31.67
PM	2.67	6.77	13.30	68.24	90.98
VOC	2.90	--	--	--	2.90
HAPs	5.28E-02	--	--	--	5.28E-02

**FACILITY-WIDE EMISSIONS (TPY)-- Crusher Operating 2,500 Hr/yr**

Pollutant	362 HP Diesel Engine	357 TPH Crusher	Stockpile	Vehicle Travel	Total Emissions
NOx	10.42				10.42
CO	2.25				2.25
SO2	1.21				1.21
PM-2.5	0.69	0.29	0.56	0.88	2.42
PM-10	0.73	0.77	1.79	5.75	9.04
PM	0.76	1.93	3.80	19.48	25.97
VOC	0.83				0.83
HAPs	1.51E-02				1.51E-02

**7. Air Quality Assessment.**

7.1 An ambient air quality impact analysis (AAQIA) for the 362 hp diesel engine that powers the Thunderbird II 357 TPH crusher was conducted using EPA's SCREEN 3 model, and assumptions used in the model included:

- a. Simple terrain impacts;
- b. Rural dispersion parameters;
- c. Wake effects from the portable crushing plant;
- d. Default meteorology;
- e. EPA Scaling factors of 0.9, 0.7, and 0.4 for the 3-hour, 8-hour, and 24 hour concentrations, respectively; and
- f. State of Hawaii scaling factor of 0.2 for the annual concentrations.

7.2 A Good Engineering Practice (GEP) stack height analysis was performed. The analysis indicates that the stack height of the Thunderbird II crusher's diesel engine is less than the GEP formula stack height based on the dimensions of the 4 meter high x 6.1 meter long x 2.4 meter wide structure of the jaw crushing plant. Therefore, the crushing plant's dimensions were inputted into the SCREEN 3 modeling run to account for downwash effects.

**GOOD ENGINEERING PRACTICE STACK HEIGHT (All dimensions in meters)**

Structure	Hgt	Length	Width	PW	L	Hg *	Stack hgt
Crusher/D.E.	4	6.1	2.4	6.56	4	10	5

\* Hg (GEP stack height) = Height + 1.5 L, where  
L is smaller of PW or structure hgt.

7.3 CAB used background air quality data from Hawaii Electric Light Co.'s Kona, Hawaii monitoring station for SO<sub>2</sub>, NOx, CO and PM-10.

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7.4 The tables below present the emission rates and stack parameters used in the AAQIA for burning fuel oil No. 2.

**Caterpillar 362 HP Diesel Engine Stack Parameters**

Stack no.	Hgt (m)	Diam (m)	Vel (m/s)	Temp (K)
1	5	0.1524	43.957	721.3

**Stack Emission Rate**

Pollutant	(g/s)
SO <sub>2</sub>	0.1225
NO <sub>x</sub>	1.0505
CO	0.2263
PM-10	0.0738

7.5 In the model, the initial receptor was placed at 1 meter, and the next one was placed at 100 meters. Thereafter, receptors were placed in 100 meter intervals out to a distance of 3,000 meters.

7.6 Results from the air quality modeling assessment showed a maximum 1-hr concentration of 793.2 µg/m<sup>3</sup> per gram/sec at a distance of 35 meters from the stack. Based on this, the following maximum pollutant concentrations were calculated:

PREDICTED AMBIENT AIR QUALITY IMPACTS <sup>a</sup>								
AIR POLLUTANT	EMISS. RATE (g/s)	AVG. TIME	SCALING FACTOR	IMPACT <sup>b</sup> (ug/m3) 2,500 hr/yr	BCKGRD <sup>c</sup> (ug/m3)	TOTAL IMPACT (ug/m <sup>3</sup> )	AIR STD (ug/m <sup>3</sup> )	% OF STD
SO <sub>2</sub>	0.122	3-Hour	0.9	87.43	87	174	1,300	13%
		24-Hour	0.4	38.86	34	73	365	20%
		Annual	0.2	5.54	4	10	80	12%
NO <sub>x</sub>	1.051	Annual	0.2	47.56	2	50	70	71%
CO	0.226	1-Hour	1	179.50	969	1149	10,000	11%
		8-Hour	0.7	125.65	736	862	5,000	17%
PM-10	0.074	24-Hour	0.4	23.43	27	50	150	34%
		Annual	0.2	3.34	12	15	50	31%

<sup>a</sup> Based on maximum 1 hour concentration of **793.2** ug/m<sup>3</sup> per g/sec 35 meters from the stack.

<sup>b</sup> IMPACT = (Emiss. Rate) X (Scaling factor) X (793.2 ug/m<sup>3</sup>).

<sup>c</sup> Background data from Hawaii Electric Light Co. monitoring station located at Kona, Hawaii

<sup>d</sup> Annual impact reduced by 2,500/8,760 to account for operational restrictions.

**8. Significant Permit Condition Changes.**

8.1 The total operating hours of the 362 hp diesel engine shall not exceed 2,500 hours per any rolling twelve-month (12-month) period.

Reason for 8.1: This condition was incorporated, as proposed by the applicant, based on their anticipated operations and to meet the State ambient air quality standards.

8.2 The Thunderbird II crusher will be subject to NSPS, Subpart OOO.

Reason for 8.2: Because the initial crusher is over 150 TPH and the additional equipment was fabricated after 1983, NSPS, Subpart OOO is triggered.

8.3 The Thunderbird II crusher shall not be operated together with any other equipment owned by the permittee (CSP No. 0475-01-CT and CSP 0562-01-CT) without the prior written approval of the Department of Health.

Reason for 8.3: The combination of equipment operating at one site may cause criteria pollutant emissions to exceed major source levels, or the combination of equipment may cause emissions to exceed the State or National AAQ Standards..

**9. Conclusion and Recommendation.**

9.1 Actual emissions from the plant should be lower than predicted since calculations were base on operation of the 357 TPH crushing plant at maximum capacity. The plant is not expected to reach maximum capacity for extended periods during actual service. The hourly limits on the 362 hp diesel engine for the Thunderbird II crusher should ensure compliance with state and federal ambient air quality standards for the combustion of fuel oil No. 2. Recommend issuance of the permit subject to the incorporation of the significant permit conditions. The 30-day public comment period, and 45-day EPA review period will be initiated simultaneously.

WKanai, 8-18-05