PROPOSED

CSP 0692–01-CT

TEMPORARY COVERED SOURCE AIR PERMIT (CSP) ENGINEERING REVIEW
INITIAL APPLICATION NO. **0692-01**

REVIEWER	PR
DATE	08.05.2008
FACILITY	Close Construction, Inc. 350 TPH Mobile Impact Crusher and 600 TPH Mobile Screen
LOCATION	Hickam Air Force Base (AFB) Honolulu, Oahu
R. OFFICIAL	Mr. James Close 1.808.678.9493
CONTACT	J. W. Morrow 1.808.942.9096
MAIL ADDRESS	Close Construction, Inc. 94-523 Puahi Street Waipahu, Hawaii 96797

EQUIPMENT

One (1) 350 TPH Mobile Impact Crusher
Model No. 4043T, Serial No. D4043TCJE1789
Production = 350 TPH

One (1) 600 TPH Mobile Screen
Model No. Spyder 516T, Serial No. D-516T-SPY-A-JC1603
Production Capacity = 400 TPH

One (1) 300 BHP Caterpillar C-9 Diesel Engine
Model No. C-9, Serial No. N/A
Fuel Consumption = 15.0 gal/hr; Fuel Oil No. 2 (0.5% Sulfur Content)
Exhaust Diameter = 0.102m, Height = 4.11m
Velocity = 108 m/s; Actual Flow Rate = 0.87 m^3/s; Temp = 696K

One (1) 112 BHP Cummins Diesel Engine
Model No. 4BTA3.9-C, Serial No. N/A
Fuel Consumption = 5.8 gal/hr; Fuel Oil No. 2 (0.5% Sulfur Content)
Exhaust Diameter = n/a, Height = n/a
Velocity = n/a; Actual Flow Rate = n/a; Temp = n/a

PERMIT BACKGROUND

The applicant proposes an operating limit of 4,000 hours in any 12-month rolling period.
Proposed typical operating schedule is 8 hr/day, 5da/wk, 52 wk/yr = 2,080 hours/yr.

PROCESS BACKGROUND

Process: SICC 1429

Raw material is dropped into the vibrating grizzly by a loader and passed to the Impact crusher. The crushed material drops on to a moving conveyor belt and is transported to the 5 x 16 screen where it is size segregated and the oversize material is conveyed back to the crusher. The product material is conveyed to two stockpiles. The crusher is powered by the 300 bhp CAT C-9 engine. The screen is powered by a 112 bhp Cummins diesel engine.

APPLICABLE REQUIREMENTS

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 10, Field Citations

This source is **subject to NSPS** (New Source Performance Standards).

40 CFR Part 60, Subpart OOO - Standards of Performance for Non-metallic Mineral Processing Plants is applicable to portable crushed stone plants with capacities greater than 150 TPH that commence construction, reconstruction, or modification after August 31, 1983. The proposed unit meets these conditions and **is subject to Subpart OOO**.
Existing screening units are normally operated independently of the crushing plants. Although stand alone screens are exempt from Subpart OOO, there may be times, depending on future jobs, when one or more of the screens will be operated in conjunction with a crusher (i.e., all of the material crushed is then screened). Should these screening plants be utilized in conjunction with a crusher, that screen and its conveyors, shall be subject to Subpart OOO. The new crushing and screening plant is designed to operate as one unit where the screen will always be used in conjunction with the crusher, and thus is subject to OOO.

40 CFR Part 60, Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines **is applicable** since this engine was manufactured after July 11, 2005, however, no modifications were performed to the proposed diesel engine after July 11, 2005.

40 CFR Part 63, Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (RICE NESHAP) – applicable to stationary RICE located at major and area sources of HAP emissions. This subpart **is not applicable** since this is not an existing source.40 CFR Part 60, Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines not applicable as the provision applies to stationary compression ignition (CI) internal combustion engines (ICE).

This source is **not subject to NESHAPS** (National Emission Standards for Hazardous Air Pollutants for Source Categories) as no hazardous air pollutants are emitted at significant levels (>= 10 TPY HAP or >= 25 TPY for total HAPs) and this source is not listed under 40 CFR Part 61 (National Emission Standards for Hazardous Air Pollutants) or 40 CFR 63 applicable to this facility.

This source is **not subject to MACT** (Maximum Achievable Control Technology) since the source is not a major source of hazardous air pollutants (HAPS) emissions (>10 TPY single hap or >25 TPY for total haps).

This source is **not subject to PSD** (Prevention of Significant Deterioration) requirements because it is not a major stationary source as defined in 40 CFR 52.21 and HAR Title 11, Chapter 60.1, Subchapter 7; (criteria air pollutant > 100 or 250 TPY as applicable).

This source is **not subject to CAM** (compliance assurance monitoring) since the proposed equipment is not classified as a major source (criteria pollutant > 100 TPY); has no pre-control device potential emissions exceeding applicable major source thresholds; nor fitted with an “active” air pollution control device; and not or not part of a facility with total emissions exceeding major source threshold.

This source is **not subject to CERR** (Consolidated Emissions Reporting Requirements) since
40 CFR Part 51, Subpart A – Emissions Inventory Reporting Requirements, determines CERR based on facility wide emissions of each air pollutant at the CERR triggering levels. The emissions do not exceed respective CERR threshold levels. As such, emissions data will not be required to be inputted into the National Emissions Inventory (NEI) database.

The Clean Air Branch requests annual emissions reporting from those facilities that have facility wide emissions exceeding the DOH reporting level(s). Based on current emissions, the facility **is subject to annual emissions reporting** due to *NOx* exceeding the DOH reporting thresholds.

This source is **subject to BACT** (Best Available Control Technology) analysis because the potential PM emissions from the proposed facility do exceed significant emissions levels. Since the greatest PM emissions are from the screen, BACT for the screen will be the use of water sprays to minimize dust emissions that may impact surrounding areas. BACT analysis is required for new noncovered sources and significant modifications to noncovered sources that have the potential to emit or increase emissions above significant levels.

INSIGNIFICANT ACTIVITIES (CSP) / EXEMPTIONS (NSP)

The 112 bhp diesel engine powering the screener is proposed as insignificant in accordance with HAR 11-60.1-82(f)(2).

ALTERNATIVE OPERATING SCENERIOS

1. Crusher & screen operating separately at two different locations.
2. Use of a temporary diesel engine in an emergency situation.

TOTAL EMISSIONS

Total facility emissions are summarized within the immediate table below.

Table 1: Total Facility Emissions and Trigger Levels (TPY)					
Pollutant	**Proposed Emissions based on Limited Hours of Operation**	**Emissions based on 8,760 hr/yr (ANNUAL – NO LIMIT)**	**Significant BACT Level**	**CERR Level**	**DOH Level**
CO	**3.90**	**8.55**	100	1000	250
NOx	**18.13**	**39.69**	40	100	25
PM-30(TSP)	**57.46**	**132.13**	25	-	25
PM-10	**18.77**	**46.31**	15	100	25
PM-2.5	**0.73**	**1.51**	-	100	-
SOx	**2.08**	**4.55**	40	100	25
TOC/VOC	**1.44**	**3.15**	40	100	25
HAPs	**0.02**	**0.04**	-	5	5

Individual equipment emissions are summarized within the immediate table below.

Table 2: Total Equipment Emissions (TPY)				
Pollutant	**DEG**	**CRUSHER**	**SCREEN**	**TOTAL**
CO	**8.55**	**--**	**--**	**8.55**
NOx	**18.13**	**--**	**--**	**18.13**
PM-30(TSP)	**--**	**22.08**	**105.1**	**127.18**
PM-10	**2.79**	**3.45**	**31.53**	**37.77**
PM-2.5	**--**	**0.08**	**0.23**	**0.31**
SOx	**4.55**	**--**	**--**	**4.55**
TOC/VOC	**3.15**	**--**	**--**	**3.15**
HAPs	**0.04**	**--**	**--**	**0.04**

Proposed emissions are based on the following hours of operation:

Equipment	Limited Hours of Operation
Mobile Impact Crusher	**4,000** hr/yr
Screener	**4,000** hr/yr
Diesel Engine	**4,000** hr/yr

FACILITY EMISSIONS CALCULATIONS

Emission Calculations for 350 HP Diesel Engine

Generator Diesel Consumption = 15.0 gallons/hour,
Proposed Limited Operating Hours = 4,000 hours/year

Annual Diesel Max Consumption = Diesel Consumption X Operating Hours
= (15.0 gallons/hour)(4,000 hours/year)
= 60,000 gallons/year

Diesel #2 Heat Value = 137,000 BTU/gal, From AP-42, Volume 1, 5th ed, App. A
Density of Diesel Fuel = 7.1 lb/gal

Diesel #2 Annual Heat Capacity = Diesel Consumption X Diesel Heat Value
= (15.0 gal/hr)(137,000 BTU/gal)(8,760 hr/yr)(10E-6 MMBTU/BTU)
= 18,002 MMBTU/yr

Diesel #2 Limited Annual Heat Capacity = (15.0 gal/hr)(137,000 BTU/gal)(4,000 hr/yr)(10E-6 MMBTU/BTU) Proposed Limit: 4,000 hrs/yr
= 8,220.0 MMBTU/yr limited

For **NOx**,

Emission Factor = 4.41 lb/MMBtu

Potential Annual Emission = Emission Factor X Annual Heat Capacity
= (4.41 lbs/MMBtu)(18,002 MMBTU/yr)(1/2000 Ton/lbs)
= **39.69 TPY or 1.14 g/s**

Limited Operation Emission = Emission Factor X Annual Heat Capacity
= (4.41 lbs/MMBtu)(8,220 MMBTU/yr limited)(1/2000 Ton/lbs)
= **18.13 TPY (limited)**

For **CO**,

Emission Factor = 0.95 lb/MMBtu

Potential Annual Emission = Emission Factor X Annual Heat Capacity
= (0.95 lbs/MMBtu)(18,002 MMBTU/yr)(1/2000 Ton/lbs)
= **8.55 TPY or 0.25 g/s**

Limited Operation Emission = Emission Factor X Annual Heat Capacity
= (0.95 lbs/MMBtu)(8,220 MMBTU/yr limited)(1/2000 Ton/lbs)
= **3.90 TPY (limited)**

For **PM10**,

Emission Factor = 0.31 lb/MMBtu

Potential Annual Emission = Emission Factor X Annual Heat Capacity
= (0.31 lbs/MMBtu)(18,002 MMBTU/yr)(1/2000 Ton/lbs)
= **2.79 TPY or 0.08 g/s**

Limited Operation Emission = Emission Factor X Annual Heat Capacity
= (0.31 lbs/MMBtu)(8,220 MMBTU/yr limited)(1/2000 Ton/lbs)
= **1.27 TPY (limited)**

For **VOC/TOC**,

Emission Factor = 0.35 lb/MMBtu

Potential Annual Emission = Emission Factor X Annual Heat Capacity
= (0.35 lbs/MMBtu)(18,002 MMBTU/yr)(1/2000 Ton/lbs)
= **3.15 TPY or 0.09 g/s**

Limited Operation Emission = Emission Factor X Annual Heat Capacity
= (0.35 lbs/MMBtu)(8,220 MMBTU/yr limited)(1/2000 Ton/lbs)
= **1.44 TPY (limited)**

For **SOx (SULFUR)**,

Emission Factor	= 0.101 lb/MMBtu X 0.5% Fuel Oil No. 2 = 0.101 lb/MMBtu X 5 = 0.505 lb/MMBtu
Potential Annual Emission	= Emission Factor X Annual Heat Capacity = (0.505 lbs/MMBtu)(18,002 MMBTU/yr)(1/2000 Ton/lbs) = **4.55 TPY or 0.13 g/s**
Limited Operation Emission	= Emission Factor X Annual Heat Capacity = (0.505 lb/MMBtu)(8,220 MMBTU/yr limited)(1/2000 Ton/lbs) = **2.08 TPY (limited)**

For **HAPs**,

Emission Factor	= EF(Benzene + Toluene + Xyelene + Propylene + Formaldehyde + Acetaldehyde + Acrolein) = 0.0042 lb/MMBtu
Potential Annual Emission	= Emission Factor X Annual Heat Capacity = (0.0042 lbs/MMBtu)(18,002 MMBTU/yr)(1/2000 Ton/lbs) = **0.0378 TPY or 0.0011 g/s**
Limited Operation Emission	= Emission Factor X Annual Heat Capacity = (0.0042 lbs/MMBtu)(8,220 MMBTU/yr limited)(1/2000 Ton/lbs) = **0.017 TPY (limited)**

Note: The following emission factors are obtained from AP-42, Table 3.3-1 10/96 edition, Emission Factors For Uncontrolled Gasoline and Diesel Industrial Engines. Sulfur emission factor from AP-42, Table 3.4-1 10/96 edition, Gaseous Emission Factors for Large Stationary Diesel and all Stationary Dual-Fuel Engines.

Emission Calculations for 350 TPH Mobile Impact Crusher (FUGITIVE)

Production Rate x Average Density = 350.0 ton/hr
Control Type: Water (70% Controlled)

For **PM2.5**,

Emission Factors = 1.30 E-05 lb/ton, Grizzly to Impact
= 1.00 E-04 lb/ton, Impact Crushing
= 1.30 E-05 lb/ton, Crushing to Conveyor
= 1.30 E-05 lb/ton, Conveyor to Stockpile

Potential Annual Emission = Density X Emission Factor X Operation Time
= (350.0 ton/hr)(1.30 E-05 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 0.0199 TPY, Grizzly to Impact
= (350.0 ton/hr)(1.00 E-05 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 0.0153 TPY, Impact Crushing
= (350.0 ton/hr)(1.30 E-05 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 0.0199 TPY, Crushing to Conveyor
= (350.0 ton/hr)(1.30 E-05 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 0.0199 TPY, Conveyor to Stockpile
NET **= 0.075 TPY or 0.0022 g/s**

Limited Operation Emission = NET, annual X Limited Operation Time X Control Factor
= (0.075 TPY)(4,000/8,760 hours/year)(1 - 70%)
= **0.0103 TPY (limited, controlled)**

For **PM10**,

Emission Factors = 1.60 E-05 lb/ton, Truck Unloading
= 1.10 E-03 lb/ton, Grizzly to Impact
= 2.40 E-03 lb/ton, Impact Crushing
= 1.10 E-03 lb/ton, Crushing to Conveyor
= 1.10 E-03 lb/ton, Conveyor to Stockpile

Potential Annual Emission = Density X Emission Factor X Operation Time
= (350.0 ton/hr)(1.60 E-05 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 0.0245 TPY, Truck Unloading
= (350.0 ton/hr)(1.10 E-03 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 0.0169 TPY, Grizzly to Impact
= (350.0 ton/hr)(2.40 E-03 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 0.0368 TPY, Impact Crushing
= (350.0 ton/hr)(1.10 E-03 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 1.6863 TPY, Crushing to Conveyor
= (350.0 ton/hr)(1.10 E-03 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 1.6863 TPY, Conveyor to Stockpile
NET **= 3.45 TPY or 0.10 g/s**

Limited Operation Emission = NET, annual X Limited Operation Time X Control Factor
= (3.51 TPY)(4,000/8,760 hours/year)(1 - 70%)
= **0.48 TPY (limited, controlled)**

For **TSP**,

Emission Factors = 3.00 E-03 lb/ton, Grizzly to Impact
= 5.40 E-03 lb/ton, Impact Crushing
= 3.00 E-03 lb/ton, Crushing to Conveyor
= 3.00 E-03 lb/ton, Conveyor to Stockpile

Potential Annual Emission = Density X Emission Factor X Operation Time
= (350.0 ton/hr)(3.00 E-03 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 4.60 TPY, Truck Unloading
= (350.0 ton/hr)(5.40 E-03 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 8.28 TPY, Truck Loading
= (350.0 ton/hr)(3.00 E-03 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 4.60 TPY, Grinding
= (350.0 ton/hr)(3.00 E-03 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 4.60 TPY, Conveyor Transfer
NET **= 22.08 TPY or 0.63 g/s**

Limited Operation Emission = NET, annual X Limited Operation Time X Control Factor
= (22.08 TPY)(4,000/8,760 hours/year)(1 - 70%)
= **3.02 TPY (limited, controlled)**

Note: The following emission factors are obtained from AP-42, 11.19.2-2 8/04 edition, Emission Factors for Crushed Stone Processing Op.

Emission Calculations for 600 TPH Mobile Screen (FUGITIVE)

Production Rate x Average Density = 600.0 ton/hr
Control Type: None (0% Controlled)

For **PM2.5**,

Emission Factors
= 1.3 E-05 lb/ton, Feeder to Screen
= 5.0 E-05 lb/ton, Screen
= 1.3 E-05 lb/ton, Screen to Stacker 1
= 1.3 E-05 lb/ton, Screen to Stacker 2
= 1.3 E-05 lb/ton, Stacker 1 to Stockpile
= 1.3 E-05 lb/ton, Stacker 2 to Stockpile

Potential Annual Emission = Density X Emission Factor X Operation Time
= (600.0 ton/hr)(1.30 E-05 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 0.034 TPY, Feeder to Screen
= (600.0 ton/hr)(5.00 E-05 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 0.131 TPY, Screen
= (300.0 ton/hr)(1.30 E-05 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 0.017 TPY, Screen to Stacker 1
= (300.0 ton/hr)(1.30 E-05 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 0.017 TPY, Screen to Stacker 2
= (300.0 ton/hr)(1.30 E-05 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 0.017 TPY, Stacker 1 to Stockpile
= (300.0 ton/hr)(1.30 E-05 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 0.017 TPY, Stacker 2 to Stockpile
NET **= 0.233 TPY or 0.007 g/s**

Limited Operation Emission = NET, annual X Limited Operation Time X Control Factor
= (0.233 TPY)(4,000/8,760 hours/year)(0%)
= **0.106 TPY (limited)**

For **PM10**,

Emission Factors
= 1.1 E-03 lb/ton, Feeder to Screen
= 8.7 E-03 lb/ton, Screen
= 1.1 E-03 lb/ton, Screen to Stacker 1
= 1.1 E-03 lb/ton, Screen to Stacker 2
= 1.1 E-03 lb/ton, Stacker 1 to Stockpile
= 1.1 E-03 lb/ton, Stacker 2 to Stockpile

Potential Annual Emission = Density X Emission Factor X Operation Time
= (600.0 ton/hr)(1.1 E-03 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 2.89 TPY, Feeder to Screen
= (600.0 ton/hr)(8.7 E-03 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 22.86 TPY, Screen
= (300.0 ton/hr)(1.1 E-03 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 1.45 TPY, Screen to Stacker 1
= (300.0 ton/hr)(1.1 E-03 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 1.45 TPY, Screen to Stacker 2
= (300.0 ton/hr)(1.1 E-03 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 1.45 TPY, Stacker 1 to Stockpile
= (300.0 ton/hr)(1.1 E-03 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 1.45 TPY, Stacker 2 to Stockpile
NET **= 31.53 TPY or 0.90 g/s**

Limited Operation Emission = NET, annual X Limited Operation Time X Control Factor
= (31.53 TPY)(4,000/8,760 hours/year)(0%)
= **14.40 TPY (limited)**

For **TSP**,

Emission Factors
= 0.003 lb/ton, Feeder to Screen
= 0.025 lb/ton, Screen
= 0.003 lb/ton, Screen to Stacker 1
= 0.003 lb/ton, Screen to Stacker 2
= 0.003 lb/ton, Stacker 1 to Stockpile
= 0.003 lb/ton, Stacker 2 to Stockpile

Potential Annual Emission = Density X Emission Factor X Operation Time
= (600.0 ton/hr)(0.003 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 7.88 TPY, Feeder to Screen
= (600.0 ton/hr)(0.025 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 65.7 TPY, Screen
= (300.0 ton/hr)(0.003 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 7.88 TPY, Screen to Stacker 1
= (300.0 ton/hr)(0.003 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 7.88 TPY, Screen to Stacker 2
= (300.0 ton/hr)(0.003 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 7.88 TPY, Stacker 1 to Stockpile
= (300.0 ton/hr)(0.003 lb/ton)(8,760 hr/yr)(ton/2000 lb) = 7.88 TPY, Stacker 2 to Stockpile
NET **= 105.1 TPY or 3.02 g/s**

Limited Operation Emission = NET, annual X Limited Operation Time X Control Factor
= (105.1 TPY)(4,000/8,760 hours/year)(0%)
= **48.00 TPY (limited)**

Note: The following emission factors are obtained from AP-42, 11.19.2-2 8/04 edition, Emission Factors for Crushed Stone Processing Op.

Emission Calculations for Stockpiles (ALL) (FUGITIVE)

AP-42, 13.2.4.3 Equation 1:

Efficiency Factor	= $k(0.0032) \times [(U/5)^{1.3} / (M/2)^{1.4}]$	
U, wind speed	= 11.4 mph,	AP42, Table 13.2.4-1
M, moisture content	= 40%, compost	
	= 14%, soil (clay/dirt mixture)	
	= 2.525%, all	AP42, Table 13.2.4-1
Production	= 1,400,000 TPY	Data from applicant. Form S-1

For **PM2.5**,

k, particle size multiplier = 0.11

Efficiency Factor = $k(0.0032) \times [(U/5)^{1.3} / (M/2)^{1.4}]$
= $(0.11)(0.0032)[(11.4/5)^{1.3} / (2.525/2)^{1.4}]$
= 7.415 E-04 lb/ton

Emission = Compost Production x Emission Factor
= (1,400,000 TPY)(7.415 E-04 lb/ton)(1/2000 ton/lb)
= **0.52 TPY**

For **PM10**,

k, particle size multiplier = 0.35

Efficiency Factor = $k(0.0032) \times [(U/5)^{1.3} / (M/2)^{1.4}]$
= $(0.35)(0.0032)[(11.4/5)^{1.3} / (2.525/2)^{1.4}]$
= 0.0024 lb/ton

Emission = Compost Production x Emission Factor
= (1,400,000 TPY)(0.0024 lb/ton)(1/2000 ton/lb)
= **1.68 TPY**

For **TSP**,

k, particle size multiplier = 0.74

Efficiency Factor = $k(0.0032) \times [(U/5)^{1.3} / (M/2)^{1.4}]$
= $(0.74)(0.0032)[(11.4/5)^{1.3} / (2.525/2)^{1.4}]$
= 0.005 lb/ton

Emission = Compost Production x Emission Factor
= (1,400,000 TPY)(0.005 lb/ton)(1/2000 ton/lb)
= **3.50 TPY**

Note: The following emission factors are obtained from AP-42, 13.2.4.3 11/06 edition, Aggregate Handling and Storage Piles.

Emission Calculations for Traffic on Unpaved Roads (FUGITIVE)

Mean Vehicle Weight	= 78,000 lbs, GROSS = 30,000 lbs (15 Tons), TARE
Load Capacity	= 24.0 Tons
Material (Production) to move	= 2,400,000 TPY
NO. of Loads per year	= Material (Production) to move / Load Capacity = 2,400,000 TPY / 24.0 T = 100,000 Loads/yr
NO. of Loads (inc. Unloading) per year	= 2 x 100,000 Loads /yr
Distance (Given) Distance (Round Trip)	= 0.0189 mi = 2 x 0.0189 mi
Speed	= 10 mph = 0.1667 mi/min
Trip Time	= Distance x Speed = (0.0189 mi)(1/0.1667 min/mi)(60 sec/min) = 6.8 sec
Load Time (Given)	= 120 sec
NO. of Round Trip(s) per hour	= 1 Hour / 2 x (Trip Time + Load Time) = (1 hr)(60 min/hr)(60 sec/min)/(2*(6.8 sec + 120 sec)) = 14.2 RT/hr
NO. of Trip(s) per year	= 2 x Number of Loads = 2(100,000 Loads/yr) = 200,000 Trips/yr
Vehicle Miles Traveled per hour	= (Distance, Round Trip)(NO. of Round Trips per hour) = (2 x 0.0189 mi)(14.2 RT/hr) = 0.54 VMT/hr
Vehicle Miles Traveled per year	= (Distance, Given)(NO. of Loads inc. Unloading per year) = (0.0189 mi)(2 x 100,000 Loads /yr) = 3,780 VMT/yr
Precipitation Factor (p)	= 96 days, Honolulu Airport
Emission Factor, Unpaved	= $k(s/12)^a(W/3)^b/(M/0.2)^c * [(365-p)/365]$, where k, a, b: Industrial Road Constants s: surface material silt content (%) W: mean vehicle weight (T)
PM Control Efficiency	= 70%, based on direct water spraying during aggregate delivery

For **PM2.5**,

Emission Factor, Unpaved	= $k(s/12)^a(W/3)^b/(M/0.2)^c * [(365-p)/365]$ = $0.15(15/12)^{0.9}(27/3)^{0.45}[(365-96)/365]$ = 0.36 lb/VMT
Potential Annual Emissions	= (Vehicle Miles Traveled per year) x (Emission Factor, Unpaved) = (3,780 VMT/yr)(0.36 lb/VMT)(1/2000 T/lb) = **0.68 TPY or 0.02 g/s**
Limited Operation Emission	= Potential Annual Emissions X Limited Operation Time X Control Factor = (0.68 TPY)(4,000/8,760 hours/year)(1 - 70%) = **0.09 TPY (limited, controlled)**

For **PM10**,

Emission Factor, Unpaved = $k(s/12)^a(W/3)^b/(M/0.2)^c * [(365-p)/365]$
= $1.5(15/12)^{0.9}(27/3)^{0.45}[(365-96)/365]$
= 3.63 lb/VMT

Potential Annual Emissions = (Vehicle Miles Traveled per year) x (Emission Factor, Unpaved)
= (3,780 VMT/yr)(3.63 lb/VMT)(1/2000 T/lb)
= **6.86 TPY or 0.20 g/s**

Limited Operation Emission = Potential Annual Emissions X Limited Operation Time X Control Factor
= (6.86 TPY)(4,000/8,760 hours/year)(1 - 70%)
= **0.94 TPY (limited, controlled)**

For **TSP**,

Emission Factor, Unpaved = $k(s/12)^a(W/3)^b/(M/0.2)^c * [(365-p)/365]$
= $4.9(15/12)^{0.7}(27/3)^{0.45}[(365-96)/365]$
= 11.35 lb/VMT

Potential Annual Emissions = (Vehicle Miles Traveled per year) x (Emission Factor, Unpaved)
= (3,780 VMT/yr)(11.35 lb/VMT)(1/2000 T/lb)
= **21.45 TPY or 0.62 g/s**

Limited Operation Emission = Potential Annual Emissions X Limited Operation Time X Control Factor
= (21.45 TPY)(4,000/8,760 hours/year)(1 - 70%)
= **2.94 TPY (limited, controlled)**

Note: The following emission factors are obtained from AP-42, 13.2.2, 11/06 update, Unpaved Roads.

AIR QUALITY ASSESSMENT

An ambient air quality analysis (AAQA) was conducted for the diesel engine to demonstrate compliance with state and national ambient air quality standards. EPA approved SCREEN3 method was used. Results attached to review.

The predicted concentrations assumes operation at proposed limited hours of operation, and using fuel oil no. 2 with 0.5% sulfur content. Based on these assumptions, the facility should comply with State and Federal AAQS for CO, SO2, NO2, and PM10 as shown below (Pb and H2S assumed to be negligible).

Air Pollutant	Emissions (g/s)	Averaging Time	Impact * ($\mu g/m^3$)	Background ** ($\mu g/m^3$) OAHU	Total Impact ($\mu g/m^3$)	SAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Compared to SAAQS
CO	**0.25**	**1-hr**	**64.6**	**2850**	**2915**	**10000**	**40000**	**29.2%**
		8-hr	**45.2**	**1226**	**1271**	**5000**	**10000**	**25.4%**
NO2	**1.14**	**Annual**	**10.2**	**9**	**19**	**70**	**100**	**27.1%**
SO2	**0.13**	**3-hr**	**30.2**	**43**	**73**	**1300**	**1300**	**5.6%**
		24-hr	**13.4**	**13**	**26**	**365**	**365**	**7.1%**
		Annual	**3.1**	**1**	**4**	**80**	**80**	**5.0%**
PM10	**0.08**	**24-hr**	**8.3**	**25**	**33**	**150**	**150**	**22.0%**
		Annual	**1.9**	**13**	**15**	**50**	**50**	**30.0%**
PM2.5	**0**	**24-hr**	**0**	**10**	**10**	**N/A**	**35**	**N/A**
		Annual	**0**	**3**	**3**	**N/A**	**15**	**N/A**

For **CO**,

1-hr Impact = (Emissions) X (Maximum 1-Hr Concentration) X (Avg Time Scaling Factor)
= (0.25 g/s)(258.2 $\mu g/m^3$) = **64.6 $\mu g/m^3$**

8-hr Impact = (Emissions) X (Maximum 1-Hr Concentration) X (Avg Time Scaling Factor)
= (0.25 g/s)(258.2 $\mu g/m^3$)(0.7) = **45.2 $\mu g/m^3$**

For **NO2**,

Annual Impact = (Emissions) X (Maximum 1-Hr Concentration) X (Avg Time Scaling Factor) X (Limited Operation Time) X …
… (Tier2 multiplier)
= (1.14 g/s)(258.2 $\mu g/m^3$)(0.2)(4000/8760)(0.75) = **10.2 $\mu g/m^3$**

For **SO2**,

3-hr Impact = (Emissions) X (Maximum 1-Hr Concentration) X (Avg Time Scaling Factor)
= (0.13 g/s)(258.2 $\mu g/m^3$)(0.9) = **30.2 $\mu g/m^3$**

24-hr Impact = (Emissions) X (Maximum 1-Hr Concentration) X (Avg Time Scaling Factor)
= (0.13 g/s)(258.2 $\mu g/m^3$)(0.4) = **13.4 $\mu g/m^3$**

Annual = (Emissions) X (Maximum 1-Hr Concentration) X (Avg Time Scaling Factor) X (Limited Operation Time)
= (0.13 g/s)(258.2 $\mu g/m^3$)(0.2)(4000/8760) = **3.1 $\mu g/m^3$**

For **PM10**,

24-hr Impact = (Emissions) X (Maximum 1-Hr Concentration) X (Avg Time Scaling Factor)
= (0.08 g/s)(258.2 $\mu g/m^3$)(0.4) = **8.3 $\mu g/m^3$**

Annual = (Emissions) X (Maximum 1-Hr Concentration) X (Avg Time Scaling Factor) X (Limited Operation Time)
= (0.08 g/s)(258.2 $\mu g/m^3$)(0.2)(4000/8760) = **1.9 $\mu g/m^3$**

For **PM2.5**,

24-hr Impact = (Emissions) X (Maximum 1-Hr Concentration) X (Avg Time Scaling Factor)
= (0.00 g/s)(258.2 $\mu g/m^3$)(0.4) = **0 $\mu g/m^3$**

Annual = (Emissions) X (Maximum 1-Hr Concentration) X (Avg Time Scaling Factor) X (Limited Operation Time)
= (0.00 g/s)(258.2 $\mu g/m^3$)(0.2)(4000/8760) = **0 $\mu g/m^3$**

Impact is calculated from the product of pollutant emissions and the Screen3 model result for 1 g/s: Maximum 1-Hr Concentration = **258.2 μg/m^3** @ 66m from the point source (based on a 0 to 1,000 meter domain).

Building downwash not incorporated in model (supporting information attached by applicant: email correspondence & site map).

Fugitive PM Emissions not included in air quality assessment.

* Applied EPA scaling factors of 0.9, 0.7, and 0.4 for the 3-hour, 8-hour, and 24-hour concentrations are used, respectively.
A scaling factor of 0.2 is used for annual concentrations.
Conversion of NO to NO2 factors a Tier2 multiplier value of 0.75.

** Background Concentration obtained from "Annual Summary 2006 Hawaii Air Quality Data". Representative data for the island of: **OAHU.**

For: 1-Hour Carbon Monoxide: Oahu, Honolulu – Maximum 1st High (LOCAL + MOST CONSERVATIVE)
For: 8-Hour Carbon Monoxide: Oahu, Honolulu – Maximum 1st High (LOCAL)

For: Annual Nitrogen Dioxide: Oahu, Kapolei – Annual Mean (NON-LOCAL, MOST CONSERVATIVE)

For: 3-Hour Sulfur Dioxide: Oahu, Honolulu – Maximum 1st High (LOCAL)
For: 24-Hour Sulfur Dioxide: Oahu, Honolulu – Maximum 1st High (LOCAL)
For: Annual Sulfur Dioxide: Oahu, Honolulu – Annual Mean (LOCAL)

For: 24-Hour Particulate Matter 10: Oahu, Honolulu – Maximum 1st High (LOCAL)
For: Annual Particulate Matter 10: Oahu, Honolulu – Annual Mean (LOCAL)

For: 24-Hour Particulate Matter 2.5: Oahu, Honolulu – Maximum 1st High (LOCAL)
For: Annual Particulate Matter 2.5: Oahu, Honolulu – Annual Mean (LOCAL)

300 BHP Diesel Engine Stack Parameters

Exhaust Diameter = 0.102m, Height = 4.11m; Velocity = 108 m/s; Actual Flow Rate = 0.87 m^3/s; Temp = 696K

FACILITY IDENTIFICATION

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 emission(s) exceed these limits and thus, this facility is classified as a major source.

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. This facility is not a synthetic minor source because potential emissions do exceed the major source threshold when the facility is operated at its maximum capacity continuously for 8,760 hours per year.

CONCLUSION

Based on the information submitted by Close Construction, Inc., it is the determination of the Department of Health (DOH) that the proposed facility will be in compliance with the Hawaii Administrative Rules (HAR), Chapter 11-60.1 and State and Federal ambient air quality standards.

Issuance of an initial temporary CSP No. 0692-01-CT is recommended based on the proposed operating restrictions by the applicant on the 350 TPH mobile Impact crusher and 600 TPH mobile screen to reduce particulate emissions and meet state ambient air quality standards (SAAQS).