PROPOSED

PERMIT APPLICATION REVIEW
TEMPORARY COVERED SOURCE PERMIT (CSP) NO. 0495-01-CT
Application for Modification No. 0495-03

Applicant: R.H.S. Lee, Inc.

Facility: Jaw crushing plant

Location: Various Temporary Sites, State of Hawaii

Initial Location: Fort Shafter, Oahu

Mailng Address: 96-1414 Waihona Place
Pearl City, Hawaii 96782

Equipment: The jaw crushing plant consists of the following:

a. 363-638 TPH "T" Series Extec Mega-Bite primary jaw crusher (28" x 44" jaw size);
b. Hopper (approximately 9' x 14');
c. Stepped vibrating grizzly feeder (approximately 4' x 13');
d. Main conveyor;
e. Hydraulic belt driven magnet;
f. Side conveyor;
g. Water spray system; and
h. 300 hp Deutz diesel engine, model no. BF6M1015, serial no. 21010898.

Responsible Official:	Mr. Richard Lee	**Contact:**	Mr. Scott Snider
Title:	President	**Title:**	Project Manager
Company:	R.H.S. Lee, Inc.	**Company:**	R.H.S. Lee, Inc.
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1. Background

1.1 R.H.S. Lee, Inc. has submitted an application for modification to replace a 300 hp diesel engine servicing the jaw crushing plant with another unit having the same make and model number as the old engine. As indicated by the applicant, the old engine for the plant seized and could not be repaired. Conditions in the existing permit restrict the plant to operate not more than 2,080 hour per year and not more than 18 hour per day. The standard industrial classification code (SICC) for this facility is 1429 (Crushed and Broken Stone, Not Elsewhere Classified).

1.2 Pictures of the Extec jaw crushing plant are shown in Enclosure (1). The pictures were taken during a January 28, 2010 site inspection at the Fort Shafter location.

2. Applicable Requirements

2.1 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

2.2 40 Code of Federal Regulations (CFR) Part 60 – New Source Performance Standards (NSPS), Subpart OOO, Standards of Performance for Non-metallic Mineral Processing Plants is applicable to this facility because the jaw crushing plant was manufactured after 1983 and the primary crusher has a capacity above 150 tons per hour.

2.3 The facility is not a major source for hazardous air pollutants (HAPs) 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.

2.4 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 pre-control emissions that are greater than the major source level; and (5) not otherwise be exempt from CAM. CAM is not applicable because this facility is not a major source.

2.5 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 air pollutant. As such, PSD review is not required.

2.6 Annual emissions reporting is required because the facility is subject to covered source permitting requirements.

2.7 The consolidate emissions reporting rule (CERR) does not apply because the facility does not exceed emission reporting levels pursuant to 40 CFR 51, Subpart A.

2.8 A best available control technology (BACT) analysis is not required because emissions from the new diesel engine replacement do not exceed significant emission levels as defined in HAR, Section 11- 60.1.

2.9 The facility is a synthetic minor source because plant operation at 8,760 hours per year causes the facility to exceed major source thresholds for particulate.

3. Insignificant Activities

3.1 Insignificant activities identified by the application are listed below:

a. 343 gallon hydraulic fluid tank servicing the 300 hp diesel engine is an insignificant activity in accordance with HAR §11-60.1-82(f)(1).

b. 132 gallon fuel storage tank servicing the 300 hp diesel engine is an insignificant activity in accordance with HAR §11-60.1-82(f)(1).

4. Alternate Operating Scenarios

4.1 No alternate operating scenarios were proposed by the applicant.

5. Air Pollution Controls

5.1 The jaw crushing plant is equipped with a water spray system with water spray bars at discharge end of main conveyor and at jaw crusher.

5.2 A water spray truck is required to control fugitive dust at each work site for the crushing operations.

6. Project Emissions

6.1 Emissions of NO_X, CO, VOC, PM, PM_{10}, $PM_{2.5}$, and HAPs were evaluated from the 300 hp diesel engine. Emissions of NO_X, CO, VOC, and PM were based on emissions data from the manufacturer. The HAP emissions were based on emission factors from AP-42, Section 3.3 (10/96), Gasoline and Diesel Industrial Engines. A mass balance calculation was used to determine SO_2 emissions based on the maximum allowable fuel sulfur content of 0.5% by weight and a 15 gallon per hour maximum fuel consumption at 100% load. It was assumed that 96% of the total particulate was PM_{10} and 90% of the total particulate was $PM_{2.5}$ based on AP-42, Appendix B.2, Table B.2-2 for gasoline and diesel fired internal combustion engines. An operation limit of 2,080 hours per year was assumed for the diesel engine. Emission estimates are shown in Enclosure (2) and summarized below.

DIESEL ENGINE				
Pollutant	Engine Emission Rate		Engine Emissions (TPY)	
	lb/hr	g/s	2,080 hours	8,760 hours
SO_2	1.06	0.134	1.1	4.6
NO_X	4.42	0.558	4.6	19.4
CO	0.73	0.092	0.8	3.2
VOC	-------	--------	0.2	0.9

PM	-------	-------	0.1	0.3
PM_{10}	0.06	0.008	0.1	0.3
$PM_{2.5}$	0.06	0.008	0.1	0.3
HAPs			0.013	0.06

6.2 Particulate emissions from the crushing plant were based on emission factors from AP-42, Section 11.19.2 (8/04), Crushed Stone Processing and Pulverized Mineral Processing. The controlled emission factors were used for crushing and conveyor transfer points. It was assumed that 51% PM was PM_{10} and 15% PM was $PM_{2.5}$ based on information from AP-42, Appendix B.2.2. Uncontrolled emission factors were used for truck loading and unloading operations. A 70% control efficiency for water sprays was applied to determine emissions using the uncontrolled emission factors. A 2,080 hr/yr operation limit was also applied to determine emissions. The 638 TPH rated capacity of the jaw crushing plant was used to determine maximum potential emissions. Emissions are shown in Enclosure (3) and summarized below.

638 TPH JAW CRUSHING PLANT		
Pollutant	Emissions (TPY)	Total Plant Emissions (TPY)
	2,080 hr/yr with water sprays	8,760 hr/yr with water sprays
PM	0.9	3.8
PM_{10}	0.4	1.7
$PM_{2.5}$	0.1	0.5

6.3 Particulate emissions from stockpiles were determined using emission factors from AP-42, Section 13.2.4 (11/06), Aggregate Handling and Storage Piles. Emissions were based on the plant's 638 TPH capacity and 2,080 hr/yr operation. The following were assumed for the emission factor equation: a 15 mph wind speed (highest value from range of wind speed specified in AP-42, Section 13.2.4), K value for PM of 0.74, K value for PM_{10} of 0.35, K value for $PM_{2.5}$ of 0.053, and a mean 0.7% moisture content for stone quarrying and processing. A 70% control efficiency was applied to account for use of a water truck to control fugitive dust. Emissions are shown in Enclosure (4) and summarized in the table below.

STORAGE PILES			
Pollutant	Emission Factor (lb/ton)	Emission Rate (TPY)	
		2,080 hr/yr with water truck	8,760 hr/yr with water truck
PM	0.043	8.6	36.0
PM_{10}	0.020	4.0	16.8
$PM_{2.5}$	0.003	0.6	2.5

6.4 Emissions from vehicle travel on unpaved roads were calculated using the emission factor equation for vehicles traveling on unpaved surfaces. The equation was obtained from AP-42, Section 13.2.2 (11/06) Unpaved Roads. Equation (1a) emission factor was extrapolated to annual average uncontrolled conditions using Equation (2). Emission rates were based on the following assumptions:

a. A distance of 31,596 vehicle miles traveled per year for the 638 TPH plant based on 2,080 hr/yr operation, an average truck capacity of 21 tons (typical of other facilities), and a 0.5 mile two way travel distance for the trucks (typical of distance used for other facilities);
b. A k value for PM, PM_{10}, and $PM_{2.5}$ of 4.9, 1.5, and 0.15, respectively based on data for industrial roads;
c. An a value for PM, PM_{10}, and $PM_{2.5}$ of 0.7, 0.9, and 0.9, respectively based on data for industrial roads;
d. A b value for PM, PM_{10}, and $PM_{2.5}$ of 0.45 based on data for industrial roads;
e. An s (silt content of road) value of 3.9% based on information from AP-42, Section 13.2.2 – Unpaved Roads Related Information www.epa.gov//ttn/chief/ap42/ch13/related/c13s02-2.html;
f. A W (mean vehicle weight) value of 26.5 tons (typical of other facilities);
g. A p (# of days with 0.01" of rain/year) value of 84 based on available data between years 1962 and 2009 from the Honolulu Observatory 702.2 recording climate parameters;
h. A 70% control efficiency was applied to account for use of a water truck;
i. Vehicle travel emissions are listed as follows:

VEHICLE TRAVEL			
Pollutant	Emission Factor (lb/VMT)	Emissions (TPY)	
		2,080 hr/yr with water truck	8,760 hr/yr with water truck
PM	5.953	21.7	91.4
PM_{10}	1.122	5.3	22.3
$PM_{2.5}$	0.112	0.5	2.1

6.5 Potential emissions from operating the jaw crushing plant are listed below as follows:

POTENTIAL EMISSIONS		
Pollutant	Potential Emissions (TPY) (2,080 hr/yr with water sprays and water truck)	Potential Emissions (TPY) (8,760 hr/yr with water sprays and water truck)
SO_2	1.1	4.6
NO_X	4.6	39.2
CO	0.8	8.4
VOC	0.2	2.9
PM	31.3	131.5
PM_{10}	9.8	41.1
$PM_{2.5}$	1.3	5.4
Total HAPs	0.013	0.059

7. Air Quality Assessment

7.1 An ambient air quality impact analysis (AAQIA) was performed for operating the 300 hp diesel engine at the Fort Shafter location which is the current location. An ISC-PRIME model was used for the analysis with default SCREN3 meteorological data. The model was run with Lakes Environmental ISC-AERMOD View (v.6.2.1) software. Model assumptions are listed below.

a. Elevated terrain was used for the model. The USGS digital elevation map (DEM) – North American Datum 1983 (NAD 83) from the Honolulu topographic quadrangle was used for executing the ISC-Prime model.

b. Rural dispersion parameters were applied to run the model.

c. The structure of the jaw crushing plant was used for downwash. The plant was assumed to be 13 feet high x 7 feet wide x 46 feet long based on plant dimensions from a previous permit application.

d. A 600 meter by 600 meter receptor grid with 441 receptors (each receptor spaced 30 meters apart) was used for the modeling assessment.

e. The EPA scaling factors of 0.9, 0.7, and 0.4 for the 3-hour, 8-hour, and 24-hour averaging periods, respectively, were applied to determine impacts. The State scaling factor of 0.2 was used to determine annual air impacts.

f. Horizontal stack parameters per Lakes Environmental guidance were used to determine if the diesel engine's horizontal stack needs to be changed to a vertical stack for complying with the ambient air quality standards. Horizontal stack parameters included the following:

   i. Setting stack exit velocity to 0.001 m/s;
   ii. Using actual stack diameter so that the flow rate is the same as actual flow rate at 0.001 m/s velocity;
   iii. Incorporating downwash.

7.2. The following background concentrations were used for the modeling assessment:

a. PM_{10} and $PM_{2.5}$ – collected in 2008 from Honolulu monitoring station on Oahu.

b. NO_X – collected in 2008 from the Kapolei monitoring station on Oahu.

c. CO – collected in 2008 from the Honolulu monitoring station on Oahu.

d. SO_2 – collected in 2008 from the Honolulu monitoring station on Oahu.

7.3 The table below lists the emission rates and stack parameters used in the AAQIA for operating the diesel engine at its current site with a vertical stack.

SOURCE	STACK	EMISSION RATES (g/s)				STACK PARAMETERS			
		NO_X	SO_2	CO	PM_{10} $PM_{2.5}$	Height (ft)	Temp. ^oK (^oF)	Dia. (in)	Flow Rate (ft^3/min)
Deutz (300 hp)	1	0.132[a]	0.134 0.003[a]	0.092	0.008 0.002[a] 0.008 0.002[a]	11.5	793 (968)	6	2,290

a: Annual emission rate reduced by 2,080/8,760 to account for the diesel engine's annual hour limit.

7.4 Results shown in the table below for the AAQIA of the diesel engine indicate compliance with the ambient air quality standards for operating the unit with a stack oriented vertically.

PREDICTED AMBIENT AIR QUALITY IMPACTS						
AIR POLLUTANT	AVERAGING TIME	IMPACT (ug/m^3)	BACKGROUND (ug/m^3)	TOTAL IMPACT (ug/m^3)	AIR STANDARD	PERCENT STANDARD
SO_2	3 –Hour 24 – Hour Annual	169 75 38	29 10 3	198 85 41	1,300 365 80	15 23 51
NO_2	Annual	37	8	45	70	64
CO	1 – Hour 8 – Hour	129 90	2,405 1,145	2,534 1,235	10,000 5,000	25 25
PM_{10}	24 – Hour Annual	5 1	31 14	36 15	150 50	24 30
$PM_{2.5}$	24 – Hour Annual	5 1	13 4.7	18 6	35 15	51 40

7.3 The table below lists the emission rates and stack parameters used in the AAQIA for operating the diesel engine at its current site with a horizontal stack configuration.

SOURCE	**STACK**	**EMISSION RATE (g/s)**	**STACK PARAMETERS**				
Deutz (300 hp)	1	0.008	11.5	793 (968)	cap[a] 0.5 actual 0.5	cap[a] 0.001 actual 59.56	cap[b] 1,546 actual 2,290

a: As per guidance from Lakes Environmental personnel, for modeling horizontal or cap stacks, reduce velocity to 0.001 m/s and use actual stack diameter. Excessively large stack diameters cause errors in the modeling results. The horizontal stack flow rate is based on actual stack diameter and a 0.001 m/s flow velocity.

7.4 The table below shows that the diesel engine is not in compliance with the ambient air quality standard for $PM_{2.5}$ if operating the unit with a horizontal stack.

PREDICTED AMBIENT AIR QUALITY IMPACTS						
AIR POLLUTANT	AVERAGING TIME	IMPACT (ug/m^3)	BACKGROUND (ug/m^3)	TOTAL IMPACT (ug/m^3)	AIR STANDARD	PERCENT STANDARD
$PM_{2.5}$	24 – Hour	367	13	380	35	greater than 100%

8. Significant Permit Conditions

8.1 The 638 TPH jaw crushing plant with 300 hp diesel engine shall not exceed 2,080 hours of

operation in any rolling twelve (12) month period.

Reason for 8.1: The applicant proposed the hour limit in the initial permit application. The limit is necessary for complying with the ambient air quality standards.

8.2 Remove the condition specifying an 18 hour per day operating limit for the jaw crushing plant.

Reason for 8.2: The current air modeling assessment shows that an 18 hour per day limit is not necessary for operating the jaw crushing plant. Ambient air quality impacts from the 300 hp diesel engine were in compliance with the air standards for operating the engine 24 hours per day with a vertical stack.

8.3 Incorporate minimum stack height requirement for the diesel engine and specify that the stack exhaust vertically.

Reason for 8.3: The AAQIA was based on stack height reported by applicant and compliance with the air standards was achieved with a vertical stack. A horizontal stack did show compliance with the 24-hour ambient air quality standard for $PM_{2.5}$

8.4: 40 CFR, Part 60, Subpart OOO provisions are applicable to the jaw crusher and conveyors built after 1983.

Reason for 8.4: Incorporated into the permit based on applicability to federal standards as indicated in Paragraph 2.2.

9. Conclusion and Recommendation:

9.1 Actual emissions from this facility should be lower than estimated. Maximum potential emissions were based on worst-case conditions assuming maximum rated capacity of the diesel engine and jaw crushing plant. Actual crushing capacity will vary depending on product size and the type of material, but will likely be much lower than the maximum rated capacity. Calculations were based on 2,080 hours per year operation. The permit requires the use of a water spray system for compliance with the fugitive emission limits. The permit also requires the use of a water truck to control fugitive dust for plant operation. Recommend issuance of the temporary covered source permit renewal subject to the significant permit conditions, 30-day public comment period, and 45-day review by EPA.

Mike Madsen, February 11, 2010