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GENERAL J.K. MERRILL & SONS CONTRACTORS

July 22, 2020
U.S. Environmental Protection Agency
Region 10
Attn: Air Permits Manager
1200 Sixth Avenue, Suite 155
Mailcode 15-H13
Seattle, WA 98101
mcfadden.kelly@epa.gov

Subject: Synthetic Minor Permit Application
JK Merrill & Sons, Inc.
Pocatello, Idaho

Dear Ms. McFadden:

J.K. Merrill and Sons, Inc. (JK Merrill and Sons), owns and operates a rock crushing facility at Merrill Pit located at 1850 Tank Farm Road near Pocatello, Idaho. The facility is located on the Fort Hall Indian Reservation within Environmental Protection Agency (EPA) Region 10 jurisdiction.

On June 3, 2020, JK Merrill and Sons and EPA settled an enforcement action based on operating the two diesel-fueled generator engines without a Title V permit. Under the terms of the Administrative Compliance Order on Consent Docket No. CAA-10-2020-0081 (Consent Order), JK Merrill and Sons is required to submit an application to EPA for a permit that limits facility-wide potential to emit nitrogen oxides (NO_X) emissions below the applicable Title V major source level (100 tons per year) prior to the August 7, 2020.

JK Merrill and Sons is submitting the enclosed synthetic minor permit application to satisfy the conditions of the Consent Order. The application includes the requested facility-wide NO_X limit, proposed compliance methods for the two generator engines (only sources of NO_X emissions at the facility), facility emission calculations, and EPA's required application forms.

Please do not hesitate to contact me at 208-237-6550 or our environmental consultant, Kyle Heitkamp of Ramboll US Corporation, at 425.412.1803 if you have any questions about this application.

Sincerely,
JK Merrill and Sons

Lloyd Merrill
President

cc: Kyle Heitkamp, Ramboll US Corporation

(208) 237-6550 ✦ P.O. BOX 4065 ✦ POCATELLO, ID 83205-4065

Prepared for:

J.K Merrill and Sons, Inc.
Pocatello, Idaho

Prepared by:

Ramboll
Lynnwood, Washington

Date

July 2020

Project Number:
1690017212

SYNTHETIC MINOR PERMIT LIMIT APPLICATION

J.K. MERRILL PIT ROCK CRUSHING PLANT

RAMBOLL

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1. INTRODUCTION

J.K. Merrill and Sons, Inc. (JK Merrill and Sons), owns and operates a rock crushing facility at Merrill Pit located at 1850 Tank Farm Road near Pocatello, Idaho. The facility is located on the Fort Hall Indian Reservation within Environmental Protection Agency (EPA) Region 10 jurisdiction.

The facility consists of a Crusher Plant and a Wash Plant. Emissions from the Rock Crusher Plant include fugitive particulate matter (PM) from the crusher, material screening and handling, and material stockpiles, and emissions from one 1,675 horsepower (hp) diesel-fueled generator engine (Caterpillar model 3512, manufactured in 1996). The Wash Plant contains wet processes with no process emissions; however, Wash Plant operations are supported by one 469 hp diesel-fueled generator engine (Caterpillar model 3406, manufactured 1996).

On June 3, 2020, JK Merrill and Sons and EPA settled an enforcement action based on operating the two diesel-fueled generator engines without a Title V permit and for not complying with the applicable requirements of Subpart ZZZZ of the National Emission Standards for Hazardous Air Pollutants (NESHAP Subpart ZZZZ) in Title 40, Part 63 of the Code of Federal Regulations (CFR). In its review, EPA determined that operation of the two generator engines has the potential to emit oxides of nitrogen (NO_X) at levels above the Title V major source threshold of 100 tons per year (tpy). Potential emissions of all other pollutants at the facility are below Title V major source thresholds.

Under the terms of the Administrative Compliance Order on Consent Docket No. CAA-10-2020-0081 (Consent Order), JK Merrill and Sons must compile and submit a complete permit application to EPA limiting potential to emit (PTE) NO_X emissions below Title V major source threshold (100 tpy) before August 7, 2020. This application meets that requirement. Under the Consent Order, JK Merrill and Sons must also install controls and come into compliance with the requirements of NESHAP Subpart ZZZZ. JK Merrill and Sons is currently in the process of installing oxidation catalyst to comply with NESHAP Subpart ZZZZ requirements.

On behalf of J.K Merrill and Sons, Ramboll US Corporation (Ramboll) has prepared this Synthetic Minor Permit application. This application provides EPA with the information required for a complete application under the Federal Minor New Source

Review Program in Indian Country. EPA permit application forms (i.e. Form NEW and Form SYNMIN) are included in Appendix A. Detailed facility-wide emission calculations are provided in Appendix B. The remainder of this document provides a description of the proposed facility-wide NO_X limit and proposed methods of demonstrating compliance with the facility-wide NO_X limit.

2. FACILITY DESCRIPTION

The Merrill Pit rock facility produces construction-grade sand and gravel. The facility operates two diesel-fueled generator engines to support operations at the Crusher Plant and the Wash Plant. The Crusher Plant houses crushers that are used to crush large rocks into smaller pieces. The primary crusher is used to break large rocks and secondary and tertiary crushers breaks them into smaller pieces. The smaller rock pieces are sorted by size by multiple screening units. The facility store rocks and crushed rocks in stockpiles and conveyors are used to transport materials from stockpiles to crushers. The Wash Plant consist of additional screening and washing processes. The facility location and a scaled site plan of operations at the facility are provided in **Figures 1 and 2.** A process flow diagram for construction sand and gravel processing is presented in **Figure 3.**

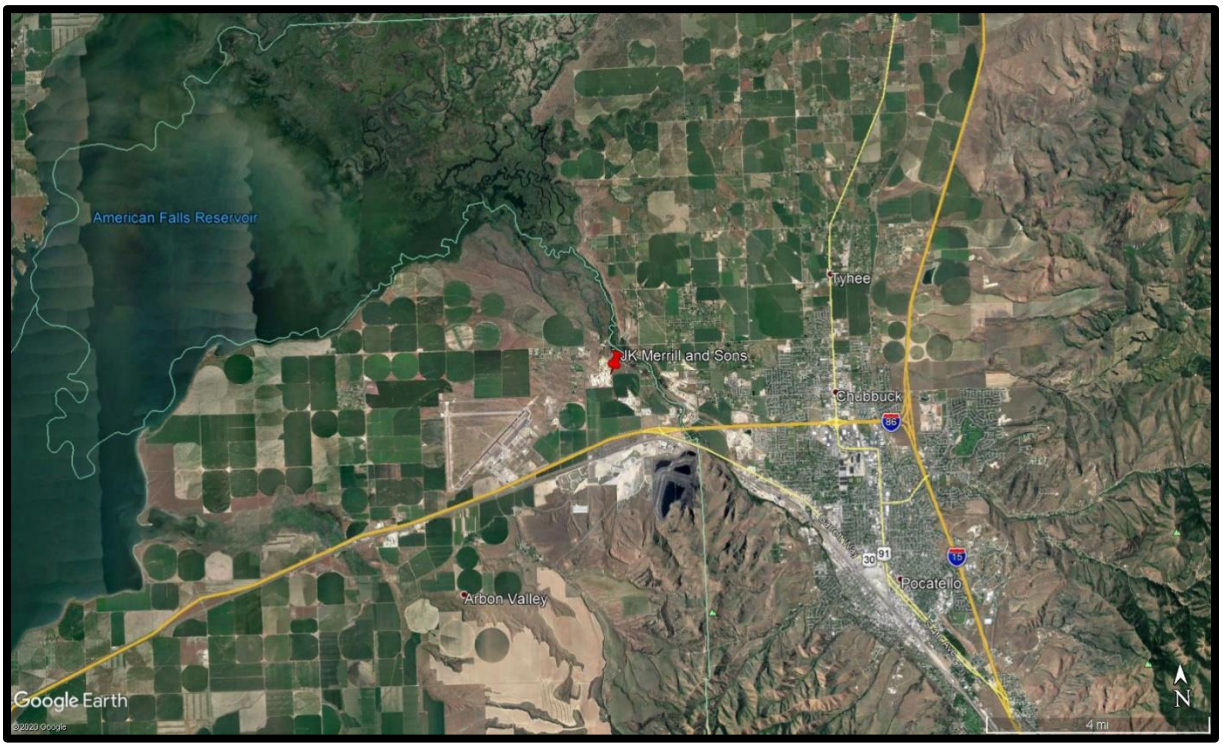

Figure 1. Facility Location

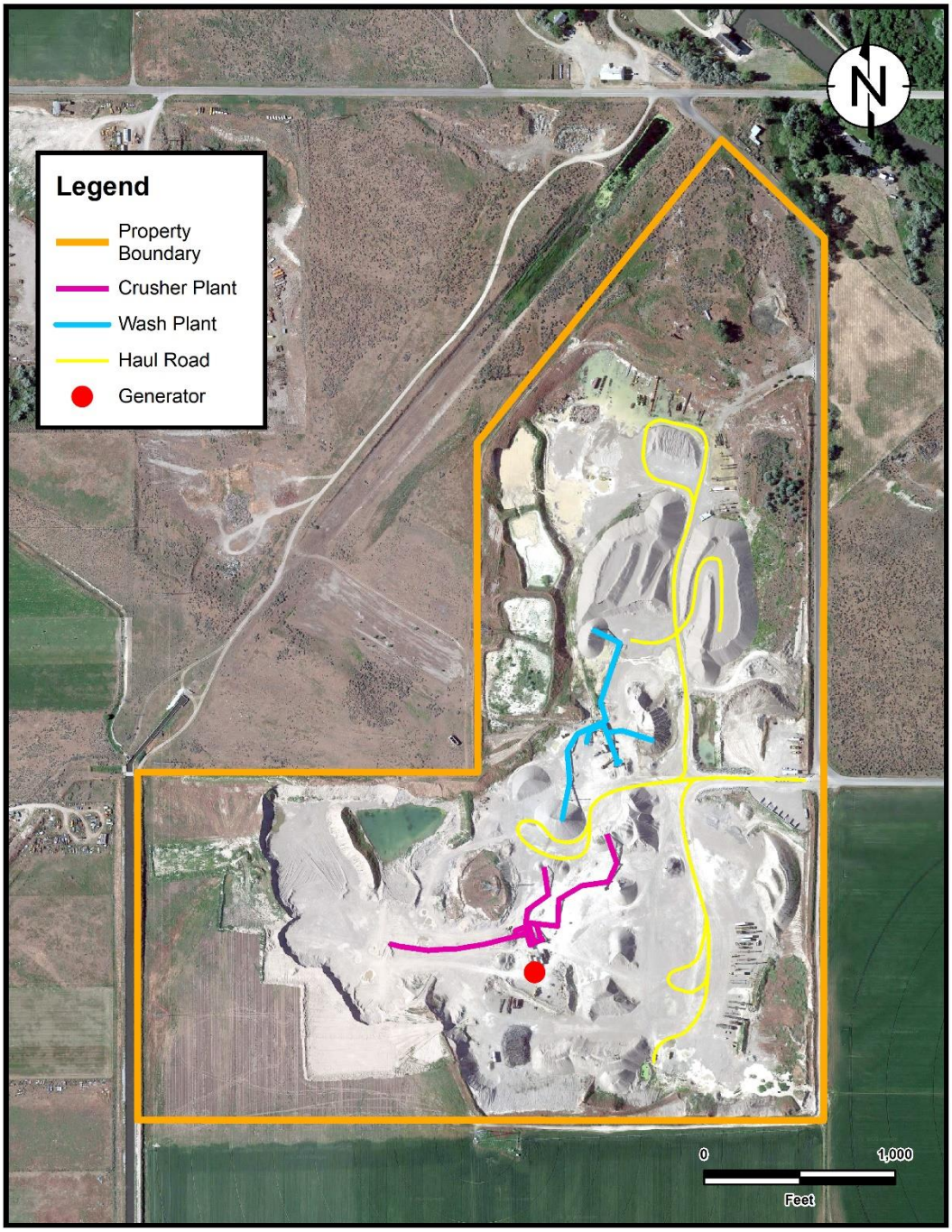

Figure 2. Facility Site Plan

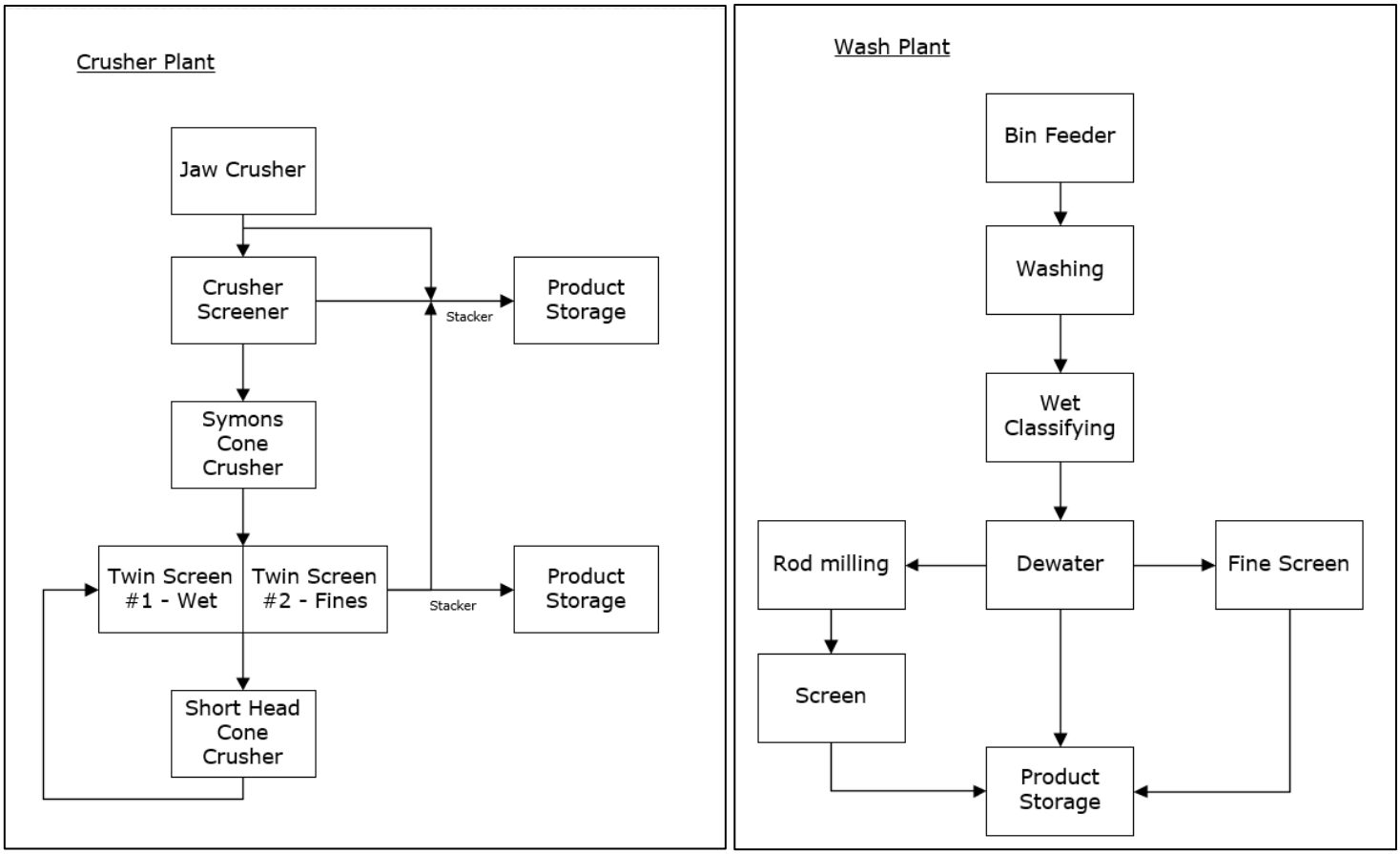

Figure 3. Process Flow Diagram

2.1 Emissions Description

Emissions from rock crushing include fugitive particulate matter from the crusher, material screening and handling, and material stockpiles, and emissions from diesel combustion in the engine generator the provides electrical power to the crushing plant.

The Wash Plant contains wet processes with no fugitive dust emissions, therefore, emissions from the Wash Plant are limited to stack emissions from a diesel combustion in the engine generator that provides electrical power for Wash Plant's equipment.

Mobile equipment in use at the facility includes front loaders, backhoes, and a water truck. Emissions from mobile equipment include fugitive dust generated from travel on haul roads.

Sand and gravel at the Crusher Plant are mined by open pit excavation. Open pit excavation is carried out primarily using backhoes and front loaders. After mining, the materials are transported to the processing plant by belt conveyors. After being transported to the processing plant, the wet sand and gravel raw feed is stockpiled or emptied directly into a hopper, which typically is covered with a “grizzly” of parallel bars to screen out large cobbles and boulders. From the hopper, the material is transported to fixed or vibrating scalping screens by gravity, belt conveyors, hydraulic pump, or bucket elevators. The scalping screens separate the oversize material from the smaller, marketable sizes.

Oversize material may be used for erosion control, reclamation, or other uses, or it may be directed to a crusher for size reduction, to produce crushed aggregate, or to produced manufactured sands. Following crushing, the material is returned to the screening operation for sizing. The material that passes through the scalping screen is fed into a battery of sizing screens, which generally consists of either horizontal or sloped, and either single or multideck, vibrating screens. Rotating trommel screens with water sprays are also used to process and wash wet sand and gravel. Screening separates the sand and gravel into different size ranges and water is sprayed throughout the screening process. After screening, the sized gravel is transported to stockpiles, storage bins, or in some cases, to crushers. After processing, the sand is transported to storage bins or stockpiles by belt conveyors.

3. PROPOSED SYNTHETIC LIMIT DESCRIPTION

As presented in the Consent Order, the potential to emit NO_X emissions from the two generator engines is above the Title V major source thresholds (there are no other stationary sources of NO_X emissions at the facility). The facility operates seasonally and for limited daily hours; therefore, actual NO_X emissions from the generator engines are much less than the 100 tpy Title V major source threshold. In accordance with the Consent Order, JK Merrill and Sons is requesting a limit proposing to limit operation of the engines such that potential emissions of NO_X are below Title V major source levels.

The remainder of emissions from the facility are fugitive particulate matter emissions from crushing, screening, material transfer, storage piles, and roadways. Fugitive emissions are not included in facility-wide emissions compared to the Title V major source thresholds because the facility operations are not a listed category of stationary source.[1]

3.1 Proposed Facility-Wide NO_X Emission Limit

JK Merrill and Sons requests that EPA establish a facility-wide federally enforceable NO_X limit of 90 tpy. This limit provides adequate buffer to ensure that NOx emissions are less than the Title V major source threshold.

As discussed in the next section, actual emissions of NO_X at the facility are currently 10 percent of the requested limit because the engines are only used on a seasonal basis. JK Merrill and Sons is not proposing to install any NO_X pollution control equipment on the generator engines.[2]

3.2 NO_X Emissions Calculations

The only sources of NO_X emissions at the facility are the two diesel-fueled generator engines: one 1,675 hp diesel-fueled generator engine (Caterpillar model 3512, manufactured in 1996) at the Crusher Plant, and one 469 hp diesel-fueled generator engine at the Wash Plant (Caterpillar model 3406, manufactured 1996).

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[1] See definition of Major Source in 40 CFR 71.2

[2] JK Merrill and Sons is in the process of installing emission control technology in order to comply with NESHAP Subpart ZZZZ, however, those technologies do not affect NO_X emissions.

Facility-wide emissions calculations for all criteria pollutants and greenhouse gasses are provided in Appendix B.

Potential hourly emissions from the engines are based on the maximum heat input rate of each engine (based on maximum diesel fuel usage) and emission factors taken from Section 3.4 - Large Stationary Diesel All Stationary Dual-fuel Engines (>600 hp) and AP-42 Section 3.3 - Gasoline and Diesel Industrial Engines (<600 hp) of EPA's AP-42 emission factor document. **Table 1** presents the current potential, actual, and proposed allowable NOx emissions from the facility. Maximum potential annual emissions are based on maximum hourly emission rate and continuous operation for 8,760 hours per year (hr/yr). 2019 Actual emissions are based on the 2019 diesel fuel usage and the AP-42 emission factors. JK Merrill and Sons is requesting a facility-wide NOx limit of 90 tpy.

Table 1. Facility-Wide NO_X Emissions

Pollutant	NO_X Emission Factor [1]		NO_X Emissions		
	lb/MMBtu		tpy		
	Crusher Plant Engine	Wash Plant Engine	Crusher Plant Engine	Wash Plant Engine	Total
Current Potential [2]	3.2	4.41	164	63	228
2019 Actual [3]			6.4	2.6	9
Requested Limit [4]			--	--	90

[1] NO_X emission factors are from AP-42 Section 3.4 (Large Stationary Diesel Engines) and Section 3.3 (Diesel Industrial Engines) for the Crusher Plant Engine and Wash Plant Engine, respectively.
[2] Potential NO_X emissions are based on the maximum heat input rate for each engine (Crusher Plant Engine = 11.725 MMBtu/hr; and Wash Plant Engine = 3.283 MMBtu/hr) and continuous operation (8,760 hrs/yr).
[3] 2019 Actual annual emissions are based on the 2019 actual fuel usage in gallons and the AP-42 emission factors (assuming a heat capacity of 137,030 Btu/gal diesel).
[4] JK Merrill and Sons requests a facility-wide limit of 90 tons per year.

3.3 Proposed Compliance Methods for Synthetic Minor Limit

Both generator engines are subject to NESHAP Subpart ZZZZ requirements, including carbon monoxide emission control technology requirements, monitor equipment and control device performance, conduct periodic carbon monoxide performance testing, complete routine maintenance and upkeep, keep records on engine performance, and submit compliance reports regarding the engines.

In order to demonstrate compliance with the 90 tpy limit, JK Merrill and Sons proposes the following monitoring, recordkeeping, and reporting requirements.

Monitoring

JK Merrill and Sons will monitor fuel use by installing, operating, and maintaining non-resettable fuel meters on both engines.

Recordkeeping

JK Merrill and Sons will keep daily records of fuel usage (in gallons) for each engine. Daily flow total will be recorded electronically, and a monthly total will be calculated for engine. Monthly NO_X emissions for each engine will be calculated using monthly fuel usage, diesel fuel heat content (137,030 Btu/gallon), and the AP-42 emission factors presented in Table 1. Each month, the 12-month rolling NO_X emissions will be updated and compared with the 90 tpy facility-wide limit.

Reporting

JK Merrill and Sons will submit an annual compliance report with the most recent 12-month rolling total NO_X emissions.

APPENDIX A: EPA SYNTHETIC MINOR PERMIT APPLICATION FORMS

OMB Control No. 2060-0003
Approval expires 04/30/2017

United States Environmental Protection Agency Program Address Phone Fax Web address	*Reviewing Authority* *Program* *Address* *Phone* *Fax* *Web address*	

FEDERAL MINOR NEW SOURCE REVIEW PROGRAM IN INDIAN COUNTRY

Application for New Construction

(Form NEW)

Please check all that apply to show how you are using this form:

☐ **Proposed Construction of a New Source**
☐ **Proposed Construction of New Equipment at an Existing Source**
☐ **Proposed Modification of an Existing Source**
☑ **Other – Please Explain**

Establishing a synthetic minor limit on existing equipment (emissions limit)

Please submit information to:

[Reviewing Authority
Address
Phone]

A. GENERAL SOURCE INFORMATION

1. (a) **Company Name** J.K. Merrill & Sons, Inc. (b) **Operator Name** J.K. Merrill & Sons, Inc		2. **Source Name** J.K. Merrill and Sons, Inc.	
3. Type of Operation Production of washed aggregate and crushed aggregate facility		4. Portable Source? ☐ Yes ☑ No 5. Temporary Source? ☐ Yes ☑ No	
6. NAICS Code 333131		7. SIC Code 1442	
8. Physical Address (home base for portable sources) 1850 Tank Farm Road, Pocatello ID 83205			
9. Reservation* Fort Hall Reservation	10. County* Bannock	11a. Latitude* 42.926209	11b. Longitude* 112.550157
12a. Quarter Quarter Section*	12b. Section*	12c. Township*	12d. Range*

*Provide all proposed locations of operation for portable sources

B. PREVIOUS PERMIT ACTIONS (Provide information in this format for each permit that has been issued to this source. Provide as an attachment if additional space is necessary)

Source Name on the Permit N/A
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

Source Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

Source Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

Source Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

Source Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

C. CONTACT INFORMATION

Company Contact Lloyd G. Merrill	Title President
Mailing Address PO Box 4065, Pocatello Idaho 83205	
Email Address wecrushrock@gmail.com	
Telephone Number 208-237-6550	Facsimile Number 208-904-1160
Operator Contact (if different from company contact) Same as above	Title
Mailing Address	
Email Address	
Telephone Number	Facsimile Number
Source Contact Same as above	Title
Mailing Address	
Email Address	
Telephone Number	Facsimile Number
Compliance Contact Same as above	Title
Mailing Address	
Email Address	
Telephone Number	Facsimile Number

D. ATTACHMENTS

Include all of the following information (see the attached instructions)

☑ **FORM SYNMIN -** New Source Review Synthetic Minor Limit Request Form, if synthetic minor limits are being requested.

☑ Narrative description of the proposed production processes. This description should follow the flow of the process flow diagram to be submitted with this application.

☑ Process flow chart identifying all proposed processing, combustion, handling, storage, and emission control equipment.

☑ A list and descriptions of all proposed emission units and air pollution-generating activities.

☑ Type and quantity of fuels, including sulfur content of fuels, proposed to be used on a daily, annual and maximum hourly basis.

☑ Type and quantity of raw materials used or final product produced proposed to be used on a daily, annual and maximum hourly basis.

☑ Proposed operating schedule, including number of hours per day, number of days per week and number of weeks per year.

☑ A list and description of all proposed emission controls, control efficiencies, emission limits, and monitoring for each emission unit and air pollution generating activity.

☑ **Criteria Pollutant Emissions -** Estimates of Current Actual Emissions, Current Allowable Emissions, Post-Change Uncontrolled Emissions, and Post-Change Allowable Emissions for the following air pollutants: particulate matter, PM_{10}, $PM_{2.5}$, sulfur oxides (SOx), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, fluorides (gaseous and particulate), sulfuric acid mist (H_2SO_4), hydrogen sulfide (H_2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates.

These estimates are to be made for each emission unit, emission generating activity, and the project/source in total.

☐ **Modeling – Air Quality Impact Analysis (AQIA)** N/A - Emission reduction at existing facility

☐ **ESA (Endangered Species Act)** N/A - Emission reduction at existing facility

☐ **NHPA (National Historic Preservation Act)** N/A - Emission reduction at existing facility

E. TABLE OF ESTIMATED EMISSIONS

The following tables provide the total emissions in tons/year for all pollutants from the calculations required in Section D of this form, as appropriate for the use specified at the top of the form.

E(i) – Proposed New Source

Pollutant	Potential Emissions (tpy)	Proposed Allowable Emissions (tpy)	
PM	See Application and Appendix B for detailed emissions		PM - Particulate Matter PM_{10} - Particulate Matter less than 10 microns in size $PM_{2.5}$ - Particulate Matter less than 2.5 microns in size SOx - Sulfur Oxides NOx - Nitrogen Oxides CO - Carbon Monoxide VOC - Volatile Organic Compound Pb - Lead and lead compounds Fluorides - Gaseous and particulates H_2SO_4 - Sulfuric Acid Mist H_2S - Hydrogen Sulfide TRS - Total Reduced Sulfur RSC - Reduced Sulfur Compounds
PM_{10}			
$PM_{2.5}$			
SO_x			
NO_x			
CO			
VOC			
Pb			
Fluorides			
H_2SO_4			
H_2S			
TRS			
RSC			

Emissions calculations must include fugitive emissions if the source is one the following listed sources, pursuant to CAA Section 302(j):

(a) Coal cleaning plants (with thermal dryers);
(b) Kraft pulp mills;
(c) Portland cement plants;
(d) Primary zinc smelters;
(e) Iron and steel mills;
(f) Primary aluminum ore reduction plants;
(g) Primary copper smelters;
(h) Municipal incinerators capable of charging more than 250 tons of refuse per day;
(i) Hydrofluoric, sulfuric, or nitric acid plants;
(j) Petroleum refineries;
(k) Lime plants;
(l) Phosphate rock processing plants;
(m) Coke oven batteries;
(n) Sulfur recovery plants;
(o) Carbon black plants (furnace process);
(p) Primary lead smelters;
(q) Fuel conversion plants;
(r) Sintering plants;
(s) Secondary metal production plants;
(t) Chemical process plants
(u) Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input;
(v) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels;
(w) Taconite ore processing plants;
(x) Glass fiber processing plants;
(y) Charcoal production plants;
(z) Fossil fuel-fired steam electric plants of more that 250 million British thermal units per hour heat input, and
(aa) Any other stationary source category which, as of August 7, 1980, is being regulated under section 111 or 112 of the Act.

E(ii) – Proposed New Construction at an Existing Source or Modification of an Existing Source

Pollutant	Current Actual Emissions (tpy)	Current Allowable Emissions (tpy)	Post-Change Potential Emissions (tpy)	Post-Change Allowable Emissions (tpy)
PM	See Application and Appendix B for detailed emissions			
PM_{10}				
$PM_{2.5}$				
SO_x				
NO_x				
CO				
VOC				
Pb				
Fluorides				
H_2SO_4				
H_2S				
TRS				
RSC				

PM - Particulate Matter
PM_{10} - Particulate Matter less than 10 microns in size
$PM_{2.5}$ - Particulate Matter less than 2.5 microns in size
SOx - Sulfur Oxides
NOx - Nitrogen Oxides
CO - Carbon Monoxide
VOC - Volatile Organic Compound
Pb - Lead and lead compounds
Fluorides - Gaseous and particulates
H_2SO_4 - Sulfuric Acid Mist
H_2S - Hydrogen Sulfide
TRS - Total Reduced Sulfur
RSC - Reduced Sulfur Compounds

[Disclaimers] The public reporting and recordkeeping burden for this collection of information is estimated to average 20 hours per response, unless a modeling analysis is required. If a modeling analysis is required, the public reporting and recordkeeping burden for this collection of information is estimated to average 60 hours per response .Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

OMB Control No. 2060-0003
Approval expires 04/30/2017

United States Environmental Protection Agency Program Address Phone Fax Web address	*Reviewing Authority* *Program* *Address* *Phone* *Fax* *Web address*

FEDERAL MINOR NEW SOURCE REVIEW PROGRAM IN INDIAN COUNTRY

Application For Synthetic Minor Limit

(Form SYNMIN)

Please submit information to:

[Reviewing Authority
Address
Phone]

A. GENERAL INFORMATION

Company Name J.K. Merrill & Sons, Inc	**Source Name** JK Merrill & Sons, Inc.
Company Contact or Owner Name Lloyd G. Merrill	Title President
Mailing Address P.O. Box 4065, Pocatello Idaho 83205	
Email Address wecrushrock@gmail.com	
Telephone Number 208-237-6550	Facsimile Number 208-904-1160

B. ATTACHMENTS

For each criteria air pollutant, hazardous air pollutant and for all emission units and air pollutant-generating activities to be covered by a limitation, include the following:

☑ **Item 1 -** The proposed limitation and a description of its effect on current actual, allowable and the potential to emit.
☑ **Item 2 -** The proposed testing, monitoring, recordkeeping, and reporting requirements to be used to demonstrate and assure compliance with the proposed limitation.
☐
☑ **Item 3 -** A description of estimated efficiency of air pollution control equipment under present or anticipated operating conditions, including documentation of the manufacturer specifications and guarantees.
☐
☑ **Item 4 -** Estimates of the Post-Change Allowable Emissions that would result from compliance with the proposed limitation, including all calculations for the estimates.
☐ **Item 5 –** Estimates of the potential emissions of Greenhouse Gas (GHG) pollutants:

APPENDIX B: DETAILED EMISSION CALCULATIONS

Facility-Wide Emissions Inventory
J.K. Merrill Pit

Emission Inventory Summary

Pollutant	Current Facility-Wide Potential Emissions (tons/year)						Total Emissions (tons/year)
	Crushing	Screening	Drop Points	Pile Erosion	Road Dust	Engines	
PM	fugitive	fugitive	fugitive	fugitive	fugitive	9.6	10
PM_{10}	fugitive	fugitive	fugitive	fugitive	fugitive	7.4	7
$PM_{2.5}$	fugitive	fugitive	fugitive	fugitive	fugitive	7.3	7.3
SO_2	--	--	--	--	--	0.10	0.10
NO_x	--	--	--	--	--	227.8	227.8
CO	--	--	--	--	--	18.1	18.1
VOC	--	--	--	--	--	10.8	10.8
CO2e	--	--	--	--	--	10,718	10,718

Pollutant	Facility-Wide Proposed Allowed Emissions (tons/year)						Total Emissions (tons/year)	
	Crushing	Screening	Drop Points	Pile Erosion	Road Dust	Engines		
PM	fugitive	fugitive	fugitive	fugitive	fugitive	9.6	10	
PM_{10}	fugitive	fugitive	fugitive	fugitive	fugitive	7.4	7	
$PM_{2.5}$	fugitive	fugitive	fugitive	fugitive	fugitive	7.3	7.3	
SO_2	--	--	--	--	--	0.10	0.10	
NO_x	--	--	--	--	--	90.0	90.0	- Proposed 90 tpy Limit
CO	--	--	--	--	--	18.1	18.1	
VOC	--	--	--	--	--	10.8	10.8	
CO2e	--	--	--	--	--	10,718	10,718	

Facility-Wide Emissions Inventory
J.K. Merrill and Sons

Rock Crushing Fugitive Emission Calculations

General Operational Parameters

Hours of Operation	8,760	hrs/yr
Potential Crusher Thoughput	200	tons/hr
	1,752,000	tons/yr
2019 Throughput	213,655	tons/yr
Control Efficiency	0	%

Emission Factor[1,2,3]

Emission Source	Emission Factor (lb/ton)		
	$PM_{2.5}$	PM_{10}	PM
Primary Crushing (Jaw) - Dry	4.7E-05	3.1E-04	7.0E-04
Secondary Crushing (All) - Wet	1.0E-04	5.4E-04	1.2E-03

Emission Calculations

Equipment Type	Potential Emissions						Actual Emissions		
	lb/hr			tpy			tpy		
	$PM_{2.5}$	PM_{10}	PM	$PM_{2.5}$	PM_{10}	PM	$PM_{2.5}$	PM_{10}	PM
Jaw Crusher - Primary Dry	0.01	0.06	0.14	4.1E-02	2.7E-01	6.1E-01	5.0E-03	3.3E-02	7.5E-02
Symons Cone - Secondary Wet	0.02	0.11	0.24	8.8E-02	4.7E-01	1.1E+00	1.1E-02	5.8E-02	1.3E-01
Short Head Cone - Secondary Wet	0.02	0.11	0.24	8.8E-02	4.7E-01	1.1E+00	1.1E-02	5.8E-02	1.3E-01
Total	0.049	0.28	0.62	0.22	1.2	2.7	0.026	0.15	0.33

Notes:

[1] PM emission factor for Primary Crushing (Jaw) are the AP-42 1995 emission factors for Primary Crusher. PM10 emission factor based on ratio of tertiary crushing PM10/PM. These emission factors should only be used for Jaw Crushers.

Dry = Uncontrolled emission rates

Wet = Controlled emission rates

[2] Secondary Crushing uses Tertiary Crushing emission factors per footnote (n) of AP-42 Ch. 11.19.2-2.

[3] Where $PM_{2.5}$ emission factors (EF) are not provided in AP-42 Ch. 11.19.2-2, a ratio of aerodynamic particle size multipliers from AP-42 Ch. 13.2.4 was used to estimate PM2.5 emission factors. PM2.5 EF = (PM10 EF/0.35)*0.053

Facility-Wide Emissions Inventory
J.K. Merrill and Sons

Screening Fugitive Emission Calculations

General Operational Parameters

Hours of Operation	8,760	hrs/yr
Potential Crusher Thoughput	200	tons/hr
	1,752,000	tons/yr
Potential Wash Plant Thoughput	250	tons/hr
	2,190,000	tons/yr
Control Efficiency	0	%

Emission Factor[1,2]

Emission Source	Emission Factor (lb/ton)		
	$PM_{2.5}$	PM_{10}	PM
Screening (All) - Wet	2.8E-05	1.9E-04	5.5E-04
Fines Screening - Wet	3.3E-04	2.2E-03	3.6E-03

Emission Calculations

Equipment Type	Potential Throughput	2019 Throughput	Potential Emissions						Actual Emissions		
			lb/hr			tpy			tpy		
	tpy	tpy	$PM_{2.5}$	PM_{10}	PM	$PM_{2.5}$	PM_{10}	PM	$PM_{2.5}$	PM_{10}	PM
Crusher Screen - Wet	1,752,000	213,655	5.6E-03	3.7E-02	1.1E-01	2.5E-02	1.6E-01	4.8E-01	3.0E-03	2.0E-02	5.9E-02
Twin Screen #1 - Wet	1,254,432	152,977	6.7E-02	4.4E-01	7.2E-01	2.1E-01	1.4E+00	2.3E+00	2.5E-02	1.7E-01	2.8E-01
Twin Screen #2 - Wet Fines	827,925	100,965	6.7E-02	4.4E-01	7.2E-01	1.4E-01	9.1E-01	1.5E+00	1.7E-02	1.1E-01	1.8E-01
Total			0.14	0.92	1.6	0.37	2.5	4.2	0.045	0.30	0.52

Notes:

[1] PM and PM_{10} emission factors are taken from AP-42 Ch. 11.19.2-2. AP 42 emission factors for screening of rock output from primary crushing are not available. Emission factors are estimated based on EPA's general permit for stone quarrying that assumes emissions are proportional to the relative surface area of the product emerging from the crusher. Secondary screening emissions are conservatively estimated at 50% of tertiary crushing emissions, and primary screening emissions are conservatively estimated at 50% of secondary
Dry = Uncontrolled emission rates
Wet = Controlled emission rates

[2] Where $PM_{2.5}$ emission factors (EF) are not provided in AP-42 Ch. 11-.19.2-2, a ratio of aerodynamic particle size multipliers from AP-42 Ch. 13.2.4 was used to estimate PM2.5 emission factors. PM2.5 EF = (PM10 EF/0.35)*0.053

Facility-Wide Emissions Inventory
J.K. Merrill and Sons

Drop Point Fugitive Emission Calculations

Drop Point Specifications

Drop No.	Description	Media Type	Control Method	No. of like transfer points
1	Crusher Plant - first drop from screen on to conveyors	Sand, Aggregate	None (low drop height)	5
2	Crusher Plant - conveyor transfer points	Sand, Aggregate	None (low drop height)	12
3	Crusher Plant - drop, conveyor to pile storage	Sand, Aggregate	None (low drop height)	3
4	Wash Plant - drop into bin	Sand, Aggregate	None (low drop height)	1
5	Wash Plant - first drop on to conveyor	Sand, Aggregate	None (low drop height)	1
6	Wash Plant - conveyor transfer points	Sand, Aggregate	None (low drop height)	1

Constants[1,2]

Wind Speed (mph)	9.6
Moisture content (%)	3.5

Emission Factor[3]

Pollutant	Emission Factor (lb/ton)
PM	0.0025
PM_{10}	0.0012
$PM_{2.5}$	0.0002

Emission Calculations

Drop No.	Potential Throughput	2019 Throughput	Uncontrolled Emission Rate (tpy)		
	tpy	tpy	$PM_{2.5}$	PM_{10}	PM
1	1,752,000	213,655	0.10	0.64	1.3
2	1,752,000	213,655	0.23	1.5	3.2
3	1,752,000	213,655	0.058	0.38	0.81
4	2,190,000	106,608	0.010	0.064	0.13
5	2,190,000	106,608	0.010	0.064	0.13
6	2,190,000	106,608	0.010	0.064	0.13
Total			0.42	2.7	5.8

Notes:

[1] Average wind speed in Pocatello from NOAA Local Climatological Data Summary.

[2] Moisture content taken from previous submittal.

[3] Emission factor calculated based on the methodology described in AP-42 Chapter 13.2.4

Aggregate Handling Emission Factor (lb/ton) = $k * 0.0032 * (U/5)^{1.3} / (M/2)^{1.4}$

where, k = particle size multiplier (dimensionless)

U = mean wind speed (mph)

M = material moisture conent (%)

Facility-Wide Emissions Inventory
J.K. Merrill and Sons

Raw Material Stockpiles Fugitive Emission Calculations

General Operational Parameters[1]

Parameters	2019	Potential	Units
Operating Schedule	N/A	8,760	hours/year
	5	7	days/week
	31	52	weeks/yr
Control Efficiency	70	70	%

Stockpile Specifications[2]

Parameters	2019	Potential	Units
Stockpile Area	5	6	acres
Number of active days	156	365	days/year
Number of inactive days	209	0	days/year

Emission Calculations[3,4]

Stockpile Type	Potential Emissions					
	lb/hr			tpy		
	$PM_{2.5}$	PM_{10}	PM	$PM_{2.5}$	PM_{10}	PM
Inactive	0.00	0.00	0.00	0.00	0.00	0.00
Active	0.07	0.50	0.99	0.33	2.17	4.34
Total	0.07	0.5	1.0	0.33	2.2	4.3

Stockpile Type	Actual Emissions		
	tpy		
	$PM_{2.5}$	PM_{10}	PM
Inactive	0.04	0.27	0.55
Active	0.12	0.77	1.54
Total	0.16	1.0	2.1

Notes:

[1] Control efficiency based on water control.

[2] Active stockpiles are those that have more than 8 hours of activity per 24 hours.

[3] Stockpile emissions based on AP-42 Section 8.19 (4th Edition, 1985), following TCEQ's rock crushing facility emission rate calculation worksheet.

[4] A ratio of aerodynamic particle size multipliers from AP-42 Ch. 13.2.4 was used to estimate PM2.5 emission factors. PM2.5 EF = (PM10 EF/0.35)*0.053

Facility-Wide Emissions Inventory
J.K. Merrill and Sons

Fugitive Unpaved Industrial Roads Emission Calculations

General Operational Parameters[1]

Hours of Operation	8	hrs/day
Hours of Operation (Crusher Plant)	156	days/year
Hours of Operation (Wash Plant)	78	days/year
Precipitation Days	90	days/year
Control Efficiency	50	%

Surface Material Characteristics[2]

Parameter	Silt Content (%)	Density (lb/cu ft)
Stone quarry processing	8.3	
Sand and gravel processing, material storage area	7.1	125

Equipment Specifications[3,4]

International Paystar 5000 Water Truck		
Parameters	**Weight**	**Units**
Weight empty	30,620	lbs
	15	tons
Weight, 4,000 gallon tank, full, @ 60 F	33,380	lbs
	17	tons
Loaded Weight	64,000	lbs
	32	tons
Mean Weight	24	tons

Caterpillar 980H Loader		
Parameters	**Weight**	**Units**
Weight empty	66,489	lbs
	33	tons
Weight with 5 cu yds sand/aggregate	8.4	tons/5 cu yd heaped bucket
Loaded Weight	42	tons
Mean Weight	37	tons

Emission Factors[5]

Truck Type	Haul Road	Uncontrolled Emission Factor (lb/VMT)		
		$PM_{2.5}$	PM_{10}	PM
Water Truck	Crusher Plant	0.21	2.1	7.2
	Wash Plant	0.18	1.8	6.5
Front Loader	Crusher Plant	0.25	2.5	8.9
	Wash Plant	0.22	2.2	8.0

Miles Traveled [6]

Truck Type	Haul Road	Miles/Trip	Trips/Day	Miles/Day
Water Truck	Crusher Plant	1.1	8	9
	Wash Plant	0.8	8	7
Front Loader	Crusher Plant	1.0	95	92
	Wash Plant	1.1	95	108

Facility-Wide Emissions Inventory
J.K. Merrill and Sons

Fugitive Unpaved Industrial Roads Emission Calculations

Emission Calculations[7]

Truck Type	Haul Road	VMT	Actual Emissions tpy		
		mile/yr	$PM_{2.5}$	PM_{10}	PM
Water Truck	Crusher Plant	1,384	0.07	0.7	2.5
	Wash Plant	511	0.023	0.23	0.8
Front Loader	Crusher Plant	14,320	0.9	9	32
	Wash Plant	8,401	0.46	4.6	17
Total			1.5	15	52

Truck Type	Haul Road	VMT	Potential Emissions tpy		
		mile/yr	$PM_{2.5}$	PM_{10}	PM
Water Truck	Crusher Plant	3,237	0.2	2	6
	Wash Plant	2,394	0.1	1	4
Front Loader	Crusher Plant	33,506	2.1	21	74
	Wash Plant	39,313	2.2	22	78
Total			4.5	45	162

Conversion factor

27 cu ft per cu yd

Notes:

[1] Annual average precip. days from AP-42 Figure 13.2.2-1. The facility is also required to comply with fugitive particulate matter controls, a 50% control efficiency is used to reflect water truck usage.

[2] Typical silt content of surface materials were taken from AP-42 Chapter 13.2.2 - Unpaved Roads.
https://www3.epa.gov/ttn/chief/ap42/ch13/final/c13s0202.pdf
Density of wet sand and gravel taken from the EngineeringToolBox website.
https://www.engineeringtoolbox.com/density-materials-d_1652.html

[3] Equipment specifications of International Paystar 5000 Water Truck based on 64,000 gross vehicle weight and 4,000 gallon water

[4] Equipment specifications of Caterpillar 980H Wheel Loader taken from specification sheet.
https://www.ritchiespecs.com/model/caterpillar-980h-wheel-loader
Loaded weight is calculated assuming the front loader is carrying 5 cu yds of sand and gravel aggregates.

[5] Emission factor calculated based on the methodology described in AP-42 Chapter 13.2.2 - Unpaved Roads.
Hauling Emission Factor (lb/VMT) = $k * (s/12)^a * (W/3)^b * (365-P)/365$

where, s = surface material silt content (%)
W = mean vehicle weight (tons)
P = number of precipitation days

Industrial Roads:

Constant	PM2.5	PM10	PM30 (TSP)
k (lb/VMT)	0.15	1.5	4.9
a	0.9	0.9	0.7
b	0.45	0.45	0.45

[6] Miles traveled based on rountrip distance for watering and loading materials from crusher and wash plant. Trips per day based on maximum watering trips, and loaders handling 100 tons/hr with 8.4 tons/trip.

[7] Actual emissions based on daily VMT and actual operating schedule. Potential emissions based on daily VMT and continuous operation (365 days/yr).

Facility-Wide Emissions Inventory
J.K. Merrill and Sons

Potential Engine Emission Calculations (Before Synthetic Minor Limit)

Engine Specifications

Crusher Plant Engine		
Make and model	Caterpillar 3512	
Maximum rated engine power	1,675	bhp
	1,250	kW
2019 annual hours of operation	933	hours/year
Potential hours of operation	8,760	hours/year
Hourly fuel usage	86	gal/hr
2019 fuel usage	29,051	gal/year
Potential fuel usage	749,551	gal/year
Fuel Type	ULSD	

Wash Plant Engine		
Make and model	Caterpillar 3406	
Maximum rated engine power	469	bhp
	350	kW
2019 annual hours of operation	791	hours/year
Potential hours of operation	8,760	hours/year
Hourly fuel usage	24	gal/hr
2019 fuel usage	8,541	gal/year
Potential fuel usage	209,874	gal/year
Fuel Type	ULSD	

Emission Factors

Criteria Air Pollutant	Emission Factor (lb/MMBtu)	
	> 600 hp	< 600 hp
NO_x	3.2	4.41
CO	2.33E-01	4.25E-01
SO_2	1.52E-03	1.52E-03
PM	1.00E-01	3.10E-01
PM10	5.73E-02	3.10E-01
PM2.5	5.56E-02	3.10E-01
VOC	9.00E-02	4.30E-01
CO2	1.63E+02	1.63E+02
CH4	6.61E-03	6.61E-03
N2O	1.32E-03	1.32E-03
CO2e	1.64E+02	1.64E+02

Facility-Wide Emissions Inventory
J.K. Merrill and Sons

Potential Engine Emission Calculations (Before Synthetic Minor Limit)

Emission Calculations

Pollutant	Potential Emissions					
	lb/hr			Potential (tpy)		
	Crusher	Wash	Total	Crusher	Wash	Total
NO_x	38	14	52	164	63	228
CO	3	1.4	4.1	12	6	18
SO_2	1.8E-02	5.0E-03	2.3E-02	0	0	1.0E-01
PM	1.2	1.0	2.2	5	4	9.6
PM10	0.67	1.0	1.7	3	4	7.4
PM2.5	0.65	1.0	1.7	3	4	7.3
VOC	1.06	1.4	2.5	5	6	10.8
CO2e	1,918	537	2,455	8,374	2,345	10,718

Conversion factor

7,000 Btu per hp-hr
137,030 Btu per gal

Notes:

[1] Diesel And All Stationary Dual-fuel Engines (>600 hp) and AP-42 Chapter 3.3 (Gasoline and Diesel Industrial Engines). CO emission factors based on oxidation system guarantee.

[2] SO2 emission factor based on ultra low sulfur diesel (0.0015% sulfur) and AP-42 Chapter 3.4 calculation methodology.

[3] For small diesel engines assume PM = PM_{10} = PM_{25}

[4] Speciated emissions based on emission factors for large uncontrolled stationartory diesel engines

[5] Greenhouse Gas emission factors from 40 CFR 98, Subpart C, Table C-1.

[6] CO2e calculated based on global warming potential (GWP) for each Greenhouse gas: CO2 = 1; CH4 = 25; and N2O = 298 (40 CFR Part 98, Subpart A).

Facility-Wide Emissions Inventory
J.K. Merrill and Sons

SYNMIN Form
Engine Emission Calculations

Engine Specifications

Crusher Plant Engine		
Make and model	Caterpillar 3512	
Maximum rated engine power	1,675	bhp
	1,250	kW
2019 operation	933	hours/year
Annual potential operation	8,760	hours/year
Hourly fuel usage	86	gal/hr
2019 fuel usage	29,051	gal/year
Potential fuel usage	749,551	gal/year
Fuel Type	ULSD	

Wash Plant Engine		
Make and model	Caterpillar 3406	
Maximum rated engine power	469	bhp
	350	kW
2019 operation	791	hours/year
Annual potential operation	8,760	hours/year
Hourly fuel usage	24	gal/hr
2019 fuel usage	8,541	gal/year
Potential fuel usage	209,874	gal/year
Fuel Type	ULSD	

Facility-Wide Emissions Inventory
J.K. Merrill and Sons

SYNMIN Form

Engine Emission Calculations

Emission Factors

Criteria Air Pollutant	Emission Factor (lb/MMBtu)[1]	
	> 600 hp	< 600 hp
NO_x	3.2	4.41

[1] Emission factors taken from AP-42 Chapter 3.4 - Large Stationary Diesel And All Stationary Dual-fuel Engines (>600 hp) and AP-42 Chapter 3.3 (Gasoline and Diesel Industrial Engines).

Emission Calculations

Pollutant	NOX Emissions					
	lb/hr			tpy		
	Crusher	Wash	Total	Crusher	Wash	Total
Potential	38	14	52	164	63	228
2019 Actual	38	14	52	6.4	2.6	9.0
Requested Limit						90.0

1 NOX emission factors are from AP-42 Section 3.4 (Large Stationary Diesel Engines) and Section 3.3 (Diesel Industrial Engines) for the Crusher Plant Engine and Wash Plant Engine, respectively.

2 Potential NOX emissions are based on the maximum heat input rate for each engine (Crusher Plant Engine = 11.725 MMBtu/hr; and Wash Plant Engine = 3.283 MMBtu/hr) and continuous operation (8,760 hrs/yr).

3 2019 Actual annual emissions are based on the 2019 actual fuel usage in gallons and the AP-42 emission factors (assuming a heat capacity of 137,030 Btu/gal diesel).

4 JK Merrill and Sons requests a facility-wide limit of 90 tons per year.

Conversion factor

7,000 Btu per hp-hr
137,030 Btu per gal