

DEQ Requests Comments on GMA Garnet (USA) Corp.'s Proposed Air Quality Permit

The Oregon Department of Environmental Quality invites the public to submit written comments on the conditions of GMA Garnet (USA) Corp.'s proposed air quality permit, known officially as a Simple Air Contaminant Discharge Permit.

Summary

The proposed permit is a new permit for a newly constructed facility.

How do I participate?

To submit your comments for the public record, send them by mail, fax, or email:

Suzy Luttrell
Air Quality Permit Coordinator
4026 Fairview Industrial Dr. SE
Salem, OR 97302

Fax: 503-378-4196

Email: luttrell.suzy@deq.state.or.us

Written comments are due by 5 p.m. June 28, 2019.

About the facility

The permittee will operate an industrial mineral sand processing plant. GMA will receive quarterly barged shipments of unprocessed (virgin) garnet sand from South Africa, and railed shipments of garnet sand from Whitehall, Montana. In addition, GMA will receive "returned" garnet sand, which was previously used in various water-jet cutting and abrasive blasting applications, via polyurethane bulk bags loaded on flat-bed trucks.

Accumulated garnet sand will be moved from stock piles using front-end loaders and placed into an outside feed hopper where it will be gravity fed to a conveyer belt. The mineral will then be conveyed to a wet screen where the sand is mixed with municipal water. The garnet slurry will then be pumped through polyurethane tubing to the water wash system (wet plant). Using a series of tanks, pumps, and separators, larger garnet sand particles are separated from fines and retained for further processing. The larger garnet sand particles are placed on a dewatering screen and then dried utilizing a natural gas rotary dryer. Following the drying process, the garnet sand will be sent to a series of

air washes, rare earth magnets, bucket elevators, and a series of screens where the garnet is sized and packaged for distribution. The finer garnet sand and dust particles are routed to a clarifier tank, where the bottom "mud" is collected and then filter pressed into a solid which is then landfilled.

What air pollutants would the permit regulate?

This permit regulates emissions of the pollutants listed in the table at the end of this document.

How does DEQ determine permit requirements?

DEQ evaluates types and amounts of pollutants and the facility's location, and determines permit requirements according to state and federal regulations.

What special conditions are in this permit?

There are no special conditions associated with this permit.

How does DEQ monitor compliance with the permit requirements?

This permit would require the facility to monitor pollutants using federally approved monitoring practices and standards.

The facility is required to track and record the facility's actual emissions on both a monthly and annual basis.

Using permit required calculations, the facility determines its facility-wide emissions, and submit an annual emissions summary report to the DEQ. These reports are reviewed for emissions compliance determination. In addition, DEQ will conduct onsite inspections to both observe facility operations, air control equipment, and permit required monitoring and recordkeeping documentation.



State of Oregon
Department of
Environmental
Quality

Western Region
Air Quality Program
381 N. 2nd Street
Coos Bay, OR 97420
Phone: 541-269-2721
Fax: 541-269-7984
Contact: Martin Abts

www.oregon.gov/DEQ

What happens after the public comment period ends?

DEQ will consider and provide responses to all comments received by the close of the comment period. DEQ may modify the proposed permit based on the comments received, but DEQ can only modify conditions of the permit in accordance with the rules and statutes under the authority given to the DEQ. If the facility meets all legal requirements, DEQ will issue the facility's air quality permit.

Where can I get more information?

Find out more and view the proposed permit at <http://www.oregon.gov/deq/Get-Involved/Pages/Public-Notices.aspx>.

View the proposed permit and related documents in person at the DEQ Office in Coos Bay or at the Coos Bay Library located at 525 Anderson Avenue, Coos Bay, Oregon 97420. For a review appointment, call Suzy Luttrell at 503-378-5305.

Alternative Formats

DEQ can provide documents in an alternate format or in another language other than English upon request. Call DEQ at 800-452-4011 or email deqinfo@deq.state.or.us.

Emissions limits

Criteria Pollutants: Table 1 below presents maximum allowable emissions of criteria pollutants for the facility. Typically, a facility's actual emissions are less than maximum limits established in a permit; however, actual emissions can increase up to the permitted limit.

Table 1

Criteria Pollutant	Proposed Maximum Limit (tons/year)
Particulate matter	24
Small particulate matter	14
Fine particulate matter	9
Sulfur dioxide	39
Nitrogen oxides	39
Carbon monoxide	99
Volatile organic compounds	39
Greenhouse gases	74,000

For more information about criteria pollutants, go to: www.epa.gov/criteria-air-pollutants

Hazardous air pollutants: GMA Garnet (USA) Corporation does not have the potential to be a major source of hazardous air pollutants. EPA has determined these types of businesses do not warrant such regulation.

For more information about hazardous air pollutants, go to: <https://www.epa.gov/haps/health-effects-notebook-hazardous-air-pollutants>



SIMPLE
AIR CONTAMINANT DISCHARGE PERMIT

Department of Environmental Quality
Western Region
4026 Fairview Industrial Drive SE
Salem, Oregon 97302
503-378-8240

This permit is being issued in accordance with the provisions of ORS 468A.040 and based on the land use compatibility findings included in the permit record.

ISSUED TO:

GMA Garnet (USA) Corp.
1780 Hughes Landing, Suite 725
The Woodlands, Texas 77380

INFORMATION RELIED UPON:

Application No.: 30654
Date Received: 03/07/2019

PLANT SITE LOCATION:

63776 Mullen Road
Coos Bay, OR 97420

LAND USE COMPATIBILITY FINDING:

Approving Authority: Coos County
Approval Date: 03/14/2019

ISSUED BY THE DEPARTMENT OF ENVIRONMENTAL QUALITY

Claudia Davis, Western Region Air Quality Manager

Dated

Source(s) Permitted to Discharge Air Contaminants (OAR 340-216-8010):

Table 1 Code	Source Description	SIC
Part B, 85	All other sources, both stationary and portable, not listed herein which would have actual emissions, if the source were to operate uncontrolled, of 5 or more tons per year of direct PM _{2.5} or PM ₁₀ if located in a PM _{2.5} or PM ₁₀ nonattainment or maintenance area, or 10 or more tons per year of any single criteria pollutant if located in any part of the state.	1446

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1.0 GENERAL EMISSION STANDARDS AND LIMITS

- 1.1. Visible Emissions** The permittee must comply with the following visible emission limits from air contaminant sources other than fugitive emission sources, as applicable. Opacity must be measured as a six-minute block average using EPA Method 9, a continuous opacity monitoring system (COMS) installed and operated in accordance with the DEQ Continuous Monitoring Manual or 40 CFR part 60, or an alternative monitoring method approved by DEQ that is equivalent to EPA Method 9.
- a. Emissions from any air contaminant source must not equal or exceed 20% opacity.
- 1.2. Particulate Matter Emissions** The permittee must comply with the following particulate matter emission limits, as applicable:
- a. Particulate matter emissions from any fuel burning equipment must not exceed 0.10 grains per dry standard cubic foot, corrected to 12% CO₂ or 50% excess air;
 - b. Particulate matter emissions from any air contaminant source other than fuel burning equipment and fugitive emission sources must not exceed 0.10 grains per standard cubic foot.
- 1.3. Fugitive Emissions** The permittee must take reasonable precautions to prevent fugitive dust emissions, as measured by EPA Method 22, by:
- a. Using, where possible, water or chemicals for control of dust in the demolition of existing buildings or structures, construction operations, the grading of roads or the clearing of land;
 - b. Applying water or other suitable chemicals on unpaved roads, materials stockpiles, and other surfaces which can create airborne dusts;
 - c. Enclosing (full or partial) materials stockpiles in cases where application of water or other suitable chemicals are not sufficient to prevent particulate matter from becoming airborne;
 - d. Installing and using hoods, fans, and fabric filters to enclose and vent the handling of dusty materials;
 - e. Covering, at all times when in motion, open bodied trucks transporting materials likely to become airborne;
 - f. Promptly removing earth or other material that does or may become airborne from paved streets; and
 - g. Developing a DEQ approved fugitive emission control plan upon request by DEQ if the above precautions are not adequate and implementing the plan whenever fugitive

emissions leave the property for more than 18 seconds in a six-minute period.

- 1.4. Particulate Matter Fallout** The permittee must not cause or permit the deposition of any particulate matter larger than 250 microns in size at sufficient duration or quantity, as to create an observable deposition upon the real property of another person.
- 1.5. Nuisance and Odors** The permittee must not cause or allow air contaminants from any source to cause a nuisance. Nuisance conditions will be verified by DEQ personnel.
- 1.6. Fuels and Fuel Sulfur Content**
- a. If the permittee burns any of the fuels listed below, the sulfur content cannot exceed:
 - i. 0.0015% sulfur by weight for ultra-low sulfur diesel;
 - ii. 0.3% sulfur by weight for ASTM Grade 1 distillate oil;
 - iii. 0.5% sulfur by weight for ASTM Grade 2 distillate oil;
 - iv. 1.75% sulfur by weight for residual oil;
 - b. The permittee is allowed to use on-specification used oil as fuel which contains no more than 0.5% sulfur by weight. The permittee must obtain analyses from the marketer or, if generated on site, have the used oil analyzed, so that it can be demonstrated that each shipment of oil does not exceed the used oil specifications contained in 40 CFR Part 279.11, Table 1.
- 1.7. Operation of Pollution Control Devices and Processes** The permittee must operate and maintain air pollution control devices and emission reduction processes at the highest reasonable efficiency and effectiveness to minimize emissions. Air pollution control devices and components must be in operation and functioning properly at all times when the associated emission source is operating. OAR 340-226-0120

2.0 NSPS APPLICABILITY AND REQUIREMENTS FOR NON-EMERGENCY ENGINES

- 2.1. New Source Performance Standards – 40 CFR Part 60, Subpart III** New Source Performance Standards, 40 CFR Part 60, Subpart III – (*Standards of Performance for Stationary Compression Ignition Internal Combustion Engines (CI ICE)*), is applicable to the stationary 75 hp non-emergency engine.
- For 2007 and later model year non-emergency engines with a displacement of < 30 liters/cylinder constructed after July 11, 2005 and manufactured after April 1, 2006.

- 2.2. Emission Standards** Engines must comply with the emission standards for new CI engines in 40 CFR 60.4201 for their 2007 model year and later stationary CI ICE. [40 CFR 60.4204(b)]
- 2.3. Fuel Requirements** The permittee must purchase diesel fuel that meets the following requirements: [40 CFR 60.4207(b)]
- a. Sulfur content: 15 ppm maximum. [40 CFR 80.510(b)(1)]
- 2.4. Importing/Installing Requirements** The permittee must not install non-emergency stationary CI ICE with a maximum engine power of greater than or equal to 56kW (75 hp) and less than 130 kW (175 hp) that do not meet the applicable requirements for 2012 model year non-emergency engines. [40 CFR 60.4208(d)]
- 2.5. Monitoring Requirements**
- a. If the permittee's engine is equipped with a diesel particulate filter to comply with the emission standards in CFR 60.4204, the diesel particulate filter must be installed with a backpressure monitor that notifies the permittee when the high backpressure limit of the engine is approached. [40 CFR 60.4209(b)]
- 2.6. Compliance Requirements**
- a. The permittee must comply by purchasing an engine certified to meet the emission standards in 40 CFR 60.4204(b), as applicable, for the same model year and maximum engine power. The engine must be installed and configured according to the manufacturer's emission-related specifications. [40 CFR 60.4211(c)]
 - b. The permittee must operate and maintain each affected engine that achieves the emission standards, as required in 40 CFR 60.4204, over the entire life of the engine. [40 CFR 60.4206]
 - c. The permittee must do all of the following: [40 CFR 60.4211(a)]
 - i. Operate and maintain the engine and control device, if installed, according to the manufacturer's emission-related written instructions; [40 CFR 60.4211(a)(1)]
 - ii. Change only those emission-related settings that are permitted by the manufacturer; and [40 CFR 60.4211(a)(2)]
 - iii. Meet the requirements of 40 CFR Parts 89, 94 and/or 1068, as they apply to the permittee. [40 CFR 60.4211(a)(3)]
 - d. If the permittee does not install, configure, operate, and maintain the engine and control device according to the manufacturer's emission-related written instructions, or the permittee changes emission-related settings in a way that in

not permitted by the manufacturer, the permittee must demonstrate compliance as follows: [40 CFR 60.4211(g)]

- i. The permittee must keep a maintenance plan and records of conducted maintenance (for all non-emergency CI ICEs with a maximum engine power less than 100 hp) to demonstrate compliance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, if the permittee does not install and configure the engine and control device according to the manufacturer's emission-related written instructions, or the permittee changes the emission-related settings in a way that is not permitted by the manufacturer, the permittee must conduct an initial performance test to demonstrate compliance with the applicable emission standards within 1 year of such action. [40 CFR 60.4211(g)(1)]
- ii. If the permittee is required to conduct a performance test, the permittee must follow the protocols as described within 40 CFR 60.4212 paragraphs (a) through (e). [40 CFR 60.4212]

2.7. Notification and Recordkeeping Requirements

If the permittee's stationary CI ICE non-emergency engine is equipped with a diesel particulate filter, the permittee must keep records of any corrective action taken after the backpressure monitor has notified the permittee that the high backpressure limit of the engine is approached. [40 CFR 60.4214(c)]

2.8. NESHAP ZZZZ covered by NSPS III

The permittee must meet the requirements of Subpart ZZZZ by meeting the requirements of 40 CFR Part 60, Subpart III. No further requirements of Subpart ZZZZ apply to new engines. [40 CFR 63.6590(c)(1)]

3.0 PLANT SITE EMISSION LIMITS

3.1. **Plant Site Emission Limits (PSEL)** The permittee must not cause or allow plant site emissions to exceed the following:

Pollutant	Limit	Units
PM	24	tons per year
PM ₁₀	14	tons per year
PM _{2.5}	9	tons per year
SO ₂	39	tons per year
NO _x	39	tons per year
CO	99	tons per year
VOC	39	tons per year
GHGs (CO ₂ e)	74,000	tons per year

3.2. **Annual Period** The annual plant site emissions limits apply to any 12-consecutive calendar month period.

4.0 COMPLIANCE DEMONSTRATION AND SOURCE TESTING

4.1. **Source Testing Requirements** Once during the permit term, the permittee must demonstrate the rotary dryer is capable of operating at its maximum operating capacity in compliance with Condition 1.2 by conducting a source test for particulate matter (PM) emissions as specified below:

- a. The permittee must test stack emissions for particulate matter (total) using DEQ Methods 1-5; EPA Methods 1-5 and 202 are acceptable alternatives. A source test consists of three replicate test runs conducted under similar plant operating conditions. Minimum sample durations must be 60 minutes (per test run) and minimum sample volumes of 31.8 dry standard cubic feet (gas volume), per test run, must be collected. Any deviation must be approved in the DEQ source test plan review letter prior to the testing.
- b. The following parameters must be monitored and recorded during the source test:
 - i. Stack gas oxygen and carbon dioxide concentration (% on a dry basis);
 - ii. Visible emissions (VE) as measured by EPA Method 9. VE must be monitored for a period of at least six (6)

- minutes, during or within 30 minutes of each PM test run (i.e., before or after each run);
- iii. NO_x emissions (ppm, dry basis) as measured by EPA Method 7E;
 - iv. CO emissions (ppm, dry basis) as measured by EPA Method 10;
 - v. Garnet sand production rate in tons/hour;
 - vi. Fuel usage in 10⁶ ft³/hour;
 - vii. The pressure drop across the baghouse; and
 - viii. Other parameters as specified in the test plan review letter.
- c. A pretest plan must be submitted to DEQ at least 15 days in advance and be approved by the Regional Source Test Coordinator. All tests must be conducted in accordance with DEQ's Source Sampling Manual and the approved pretest plan. Test data and results must be submitted for review to the Regional Source Test Coordinator within 60 days unless otherwise approved in the pretest plan. The pretest plan and test report are to be submitted to the DEQ regional office identified in Condition 9.3.
 - d. All tests must be conducted in accordance with DEQ's Source Sampling Manual and the approved pretest plan. The pretest plan must be submitted at least 30 days in advance and approved by the Regional Source Test Coordinator. Test data and results must be submitted for review to the Regional Source Test Coordinator within 60 days unless otherwise approved in the pretest plan.
 - e. Only regular operating staff may adjust the combustion system or production processes and emission control parameters during the source test and within two hours prior to the source test. Any operating adjustments made during the source test, which are a result of consultation with source testing personnel, equipment vendors or consultants, may render the source test invalid.
 - f. Unless otherwise specified by permit, State rule, federal regulation, or DEQ letter, each source test must consist of at least (3) test runs and the emission results reported as the arithmetic average of all valid test runs. If or reasons beyond the control of the permittee (e.g., forced shutdown, extreme meteorological conditions, failure of an irreplaceable portion of the sample train) a test run is invalidated and cannot be replaced by a valid test run, DEQ may consider accepting two (2) test runs for demonstrating compliance with the emission limit or Source Sampling Manual standard. However, all test runs, including those deemed invalid, are to

be included in the test report.

- g. DEQ may approve an extension of a testing deadline stated in this permit condition if the permittee provides adequate justification for the extension.
 - i. Extension requests must be submitted to DEQ in writing and must include adequate justification for the request and include the reason for the request.
 - ii. The decision to grant an extension to a performance test deadline is solely within the discretion of DEQ.
 - iii. DEQ will notify the permittee in writing of approval or disapproval of the request for an extension as soon as practicable.
 - iv. Unless and until an extension of a performance test deadline is approved by DEQ, the permittee must comply with the testing deadline requirements of this condition.
- h. Any required source test that is declared invalid by DEQ or fails to demonstrate compliance with the applicable limits in Condition 1.2 must be repeated. The permittee or its agent must submit a new pretest plan to DEQ for approval within 30 calendar days from the date DEQ declares a source test invalid or the permittee receives source test results that fail to demonstrate compliance with the applicable limits.

4.2. PSEL Compliance Monitoring

The permittee must demonstrate compliance with the PSEL for each 12-consecutive calendar month period based on the following calculation for each pollutant except GHGs:

$$E = \Sigma(EF \times P)/2000 \text{ lbs}$$

where:

- E = pollutant emissions (ton/yr);
- EF = pollutant emission factor (see Condition 11.0);
- P = process production (see Condition 12.0)

4.3. Emission Factors

The permittee must use the default emission factors provided in Condition 11.0 for calculating pollutant emissions, unless alternative emission factors are approved in writing by DEQ. The permittee may request or DEQ may require using alternative emission factors provided they are based on actual test data or other documentation (e.g., AP-42 compilation of emission factors) that has been reviewed and approved by DEQ.

5.0 RECORDKEEPING REQUIREMENTS

5.1. Operation and Maintenance

The permittee must maintain the following records related to the operation and maintenance of the plant and associated air contaminant control devices:

- a. Quantity of natural gas used in the rotary dryer.

- b. Quantity of garnet sands processed on a monthly basis.
 - c. Keep a log of maintenance, repair, and bag/filter replacement activities on baghouse and dust collection system filters.
 - d. Quantity of fuel used in diesel generators.
- 5.2. Excess Emissions** The permittee must maintain records of excess emissions as defined in OAR 340-214-0300 through 340-214-0340 (recorded on occurrence). Typically, excess emissions are caused by process upsets, startups, shutdowns, or scheduled maintenance. In many cases, excess emissions are evident when visible emissions are greater than 20% opacity as a six-minute block average. If there is an ongoing excess emission caused by an upset or breakdown, the permittee must cease operation of the equipment or facility no later than 48 hours after the beginning of the excess emissions, unless continued operation is approved by DEQ in accordance with OAR 340-214-0330(4).
- 5.3. Complaint Log** The permittee must maintain a log of all written complaints and complaints received via telephone that specifically refer to air pollution concerns associated to the permitted facility. The log must include a record of the permittee's actions to investigate the validity of each complaint and a record of actions taken for complaint resolution.
- 5.4. Retention of Records** Unless otherwise specified, the permittee must retain all records for a period of at least five (5) years from the date of the monitoring sample, measurement, report, or application and make them available to DEQ upon request. The permittee must maintain the two (2) most recent years of records onsite.

6.0 REPORTING REQUIREMENTS

- 6.1. Excess Emissions** The permittee must notify DEQ of excess emissions events if the excess emission is of a nature that could endanger public health.
- a. Such notice must be provided as soon as possible, but never more than one hour after becoming aware of the problem. Notice must be made to the regional office identified in Condition 9.0 by e-mail, telephone, facsimile, or in person.
 - b. If the excess emissions occur during non-business hours, the permittee must notify DEQ by calling the Oregon Emergency Response System (OERS). The current number is 1-800-452-0311.
 - c. The permittee must also submit follow-up reports when required by DEQ.
- 6.2. Annual Report** For each year this permit is in effect, the permittee must submit to DEQ by **February 15** two (2) copies of the following information for the previous calendar year:
- a. Operating parameters:

- i. Quantity of natural gas used annually plant wide
 - ii. Annual quantity of garnet sands processed.
 - iii. Maintenance and repair performed on the future proposed 56 kW/75 hp diesel generators.
 - iv. Quantity of fuel used in diesel generators.
 - b. A summary of annual pollutant emissions determined each month in accordance with Condition 4.0.
 - c. Records of all planned and unplanned excess emissions events.
 - d. Summary of complaints relating to air quality received by permittee during the year.
 - e. List permanent changes made in plant process, production levels, and pollution control equipment which affected air contaminant emissions.
 - f. List of major maintenance performed on pollution control equipment.
- 6.3. Greenhouse Gas Registration and Reporting** If the calendar year emission rate of greenhouse gases (CO₂e) is greater than or equal to 2,756 tons (2,500 metric tons), the permittee must register and report its greenhouse gas emissions with DEQ in accordance with OAR 340-215.
- 6.4. Initial Startup Notice** The permittee must notify DEQ in writing of the date a new facility is started up. The notification must be submitted no later than seven (7) days after startup.
- 6.5. Notice of Change of Ownership or Company Name** The permittee must notify DEQ in writing using a Departmental “Transfer Application Form” within 60 days after the following:
- a. Legal change of the name of the company as registered with the Corporations Division of the State of Oregon; or
 - b. Sale or exchange of the activity or facility.
- 6.6. Construction or Modification Notices** The permittee must notify DEQ in writing using a Departmental “Notice of Intent to Construct Form,” or other permit application form and obtain approval in accordance with OAR 340-210-0205 through 340-210-0250 before:
- a. Constructing, installing, or establishing a new stationary source that will cause an increase in any regulated pollutant emissions;
 - b. Making any physical change or change in operation of an existing stationary source that will cause an increase, on an hourly basis at full production, in any regulated pollutant emissions; or

- c. Constructing or modifying any air pollution control equipment.

7.0 ADMINISTRATIVE REQUIREMENTS

- 7.1. **Permit Renewal Application** The permittee must submit the completed application package for renewal of this permit by 12/01/2023. The permittee must submit two (2) copies of the application to the DEQ Permit Coordinator listed in Condition 9.2.
- 7.2. **Permit Modifications** The permittee must submit an application for a modification of this permit not less than **60** days prior to the source modification. A special activity fee must be submitted with an application for the permit modification. The fees and two (2) copies of the application must be submitted to the Business Office of DEQ.

8.0 FEES

- 8.1. **Annual Compliance Fee** The permittee must pay the Annual Fee specified in OAR 340-216-8020, Table 2, Part 2 for a Simple ACDP by **December 1** of each year this permit is in effect. An invoice indicating the amount, as determined by DEQ regulations, will be mailed prior to the above date. **Late fees in accordance with Part 4 of the table will be assessed as appropriate.**
- 8.2. **Change of Ownership or Company Name Fee** The permittee must pay the non-technical permit modification fee specified in OAR 340-216-8020, Table 2, Part 3(a) with an application for changing the ownership or the name of the company.
- 8.3. **Special Activity Fees** The permittee must pay the special activity fees specified in OAR 340-216-8020, Table 2, Part 3 (b through k) with an application to modify the permit.

9.0 DEQ CONTACTS / ADDRESSES

- 9.1. **Business Office** The permittee must submit payments for invoices, applications to modify the permit, and any other payments to DEQ's Business Office:
- Department of Environmental Quality
Accounting / Revenue
700 NE Multnomah St, Suite 600
Portland, Oregon 97232
- 9.2. **Permit Coordinator** The permittee must submit all Notices and applications that do not include payment to the Western Region's Permit Coordinator:
- Western Region
4026 Fairview Industrial Drive SE
Salem, Oregon 97302
503-378-8240
- 9.3. **Report Submittals** Unless otherwise notified, the permittee must submit all reports (annual reports, source test plans and reports, etc.) to DEQ's Western Region. If you know the name of the Air Quality staff member responsible for your permit, please include it:
- Western Region
4026 Fairview Industrial Drive SE
Salem, Oregon 97302
503-378-8240
- 9.4. **Permit Writer/Inspector** The permit writer/inspector can be reached at the following office:
- DEQ Salem
4026 Fairview Industrial Drive SE
Salem, Oregon 97302
503-378-8240
- 9.5. **Web Site** Information about air quality permits and DEQ's regulations may be obtained from the DEQ web page at www.deq.state.or.us

10.0 GENERAL CONDITIONS AND DISCLAIMERS

- 10.1. **Permitted Activities** This permit allows the permittee to discharge air contaminants from processes and activities related to the air contaminant source(s) listed on the first page of this permit until this permit expires, is modified, or is revoked.
- 10.2. **Other Regulations** In addition to the specific requirements listed in this permit, the permittee must comply with all other legal requirements enforceable by DEQ.

- 10.3. Conflicting Conditions** In any instance in which there is an apparent conflict relative to conditions in this permit, the most stringent conditions apply.
- 10.4. Masking of Emissions** The permittee must not cause or permit the installation of any device or use any means designed to mask the emissions of an air contaminant that causes or is likely to cause detriment to health, safety, or welfare of any person or otherwise violate any other regulation or requirement.
- 10.5. DEQ Access** The permittee must allow DEQ's representatives access to the plant site and pertinent records at all reasonable times for the purposes of performing inspections, surveys, collecting samples, obtaining data, reviewing and copying air contaminant emissions discharge records and conducting all necessary functions related to this permit in accordance with ORS 468.095.
- 10.6. Permit Availability** The permittee must have a copy of the permit available at the facility at all times.
- 10.7. Open Burning** The permittee may not conduct any open burning except as allowed by OAR 340, division 264.
- 10.8. Asbestos** The permittee must comply with the asbestos abatement requirements in OAR 340, Division 248 for all activities involving asbestos-containing materials, including, but not limited to, demolition, renovation, repair, construction, and maintenance.
- 10.9. Property Rights** The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state, or local laws or regulations.
- 10.10. Permit Expiration**
- a. A source may not be operated after the expiration date of the permit, unless any of the following occur prior to the expiration date of the permit:
 - i. A timely and complete application for renewal or for an Oregon Title V Operating Permit has been submitted, or
 - ii. Another type of permit (ACDP or Oregon Title V Operating Permit) has been issued authorizing operation of the source.
 - b. For a source operating under an ACDP or Oregon Title V Operating Permit, a requirement established in an earlier ACDP remains in effect notwithstanding expiration of the ACDP, unless the provision expires by its terms or unless the provision is modified or terminated according to the procedures used to establish the requirement initially.
- 10.11. Permit Termination, Revocation, or Modification** DEQ may modify or revoke this permit pursuant to OAR 340-216-0082 and 340-216-0084.

11.0 EMISSION FACTORS

Emissions device or activity	Pollutant	Emission Factor (EF)	EF units	EF reference
Rotary Dryer (sand component)	PM ₁₀	7.72E-02	PM ₁₀ / ton of garnet sand	Estimate based on similar process (see emissions detail sheet in the review report for further information)
Rotary Dryer (natural gas component)	PM ₁₀	7.6	lbs/MM ft ³	AP-42 Table 1.4-1
	PM _{2.5}	7.6		Manufacturer
	NO _x	25		
	CO	84		
	SO ₂	0.6		AP-42 Table 1.4-1
	VOC	5.5		
Zircon Stockpile	PM ₁₀	6.24E-03	lbs/ton	AP-42, Section 13.2.4
	PM _{2.5}	9.45E-04		
Garnet Sand Stockpile - Wet Plant Feed	PM ₁₀	6.24E-03		
	PM _{2.5}	9.45E-04		
Returned Garnet Sand Stockpile -Wet Plant Feed	PM ₁₀	6.24E-03		
	PM _{2.5}	9.45E-04		
Ilmenite Stockpile	PM ₁₀	6.24E-03		
	PM _{2.5}	9.45E-04		
Wet Plant Garnet Stockpile - Dry Plant Feed	PM ₁₀	8.96E-04		
	PM _{2.5}	1.36E-04		
MRC Garnet Handling Activities	PM ₁₀	6.24E-03		
	PM _{2.5}	9.45E-04		
Returned Garnet Handling Activities	PM ₁₀	6.24E-03		
	PM _{2.5}	9.45E-04		
Wet Plant Garnet Sand Handling Activities	PM ₁₀	1.58E-03		
	PM _{2.5}	2.39E-04		
Ilmenite Handling Activities	PM ₁₀	3.05E-03		
	PM _{2.5}	4.62E-04		
Zircon Handling Activities	PM ₁₀	3.05E-03		
	PM _{2.5}	4.62E-04		
Indoor Conveying and Handling Activities - Dry Plant	PM ₁₀	4.60E-03		
	PM _{2.5}	1.30E-04		
continued on next page				

Emissions device or activity	Pollutant	Emission Factor (EF)	EF units	EF reference
Paved Road Emissions	PM ₁₀	0.16	lbs/VMT	AP-42 Section 13.2.1 (Equation 3)
	PM _{2.5}	0.65		
Indoor Convey and Handling Activities - Wet Plant Filter Press	PM ₁₀	4.60E-05	lbs/ton	AP-42 Section 11.19.2 - 2
	PM _{2.5}	1.30E-05	lbs/ton	
Combustion Sources - Small Diesel Fuel Stationary Engines (<500Hp)	PM ₁₀	4.60E-05	lbs/hr	Manufacturer
	PM _{2.5}	1.30E-05	lbs/hr	
	NO _x	4.70	g/kW-hr	AP-42 Table 3.3-1
	CO	5.00		
	SO ₂	2.05E-03		
	VOC	4.70		
Rail Car Garnet Sand Conveying and Handling Activities	PM ₁₀	4.60E-05	lbs/ton	AP-42 Section 11.19.2-2
	PM _{2.5}	1.30E-05		
Barge Garnet Sand Conveying and Handling Activities	PM ₁₀	4.60E-05	lbs/ton	AP-42 Section 11.19.2-2
	PM _{2.5}	1.30E-05		

12.0 PROCESS/PRODUCTION RECORDS

Emissions device or activity	Process or production parameter	Frequency
Plant-wide	Processed Garnet sand (tons)	Monthly
Plant-wide	Natural Gas (MM ft ³)	Monthly
Generators	Diesel Fuel (gallons)	Monthly

13.0 ABBREVIATIONS, ACRONYMS, AND DEFINITIONS

ACDP	Air Contaminant Discharge Permit	NSR	New Source Review
ASTM	American Society for Testing and Materials	O ₂	oxygen
AQMA	Air Quality Maintenance Area	OAR	Oregon Administrative Rules
calendar year	The 12-month period beginning January 1st and ending December 31 st	ORS	Oregon Revised Statutes
CFR	Code of Federal Regulations	O&M	operation and maintenance
CO	carbon monoxide	Pb	lead
CO _{2e}	carbon dioxide equivalent	PCD	pollution control device
DEQ	Oregon Department of Environmental Quality	PM	particulate matter
dscf	dry standard cubic foot	PM ₁₀	particulate matter less than 10 microns in size
EPA	US Environmental Protection Agency	PM _{2.5}	particulate matter less than 2.5 microns in size
FCAA	Federal Clean Air Act	ppm	part per million
Gal	gallon(s)	PSD	Prevention of Significant Deterioration
GHG	greenhouse gas	PSEL	Plant Site Emission Limit
gr/dscf	grains per dry standard cubic foot	PTE	Potential to Emit
HAP	Hazardous Air Pollutant as defined by OAR 340-244-0040	RACT	Reasonably Available Control Technology
I&M	inspection and maintenance	scf	standard cubic foot
lb	pound(s)	SER	Significant Emission Rate
MMBtu	million British thermal units	SIC	Standard Industrial Code
NA	not applicable	SIP	State Implementation Plan
NESHAP	National Emissions Standards for Hazardous Air Pollutants	SO ₂	sulfur dioxide
NO _x	nitrogen oxides	Special Control Area	as defined in OAR 340-204-0070
NSPS	New Source Performance Standard	VE	visible emissions
		VOC	volatile organic compound
		year	A period consisting of any 12-consecutive calendar months



State of Oregon
Department of
Environmental
Quality

SIMPLE AIR CONTAMINANT DISCHARGE PERMIT REVIEW REPORT

Department of Environmental Quality
Western Region

Source Information:

SIC	1446
NAICS	212322

Source Categories	Table 1, Part B #85
Public Notice Category	II

Compliance and Emissions Monitoring Requirements:

FCE	
Compliance schedule	
Unassigned emissions	
Emission credits	
Special Conditions	

Source test [date(s)]	Once during permit term
COMS	
CEMS	
PEMS	
Ambient monitoring	

Reporting Requirements

Annual report (due date)	February 15 th
Quarterly report (due dates)	

Monthly report (due dates)	
Excess emissions report	
Other (specify)	

Air Programs

Synthetic Minor (SM)	
SM -80	
NSPS (list subparts)	III
NESHAP (list subparts)	ZZZZ
Part 68 Risk Management	
CFC	

NSR	
PSD	
RACT	
TACT	
Other (specify)	

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PERMITTING

PERMITTEE IDENTIFICATION

1. GMA Garnet (USA) Corp. is located at 63776 Mullen Road, Coos Bay, Oregon.

PERMITTING ACTION

2. The proposed Simple Air Contaminant Discharge Permit is a new permit for a new facility.

OTHER PERMITS

3. Other permits issued or required by the DEQ for this source include a NPDES Permit #100860 (file number 106451).

ATTAINMENT STATUS

4. The source is located in an attainment area for all criteria pollutants.
5. The source is not located within 10 kilometers of the Kalmiopsis Wilderness Class I Air Quality Protection Area, and the emissions are less than the significant emissions rate.

SOURCE DESCRIPTION

OVERVIEW

6. The permittee will operate an industrial mineral sand processing plant. GMA will receive quarterly barged shipments of unprocessed (virgin) garnet sand from South Africa, and railed shipments of garnet sand from Whitehall, Montana. In addition, GMA will receive “returned” garnet sand, which was previously used in various water-jet cutting and abrasive blasting applications, via polyurethane bulk bags loaded on flat-bed trucks. Accumulated garnet sand will be moved from stock piles using front-end loaders and placed into an outside feed hopper where it will be gravity fed to a conveyer belt. The mineral will then be conveyed to a wet screen where the sand is mixed with municipal water. The garnet slurry will then be pumped through polyurethane tubing to the water wash system (wet plant). Using a series of tanks, pumps, and separators, larger garnet sand particles are separated from fines and retained for further processing. The larger garnet sand particles are placed on a dewatering screen and then dried utilizing a natural gas rotary dryer. Following the drying process, the garnet sand will be sent to a series of air washes, rare earth magnets, bucket elevators, and a series of screens where the garnet is sized and packaged for distribution. The finer garnet sand and dust particles are routed to a clarifier tank, where the bottom “mud” is collected and then filter pressed into a solid which is then landfilled. The facility is proposed to be built in April/May 2019.

PROCESS AND CONTROL DEVICES

7. Existing air contaminant sources at the facility consist of the following:
 - a. One FEECO International 25 MM Btu/hour natural gas-fired rotary dryer with a Kinedizer LE high capacity low-NO_x burner. Particulate controlled by an 18,500 scfm Schenck 144 MCF306 baghouse, with a 99% capture efficiency on PM_{2.5}. Installed in April/May 2019.
 - b. One process dust collection system (for screens, elevators, conveyors, etc.) utilizing a 30,000 scfm Schenck 144 MCF416 baghouse with DYNA-MAC 16 oz. Dacron polyester bags, with a 99.9% capture efficiency on PM_{2.5}. Installed in April/May 2019.
 - c. Future proposed baghouse for railcar off-loading, powered by a 56-kilowatt / 75 hp EPA Tier 4 diesel engine. Particulate controlled by a DCE Model UMA-100 dust collector.
 - d. Future proposed baghouse for barge off-loading, powered by a 56-kilowatt EPA / 75 hp Tier 4 diesel engine. Particulate controlled by a DCE Model UMA-100 dust collector.

COMPLIANCE

8. The facility will be inspected by DEQ personnel to ensure compliance with the permit conditions.

EMISSIONS

9. Proposed PSEL information:

Pollutant	Baseline Emission Rate (tons/yr)	Netting Basis		Plant Site Emission Limits (PSEL)		
		Previous (tons/yr)	Proposed (tons/yr)	Previous PSEL (tons/yr)	Proposed PSEL (tons/yr)	PSEL Increase (tons/yr)
PM	0.0	0.0	0.0	N/A	24	N/A
PM ₁₀	0.0	0.0	0.0	N/A	14	N/A
PM _{2.5}	0.0	0.0	0.0	N/A	9	N/A
SO ₂	0.0	0.0	0.0	N/A	39	N/A
NO _x	0.0	0.0	0.0	N/A	39	N/A
CO	0.0	0.0	0.0	N/A	99	N/A
VOC	0.0	0.0	0.0	N/A	39	N/A
GHG (CO ₂ e)	0.0	0.0	0.0	N/A	74,000	N/A

- a. The netting basis is zero for Simple ACDPs in accordance with OAR 340-222-0040(3).

- b. For Simple ACDPs, the proposed PSELs for all pollutants are equal to the Generic PSEL in accordance with OAR 340-216-0064(3)(b).
- c. For specific emissions information refer to the emissions detail sheets attached to this Review Report.
- d. The PSEL is a federally enforceable limit on the potential to emit.

SIGNIFICANT EMISSION RATE ANALYSIS

- 10. For each pollutant, the proposed Plant Site Emission Limit is less than the Netting Basis plus the significant emission rate, thus no further air quality analysis is required.

TITLE V MAJOR SOURCE APPLICABILITY

- 11. A major source is a facility that has the potential to emit 100 tons/year or more of any criteria pollutant or 10 tons/year or more of any single HAP or 25 tons/year or more of combined HAPs. This facility is not a major source criteria pollutants or of HAP emissions. This source is considered an Area Source. The basis for this determination can be found within the attached emissions calculation detail sheets of this Review Report.
- 12. A source that has potential to emit at the major source levels, but accepts a PSEL below major source levels is called a synthetic minor (SM). This source does not have the potential to emit at major source levels; therefore, it is not a synthetic minor. The basis for this determination can be found within the attached emissions calculation detail sheets of this Review Report.
- 13. A source that has elected to become a synthetic minor source can be a SM-80 source when the source's potential to emit is at or above the 80 percent major source threshold regardless of whether the source's actual emissions are lower. This source is not a synthetic minor, thus is not a SM-80 source. The basis for this determination can be found within the attached emissions calculation detail sheets of this Review Report.
- 14. A source that has the potential to emit less than major source thresholds is called a true minor. This source is a true minor for criteria pollutants and HAP emissions. The basis for this determination can be found within the attached emissions calculation detail sheets of this Review Report.

CRITERIA POLLUTANTS

- 15. This facility is a minor source of criteria pollutant emissions.

HAZARDOUS AIR POLLUTANTS

This facility is a minor source of hazardous air pollutants. The HAP emissions are described within the attached emissions calculation detail sheets provided at the end of this Review Report.

ADDITIONAL REQUIREMENTS

NSPS APPLICABILITY

16. 40 CFR Part 60, Subpart IIII will be applicable to the source when the two proposed 56-kilowatt / 75 horse power stationary compression ignition internal combustion engines are installed.

NESHAPS/MACT APPLICABILITY

17. Though 40 CFR Part 63, Subpart ZZZZ will be applicable to the source when the two 56-kilowatt / 75 horse power reciprocating internal combustion engines are installed, meeting the applicable requirements of 40 CFR Part 63, Subpart IIII will satisfy the requirements of Subpart ZZZZ.

RACT APPLICABILITY

18. The RACT rules are not applicable to this source because it is not in the Portland AQMA, Medford AQMA, or Salem SKATS.

TACT APPLICABILITY

19. The source is meeting DEQ's TACT/Highest and Best Rules by conducting the following activities:
 - a. Baghouse control on the rotary dryer.

SOURCE TESTING

PROPOSED TESTING

20. The rotary dryer will be tested once during the term of this permit for Total PM and PM₁₀ emissions. The following production and control device parameters will be recorded during the tests:
 - a. Visible emissions as measured by EPA Method 9 for a period of at least six minutes during or within 30 minutes before or after each test run;
 - b. Tons of garnet sand production in tons/hour;
 - c. Fuel usage in 10⁶ ft³/hour; and
 - d. Pressure differential across baghouse.

PUBLIC NOTICE

21. Pursuant to OAR 340-216-0064(3)(a), issuance of Simple Air Contaminant Discharge Permits require public notice in accordance with OAR 340-209-0030(3)(b), which requires DEQ to provide notice of the proposed permit action and a minimum of 30 days for interested persons to submit written comments. **The public notice was emailed/mailed on May 22, 2019 and the comment period will end on June 28, 2019.**

APPENDIX A – EMISSIONS DETAIL

Summary of Facility Regulated Air Pollutants - Actual Uncontrolled Emissions

Point Emission Source	PM ₁₀		PM _{2.5}		SO ₂		NO _x		CO		VOC		Lead		
	lb/hr	T/Yr	lb/hr	T/Yr	lb/hr	T/Yr	lb/hr	T/Yr	lb/hr	T/Yr	lb/hr	T/Yr	lb/hr	T/Yr	CO _{2e}
Rotary Dryer (25 mmbtu/hour)	0.19	0.82	0.19	0.82	0.01	0.06	0.61	2.68	2.06	9.02	0.13	0.59	1.23E-05	5.37E-05	1.28E+04
Rotary Dryer - Sand Component	Total PM = 11.1 tons per year														
(Virgin) Garnet Pile	2.85E-02	1.25E-01	4.31E-03	1.89E-02											
Returned Garnet Pile	1.42E-02	6.24E-02	2.16E-03	9.45E-03											
Returned Garnet Handling	5.70E-02	2.50E-01	8.63E-03	3.78E-02											
(Virgin) Garnet Handling	4.27E-01	1.87E+00	6.47E-02	2.83E-01											
Wet Plant Pile	1.53E-03	6.72E-03	2.32E-04	1.02E-03											
Zircon Stockpile ¹	7.12E-03	3.12E-02	1.08E-03	4.72E-03											
Ilmenite Stockpile ²	7.12E-03	3.12E-02	1.08E-03	4.72E-03											
Wet Plant Handling	8.12E-03	3.56E-02	1.23E-03	5.38E-03											
Zircon Handling	1.05E-02	4.58E-02	1.58E-03	6.93E-03											
Ilmenite Handling	1.05E-02	4.58E-02	1.58E-03	6.93E-03											
Barge Off-Loading	4.14E-02	4.31E-02	1.17E-02	1.22E-02											
Dry Plant Transfer	1.66E-01	2.15E-01	4.68E-02	6.08E-02											
Paved Roads		1.64E+00		4.02E-01											
Conveyor Engine Emissions	3.70E-03	1.85E-03	3.70E-03	1.85E-03	0.15	0.08	0.58	0.29	0.62	0.31	0.58	0.29			
Sub Total Emissions	0.97	5.21	0.33	1.67	0.17	0.14	1.19	2.97	2.67	9.33	0.71	0.88			
Total Emissions		16.31		11.99	0.17	0.14	1.19	2.97	2.67	9.33	0.71	0.88			

¹ Zircon will be contained within a silo located inside the processing building, emissions were conservatively calculated as being temporarily stockpiled outside.

² Ilmenite will be contained within a silo located inside the processing building, emissions were conservatively calculated as being temporarily stockpiled outside.

Rotary Dryer – Sand Component (Total PM as PM₁₀)

Due to similarities in process, data from a November 8, 2011 source test performed at Oregon Resources Corporation (ORC) is used to estimate particulate emissions for the proposed natural gas-fired rotary dryer. The source test data below serves as the basis for estimating GMA's PM emissions from the rotary dryer:

$$\text{Total PM (as PM}_{10}\text{)} = \frac{271 \text{ lb}}{\text{MM scf}}$$

$$\text{Total PM (as PM}_{10}\text{)} = \frac{1.54 \text{ lb}}{\text{hr}} \quad (\text{Assume } 90\% \text{ Efficiency of Wet Scrubber})$$

$$\text{Production Rate} = \frac{19.99 \text{ tons}}{\text{hr}}$$

$$\text{Fuel Flow Rate} = \frac{94.21 \text{ scf}}{\text{min}}$$

Using ORC Data to Calculate Pounds of Total PM per Ton of Garnet Sand Dried:

$$\frac{1.54 \text{ lbs}}{\text{hr}} \div \frac{19.99 \text{ tons}}{\text{hr}} = \frac{1.54 \text{ lbs}}{\text{hr}} \times \frac{\text{hr}}{19.99 \text{ tons}} = \frac{7.72 \times 10^{-2} \text{ lbs Total PM}}{\text{ton of garnet sand}}$$

GMA Annual Production:

8 x 30,000 mt garnet sand from South Africa	=	240,000 mt	
20,000 mt returned garnet sand	=	20,000 mt	
	=	260,000 mt	
TOTAL	=	<u>286,600 short tons (tons)</u>	<u>yr</u>

GMA Proposed Annual Emissions of Total PM:

$$\frac{7.72 \times 10^{-2} \text{ lbs Total PM}}{\text{ton of garnet sand}} \times \frac{286,600 \text{ tons garnet sand}}{\text{yr}} = \frac{20,635.2 \text{ lbs Total PM}}{\text{yr}} = \underline{\underline{11.1 \text{ tons Total PM}}}$$

Rotary Dryer Emissions - Natural Gas Component

Assumptions:

		Units	Source
Natural Gas Heating Value	1,020	Btu/scf	AP-42 Table 1.4-1, footnote a

Pollutant	Emission Factor (lb/10 ⁶ scf)	Source	Natural Gas Rotary Dryer	
			Dryer 01	
			Unit Size	25,000,000 Btu/hr
			Operation	8,760 hours/year
Emissions				
			(lb/hr)	(tons/year)
NOx (Low NO _x Burner)	25	Manufacture	0.61	2.68
CO	84	AP-42 Table 1.4-1	2.06	9.02
SO ₂	0.6	AP-42 Table 1.4-2	0.01	0.06
VOC	5.5	AP-42 Table 1.4-2	0.13	0.59
PM ₁₀ (Total) ¹	7.6	AP-42 Table 1.4-2	0.186	0.816
PM _{2.5} (Total)	7.6	AP-42 Table 1.4-2	0.186	0.816
Lead	0.0005	AP-42 Table 1.4-2	1.23E-05	5.37E-05
2-Methylnaphthalene	2.40E-05	AP-42 Table 1.4-3	5.88E-07	2.58E-06
3-Methylchloranthrene	1.80E-06	AP-42 Table 1.4-3	4.41E-08	1.93E-07
Acenaphthene	1.80E-06	AP-42 Table 1.4-3	4.41E-08	1.93E-07
Acenaphthylene	1.80E-06	AP-42 Table 1.4-3	4.41E-08	1.93E-07
Anthracene	2.40E-06	AP-42 Table 1.4-3	5.88E-08	2.58E-07
Benzo(a)anthracene	1.80E-06	AP-42 Table 1.4-3	4.41E-08	1.93E-07
Benzo(a)pyrene	1.20E-06	AP-42 Table 1.4-3	2.94E-08	1.29E-07
Benzo(b)fluoranthene	1.80E-06	AP-42 Table 1.4-3	4.41E-08	1.93E-07
Benzo(g,h,i)perylene	1.20E-06	AP-42 Table 1.4-3	2.94E-08	1.29E-07
Benzo(k)fluoranthene	1.80E-06	AP-42 Table 1.4-3	4.41E-08	1.93E-07
Chrysene	1.80E-06	AP-42 Table 1.4-3	4.41E-08	1.93E-07
Dibenzo(a,h)anthracene	1.20E-06	AP-42 Table 1.4-3	2.94E-08	1.29E-07
Dichlorobenzene	1.20E-03	AP-42 Table 1.4-3	2.94E-05	1.29E-04
Fluoranthene	3.00E-06	AP-42 Table 1.4-3	7.35E-08	3.22E-07
Fluorene	2.80E-06	AP-42 Table 1.4-3	6.86E-08	3.01E-07
Indeno(1,2,3-cd)pyrene	1.80E-06	AP-42 Table 1.4-3	4.41E-08	1.93E-07
Naphthalene	6.10E-04	AP-42 Table 1.4-3	1.50E-05	6.55E-05
Phenanthrene	1.70E-05	AP-42 Table 1.4-3	4.17E-07	1.83E-06
Pyrene	5.00E-06	AP-42 Table 1.4-3	1.23E-07	5.37E-07
Polycyclic Organic Matter (POM) 7-PAH Group ²			2.79E-07	1.22E-06
Benzene	2.10E-03	AP-42 Table 1.4-3	5.15E-05	2.25E-04
Formaldehyde	7.50E-02	AP-42 Table 1.4-3	1.84E-03	8.05E-03
Hexane	1.80E+00	AP-42 Table 1.4-3	4.41E-02	1.93E-01
Toluene	3.40E-03	AP-42 Table 1.4-3	8.33E-05	3.65E-04
7,12-Dimethylbenz(a)anthracene	1.60E-05	AP-42 Table 1.4-3	3.92E-07	1.72E-06
Butane	2.10E+00	AP-42 Table 1.4-3	5.15E-02	2.25E-01
Ethane	3.10E+00	AP-42 Table 1.4-3	7.60E-02	3.33E-01
Pentane	2.60E+00	AP-42 Table 1.4-3	6.37E-02	2.79E-01
Propane	1.60E+00	AP-42 Table 1.4-3	3.92E-02	1.72E-01
Arsenic	2.00E-04	AP-42 Table 1.4-4	4.90E-06	2.15E-05
Barium	4.40E-03	AP-42 Table 1.4-4	1.08E-04	4.72E-04
Beryllium	1.20E-05	AP-42 Table 1.4-4	2.94E-07	1.29E-06
Cadmium	1.10E-03	AP-42 Table 1.4-4	2.70E-05	1.18E-04
Chromium	1.40E-03	AP-42 Table 1.4-4	3.43E-05	1.50E-04
Cobalt	8.40E-05	AP-42 Table 1.4-4	2.06E-06	9.02E-06
Copper	8.50E-04	AP-42 Table 1.4-4	2.08E-05	9.13E-05
Manganese	3.80E-04	AP-42 Table 1.4-4	9.31E-06	4.08E-05
Mercury	2.60E-04	AP-42 Table 1.4-4	6.37E-06	2.79E-05
Molybdenum	1.10E-03	AP-42 Table 1.4-4	2.70E-05	1.18E-04
Nickel	2.10E-03	AP-42 Table 1.4-4	5.15E-05	2.25E-04
Selenium	2.40E-05	AP-42 Table 1.4-4	5.88E-07	2.58E-06
Vanadium	2.30E-03	AP-42 Table 1.4-4	5.64E-05	2.47E-04
Zinc	2.90E-02	AP-42 Table 1.4-4	7.11E-04	3.11E-03
Total HAPS			2.78E-01	1.22E+00

¹ Conservatively Assume PM₁₀ = PM_{2.5}

² Polycyclic Organic Matter (POM) Consists of 7-PAH Group - Indeno(1,2,3-cd)pyrene, Dibenzo(a,h)anthracene, Chrysene, Benzo(k)fluoranthene, Benzo(b)fluoranthene, Benzo(a)pyrene, Benzo(a)anthracene.

AP-42 Table 1.4.1. Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion.

AP-42 Table 1.4.2. Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion.

AP-42 TABLE 1.4-3. Emission Factors for Speciated Organic Compounds from Natural Gas Combustion.

AP-42 TABLE 1.4-4. Emission Factors for Metals from Natural Gas Combustion.

Total HAPs include lead emissions.

Actual Hours of Operation = 10 hours/day x 5 days/week x 52 weeks/year = 2,600 hours/year.

Emission values shown represent pre-controlled emission levels.

Emission Source: Zircon Stockpile ⁽¹⁾
Pollutants: PM₁₀, PM_{2.5}
Emission Factor From: AP-42, Section 13.2.4 (11/06)
 "Zircon Storage Piles"

Explanation: PM₁₀ and PM_{2.5} emissions generated from wind erosion activities from Zircon stockpile are calculated from the emission factor provided in AP-42 Section 13.2.4. The PM₁₀ and PM_{2.5} emission factor (lb/ton) is generated from using the particle size multiplier (dimensionless), mean wind speed and the material moisture content. The emission factor is then multiplied by the material throughput to yield the PM₁₀ and PM_{2.5} emissions.

Emission Factor:
$$E = k(0.0032) \frac{(U/5)^{1.3}}{(M/2)^{1.4}} \quad (\text{lb/ton})$$

Where: E is the emission factor
 k is the Aerodynamic Particle Size Multiplier (dimensionless) Particle size multiplier (0.35 for PM₁₀ and 0.053 for PM_{2.5})
 U is the mean wind speed (mph)
 M is the material moisture content (%)

Data: k = 0.35
 U⁽²⁾ = 29 Ziron material will contained in silo within the processing building, to be conservative emissions were calculated for outside stockpile
 M = 3.0
 k = 0.053

PM₁₀ Annual Emissions: PM₁₀ in tons per year = (0.35)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly garnet throughput)

PM₁₀ Short Term Emissions: PM₁₀ in lbs per hour = (0.35)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly ore throughput) (hours of operation per year)/2000 lbs/ton

PM₁₀ Emissions Factor: 6.24E-03 lb/ton

PM_{2.5} Annual Emissions: PM_{2.5} in tons per year = (0.053)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly garnet throughput)

PM_{2.5} Short Term Emissions: PM_{2.5} in lbs per hour = (0.053)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly garnet throughput) (hours of operation per year)/2000 lbs/ton

PM_{2.5} Emissions Factor: 9.45E-04 lb/ton

	Total Zircon Stored (tons)		Total Zircon Stored (tons)	PM ₁₀ Emissions	
				(tons/yr)	(lb/hr)
	10,000		10,000	3.12E-02	7.12E-03
	Total Zircon Stored (tons)		Total Zircon Stored (tons)	PM _{2.5} Emissions	
				(tons/yr)	(lb/hr)
	10,000		10,000	4.72E-03	1.08E-03

1 knot = 1.15 mph

⁽¹⁾ After going through the dry plant, the Zircon sand is temporarily stockpiled outside. From the stockpile it is trucked off site and blown into a silo.

⁽²⁾ The mean wind speed (mph) is derived from the average monthly wind speed (knots) and converted to mph. Data from Coos Bay/North Bend Airport www.windfinder.com/windstatistics/coos_bay

Greenhouse Gas Emissions

Emission Factors

From California Climate Action Registry - General Reporting Protocol, Version 2.2, March 2007

CO2 emission factor for natural gas =	53.06 Kg CO2/MMBTU	Table C.5
CH4 emission factor for natural gas =	0.0059 Kg CO2/MMBTU	Table C.6
N20 emission factor for natural gas =	0.0001 Kg CO2/MMBTU	Table C.6

Combustion sources

Natural Gas Dryer	25 MMBTU/hr
Total	25 MMBTU/hr

Total CO2 Emissions =	1326.5 Kg CO2/hr =	1.3265 metric tons/hr
Total CH4 Emissions =	0.1475 Kg CH4/hr =	0.0001475 metric tons/hr
total N20 Emissions =	0.0025 Kg N20/hr =	0.0000025 metric tons/hr

Global Warming Potential (GWP) factor are from Table III.6.1 of California Climate Action Registry, Version 2.2 March 2007

GWP factor for CH4 =	21
GWP factor for N20 =	310

Total CO2 equivalent =	1.33	metric tons/hr CO2 equivalent CO2e
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Maximum operating hours/yr =	8760
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Annual CO2e emissions =	11654.06	metric tons per year
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metric ton =	2204.62 lbs.
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Annual CO2e =	12846 Tons per year	Potential Emissions of CO2e
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Emission Source: Garnet Sand Stockpile - Wet Plant Feed
Pollutants: PM₁₀, PM_{2.5}

Emission Factor From: AP-42, Section 13.2.4 (11/06)
 "Aggregate Handling and Storage Piles"

Explanation: PM₁₀ and PM_{2.5} emissions generated from wind erosion of garnet sand stockpiles are calculated from the emission factor provided in AP-42 Section 13.2.4. The PM₁₀ and PM_{2.5} emission factor (lb/ton) is generated from using the particle size multiplier (dimensionless), mean wind speed and the material moisture content. The emission factor is then multiplied by the material throughput to yield the PM₁₀ and PM_{2.5} emissions.

Emission Factor:
$$E = k(0.0032) \frac{(U/5)^{1.3}}{(M/2)^{1.4}} \quad (\text{lb/ton})$$

Where: E is the emission factor
 k is the Aerodynamic Particle Size Multiplier (dimensionless) Particle size multiplier (0.35 for PM₁₀ and 0.053 for PM_{2.5})
 U is the mean wind speed (mph)
 M is the material moisture content (%)

Data: k = 0.35
 U⁽¹⁾ = 29
 M = 3.0
 k = 0.053

PM₁₀ Annual Emissions: PM₁₀ in tons per year = (0.35)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly ore throughput)

PM₁₀ Short Term Emissions: PM₁₀ in lbs per hour = (0.35)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly garnet throughput) (hours of operation per year)/2000 lbs/ton

PM₁₀ Emissions Factor: 6.24E-03 lb/ton

PM_{2.5} Annual Emissions: PM_{2.5} in tons per year = (0.053)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly ore throughput)

PM_{2.5} Short Term Emissions: PM_{2.5} in lbs per hour = (0.053)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly garnet throughput) (hours of operation per year)/2000 lbs/ton

PM_{2.5} Emissions Factor: 9.45E-04 lb/ton

	Total Garnet Stored ⁽²⁾ (tons)	Total Garnet Throughput (tons) ⁽²⁾	PM ₁₀ Emissions		
			(tons/yr)	(lb/hr)	
	40,000	40,000	1.25E-01	2.85E-02	
	Total Garnet Stored ⁽²⁾ (tons)	Total Garnet Throughput (tons) ²	PM _{2.5} Emissions		
			(tons/yr)	(lb/hr)	
	40,000	40,000	1.89E-02	4.31E-03	

1 knot = 1.15 mph

⁽¹⁾ The mean wind speed (mph) is derived from the average monthly wind speed (knots) and converted to mph. Data from Coos Bay/North Bend Airport

⁽²⁾ 40,000 tons of garnet sand stockpiled at one time.

www.windfinder.com/windstatistics/coos_bay

Emission Source: Returned Garnet Stockpile ⁽²⁾ - Wet Plant Feed
Pollutants: PM₁₀, PM_{2.5}

Emission Factor From: AP-42, Section 13.2.4 (11/06)
 "Aggregate Handling and Storage Piles"

Explanation: PM₁₀ and PM_{2.5} emissions generated from wind erosion of returned garnet stockpile are calculated from the emission factor provided in AP-42 Section 13.2.4. The PM₁₀ and PM_{2.5} emission factor (lb/ton) is generated from using the particle size multiplier (dimensionless), mean wind speed and the material moisture content. The emission factor is then multiplied by the material throughput to yield the PM₁₀ and PM_{2.5} emissions.

Emission Factor:
$$E = k(0.0032) \frac{(U/5)^{1.3}}{(M/2)^{1.4}} \quad (\text{lb/ton})$$

Where: E is the emission factor
 k is the Aerodynamic Particle Size Multiplier (dimensionless) Particle size multiplier (0.35 for PM₁₀ and 0.053 for PM_{2.5})
 U is the mean wind speed (mph)
 M is the material moisture content (%)

Data: k = 0.35
 U⁽¹⁾ = 29
 M = 3.0
 k = 0.053

PM₁₀ Annual Emissions: PM₁₀ in tons per year = (0.35)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly ore throughput)

PM₁₀ Short Term Emissions: PM₁₀ in lbs per hour = (0.35)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly garnet throughput) (hours of operation per year)/2000 lbs/ton

PM₁₀ Emissions Factor: 6.24E-03 lb/ton

PM_{2.5} Annual Emissions: PM_{2.5} in tons per year = (0.053)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly ore throughput)

PM_{2.5} Short Term Emissions: PM_{2.5} in lbs per hour = (0.053)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly garnet throughput) (hours of operation per year)/2000 lbs/ton

PM_{2.5} Emissions Factor: 9.45E-04 lb/ton

	Total Returned Garnet ⁽³⁾ (tons)		Total Garnet Throughput (tons)	PM ₁₀ Emissions	
				(tons/yr)	(lb/hr)
	16,000		20,000	6.24E-02	1.42E-02
	Total Returned Garnet ⁽³⁾ (tons)		Total Garnet Throughput (tons)	PM _{2.5} Emissions	
				(tons/yr)	(lb/hr)
	16,000		20,000	9.45E-03	2.16E-03

1 knot = 1.15 mph

⁽¹⁾ The mean wind speed (mph) is derived from the average monthly wind speed (knots) and converted to mph. Data from Coos Bay/North Bend Airport

www.windfinder.com/windstatistics/coos_bay

⁽²⁾ Returned garnet is stockpiled and batch processed, each batch process consists of approximately 4,000 tons

⁽³⁾ Approximately 4,000 tons will be stockpiled at one time then processed. Stockpile emissions are conservative and assume 16,000 tons are stockpiled

Emission Source: Ilmenite Stockpile ⁽¹⁾

Pollutants: PM₁₀, PM_{2.5}

Emission Factor From: AP-42, Section 13.2.4 (11/06)
"Ilmenite Storage Piles"

Explanation: PM₁₀ and PM_{2.5} emissions generated from wind erosion activities from Ilmenite stockpile are calculated from the emission factor provided in AP-42 Section 13.2.4. The PM₁₀ and PM_{2.5} emission factor (lb/ton) is generated from using the particle size multiplier (dimensionless), mean wind speed and the material moisture content. The emission factor is then multiplied by the material throughput to yield the PM₁₀ and PM_{2.5} emissions.

Emission Factor:
$$E = k(0.0032) \frac{(U/5)^{1.3}}{(M/2)^{1.4}} \quad (\text{lb/ton})$$

Where: E is the emission factor
k is the Aerodynamic Particle Size Multiplier (dimensionless) Particle size multiplier (0.35 for PM₁₀ and 0.053 for PM_{2.5})
U is the mean wind speed (mph)
M is the material moisture content (%)

Data: k = 0.35 Ilmenite material will be contained in silo within the processing building, to be conservative
 U⁽²⁾ = 29 emissions were calculated for outside stockpile
 M = 3.0
 k = 0.053

PM₁₀ Annual Emissions: PM₁₀ in tons per year = (0.35)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly garnet throughput)

PM₁₀ Short Term Emissions: PM₁₀ in lbs per hour = (0.35)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly ore throughput) (hours of operation per year)/2000 lbs/ton

PM₁₀ Emissions Factor: 6.24E-03 lb/ton

PM_{2.5} Annual Emissions: PM_{2.5} in tons per year = (0.053)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly garnet throughput)

PM_{2.5} Short Term Emissions: PM_{2.5} in lbs per hour = (0.053)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly garnet throughput) (hours of operation per year)/2000 lbs/ton

PM_{2.5} Emissions Factor: 9.45E-04 lb/ton

	Total Ilmenite Stored (tons)		Total Ilmenite Stored (tons)	PM ₁₀ Emissions	
				(tons/yr)	(lb/hr)
	10,000		10,000	3.12E-02	7.12E-03
	Total Ilmenite Stored (tons)		Total ilmenite Stored (tons)	PM _{2.5} Emissions	
				(tons/yr)	(lb/hr)
	10,000		10,000	4.72E-03	1.08E-03

1 knot = 1.15 mph

⁽¹⁾ After going through the dry plant, the Ilmenite sand is temporarily stockpiled outside. From the stockpile, it is trucked off site and blown into a silo.

⁽²⁾ The mean wind speed (mph) is derived from the average monthly wind speed (knots) and converted to mph. Data from Coos Bay/North Bend Airport www.windfinder.com/windstatistics/coos_bay

Emission Source: Wet Plant Garnet Stockpile ⁽¹⁾ - Dry Plant Feed

Pollutants: PM₁₀, PM_{2.5}

Emission Factor From: AP-42, Section 13.2.4 (11/06)
"Wet Plant Storage Piles"

Explanation: PM₁₀ and PM_{2.5} emissions generated from handling activities are calculated from the emission factor provided in AP-42 Section 13.2.4. The PM₁₀ and PM_{2.5} emission factor (lb/ton) is generated from using the particle size multiplier (dimensionless), mean wind speed and the material moisture content. The emission factor is then multiplied by the material throughput to yield the PM₁₀ and PM_{2.5} emissions.

Emission Factor:
$$E = k(0.0032) \frac{(U/5)^{1.3}}{(M/2)^{1.4}} \quad (\text{lb/ton})$$

Where: E is the emission factor
k is the Aerodynamic Particle Size Multiplier (dimensionless) Particle size multiplier (0.35 for PM₁₀ and 0.053 for PM_{2.5})
U is the mean wind speed (mph)
M is the material moisture content (%)

Data: k = 0.35
 U⁽²⁾ = 29 Garnet sand comes out of the wet plant to the outside storage bin at 12 percent
 M = 12.0
 k = 0.053

PM₁₀ Annual Emissions: PM₁₀ in tons per year = (0.35)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly garnet throughput)

PM₁₀ Short Term Emissions: PM₁₀ in lbs per hour = (0.35)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly ore throughput) (hours of operation per year)/2000 lbs/ton

PM₁₀ Emissions Factor: 8.96E-04 lb/ton

PM_{2.5} Annual Emissions: PM_{2.5} in tons per year = (0.053)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly garnet throughput)

PM_{2.5} Short Term Emissions: PM_{2.5} in lbs per hour = (0.053)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly garnet throughput) (hours of operation per year)/2000 lbs/ton

PM_{2.5} Emissions Factor: 1.36E-04 lb/ton

	Total Wet Plant Garnet (tons)		Total Garnet Stored (tons)	PM ₁₀ Emissions	
				(tons/yr)	(lb/hr)
	15,000		15,000	6.72E-03	1.53E-03
	Total Wet Plant Garnet (tons)		Total Garnet Stored (tons)	PM _{2.5} Emissions	
				(tons/yr)	(lb/hr)
	15,000		15,000	1.02E-03	2.32E-04

1 knot = 1.15 mph

⁽¹⁾ After going to the wet plant, the garnet sand comes out at 3 to 5 moisture content, from here it is temporarily stockpiled outside.

⁽²⁾ The mean wind speed (mph) is derived from the average monthly wind speed (knots) and converted to mph. Data from Coos Bay/North Bend Airport www.windfinder.com/windstatistics/coos_bay

Emission Source: MRC Garnet Handling Activities ⁽²⁾

Pollutants: PM₁₀, PM_{2.5}

Emission Factor From: AP-42, Section 13.2.4 (11/06)
"Aggregate Handling and Storage Piles"

Explanation: PM₁₀ and PM_{2.5} emissions generated from handling activities are calculated from the emission factor provided in AP-42 Section 13.2.4. The PM₁₀ and PM_{2.5} emission factor (lb/ton) is generated from using the particle size multiplier (dimensionless), mean wind speed and the material moisture content. The emission factor is then multiplied by the material throughput to yield the PM₁₀ and PM_{2.5} emissions.

Emission Factor:
$$E = k(0.0032) \frac{(U/5)^{1.3}}{(M/2)^{1.4}} \quad (\text{lb/ton})$$

Where: E is the emission factor
k is the Aerodynamic Particle Size Multiplier (dimensionless) Particle size multiplier (0.35 for PM₁₀ and 0.053 for PM_{2.5})
U is the mean wind speed (mph)
M is the material moisture content (%)

Data: k = 0.35
U⁽¹⁾ = 29
M = 3.0
k = 0.053
Drop Points 15

PM₁₀ Annual Emissions: PM₁₀ in tons per year = (0.35)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly garnet throughput)

PM₁₀ Short Term Emissions: PM₁₀ in lbs per hour = (0.35)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly ore throughput) (hours of operation per year)/2000 lbs/ton

PM₁₀ Emissions Factor: 6.24E-03 lb/ton

PM_{2.5} Annual Emissions: PM_{2.5} in tons per year = (0.053)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly garnet throughput)

PM_{2.5} Short Term Emissions: PM_{2.5} in lbs per hour = (0.053)(0.0032)(29/5)^{1.3}/(3.0/2)^{1.4}(maximum hourly garnet throughput) (hours of operation per year)/2000 lbs/ton

PM_{2.5} Emissions Factor: 9.45E-04 lb/ton

	Max Garnet Throughput (tons)		Max Garnet Throughput (tons) ²	PM ₁₀ Emissions		
				(tons/yr)	(lb/hr)	
	40,000		40,000	1.87E+00	4.27E-01	
	Max Garnet Throughput (tons)		Max Garnet Throughput (tons) ²	PM _{2.5} Emissions		
				(tons/yr)	(lb/hr)	
	40,000		40,000	2.83E-01	6.47E-02	

1 knot = 1.15 mph

⁽¹⁾ The mean wind speed (mph) is derived from the average monthly wind speed (knots) and converted to mph. Data from Coos Bay/North Bend Airport www.windfinder.com/windstatistics/coos_bay

⁽²⁾ Garnet sand handling activities consist of unloading garnet from trucks, conveying garnet from barge to the stockpile, picking up from pile, and dropping garnet into wet plant hopper.

Emission Source: Returned Garnet Handling Activities ⁽²⁾
Pollutants: PM₁₀, PM_{2.5}

Emission Factor From: AP-42, Section 13.2.4 (11/06)
 "Aggregate Handling and Storage Piles"

Explanation: PM₁₀ and PM_{2.5} emissions generated from handling activities are calculated from the emission factor provided in AP-42 Section 13.2.4. The PM₁₀ and PM_{2.5} emission factor (lb/ton) is generated from using the particle size multiplier (dimensionless), mean wind speed and the material moisture content. The emission factor is then multiplied by the material throughput to yield the PM₁₀ and PM_{2.5} emissions.

Emission Factor:
$$E = k(0.0032) \frac{(U/5)^{1.3}}{(M/2)^{1.4}} \quad (\text{lb/ton})$$

Where: E is the emission factor
 k is the Aerodynamic Particle Size Multiplier (dimensionless) Particle size multiplier (0.35 for PM₁₀ and 0.053 for PM_{2.5})
 U is the mean wind speed (mph)
 M is the material moisture content (%)

Data: k = 0.35
 U⁽¹⁾ = 29
 M = 3.0
 k = 0.053
 Drop Points 4

PM₁₀ Annual Emissions: PM₁₀ in tons per year = (0.35)(0.0032)(6.8/5)^{1.3}/(2.1/2)^{1.4}(maximum hourly garnet throughput)

PM₁₀ Short Term Emissions: PM₁₀ in lbs per hour = (0.35)(0.0032)(6.8/5)^{1.3}/(2.1/2)^{1.4}(maximum hourly ore throughput) (hours of operation per year)/2000 lbs/ton

PM₁₀ Emissions Factor: 6.24E-03 lb/ton

PM_{2.5} Annual Emissions: PM_{2.5} in tons per year = (0.053)(0.0032)(6.8/5)^{1.3}/(2.1/2)^{1.4}(maximum hourly garnet throughput)

PM_{2.5} Short Term Emissions: PM_{2.5} in lbs per hour = (0.053)(0.0032)(6.8/5)^{1.3}/(2.1/2)^{1.4}(maximum hourly garnet throughput) (hours of operation per year)/2000 lbs/ton

PM_{2.5} Emissions Factor: 9.45E-04 lb/ton

	Max Garnet Throughput ⁽³⁾ (tons)		Max Garnet Throughput (tons)	PM ₁₀ Emissions	
				(tons/yr)	(lb/hr)
	16,000		20,000	2.50E-01	5.70E-02
	Max Garnet Throughput (tons)		Max Garnet Throughput (tons)	PM _{2.5} Emissions	
				(tons/yr)	(lb/hr)
	16,000		20,000	3.78E-02	8.63E-03

1 knot = 1.15 mph

⁽¹⁾ The mean wind speed (mph) is derived from the average monthly wind speed (knots) and converted to mph. Data from Coos Bay/North Bend Airport

www.windfinder.com/windstatistics/coos_bay

⁽²⁾ Recycled garnet sand handling activities consist of mixing the garnet, loading garnet into flip screen, and transferring garnet into wet plant hopper.

⁽³⁾ Used garnet sand is batched processed, where 4,000 tons will be stockpiled at one time then processed. Material handling emissions are conservative and assume 16,000 tons

Emission Source: Wet Plant Garnet Sand Handling Activities ⁽²⁾

Pollutants: PM₁₀, PM_{2.5}

Emission Factor From: AP-42, Section 13.2.4 (11/06)
"Aggregate Handling and Storage Piles"

Explanation: PM₁₀ and PM_{2.5} emissions generated from handling activities are calculated from the emission factor provided in AP-42 Section 13.2.4. The PM₁₀ and PM_{2.5} emission factor (lb/ton) is generated from using the particle size multiplier (dimensionless), mean wind speed and the material moisture content. The emission factor is then multiplied by the material throughput to yield the PM₁₀ and PM_{2.5} emissions.

Emission Factor:
$$E = k(0.0032) \frac{(U/5)^{1.3}}{(M/2)^{1.4}} \quad (\text{lb/ton})$$

Where: E is the emission factor
k is the Aerodynamic Particle Size Multiplier (dimensionless) Particle size multiplier (0.35 for PM₁₀ and 0.053 for PM_{2.5})
U is the mean wind speed (mph)
M is the material moisture content (%)

Data: k = 0.35
U⁽¹⁾ = 29
M = 8.0 Garnet comes out of the wet plant damp at a moisture content of 12 percent, its handled at 8 percent
k = 0.053
Drop Points 3

PM₁₀ Annual Emissions: PM₁₀ in tons per year = (0.35)(0.0032)(29/5)^{1.3}/(5.0/2)^{1.4}(maximum hourly garnet throughput)

PM₁₀ Short Term Emissions: PM₁₀ in lbs per hour = (0.35)(0.0032)(29/5)^{1.3}/(5.0/2)^{1.4}(maximum hourly ore throughput) (hours of operation per year)/2000 lbs/ton

PM₁₀ Emissions Factor: 1.58E-03 lb/ton

PM_{2.5} Annual Emissions: PM_{2.5} in tons per year = (0.053)(0.0032)(29/5)^{1.3}/(5.0/2)^{1.4}(maximum hourly garnet throughput)

PM_{2.5} Short Term Emissions: PM_{2.5} in lbs per hour = (0.053)(0.0032)(29/5)^{1.3}/(5.0/2)^{1.4}(maximum hourly garnet throughput) (hours of operation per year)/2000 lbs/ton

PM_{2.5} Emissions Factor: 2.39E-04 lb/ton

	Max Garnet Throughput (tons)		Max Garnet Throughput (tons)	PM ₁₀ Emissions		
				(tons/yr)	(lb/hr)	
	15,000		15,000	3.56E-02	8.12E-03	
	Max Garnet Throughput (tons)		Max Garnet Throughput (tons)	PM _{2.5} Emissions		
				(tons/yr)	(lb/hr)	
	15,000		15,000	5.38E-03	1.23E-03	

1 knot = 1.15 mph

⁽¹⁾ The mean wind speed (mph) is derived from the average monthly wind speed (knots) and converted to mph. Data from Coos Bay/North Bend Airport www.windfinder.com/windstatistics/coos_bay

⁽²⁾ Wet Plant Pile handling activities consist of loading garnet into loader, and transferring garnet into dry plant hopper inside the building

Emission Source: Ilmenite Handling Activities ⁽²⁾

Pollutants: PM₁₀, PM_{2.5}

Emission Factor From: AP-42, Section 13.2.4 (11/06)
"Aggregate Handling and Storage Piles"

Explanation: PM₁₀ and PM_{2.5} emissions generated from handling activities are calculated from the emission factor provided in AP-42 Section 13.2.4. The PM₁₀ and PM_{2.5} emission factor (lb/ton) is generated from using the particle size multiplier (dimensionless), mean wind speed and the material moisture content. The emission factor is then multiplied by the material throughput to yield the PM₁₀ and PM_{2.5} emissions.

Emission Factor:
$$E = k(0.0032) \frac{(U/5)^{1.3}}{(M/2)^{1.4}} \quad (\text{lb/ton})$$

Where: E is the emission factor
k is the Aerodynamic Particle Size Multiplier (dimensionless) Particle size multiplier (0.35 for PM₁₀ and 0.053 for PM_{2.5})
U is the mean wind speed (mph)
M is the material moisture content (%)

Data: k = 0.35
U⁽¹⁾ = 29
M = 5.0 Garnet comes out of the wet plant damp at a moisture content of 5 to 6 percent.
k = 0.053
Drop Points 2

PM₁₀ Annual Emissions: PM₁₀ in tons per year = (0.35)(0.0032)(29/5)^{1.3}/(5.0/2)^{1.4}(maximum hourly garnet throughput)

PM₁₀ Short Term Emissions: PM₁₀ in lbs per hour = (0.35)(0.0032)(29/5)^{1.3}/(5.0/2)^{1.4}(maximum hourly ore throughput) (hours of operation per year)/2000 lbs/ton

PM₁₀ Emissions Factor: 3.05E-03 lb/ton

PM_{2.5} Annual Emissions: PM_{2.5} in tons per year = (0.053)(0.0032)(29/5)^{1.3}/(5.0/2)^{1.4}(maximum hourly garnet throughput)

PM_{2.5} Short Term Emissions: PM_{2.5} in lbs per hour = (0.053)(0.0032)(29/5)^{1.3}/(5.0/2)^{1.4}(maximum hourly garnet throughput) (hours of operation per year)/2000 lbs/ton

PM_{2.5} Emissions Factor: 4.62E-04 lb/ton

	Max Garnet Throughput (tons)		Max Garnet Throughput (tons)	PM ₁₀ Emissions	
				(tons/yr)	(lb/hr)
	15,000		15,000	4.58E-02	1.05E-02
	Max Garnet Throughput (tons)		Max Garnet Throughput (tons)	PM _{2.5} Emissions	
				(tons/yr)	(lb/hr)
	15,000		15,000	6.93E-03	1.58E-03

1 knot = 1.15 mph

⁽¹⁾ The mean wind speed (mph) is derived from the average monthly wind speed (knots) and converted to mph. Data from Coos Bay/North Bend Airport www.windfinder.com/windstatistics/coos_bay

⁽²⁾ Ilmenite Pile handling activities consist of loading zircon into loader, and transferring garnet into truck for removal

Emission Source: Zircon Handling Activities ⁽²⁾

Pollutants: PM₁₀, PM_{2.5}

Emission Factor From: AP-42, Section 13.2.4 (11/06)
"Aggregate Handling and Storage Piles"

Explanation: PM₁₀ and PM_{2.5} emissions generated from handling activities are calculated from the emission factor provided in AP-42 Section 13.2.4. The PM₁₀ and PM_{2.5} emission factor (lb/ton) is generated from using the particle size multiplier (dimensionless), mean wind speed and the material moisture content. The emission factor is then multiplied by the material throughput to yield the PM₁₀ and PM_{2.5} emissions.

Emission Factor:
$$E = k(0.0032) \frac{(U/5)^{1.3}}{(M/2)^{1.4}} \quad (\text{lb/ton})$$

Where: E is the emission factor
k is the Aerodynamic Particle Size Multiplier (dimensionless) Particle size multiplier (0.35 for PM₁₀ and 0.053 for PM_{2.5})
U is the mean wind speed (mph)
M is the material moisture content (%)

Data: k = 0.35
U⁽¹⁾ = 29
M = 5.0 Garnet comes out of the wet plant damp at a moisture content of 5 to 6 percent.
k = 0.053
Drop Points 2

PM₁₀ Annual Emissions: PM₁₀ in tons per year = (0.35)(0.0032)(29/5)^{1.3}/(5.0/2)^{1.4}(maximum hourly garnet throughput)

PM₁₀ Short Term Emissions: PM₁₀ in lbs per hour = (0.35)(0.0032)(29/5)^{1.3}/(5.0/2)^{1.4}(maximum hourly ore throughput) (hours of operation per year)/2000 lbs/ton

PM₁₀ Emissions Factor: 3.05E-03 lb/ton

PM_{2.5} Annual Emissions: PM_{2.5} in tons per year = (0.053)(0.0032)(29/5)^{1.3}/(5.0/2)^{1.4}(maximum hourly garnet throughput)

PM_{2.5} Short Term Emissions: PM_{2.5} in lbs per hour = (0.053)(0.0032)(29/5)^{1.3}/(5.0/2)^{1.4}(maximum hourly garnet throughput) (hours of operation per year)/2000 lbs/ton

PM_{2.5} Emissions Factor: 4.62E-04 lb/ton

	Max Garnet Throughput (tons)		Max Garnet Throughput (tons)	PM ₁₀ Emissions	
				(tons/yr)	(lb/hr)
	15,000		15,000	4.58E-02	1.05E-02
	Max Garnet Throughput (tons)		Max Garnet Throughput (tons)	PM _{2.5} Emissions	
				(tons/yr)	(lb/hr)
	15,000		15,000	6.93E-03	1.58E-03

1 knot = 1.15 mph

⁽¹⁾ The mean wind speed (mph) is derived from the average monthly wind speed (knots) and converted to mph. Data from Coos Bay/North Bend Airport www.windfinder.com/windstatistics/coos_bay

⁽²⁾ Zircon Pile handling activities consist of loading zircon into loader, and transferring garnet into truck for removal.

Emission Source: Indoor Conveying and Handling Activities (Dry Plant)

Pollutants: PM₁₀, PM_{2.5}

All processing, screening, conveying is completed inside the main processing building.

Emission Factor From: AP-42, Section 11.19.2-2 (8/04)
"Crushed Stone Processing and Mineral Processing"

Explanation: PM₁₀ and PM_{2.5} emissions are generated from material transfer-conveying of garnet sand, Zircon, and Ilmenite material through the extraction and sizing process, which consists of conveyors, bucket elevators, magnets, sizing and screening, and material entering silo storage. Material handling activities are calculated from emission factor provided in AP-42 Section 11.19.2.2. The PM₁₀ and PM_{2.5} emission factor (lb/ton) is generated from using the emission factor found in Table 11.19.2.2 for 0.000046 and 0.000013 respectively.

Process Rate 60 ton/hr

Transfer Points 60 conservatively estimated as bucket elevators and screening are enclosed

PM₁₀ Emissions Factor: 4.60E-05 lb/ton

PM_{2.5} Emissions Factor: 1.30E-05 lb/ton

PM ₁₀ Emissions		
(tons/yr)	(lb/hr)	
2.15E-01	0.17	
PM _{2.5} Emissions		
(tons/yr)	(lb/hr)	
6.08E-02	0.05	

The dry plant equipment is fitted with dust control extraction points, where dust is vented to a Donaldson baghouse with a filter control efficiency of 99.9 percent.

Paved Road -Emission Calculations

Emission Factors developed using procedures outlined in AP-42 Section 13.2.1 (Equation 3)

E = particulate emission factor (having units matching the units of k),

k = particle size multiplier for particle size range and units if interest,

sL = road surface silt loading (grams per square meters) g/m², and

W = average weight (tons) of the vehicles traveling the road

P = number of hours with at least 0.254 mm (0.1 in) of precipitation during the averaging period,

N = number of hours in the averaging period

$$E_{ext} = [k(sL)^{0.91} \times (W)^{1.02}]^{(1-1.2P/N)}$$

$$W = (67,500 \text{ lb semi truck} + 29,000 \text{ loader} + 28,000 \text{ lb Forklift}/2000) = 47.75 \text{ tons}/2 =$$

23.88 tons avg weight

k - From AP-42 Table 13.2.1-1 Particle Size Multipliers for Paved road Equations are:

PM_{2.5} 0.00054 lb/VMT

k =

0.00054 lb PM_{2.5}/VMT

PM₁₀ 0.0022 lb/VMT

k =

0.0022 lb PM₁₀/VMT

sL=

12.04 g/m²

1 oz = 28.35 g

P =

150 hours¹

1 sq yard = 0.836 m²

N=

2600 hours/yr

sL = 0.355 oz/sq yd = 12.04 g/m²

W=

31 Tons

PM_{2.5} Factor

E_{ext} = 0.16 lbs PM_{2.5}/VMT

¹ From AP-42 - Figure 13.2.1-2

PM₁₀ Factor

E_{ext} = 0.65 lbs PM₁₀/VMT

VMT = 5,000 VMT

Trucks from entrance to loading docks, loading docks to entrance, trucks from entrance to stockpiles

PM_{2.5} = 0.40 TPY

PM₁₀ = 1.64 TPY

Emission Source: Indoor Conveying and Handling Activities (Wet Plant Filter Press)

Pollutants: PM₁₀, PM_{2.5}

All processing, screening, conveying is completed inside the main processing building.

Emission Factor From: AP-42, Section 11.19.2-2 (8/04)
"Crushed Stone Processing and Mineral Processing"

Explanation: PM₁₀ and PM_{2.5} emissions are generated from material transfer-conveying of garnet sand, Zircon, and Ilmenite material from the wet plant through the filter press. From the wet plant, material has moisture content of 12%. This material passes through a filter press which reduces moisture content to 8%. Material handling activities are calculated from emission factor provided in AP-42 Section 11.19.2.2. The PM₁₀ and PM_{2.5} emission factor (lb/ton) is generated from using the emission factor found in Table 11.19.2.2 for 0.000046 and 0.000013 respectively.

Process Rate 65 Ton/hr

Transfer Points 2 Since the material is at 12% moisture content there should be no particulate matter emissions, to be conservative, emissions were calculated with three transfer points with the assumption the material is dry.

PM₁₀ Emissions Factor: 4.60E-05 lb/ton

PM_{2.5} Emissions Factor: 1.30E-05 lb/ton

PM ₁₀ Emissions		
(tons/yr)	(lb/hr)	
0.01	5.98E-03	
PM _{2.5} Emissions		
(tons/yr)	(lb/hr)	
0.002	1.69E-03	

