Air Quality Impact Study for UMore Park Sand and Gravel Resources Project

City of Rosemount and Empire Township
Dakota County, Minnesota

SEH No. UOFMN 103496

November 4, 2009
# Table of Contents

Title Page
Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 Introduction</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Project Description</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Purpose of this Study</td>
<td>1</td>
</tr>
<tr>
<td>1.3 Project Location and Setting</td>
<td>2</td>
</tr>
<tr>
<td>2.0 Operations and Assumptions</td>
<td>2</td>
</tr>
<tr>
<td>2.1 Operations</td>
<td>2</td>
</tr>
<tr>
<td>2.2 Stationary and Mobile Sources</td>
<td>2</td>
</tr>
<tr>
<td>2.3 Air Emissions</td>
<td>2</td>
</tr>
<tr>
<td>2.4 Emission Factors</td>
<td>3</td>
</tr>
<tr>
<td>2.5 Key Assumptions</td>
<td>3</td>
</tr>
<tr>
<td>3.0 Emission Calculation Methodology</td>
<td>3</td>
</tr>
<tr>
<td>3.1 Material Processing and Handling Sources</td>
<td>4</td>
</tr>
<tr>
<td>Required Inputs</td>
<td>4</td>
</tr>
<tr>
<td>AP-42 Methodology</td>
<td>4</td>
</tr>
<tr>
<td>3.2 Ready-Mix Operations</td>
<td>4</td>
</tr>
<tr>
<td>Required Inputs</td>
<td>4</td>
</tr>
<tr>
<td>AP-42 Methodology</td>
<td>5</td>
</tr>
<tr>
<td>3.3 Asphalt Operations</td>
<td>5</td>
</tr>
<tr>
<td>Required Inputs</td>
<td>5</td>
</tr>
<tr>
<td>AP-42 Methodology</td>
<td>5</td>
</tr>
<tr>
<td>3.4 Unpaved Internal Haul Roads</td>
<td>5</td>
</tr>
<tr>
<td>Required Inputs</td>
<td>5</td>
</tr>
<tr>
<td>AP-42 Unpaved Haul Road Equation</td>
<td>5</td>
</tr>
<tr>
<td>3.5 Storage Pile Wind Erosion</td>
<td>6</td>
</tr>
<tr>
<td>Required Inputs</td>
<td>6</td>
</tr>
<tr>
<td>MPCA Emission Calculation Methodology</td>
<td>6</td>
</tr>
<tr>
<td>3.6 Backup Power Generators</td>
<td>7</td>
</tr>
<tr>
<td>Required Inputs</td>
<td>7</td>
</tr>
<tr>
<td>AP-42 Methodology</td>
<td>7</td>
</tr>
<tr>
<td>4.0 Emission Calculations Summary</td>
<td>7</td>
</tr>
<tr>
<td>5.0 Mitigation Options</td>
<td>7</td>
</tr>
<tr>
<td>5.1 Aggregate Processing and Handling Emissions</td>
<td>7</td>
</tr>
<tr>
<td>5.2 Internal Haul Road Emissions</td>
<td>8</td>
</tr>
<tr>
<td>6.0 Applicable Regulations</td>
<td>8</td>
</tr>
<tr>
<td>6.1 MPCA Permitting Requirements</td>
<td>8</td>
</tr>
<tr>
<td>6.2 Applicable State and Federal Requirements</td>
<td>9</td>
</tr>
<tr>
<td>Haul Roads and Storage Piles</td>
<td>9</td>
</tr>
<tr>
<td>Power Generators</td>
<td>9</td>
</tr>
</tbody>
</table>
Table of Contents (Continued)

List of Appendices

Appendix A  Emission Calculations
1.0 Introduction

Dakota Aggregates, LLC (applicant/operator) is applying for a nonmetallic mining permit on land within UMORE Park which is located in the City of Rosemount and Empire Township. Dakota Aggregates, LLC is proposing to operate the sand and gravel mining operation. Mineral extraction is proposed on approximately 1,608 acres of land which is owned by the University of Minnesota. The proposed operation will include stripping and stockpiling of topsoil and other overburden material including clay for aggregate products and or pond/landfill lining, clearing and grubbing, mineral extraction, material transporting, material processing including crushing, screening, washing, bagging, asphalt production, concrete production, RAP production, potential removal of an abandoned met council sewer line, loading and transporting materials to and from the proposed extraction site, importation of non toxic compactable material for reclamation purposes and possibly producing, stockpiling, warehousing and transporting concrete block, pavers, pipe, plank, etc.

1.1 Project Description

It is estimated that approximately 105 - 110 million tons of aggregate material (sand and gravel) will be sold over approximately 40 years. Initially, it is estimated that approximately 250,000 tons of material will be sold within the first year of operation. However, the annual sales from the remaining production years are estimated to reach between 700,000 to 3,000,000 tons per year depending on the economy and market demand. Extraction activities will reach approximately 80 feet below the natural water table in some areas of the floating dredge phases. The materials extracted will consist of exceptional granular and aggregate material (sand and gravel). In addition to the onsite aggregate material, RAP (recycled aggregate products) will be imported and processed onsite. It is estimated that the extraction activities will be completed by December 31, 2051; however, the actual life of the extraction facility will be determined by the present and future demand of the extracted products.

1.2 Purpose of this Study

This Air Quality Impact Study is part of the overall Environmental Impact Statement (EIS) process. A Scoping Decision Document and a companion Scoping Environmental Assessment Worksheet was already prepared for the project and identified issues and alternatives to be examined in depth in the EIS. This Air Quality Impact Study has been prepared using conservative assumptions to provide an analysis of potential air quality impacts in the mining area, and to identify options for mitigating these potential impacts.
1.3 Project Location and Setting
The mining area is located within the boundary of the UMore Park, owned by the University of Minnesota located in the city of Rosemount and Empire Township, Dakota County, Minnesota. The mining area itself will be referred to as the “UMore Mining Area” (UMA).

2.0 Operations and Assumptions
2.1 Operations
Site activities at the UMA include the mining of sand and gravel and the subsequent processing of the mined material.

The +/- 190 acre ancillary use facility will include aggregate production activities such as crushing, mixing, screening, washing, loading, stockpiling of aggregate materials, hauling, ready mixed concrete production, bagging, asphalt production, and RAP production. Ready-mixed concrete production requires a plant capable of storing and mixing the ingredients for the various mix designs. Ready-mixed plant sites will have storage silos for the concrete materials and storage tanks for the liquid additives, and will maintain an area for stockpiling return concrete and truck wash out activities. Two 12,000-gallon fuel tanks will be stored within the ancillary use facility as well. There may also be a need for onsite truck maintenance facilities. The asphalt plant will require areas for liquid storage tanks and components which vary, depending on the asphalt mix specifications. These areas will include tanks for asphalt cement, tack oil and heating oil. Additionally, there are approximately 88 acres located on the north portion of the facility for future expansion of the ancillary use facility operations. Offices and scale houses will be located within the ancillary use facilities as well.

2.2 Stationary and Mobile Sources
Stationary source, as defined in Minnesota Rule 7005.0100, means an assemblage of all emissions units and emission facilities that belong to the same industrial grouping, are located at one or more contiguous or adjacent properties and are under the control of the same person (or persons under common control). Emission units or emission facilities must be considered as part of the same industrial grouping if they belong to the same “major group” (that is, which have the same two-digit code) as described in the Standard Industrial Classification Manual, 1972, as amended by the 1977 Supplement (United States Government Printing Office Stock Numbers 4101 to 0066 and 003-005-00176-0, respectively). For there to be a nonmetallic mineral processing stationary source, one or more pieces of processing equipment must be present and operating. Stationary sources may contain portable, mobile and stationary equipment.

Mobile sources, such as haul trucks, are non-stationary sources of air pollution.

2.3 Air Emissions
The activities associated with mining and subsequent production of construction-related materials from the mined product are particulate matter (PM), particulate matter less than or equal to 10 microns (PM\(_{10}\)) as well as other criteria pollutants, such as nitrogen oxides (NO\(_x\)), carbon monoxide (CO), sulfur dioxide (SO\(_2\)) and volatile organic compounds (VOCs). These emissions may result from aggregate processing equipment, fuel combustion sources and potentially, from future asphalt and concrete operations. This air impact analysis only addresses PM emissions, because at this time, there are no known fuel combustion sources and throughputs for future asphalt and concrete plants are unknown.
2.4 **Emission Factors**

The emission rates for all sources at the UMA were calculated using published emission factors standard to the mining industry. An “emission factor” is the most accurate and representative emission data available, and can come from several sources as explained in Minnesota Rules 7005.0100 Subpart 10a. The emission factors used for the UMA’s calculations came from the Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume 1: Stationary Point and Area Sources (AP-42), published by United States Environmental Protection Agency (EPA). The Minnesota Pollution Control Agency (MPCA) uses AP-42 factors in its permit application forms. The MPCA provides some additional emission factors in its guidance (*MPCA Air Dispersion Modeling Guidance for Minnesota Title V Modeling Requirements and Federal Prevention of Significant Deterioration (PSD) Requirements (Version 2.2)*, October 20, 2004 (Reference 1)).

The emission factors are described in greater detail in Section 3. Potential and actual emissions, along with example calculations, can be found in Appendix A, “Emission Calculations”.

2.5 **Key Assumptions**

The assumptions used in this analysis are very conservative. Because the exact design of the new facilities is not known, this analysis assumes the following:

- Transfer Points = 19 (throughput = crusher throughput)
- Average Weight of Empty Vehicles = 12 tons
- Average Weight of Full Vehicles = 31.5 tons
- Round Trip Length of Haul Road = 0.5 miles
- Hauling Throughput = 3,000,000 tons/year (based on maximum export quantity)
- Annual Crushing Throughput = 2,000,000 tons/year (2 dry crushers)
- Annual Screening Throughput = 7,000,000 tons/year (3 dry screens)
- Maximum Hourly Crushing Throughput = 1,000 tons/hour (2 dry crushers)
- Maximum Hourly Screening Throughput = 3,500 tons/hour (3 dry screens)
- Acreage of stockpiles = 9 acres
- Asphalt Plant (throughput unknown) to be added at some point
- Ready Mix/Concrete Plant (throughput unknown) to be added at some point
- No fuel combustion engines will be used for operations

3.0 **Emission Calculation Methodology**

The following sections address each type of emission source at the proposed mining area. The methodology for computing the emissions from each source and a summary of the required inputs to calculate the emissions are presented below. These methods were used to calculate the emissions found in Appendix A.

The MPCA requires operators of crushed stone and sand and gravel plants to use dust control measures for their operations. The term "fugitive dust" when referring to emissions from aggregate processing, means the dust does not come from a stack, but instead comes from something open to the air such as an unpaved road, wind from a stockpile or material released between conveyors at the transfer points.
3.1 Material Processing and Handling Sources

The majority of the emission sources at the UMA are associated with aggregate material processing or handling. These sources include crushing, screening, conveying, and truck loading and unloading, all with PM/PM$_{10}$ emissions only.

The processing operations from sand and gravel mining and dredging typically include crushing, screening, size classification, material handling, and storage operations. All of these processes can be significant sources of particulate matter, or dust, which is of concern to the regulating agencies and surrounding neighbors. If not controlled properly, the dust emitted by these operations can be carried by the wind into surrounding neighborhoods.

Emissions from conveyors are considered at each drop or transfer point from one conveyor to the next. Wash plant emissions are considered to be zero after the point that the material enters the wet portion of the wash plant. At that point, the material moisture content is sufficiently high to control particulate emissions. Therefore, wash plant sources of this nature are not considered in this analysis.

Required Inputs

The following inputs are required to calculate the annual emission rates for the proposed material processing and handling sources using the AP-42 Section 11.19.2 emission factors:

- Material throughput (tons/yr)
- Emission factor (lb/ton)

AP-42 Methodology

AP-42 Table 11.19.2-2 provides emission factors for crushing, screening, conveying, and truck loading and unloading. The appropriate factors were applied to each activity.

Both controlled and uncontrolled emission factors are presented in AP-42. Typically, equipment processing material with a moisture content greater than 1.5% is considered controlled. The material for the proposed mining area is assumed to be greater than 1.5%; therefore, the controlled emission factors were used in the analysis. The requirements for how to demonstrate a greater than 1.5% moisture content is explained in the MPCA Nonmetallic Mineral Processing Air Emissions General Permit and Technical Support Document (Reference 2).

The annual emissions for material processing and handling sources were calculated in the following manner:

\[
\text{Emission Factor (lb/ton)} \times \text{Annual Throughput (tons/year)} / 2000 \text{ lb/ton} = \text{Annual Emission Rate (ton PM or PM$_{10}$/yr)}.
\]

3.2 Ready-Mix Operations

At this time, it is unknown what material throughput will be for the ready-mix operations. Emission calculations and air dispersion modeling will be conducted as deemed necessary for permitting purposes prior to constructing any such facility.

Required Inputs

The following inputs will be required using AP-42 Section 11.12 emission factors:

- Material throughput (yd$^3$/yr)
- Emission factor (lb/yd$^3$)
AP-42 Methodology

AP-42 Table 11.12-14 provides a total facility ready-mix emission factor for PM and PM$_{10}$. Both uncontrolled and controlled emission factors are presented. It is assumed that the ready-mix plant will have particulate controls, because Minnesota rules require controls on cement silos. The emission factors are per yards of concrete for an average batch formulation at a typical facility. Emissions from the ready-mix operations will be calculated using these total ready-mix emission factors for PM and PM$_{10}$ from AP-42 for a central mix facility.

3.3 Asphalt Operations

At this time, it is unknown what material throughput will be for the asphalt operations. Emission calculations and air dispersion modeling will be conducted as deemed necessary for permitting purposes prior to constructing any such facility.

Required Inputs
The following inputs will be required using AP-42 Section 11.1 emission factors:

- Material throughput (tons/year)
- Emission factor (lb/ton)

AP-42 Methodology

Ap-42 Section 11.1, Hot Mix Asphalt Plants, provides emission factors for PM, PM$_{10}$, NO$_x$, SO$_2$, CO and VOC for drum mix plants. These emission factors will be used to calculate emissions from the proposed plant. It is assumed that the asphalt plant will have fabric filters for particulate control. Fabric filter controls are the standard for the industry. Therefore, controlled emission factors for PM and PM$_{10}$ will be used in future calculations.

3.4 Unpaved Internal Haul Roads

Haul roads in the UMA will consist of unpaved haul roads. It is assumed that no haul roads will be paved at the proposed site. The haul roads considered are only those for moving final product out of each facility for transport off site. All on-site movement of raw material is assumed to be transported by conveyor.

The emission rates for the unpaved haul roads were computed using AP-42 Section 13.2.2 (11/06) Unpaved Road Equation (Equation 1a) (11/06). This equation is outlined below along with a list of the required inputs and an example of the equation.

Required Inputs
The following inputs are required to calculate the emission rate for haul roads using the AP-42 Section 13.2.2 Unpaved Road Equation:

- Surface Material Silt Content (Ap-42 default values available)
- Mean Vehicle Weight
- Particle Size Multiplier
- Distance Traveled
- Days per year with at least 0.01 inch precipitation

AP-42 Unpaved Haul Road Equation

The unpaved road equation used to calculate the UMA unpaved haul road emissions is provided below.

Unpaved Road PM10 Emission Factor:
E = k (s/12)a(W/3)b[(365 – P)/365]

Where:

E = Emission Factor (lb/Vehicle Miles Traveled (VMT))
k = Particle Size Multiplier (lb/VMT) = 4.9 for PM emissions and 1.5 for PM10 emissions
s = Silt Content (%) = 4.8%
W = Mean Vehicle Weight (tons)
a = Empirical Constant = 0.7 for PM emissions and 0.9 for PM10 emissions
b = Empirical Constant = 0.45 for PM and PM10 emissions
P = Days per year with at least 0.01 inch precipitation (i.e. “wet days”)

For the above equation, k, a, and b are default values and were obtained from AP-42 Table 13.2.2-2. The UMA road silt content value was obtained from AP-42 table 13.2.2-1, Sand and Gravel Processing Plant Road category.

The amount of natural moisture occurring during operation can be considered. This is done by assuming that annual average emissions are inversely proportional to the number of days with measurable (more than 0.01 inch) precipitation. This is consistent with EPA methodology. The number of “wet days” used in this analysis was taken from the National Oceanic and Atmospheric Administration – Comparative Climate Data through 2008.

The unpaved haul road equation provides an emission factor in lbs/VMT. The annual emission rate from vehicle activity was then found by multiplying the resulting emission factor by the vehicle miles traveled each year for each operation at the proposed mining area. The vehicle miles traveled per year were based on the material throughput, the truck capacities and roundtrip length of the trucking route.

Haul road control efficiencies were assumed in the haul road emission calculations for the proposed mining area. Because water will be used as dust suppression, 50% control efficiency was used for this analysis.

3.5 Storage Pile Wind Erosion

The proposed mining area will have product storage piles throughout the property. The emissions from a storage pile are created by wind traveling over the pile, releasing dust and particulate into the air. The emissions from the storage pile are a continuous activity, because they are not based on a specific handling activity, but rather atmospheric conditions, such as high winds. Therefore, the emissions will occur 24 hours per day and will be present year-round.

The storage pile emissions are calculated using an emission factor from the MPCA guidance (MPCA Air Dispersion Modeling Guidance for Minnesota Title V Modeling Requirements and Federal Prevention of Significant Deterioration (PSD) Requirements (Version 2.2), October 20, 2004 (Reference 1)).

Required Inputs

The following input was required to calculate the emission rate for the UMA storage piles using the MPCA storage pile emission factor:

- Storage pile footprint (acres)

MPCA Emission Calculation Methodology

The MPCA storage pile emission factor is 1.0 tons of PM or PM10/acre – year
The emission factor assumes that PM$_{10}$ emissions are equal to PM emissions. The storage pile emission rate is then calculated by multiplying the MPCA emission factor by the storage area (in acres).

3.6 Backup Power Generators

At this time, it is assumed that no fuel-burning generators will be used at the UMA.

Required Inputs

The following inputs will be used to calculate the emission rate for any future generators using the AP-42 Section 3.3, Gasoline and Diesel Industrial Engines:

- Generator size (kW, horsepower (hp) or MMBtu/hr)
- Fuel type (Diesel, Natural Gas, etc.)
- Sulfur content (only required for fuel oil)

AP-42 Methodology

As stated above, AP-42 Section 3.3, Gasoline and Diesel Industrial Engines, emission factors will be used, if needed, to compute the generator emission rates. This section is applicable for all diesel generators less than 600 hp.

4.0 Emission Calculations Summary

Appendix A demonstrates the results of the particulate emissions predicted at the UMA. Emissions have not been calculated for any fuel-burning equipment, because the equipment and/or throughputs are unknown at this time. The summary of emissions shows material handling to be estimated at 68 tons per year of PM and 26 tons per year of PM$_{10}$. The haul road emissions will be dependent on the percent control agreed upon between the MPCA and Dakota Aggregates, LLC. With no controls, the haul road emissions are estimated at 168 tons per year of PM and 43 tons per year of PM$_{10}$. For 50% control, the emissions are half of the uncontrolled emissions for PM and PM$_{10}$, 84 tons per year and 21 tons per year, respectively. For 75% control, the emissions are 25% of the uncontrolled emissions for PM and PM$_{10}$, 42 tons per year and 11 tons per year, respectively. The appropriate emission calculations and permit applications will be completed, as necessary, if and/or when the equipment is deemed necessary for operations.

5.0 Mitigation Options

5.1 Aggregate Processing and Handling Emissions

Minnesota Rule 7011.0150 reads, “No person shall cause or permit the handling, use, transporting, or storage of any material in a manner which may allow avoidable amounts of particulate matter to become airborne. No person shall cause or permit a building or its appurtenances or a road, or a driveway, or an open area to be constructed, used, repaired, or demolished without applying all such reasonable measures as may be required to prevent particulate matter from becoming airborne. All persons shall take reasonable precautions to prevent the discharge of visible fugitive dust emissions beyond the lot line of the property on which the emissions originate.” Some federal regulations also limit the visible thickness of dust plumes (a term called opacity) and the amount of time emissions can be seen by the naked eye.

Mitigation of dust emissions from aggregate processing and handling operations includes two basic options – reducing the number of processing and/or handling operations, and apply dust control. The numbers used in this analysis are a worst case estimate. They assume a
maximum production and a maximum number of pieces of equipment and further assume 100% of the material passes through every operation.

There are a number of dust control techniques that will be applied within each of the on-site mining facilities, including general operational techniques and specific applications:

- Use of conveyors for transport of all raw material onsite to limit the number of internal truck trips.
- Seed graded areas to provide cover during interim operations and/or to stabilize overburden soils.
- Use of water to minimize fugitive dust emissions.

These dust control techniques will reduce the particulate matter from the proposed mining operations.

5.2 Internal Haul Road Emissions

As shown in Appendix A, the haul roads contribute to a majority of the total projected emissions. This is typical of such operations. With respect to internal haul roads, there are two basic mitigation options: shorten the length of haul roads, and/or apply dust control. The haul road distances at this time are estimates, but on average, are believed to be a half mile or less round trip. Any reduction in haul road distances will significantly reduce the haul road emissions.

Two control efficiencies, 50 and 75 percent, were provided in the calculations found in Appendix A to demonstrate the difference in overall emission totals and available control options. Requirements for achieving 50 and 75 percent control efficiencies can be found in the MPCA Nonmetallic Mineral Processing Air Emissions General Permit and Technical Support Document (Reference 2).

Typical unpaved haul road controls include:

- Wet suppression
- Chemical Stabilization
- Reduction of silt content by gravel surface application

It is assumed that the operations in the proposed mining area will apply wet suppression (water application) to the unpaved haul roads. Water application keeps the road surface wet to control emissions. The control efficiency of unpaved road watering depends on: 1) the amount of water applied per unit area of road surface, 2) the time between reapplications, 3) traffic volume during that period, and 4) prevailing meteorological conditions during the period.

6.0 Applicable Regulations

6.1 MPCA Permitting Requirements

The MPCA requires that facilities have air emissions permit(s) based on the type and size of operations. The MPCA requirements base the permit decision on the ‘potential to emit’ of pollutants. That requires sources of all types to assume that operations occur 24 hours per day, 365 days per year regardless of any local restrictions. Also, for this determination, no controls can be considered. This basis is only for the initial determination of whether or not a
permit is needed. Once that decision is made, controls and limits can be considered in permitting documents as appropriate.

MPCA permit requirement thresholds for particulate matter are as follows:

- \( PM = 100 \text{ tons/yr} \)
- \( PM_{10} = 25 \text{ tons/year} \)

Based on the assumptions in this analysis and calculations assuming 0% control for fugitive dust emissions, the UMA will likely be required to obtain a permit. The applicable permit will have to be obtained from the MPCA prior to commencing construction or operation at the site. The permit may be a site specific permit or a Non-Metallic Mineral Processing General Permit, depending on eligibility requirements. The permit issued will need to reflect the final agreed upon control requirements for the internal haul roads. The general permit does include requirements for either 50% or 75% control credit for haul roads.

Asphalt operations in the state of Minnesota are primarily covered under the MPCA’s Registration Permit system. This is available for facilities having less than 50 and 12.5 tons per year of PM and PM\(_{10}\), respectively. If the facility is not eligible for a Registration Permit, a site specific permit may be issued instead.

Ready mix operations in Minnesota that produce less than 300,000 tons per year without haul road controls or less than 360,000 tons per year with haul road controls, are exempt from permitting requirements under Minnesota Rules 7008.2200. That rule contains various recordkeeping, reporting and monitoring requirements that a company must comply with in order to be eligible for the permitting exemption.

6.2 Applicable State and Federal Requirements

The processing equipment (crushers, screens, conveyors) at the proposed mining site will likely be subject to a US EPA New Source Performance Standard (NSPS). That standard is 40 CFR Part 60, Subpart OOO – Standards of Performance for Nonmetallic Mineral Processing Plants. The applicability will vary with the particular equipment used. Equipment constructed, reconstructed or modified after August 31, 1983 is subject to the NSPS. The rule sets opacity limits for dust emissions from the equipment. Opacity is the amount of obstruction of light transmittance caused by a plume of dust or gases. Opacity is used as a limit in cases where emissions are not from a well defined stack, which is the case for these types of operations. The addition of water is generally used to control emissions to meet these requirements.

Haul Roads and Storage Piles

Fugitive dust from haul roads and storage piles is controlled by Minnesota Rule 7011.0151. This rule requires that reasonable measures to control fugitive dust be taken.

Power Generators

Power generators, if deemed necessary for operations, will be subject to Minnesota Rule 7011.2300 and may also be subject to future federal rules on engines. The final determination will depend on the type and size of the unit.

Asphalt Operations

Asphalt production is subject to federal NSPS, 40 CFR Part 60, Subpart I. That regulates particulate emissions and opacity.
Asphalt operations are also subject to state requirements in Minnesota Rules 7011.0900 – 7011.0922. These rules address various testing, and monitoring and operational requirements.

**Ready Mix**

Ready mix operations are subject to state requirement in Minnesota Rules 7011.0850-7011.0859. These rules require controls on cement silos as well as other miscellaneous requirements.

### 7.0 Conclusions

The emission calculations for the proposed project show results typically expected for these types of operations. The pollutant of concern is particulate (PM and PM₁₀) with the largest emission contributor being fugitive dust.

Haul road fugitive dust is the air quality impact most likely to be experienced by nearby residents. Haul road fugitive dust is typically controlled with water suppression or similar techniques discussed in Section 5.2. With adequate dust suppression, operations should not result in significant negative impacts on nearby residents.

With adequate moisture content in the aggregate, operations should be able to meet the federal applicable requirements for aggregate operations discussed in Section 6.2.

The calculations show that the operations (other than any exempt concrete batching operations) will require permitting by the MPCA, with the applicable permit options as discussed in Section 6.1. That permit will invoke the applicable requirements discussed in 6.0.

### 8.0 References


Appendix A

Emission Calculations

Summary of Total Emissions
Unpaved Haul Roads
Stockpiles
Material Processing & Handling
Air Quality Impact Study for UMore Park Sand and Gravel Resources
Summary of Total Emissions

Haul Road Emission Calculations
Total Actual Emissions with Haul Roads @ 0% Control

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Haul Roads</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM (tons/year)</td>
<td>168</td>
</tr>
<tr>
<td>PM$_{10}$ (tons/year)</td>
<td>43</td>
</tr>
</tbody>
</table>

Total Actual Emissions with Haul Roads @ 50% Control

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Haul Roads</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM (tons/year)</td>
<td>84</td>
</tr>
<tr>
<td>PM$_{10}$ (tons/year)</td>
<td>21</td>
</tr>
</tbody>
</table>

Total Actual Emissions with Haul Roads @ 75% Control

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Haul Roads</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM (tons/year)</td>
<td>42</td>
</tr>
<tr>
<td>PM$_{10}$ (tons/year)</td>
<td>11</td>
</tr>
</tbody>
</table>

Material Processing & Handling & Stockpile Emissions
Total Facility Potential to Emit

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Material Processing &amp; Handling</th>
<th>Stockpiles</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM (tons/year)</td>
<td>52</td>
<td>16</td>
<td>68</td>
</tr>
<tr>
<td>PM$_{10}$ (tons/year)</td>
<td>18</td>
<td>8</td>
<td>26</td>
</tr>
</tbody>
</table>
### Calculations for Unpaved Haul Roads

#### Emissions Calculations with 0% Control

<table>
<thead>
<tr>
<th>Process</th>
<th>Pollutant</th>
<th>Emission Factor</th>
<th>Emission Factor Units</th>
<th>Source of Emission Factor</th>
<th>Potential Uncontrolled Emissions (tons/year)</th>
<th>Control Efficiency</th>
<th>Potential Uncontrolled Emissions (Tons/Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haul Road</td>
<td>PM</td>
<td>4.38</td>
<td>lb/vmt</td>
<td>AP-42</td>
<td>168</td>
<td>0</td>
<td>168</td>
</tr>
<tr>
<td>Haul Road</td>
<td>PMₐ₁₀</td>
<td>1.12</td>
<td>lb/vmt</td>
<td>AP-42</td>
<td>43</td>
<td>0</td>
<td>43</td>
</tr>
</tbody>
</table>

#### Emissions Calculations with 50% Control

<table>
<thead>
<tr>
<th>Process</th>
<th>Pollutant</th>
<th>Emission Factor</th>
<th>Emission Factor Units</th>
<th>Source of Emission Factor</th>
<th>Potential Uncontrolled Emissions (tons/year)</th>
<th>Control Efficiency</th>
<th>Potential Uncontrolled Emissions (Tons/Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haul Road*</td>
<td>PM</td>
<td>4.38</td>
<td>lb/vmt</td>
<td>AP-42</td>
<td>168</td>
<td>50</td>
<td>84</td>
</tr>
<tr>
<td>Haul Road</td>
<td>PMₐ₁₀</td>
<td>1.12</td>
<td>lb/vmt</td>
<td>AP-42</td>
<td>43</td>
<td>50</td>
<td>21</td>
</tr>
</tbody>
</table>

#### Emissions Calculations with 75% Control

<table>
<thead>
<tr>
<th>Process</th>
<th>Pollutant</th>
<th>Emission Factor</th>
<th>Emission Factor Units</th>
<th>Source of Emission Factor</th>
<th>Potential Uncontrolled Emissions (tons/year)</th>
<th>Control Efficiency</th>
<th>Potential Uncontrolled Emissions (Tons/Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haul Road</td>
<td>PM</td>
<td>4.38</td>
<td>lb/vmt</td>
<td>AP-42</td>
<td>168</td>
<td>75</td>
<td>11</td>
</tr>
<tr>
<td>Haul Road</td>
<td>PMₐ₁₀</td>
<td>1.12</td>
<td>lb/vmt</td>
<td>AP-42</td>
<td>43</td>
<td>75</td>
<td>11</td>
</tr>
</tbody>
</table>

VMT = vehicle miles traveled

*Example Calculations:

\[
\text{Potential Uncontrolled Emissions} = \text{emission factor (lb/VMT)} \times \text{potential one-way trips/year} \times \text{length of haul road (VMT)} / 2000 \text{ lbs/ton}
\]

\[
= 4.40 \text{ lb/VMT} \times 153,486 \text{ trips/year} \times 0.5 \text{ miles} \times 2000 \text{ lbs/ton}
\]

\[
= 168 \text{ tons/year}
\]

\[
\text{Potential Controlled Emissions} = \text{potential uncontrolled emissions} \times \left(1 - \frac{\text{control efficiency}}{100}\right)
\]

\[
= 168 \text{ tons/year} \times \left(1 - \frac{50}{100}\right)
\]

\[
= 84 \text{ tons/year}
\]

Note:
Control efficiency criteria (0%, 50%, 75%) can be found in MPCA's Nonmetallic Mineral Processing Air Emission General Permit - Table A.3.
### Wind Erosion of Stockpiles

<table>
<thead>
<tr>
<th>Silt Content of Material (s):</th>
<th>3.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of days with &gt; 0.01 inches of precipitation (p):</td>
<td>111</td>
</tr>
<tr>
<td>Percent of time wind speeds exceed 12 mph @ mean pile height (f):</td>
<td>30</td>
</tr>
<tr>
<td>Number of days the pile is present (d):</td>
<td>365</td>
</tr>
<tr>
<td>Acres of pile base (a):</td>
<td>9.0</td>
</tr>
</tbody>
</table>

\[ d^{\text{acre}} (d^{\text{a}}): = 365 \text{ days} \times 9.0 \text{ acres} \]

### Emissions

#### EMISSIONS CALCULATIONS

<table>
<thead>
<tr>
<th>Process</th>
<th>Pollutant</th>
<th>Emission Factor</th>
<th>Emission Factor Units</th>
<th>d^{\text{acre}}</th>
<th>Potential Emissions (tons/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stockpiles*</td>
<td>PM</td>
<td>9.6</td>
<td>lb/d/acre</td>
<td>3,285</td>
<td>16</td>
</tr>
<tr>
<td>Stockpiles</td>
<td>PM_{10}</td>
<td>4.8</td>
<td>lb/d/acre</td>
<td>3,285</td>
<td>7.8</td>
</tr>
</tbody>
</table>

\[ \text{Potential and Actual Emissions} = \frac{(\text{emission factor (lb/d/acre)} \times d^{\text{acre}})}{2000 \text{ lbs/ton}} \]

*Example Calculations:

\[ (9.6 \text{ lb/d/acre} \times 3,285) / 2000 \text{ lbs/ton} = 16 \text{ tons/year} \]
Air Quality Impact Study for UMore Park Sand and Gravel Resources Project

Material Processing & Handling

<table>
<thead>
<tr>
<th>Process</th>
<th>Emission Factor</th>
<th>Potential Emissions (tons/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crushing</td>
<td></td>
<td>4.0</td>
</tr>
<tr>
<td>Screening</td>
<td></td>
<td>3.5</td>
</tr>
<tr>
<td>Conveying</td>
<td></td>
<td>2.6</td>
</tr>
<tr>
<td>Truck Unloading/Loading</td>
<td></td>
<td>0.8</td>
</tr>
</tbody>
</table>

*Note: Emission factors for Material Processing & Handling Potential to Emit were taken from the MPCA's Sand & Gravel Emission Calcs.xls spreadsheet on the MPCA Website at http://www.pca.state.mn.us/programs/sbeap-resources.html. Emission factors used are "controlled" factors, because Minnesota Rule 7011.0150 prevents the handling, use, transporting or storage of any material in a manner which may allow avoidable amounts of PM to become airborne. Additionally, No person shall cause or permit a building or its appurtenances or a road, or a driveway, or an open area to be constructed, used, repaired, or demolished without applying all such reasonable measures as may be required to prevent particulate matter from becoming airborne. All persons shall take reasonable precautions to prevent the discharge of visible fugitive dust emissions beyond the lot line of the property on which the emissions originate.*