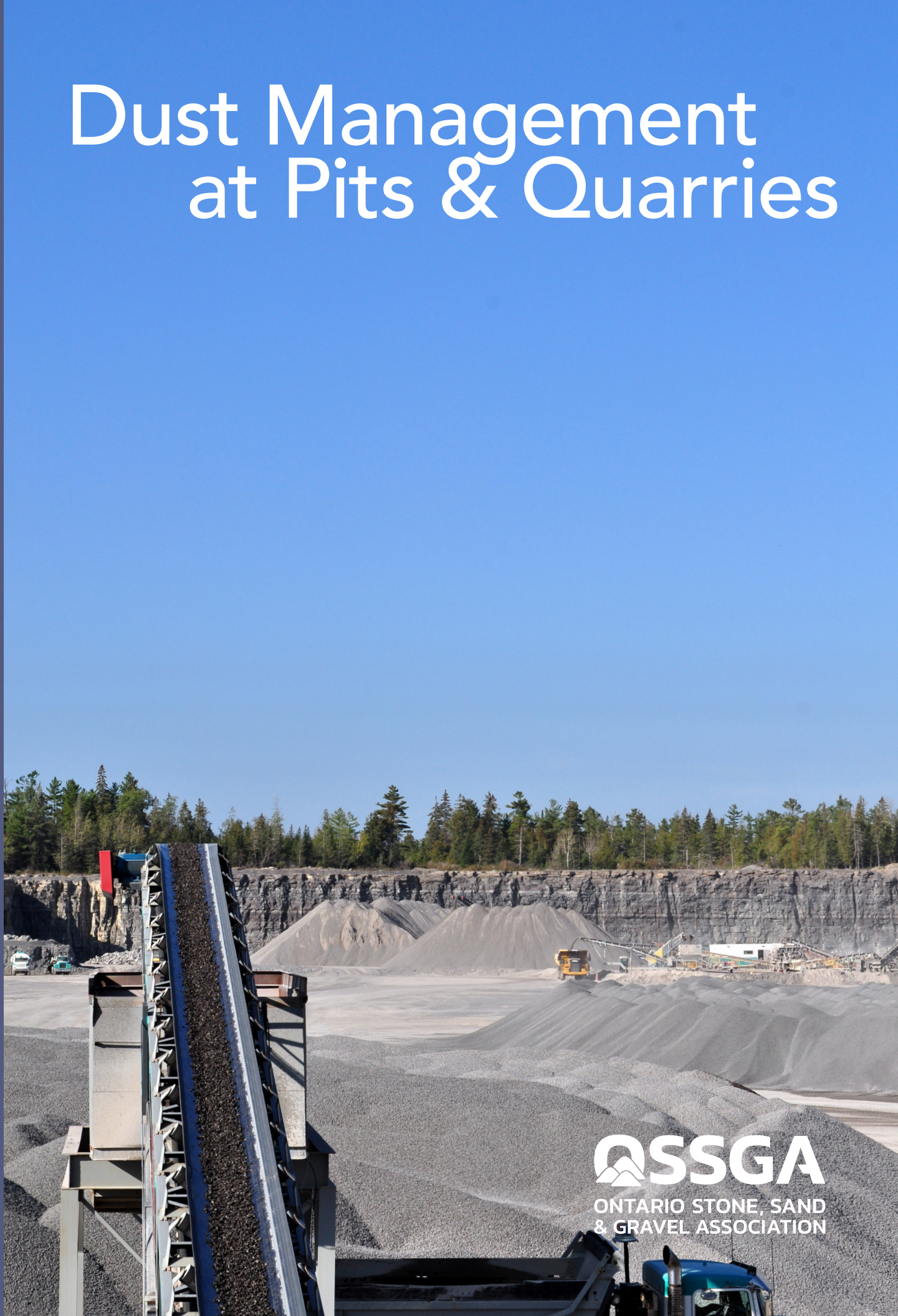
Dust Management at Pits & Quarries

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The aggregate industry is committed to providing and promoting a safe and healthy environment for its workers and neighbours. This includes the proper monitoring and mitigation of fugitive dust emissions on site.

WHAT IS DUST?

Suspended particulate matter (SPM) or "dust" refers to the particles, of varying sizes, in the air we breathe. It is naturally present but can be increased due to aggregate related activities. SPM is measured in micrometres.

There are three main groupings of particulate matter. Particulate matter with a diameter of less than 44 microns (µm), often referred to as Total Suspended Particulate (TSP), is small enough to remain suspended in air, and can cause reduced visibility.

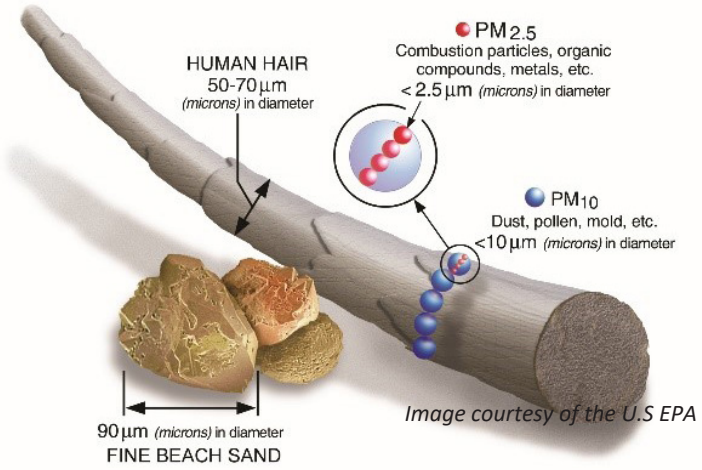


Image courtesy of the U.S EPA

Particles with a diameter of 10 µm or less (PM_{10}) can be generated by a range of natural and anthropogenic processes, including vehicles moving on paved and unpaved surfaces, combustion, construction activities, mining and mineral processing, landfill operations, agricultural activities, industrial facilities and windblown dust from open lands. Particles with a diameter of less than 2.5 µm ($PM_{2.5}$) are generated primarily through combustion processes and as a result of chemical reactions in the atmosphere. They may be generated by aggregate operations alongside other industrial activities. $PM_{2.5}$ may be of greater health concern than larger particles.

REGULATIONS AND LEGISLATION

There are provincial and federal air quality standards/criteria for dust. Provincially, Ontario Regulation 419/05 – *Air Pollution and Local Air Quality*, applies to every aggregate site in Ontario, regardless of whether the site requires an Environmental Compliance Approval, and sets benchmarks for TSP and PM_{10} to ensure dust at a site is within acceptable levels. Federally, the Canadian Ambient Air Quality Standards also sets benchmarks for $PM_{2.5}$.

Before a licence for a pit or quarry is approved under the Aggregate Resources Act (ARA), site plans must include requirements for managing and mitigating fugitive dust on site. The Provincial Standards under the ARA require that producers must:

- Mitigate dust on site.The licensee or permittee shall apply water or another provincially approved dust suppressant to internal haul roads and processing areas, as necessary to mitigate dust, if the pit or quarry is located within 1,000 metres of a sensitive receptor.
- The licensee or permittee shall equip any processing equipment that creates dust with dust suppressing or collection devices if it is located within 300 metres of a sensitive receptor.
- The licensee or permittee shall obtain an environmental compliance approval under the Environmental Protection Act where required to carry out operations at the pit or quarry.

A Fugitive Dust Best Management Practices Plan (BMPP) may be required as a condition of the ARA licence, as a condition of an Environmental Compliance Approval (ECA) or by an order from the Ministry of Environment, Conservation and Parks (MECP). An ECA is required if the facility operates a permanent processing plant, if portable plants are operated on site for more than a defined period or if portable plants are not located below grade, in accordance with O. Reg. 524/98.



SOURCES OF DUST

The amount of dust generated will be dependent on the type of material on site, weather conditions (wind and precipitation) and the controls in place at site. Typically, aggregate activities generate larger particulate matter but smaller particles (particularly those less than 44 µm in size) will travel longer distances and cause greater impacts than larger particles.

Dust may be generated through site preparation and rehabilitation activities, various processing activities (drilling, blasting, crushing, screening and sorting), material movement (hauling, loading/unloading, conveyors), wind erosion of storage piles and exposed areas, as well as the movement of vehicles on paved and unpaved roadways.





MINIMIZING DUST FROM AGGREGATE OPERATIONS

Aggregate producers are required to manage dust through their site licence, BMPP and relevant legislation. To do so, producers first identify and characterize the sources of dust at their site, implement control measures, and monitor and maintain these control measures. Operational plans and equipment are designed to reduce impacts to air quality for workers and neighbours. Additionally, education, awareness and training of staff on dust prevention, control measures, monitoring and reporting are important in reducing dust emissions at an aggregate operation.

Dust is managed on site through a variety of potential control measures. Reducing visible dust emissions at an aggregate operation has the added benefit of also reducing emissions of smaller particle sizes, including those invisible to the naked eye. Different control methods vary in effectiveness at controlling different particle sizes, but all control methods provide a benefit. Implementing a layered system of control methods is often the most successful approach. The exact combination of measures required at a site can vary widely, and depends on production and shipping rates, size of the site and distance to neighbouring residents. Examples of potential control measures can include:

- Proper housekeeping (removing dust particles before becoming airborne).
- Applying an approved dust suppressant (such as calcium chloride or magnesium chloride) to internal haul roads.
- Spraying, washing, vacuum sweeping and / or paving of haul roads, parking areas, site entrances and exits.
- Regular washing of extraction, processing and transport equipment (cleaning of the bed and wheels).
- Reducing haul trips (if possible) and limiting speeds on unpaved roads.
- Wetting material prior to processing or loading.
- Covering stock piles, conveyor belts and loads in trucks.
- Locating stock piles in locations that limit their exposure to wind (away from the prevailing downwind), below the level of the windbreak, avoiding tall conical shapes.
- Installing enclosures (i.e. silos, bunkers or hoppers) for very fine material.
- Constructing/installing barriers, wind screens or berms (cement or vegetation) to reduce windblown dust.
- Scheduling loading/unloading and blasting activities on days when there is less wind and restricting operations when the wind is blowing towards neighbours.
- Proper loading of trucks (ensuring there is sufficient freeboard).
- Regular spraying and clean up of conveyors; lowering the drop distances at transfer points.
- Re-vegetating disturbed areas as soon as possible to reduce erosion and minimize fugitive dust emissions.
- Enclosing on-site manufacturing or processing operations.



MONITORING DUST

Aggregate producers monitor their dust emissions through regular visual site inspections. This, coupled with regular weather monitoring (to determine the frequency of watering required based on temperature and relative humidity), ensures that control measures are working effectively to minimize fugitive dust emissions.

Usually, dust emissions from storage piles and road ways is not a concern but in some cases, some sites may be required to analyze fugitive dust sources by sampling road dust and storage piles. In some cases, aggregate sites may conduct ambient air quality monitoring for dust. This may be done as a condition of the ARA licence, as a voluntary measure to gauge the effectiveness of controls or in response to concerns raised by the community. While uncommon, this information can also be very effective in evaluating the performance of the dust control measures implemented at the site. If monitoring is to be undertaken, it is critical that a plan be developed with suitable experts to ensure that the data obtained from the program are valid.



INDUSTRY INITIATIVES AND COMMUNITY RELATIONS

Pit and quarry owners recognize that dust is an important issue of concern for the public, stakeholders and their neighbours, which is why they work closely with the community on this matter. For example, some producers have Community Advisory Panels to keep local community members informed about dust emissions.

The aggregate industry also continuously works towards minimizing fugitive dust emissions through the adoption of new and improved technologies. Utilizing new street sweep systems that can be operated through the winter months is one example of how aggregate producers lower dust emissions and minimize impacts even further.

DID YOU KNOW?

1 Total Suspended Particles (TSP) are less than half the width of a human hair.

2 The majority of dust generated from an aggregate site are coarse particles that arise from the disturbance of rock, soil, gravel and by the movement of vehicles and equipment.

3 Many aggregate company staff members are trained and educated on dust prevention, control measures, monitoring and reporting necessary to reduce dust emissions on site

4 Many aggregate companies have Community Advisory Panels to keep local community member informed about dust emissions, blasts, the amount of explosives used and the results of the monitoring.





REFERENCES

- The Ministry of the Environment, Conservation and Parks Technical Guidance: Management practices for industrial fugitive dust sources - https://www.ontario.ca/page/technical-bulletin-management-approaches-industrial-fugi-tive-dust-sources
- OSSGA Environmental Management Guide for Pits and Quarries (revised in 2016), which includes recommended Best Management Practices for Dust Control and Atmospheric Emissions - www.ossga.com
- MECP Guideline A-10: Procedure for Preparing an Emission Summary and Dispersion Modelling (ESDM) Report - https://www.ontario.ca/docu-ment/guideline-10-procedure-preparing-emission-summary-and-dispersion-modelling-esdm-report-0
- O. Reg. 419/05: Air Pollution - Local Air Quality - https://www.ontario.ca/laws/regulation/050419
- Ontario's Ambient Air Quality Criteria - https://www.ontario.ca/page/ontarios-ambient-air-quality-criteria-sorted-con-taminant-name#section-0
- O. Reg. 524/98: Environmental Compliance Approvals - Exemptions from Section 9 of the Act - https://www.ontario.ca/laws/regulation/980524

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