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Building Nunavut Together
Nunavuliuqatigiingniq
Bâtir le Nunavut ensemble

ENVIRONMENTAL GUIDELINE

Dust Suppressants

This Guideline has been prepared by the Department of Environment's Environmental Protection Division and approved by the Minister of Environment under the authority of Section 2.2 of the Environmental Protection Act.

This Guideline is not an official statement of the law and is provided for guidance only. Its intent is to serve as an introduction to best management practices to reduce dust levels from unpaved roads on Commissioner's land, and to increase awareness and understanding of the characteristics, benefits and hazards associated with commonly used dust suppressants. This Guideline does not replace the need for the owner or person in charge, management, or control of dust suppression to comply with all applicable legislation and to consult with Nunavut's Department of Environment, other regulatory authorities, and qualified persons with expertise in the control of dust from unpaved roads.

Copies of this Guideline are available upon request from:

Department of Environment Government of Nunavut
P.O. Box 1000, Station 1360, Iqaluit, NU, X0A 0H0
867-975-7700

An electronic version of this Guideline is available at www.gov.nu.ca/environment/

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1 List of Acronyms and Units

Acronym	Definition
ENV	Department of Environment, Government of Nunavut
EPA	Environmental Protection Act (1988)
SDS	Safety Data Sheet, also Materials Safety Data Sheet (MSDS)
SOP	Standard Operating Procedures
TCLP	Toxicity Characteristic Leaching Procedure
WHMIS	Workplace Hazardous Materials Information System

Units	Description
µg	Microgram (1/1,000,000 gram)
mg	Milligram (1/1,000 gram)
Kg	Kilogram (1,000 grams)
L	Litre
ppm	Parts per million
ppb	Parts per billion
mg/L	Milligrams per litre (ppm)
mg/kg	Milligrams per kilogram (ppm)
µg/L	Micrograms per litre (ppb)

2 Introduction

When used in accordance with manufacturers' instructions, dust suppressants can lower the environmental, health and safety impacts associated with road dust. Numerous products and techniques are available to reduce dust conditions and preserve road surfaces.

This Guideline provides information on the dust suppressants approved for use in Nunavut by the Government of Nunavut Department of Environment (ENV) and the way they should be used to limit impacts on the environment.

While this Guideline may be a useful reference for a variety of dust-generating commercial and industrial activities in Nunavut, it is intended as an introduction to best management practices to reduce dust levels from unpaved roads on Commissioner's land, and to increase awareness and understanding of the characteristics, benefits and hazards associated with commonly used dust suppressants. Industrial operations outside of Commissioner's lands may require different approaches and recommendations.

For further information and guidance, the owner or person in charge, management or control of dust suppression is encouraged to review all applicable legislation and consult the Department of Environment, other regulatory agencies or qualified persons with expertise in the control of dust from unpaved roads.

3 Roles and Responsibilities

3.1 Owners and Applicators of Dust Suppressants

Owners or persons in charge, management, or control of a chemical dust suppressant, must ensure the chemical is properly and safely managed from the time it is purchased until its final use or disposal.

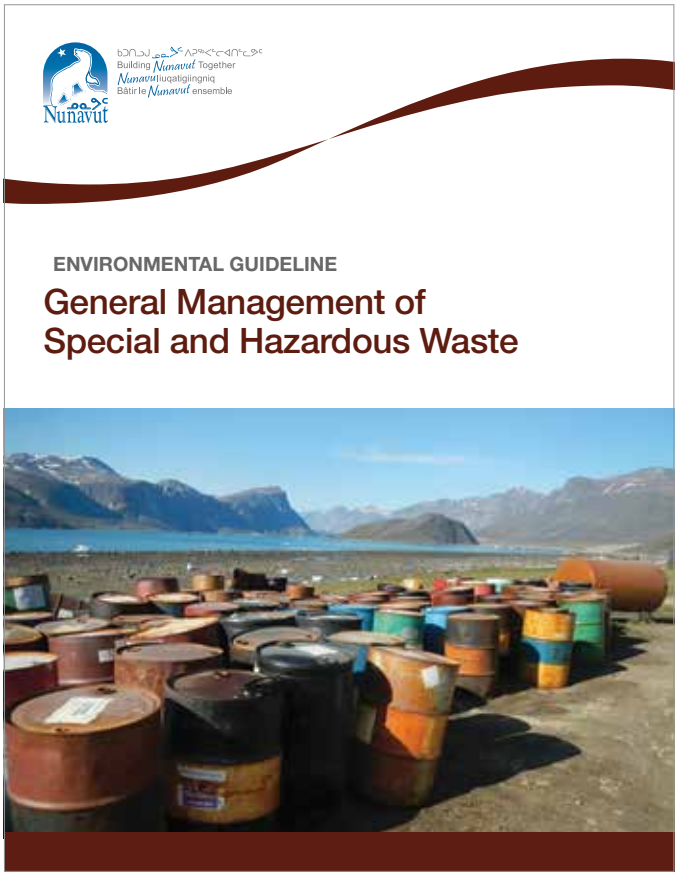
Contractors may manage and apply dust suppressants on behalf of the owner. However, the owner remains liable for ensuring the contractor complies with all applicable statutes, regulations, standards, guidelines, and community by-laws. Dust suppressant chemicals that are misused or spilled are **Contaminants** under the *Environmental Protection Act (EPA)* (1988). If the contractor does not comply with the requirements of the *EPA* and is charged with a violation while managing or applying the dust suppressant, the owner may also be charged.

If a dust suppressant becomes contaminated, expires, or otherwise becomes unsuitable for its intended purpose, it may become a **Special Waste**. Information on the management of **Special Waste** can be found in the Environmental Guideline for *General Management of Special and Hazardous Waste,* also from the Department of Environment.

Application of **Approved Suppressants** listed in this Guideline (Section 5.5) does not require a permit from the ENV. If another product is to be used, an application has to be made to the ENV for approval (Section 6).

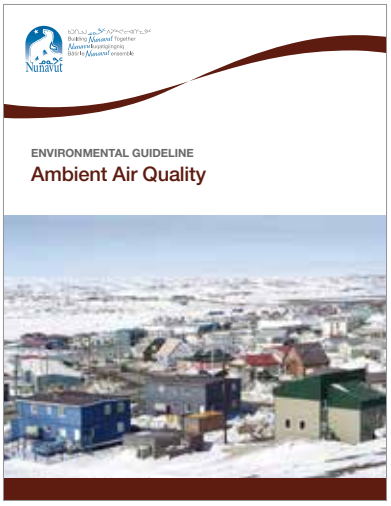
Both the owner and applicator of the dust suppressant must ensure that the product is an **Approved Suppressant** and is being properly applied.

If the product leaves the roadway and is deemed to violate the *EPA*, the person(s) responsible may be required to take appropriate remedial measures.



3.2 Department of Environment

The Department of Environment (ENV) is responsible for enforcing the *EPA*, which prohibits the discharge of **Contaminants** to the environment.



The Environmental Guideline for *Ambient Air Quality* sets standards for maximum levels of dust in ambient air. The standard for **Fine Particulate Matter** measured over a 24-hour period is 30 micrograms per cubic meter (µg/m3) while the standard for **Total Suspended Particulates** measured over a 24-hour period is 120 µg/m3. These standards apply to the whole of Nunavut. They are used to assess the impact that dust levels may have on the environment, facilitate regional air quality management planning, and establish benchmarks for reporting on the state of air quality.

3.3 Workers' Safety and Compensation Commission

The Workers' Safety and Compensation Commission derives its authority from the *Workers' Compensation Act* (1988) and the *Safety Act* (1988). The Commission is responsible for promoting and regulating worker and workplace health and safety in Nunavut. The laws above require an employer to maintain a safe workplace and ensure the safety and wellbeing of workers. The **Workplace Hazardous Materials Information System (WHMIS)** is used to provide information to workers on the safe use of any hazardous material in the workplace.

4 Why are Dust Suppressants Used?

Reasons for using dust suppressants include:

Safety	Untreated roads may lead to more accidents. Dust makes it hard for drivers to see other cars and people.
Health	Dust particles may harm people's health when dust is inhaled or ingested.
Environmental Protection	Large amounts of dust may damage plants near the road. Dust may also get into waterways, which can harm plants and fish.
Road Maintenance Costs	Treated roads can lower road maintenance costs by reducing gravel loss and the time spent grading the road.
Vehicle Maintenance Costs	Dust can damage vehicles. It clogs air filters and can bind unsealed moving parts.
Unpleasant Effects	Dust can cover areas near roads, affecting those who work and live nearby.

5 Types of Dust Suppressants

5.1 Water

Water is the most commonly used dust control agent. It works by binding fine particles on the road surface together. While water is readily-available, low-cost, and easy to apply, it evaporates quickly and generally controls dust for less than 12 hours.

5.2 Salts

Salts like **Calcium Chloride** and magnesium chloride are the two most commonly used dust suppressants. Of these, only **Calcium Chloride** is approved for use in Nunavut. These products attract water from moisture in the air to keep roads from drying out. This helps form a crusty layer which holds dust on the road surface. Usually, one to two treatments is required each year to maintain effective dust control. Some studies have shown that **Calcium Chloride** is very efficient in northern climates when applied as a water-based solution.[1] Because these products rely on moisture in the air, they may not work as well in communities that have a very dry climate or summer. Salts are not recommended for use outside the immediate vicinity of communities and Commissioner's lands as they attract wildlife. Wildlife may be killed by vehicle traffic on the road as a result.

5.3 Emulsion Products

These include a wide range of natural and synthetic (man-made) materials that bond the soil together like glue. Emulsion products come as a concentrate and are then mixed with water and sprayed on the road surface. Usually, the stronger the compound, the less easily it penetrates the soil. Sometimes, roads are treated with a weaker solution to bind all the soil within a few inches of the surface and then retreated later with a stronger solution that provides greater protection to the surface.[2]

DL-10 is an emulsion product approved for use in Nunavut as a dust suppressant.

5.4 Polymers

Polymers are composed of long-chained molecular structures and bind road particles together to form a semi-rigid film on the road surface. These suppressants are usually more expensive.

EK-35 and DustStop are polymer products approved for use in Nunavut as dust suppressants.

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[1] Edvardsson, K., Gustafsson, A., and Magnusson, R. (2012).

[2] Green Agrochem-Lignin (2009).

5.5 Approved Suppressants

Product	Application	Limitations
Calcium Chloride	Usually one to two treatments are required each year to maintain effective dust control. Must be stored airtight or in buildings with solid floors and protected from wet, humid conditions. Significant heat released when mixed with water. Should be applied in a solution. Available in three forms: flake, pellet and clear liquid.	Calcium Chloride is corrosive to steel and aluminum and may be toxic to aquatic organisms if allowed to enter freshwater lakes, rivers and streams. It is a skin and eye irritant in concentrated form. Skin should immediately be flushed with plenty of water after contact. This type of dust control is normally used for lower traffic areas.
DL-10	DL-10 should be applied to one side of the road at a time and allowed to set for approximately three hours before vehicles travel on the treated surface. A pilot car or road attendants may be required to direct traffic during its application and until it has set.	Treated areas may be visually unappealing, odourous, and very sticky immediately following its application. While fresh DL-10 can be washed off using soap and water, a petroleum-based solvent may be required to clean it if it is allowed to dry.
EK-35	It is applied to the road surface without mixing with any other substance. Weather is not a significant consideration in its application as EK-35 will not wash away with rain. Application to the road surface by sprayer should be in one continuous operation to ensure a consistent finish. Multiple passes may be required to achieve a desired finish. EK-35 can be re-worked (e.g., graded) without re-application.	EK-35 is non-flammable but will burn on prolonged exposure to flame or high temperature. Although toxicity levels are low, eye protection and protective clothing should be provided to workers to minimize skin contact.
Dust Stop	Dust Stop is applied with standard road construction equipment and can be applied topically or mixed into the top layer of the road material. Dust Stop is applied in a solution with water. Traffic should stay off of the road until the product has time to dry (drying time can vary depending on the climatic conditions on the day of application, in many cases this is around 1 hour on a warm day).	Dust Stop is an odourless white to off-white free-flowing powder. While it is nonirritating to eyes and skin, safety glasses and clean body-covering clothing should be worn by workers. Dust Stop is nontoxic except when ingested in relatively large amounts.

6 Using Dust Suppressants

When planning a dust suppression program, the dust suppressant material or technique should be:

- Environmentally safe
- Workable and responsive to maintenance activities
- Reasonably effective at controlling dust
- Relatively harmless to vehicles using the road
- Posing little hazard or inconvenience to users of the road and adjacent residents

Important

The manufacturer's specifications, directions, and other procedures for storage, application, and equipment maintenance related to dust suppression products must be followed at all times. If the manufacturer's directions contradict these general guidelines, refer to the manufacturer's directions. These specifications, directions, and other procedures are available through the product supplier.

Dust-suppressed roads have many benefits for the community

Application Procedures

Notification	The general public or other users of the road should be notified at least 24 hours before any application is scheduled to begin. This notification can be through the use of temporary road signs, public notices, and local media announcements. The local office of the territorial Department of Environment should be provided with information on the dust suppressants to be used, location, and schedule of work.
When to Apply	Most products should not be applied if it is raining or forecast to rain before the product sets or cures.
How to Apply	The road surface should be tested to ensure proper gradation. The dust suppressant should not pool on the surface due to depressions in the road surface or run off the traveled area because of excessive surface slope. If the road surface is tight and penetration of the liquid suppressant is poor, the top one to two inches of road surface should be loosened or scarified before applying the dust suppressant. Application equipment should be accurately calibrated and the suppressant applied evenly across the road surface. The amount of dust suppressant should not exceed the minimum amount required to effectively suppress dust. The dust suppressant should be bladed or incorporated into the road surface immediately following its application. This helps to ensure the product is incorporated into the surface materials and does not migrate off the roadway. It is ideal to keep traffic off the road for up to two hours after application has been completed. Avoid applying dust suppressant when heavy vehicle traffic is expected (e.g., immediately before or after regular office hours). If this is not possible, then only one side of the road should be treated at a time and traffic diverted. This will help to minimize the spreading of dust suppressant by vehicles and protect vehicles from metal corrosion.
Where to Apply	The application must be limited to the roadway or parking lot surface. The material must not migrate or run off the traveled portion of the roadway. Carefully monitor the application rate to ensure adequate coverage is achieved without any runoff of the product. Limit the application of dust suppressants near open bodies of water (e.g., lakes and streams) to prevent runoff or leachate from entering the water. Never apply a dust suppressant to areas of roads that are subject to flooding.
Cleaning of Equipment	The application equipment should be cleaned immediately following use when using chloride salts due to their corrosive nature.
Reworking the Road Surface	Many dust suppressants allow the road surface to be periodically reworked to remove potholes and ruts. Grading should never exceed the depth of the suppressant to avoid its dilution with untreated gravel and sand.
Test Sections	It is sometimes difficult to predict what level of performance will be achieved through the use of a dust suppressant. It is advisable to test the suppressant on a small portion of the road when the product is being applied for the first time.

7 Approval of New Dust Suppressants

Dust suppressants may only be used on Commissioner's Land if they are **Approved Suppressants** listed in Section 5.5. Dust suppressants may also be approved through the setting of terms and conditions in plans, permits and licenses issued by the Nunavut Water Board, Nunavut Impact Review Board or a Designated Inuit Organization responsible for land administration.

To enable new dust suppressants to be assessed, specific information should be provided to the Environmental Protection Division of the Department of Environment no later than 90 calendar days before the dust suppression program is scheduled to begin.

Information Requirements

Product Information	Manufacturer's product information (including toxicity and solubility) and Safety Data Sheet (SDS)
Procedures	Manufacturer's Standard Operating Procedures (SOP) for the handling, storage and application of the dust suppressant
Test Results	Any results of testing that may show the environmental effects of the product. This may include the Toxicity Characteristic Leaching Procedure (TCLP) if the dust suppressant and road material forms a solid substance following application
Map	A map of the area to be treated including location of any sensitive environments (e.g., lakes, streams, rivers), homes and businesses
Other Information	Copies of regulatory approvals from other Canadian jurisdictions, boards and agencies, and accounts of product effectiveness and subsequent durability of the treated road surface

8 Definitions

Approved Suppressants:
Dust suppressants approved for use in Nunavut by the Department of Environment. They include: Calcium chloride, DL-10, EK-35 and Dust Stop.

Calcium Chloride:
A naturally occurring salt, similar to table salt, made of calcium atoms.

Contaminant:
Defined in the *Environmental Protection Act* (1988) as:

> "any noise, heat, vibration or substance and includes such other substance as the Minister may prescribe that, where discharged into the environment,
>
> - endangers the health, safety or welfare of persons,
> - interferes or is likely to interfere with normal enjoyment of life or property,
> - endangers the health of animal life, or causes or is likely to cause damage to plant life or to property;"

Fine Particulate Matter:
Extremely fine particles and droplets with a diameter of less than 2.5 microns (one micron equals one millionth of a meter).

Special Waste:
The Department of Environment defines **Special Waste** as any unwanted substance that can bring significant harm people or the environment. It is a waste that must be handled, stored and disposed of separately from regular solid waste. Refer to the *Guideline for the Management of Special and Hazardous Waste in Nunavut,* also from the ENV.

Toxicity Characteristic Leaching Procedure (TCLP):
The **Toxicity Characteristic Leaching Procedure** is a test developed by the United States Environmental Protection Agency that is meant to simulate conditions in a landfill. It tests for the presence and concentration of contaminants in a given sample and will determine how they interact with water or other liquids moving through a landfill.

Total Suspended Particulate (TSP):
Commonly referred to as airborne dust or dirt, total suspended particulate consists of airborne particles or droplets that have a diameter of up to 100 microns.

Workplace Hazardous Materials Information System (WHMIS):
Canada's national workplace hazard communications standard. Administered by Health Canada.

9 References

Caouette, L. (2013). *Application Methods - Calcium Chloride as a Dust Suppressant.* [Online]. Hopec Enterprises Ltd.

Cypher Environmental Ltd. (2015). *Material Safety Data Sheet: DUST STOP* [Online]. Cypher Environmental. Available from https://www.cypherenvironmental.com/wp-content/uploads/2017/02/Dust_Stop_SDS.pdf [Accessed 11 October 2021].

Edvardsson, K., Gustafsson, A., and Magnusson, R. (2012). Dust suppressants efficiency study: in situ measurements of dust generation on gravel roads. *International Journal of Pavement Engineering,* 13(1), 11-31.

Federation of Canadian Municipalities (2005). *Roads and Sidewalks: Dust Control for Unpaved Roads.* [Online]. National Research Council (NRC) National Guide to Sustainable Municipal Infrastructure. Available from: http://www.fcm.ca/Documents/reports/Infraguide/Dust_Control_for_Unpaved_Roads_EN.pdf [Accessed 29 September 2021].

Global Safety Management Inc. (2014), *Material Safety Data Sheet: Calcium Chloride.* [Online]. Fischer Scientific. Available from: https://beta-static.fishersci.com/content/dam/fishersci/en_US/documents/programs/education/regulatory-documents/sds/chemicals/chemicals-c/S25222A.pdf [Accessed 8 October 2021].

Government of Nunavut (2009). *Dust Suppression Alternatives for Municipal Roads in Nunavut.* [Online]. Nunavut Municipal Training Organization (NMTO).

Government of Nunavut (2014). *Environmental Guideline for Dust Suppression on Unpaved Roads.* [Online]. GN Dept. of Environment. Available from: https://www.gov.nu.ca/sites/default/files/2014_03_dust_suppression_on_unpaved_roads_0.pdf [Accessed 29 September 2021].

Government of the Northwest Territories (2013). *Guideline for Dust Suppression.* [Online]. GNWT. Available from: https://www.enr.gov.nt.ca/sites/enr/files/guidelines/dustsupression.pdf [Accessed 5 October 2021].

Green Agrochem-Lignin (2009). *Lignosulfonate Used in Dust Control* [Online]. Available from: https://www.ligninchina.com/lignosulfonate-used-in-dust-control/ [Accessed 7 October 2021].

Midwest Industrial Supply Inc. (2003). *Material Safety Data Sheet: EK-35.* [Online] MIS Inc. Available from: http://www.dustdr.com/ek35msds.pdf [Accessed 11 October 2021].

For additional information on the remediation of contaminant spills, or to obtain a complete listing of guidelines, go to the Department of Environment website or contact the Department at:

Environmental Protection Division
Department of Environment
P.O. Box 1000, Stn. 1360
Iqaluit, Nunavut, X0A 0H0

Phone: (867) 975-7700
Fax: (867) 975-7742

www.gov.nu.ca/environment

Contingency plans are to be submitted to the above address.

Nunavut