

ea1™ Dust Suppressant

The first 100% organic and biodegradable dust control technology for mines and industrial roads



Summary

- Mining challenges
- A unique mode of action
- A tailor made solution
- Key benefits
- Competition
- Customized turn-key solution
- Local is ideal
- Typical application protocol
- Case study
- Global strategy



Mining challenges
Sustainable & efficient dust control

Dust challenge

Dust presents **many challenges** for the mining industry:

- **Health and Safety:** Dust can be harmful to the health of mine workers and surrounding communities. It can cause respiratory problems such as silicosis and can also aggravate conditions such as asthma and allergies.
- **Environment:** Dust can be harmful to the environment and local ecosystems, particularly when it contains toxic substances such as arsenic, lead, and mercury. It can also reduce air and water quality, which can affect the health of plants, animals, and people.
- **Community Relations:** Dust can cause problems for the relationship between mines and local communities. Communities can feel disadvantaged due to the negative impacts of dust on their health and environment.
- **Economic Performance:** Dust can also have an impact on the economic performance of mines by causing production downtime and additional costs for dust control efforts.

Long-term savings

By working to reduce dust, mines can not only improve their environmental and social performance, but also **realize significant long-term savings**.

- **Improved production efficiency:** By controlling dust, mines can improve the quality of their production and avoid operational downtime related to dust issues.
- **Reduced dust control costs:** By using effective dust control techniques and optimizing their use, mines can reduce the costs associated with reducing dust.
- **Improved health and safety:** By reducing dust, mines can improve the health and safety of workers, which can result in reduced costs such as insurance costs and training fees.
- **Better community relations:** By reducing the negative impacts of dust on surrounding communities, mines can improve their relationships with local communities. This can result in increased trust and cooperation, which can facilitate future negotiations and reduce potential risks of social unrest.
- **In line with local and international regulations :** Earth Alive helps mines to be in compliance with ecological and labor regulations.

Sustainability

Growing demand for responsible practices from consumers, investors and other stakeholders: Mines will need to adopt these practices in order to maintain their license to operate and attract investments.

Increasing government regulations for mines' operations: Implementation of new regulations aimed at reducing the environmental impact of mining and improving social outcomes for workers and communities.

Climate change: Climate change, water stress, torrential rains and desertification have a significant impact on the mining industry. Mines will need to adopt sustainable practices in order to reduce their carbon footprint and prepare for their future.

Limited resources: Mines are becoming increasingly aware of the finite nature of the earth's resources and are looking for ways to conserve and extend the life of these resources. By adopting sustainable practices, mines can help ensure that these resources are used responsibly and conserved for future generations.

Environment Social Governance

Earth Alive brings a unique solution to ESG issues in the mining sector:

Environment: Mining operations can have a significant impact on the environment and the natural habitats. Earth Alive has developed the first highly efficient 100% bio-based solutions which reduce water consumption and improve the carbon footprint without any groundwater pollution or ecotoxicological effects.

Social: Mining activities can also impact local communities, particularly with regards to workers' rights, economic inequalities, and population displacement. Earth Alive helps by providing solutions for responsible practices that respect the rights of workers and local communities.

Governance: Transparency and accountability are crucial for a responsible mining industry. Earth Alive helps mines to be in compliance with local and international ecological regulations and improve the work environment.

By working on these ESG issues, mining companies can not only improve their brand image but also create opportunities for sustainable partnerships with local communities and enhance their long-term financial performance.

ea1™ - dust challenges - ESG

Environment

- **High efficiency** dust control effects
- **More than 90%** reduction in water use
- Safe for the environment and neighboring water sources
- No leaching brings protection to surface and ground water
- No corrosive effect
- **Respecting biodiversity:** no ecotoxicological effects
- **Greenhouse Gas emissions reduction** : fewer water truck passes means reduced fuel consumption
- Carbon footprint reduction

Social

- **Operational safety**
- Water resources **management**
- **Impact on** neighboring communities
- **Workers' health**

Governance

- Social licence to operate
- Compliance with local and national regulations
- Improvement in work environment



A unique mode of action

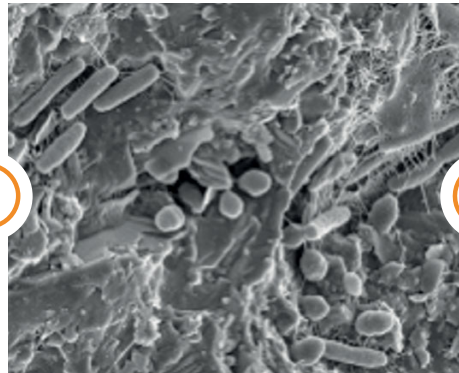
When the roads are under a high stress situation, the soil particles can not stay agglomerated, generating high dust emissions. Earth Alive has selected the most productive biosurfactant microorganisms to agglomerate the road particulate. These living microorganisms are completely natural, non-pathogenic, and non-GMO.

Once applied onto the ground, the natural components present in the ea1™ bind the soil particles, retain the soil moisture and create a firm and resistant layer on the surface, preventing dust from becoming airborne. This crust is also flexible enough to withstand the weight of the high traffic of a mine road.

Before



Agglomeration of particles through bacterial interactions



After



From healthy soils, Earth Alive Clean Technologies has selected the most productive biosurfactant microorganisms

A tailor-made solution

To find the best biological solutions for your challenges

We offer solutions that are tailor-made, understanding that every mine faces his own challenges.



Understanding challenges



Analysis



Scientific concept development



Choosing right biological mix



Testing solution on site

OUR MISSION

Earth Alive develops lines of products that are environmentally friendly and safe for humans, making our planet a cleaner place for everyone.

Key benefits



Easy application



Operational
improvement



Reduced
operating costs



Environmentally
friendly



Easy application

■ Replace daily water applications

■ Long lasting quality effect with up to 14 days between applications

■ Versatility

- ☐ Compatible with all types of soils at various temperatures, altitudes and weather conditions
- ☐ Standard protocol is adapted to each mine's specificities
- ☐ Successful on roads with different traffic conditions

■ High stability roads

- ☐ Increase in the bearing capacity (CBR)
- ☐ Unchanged road permeability
- ☐ Unpaved roads requires less grading

■ No specialized equipment required

ea1™ is versatile enough to be applied anywhere, from the heaviest mine haul roads, to medium and lighter traffic roads, such as social roads.



Heavy: frequent traffic of very heavy vehicles.
Ex: mining



Medium: frequent traffic of light and heavy vehicles.
Ex: construction site



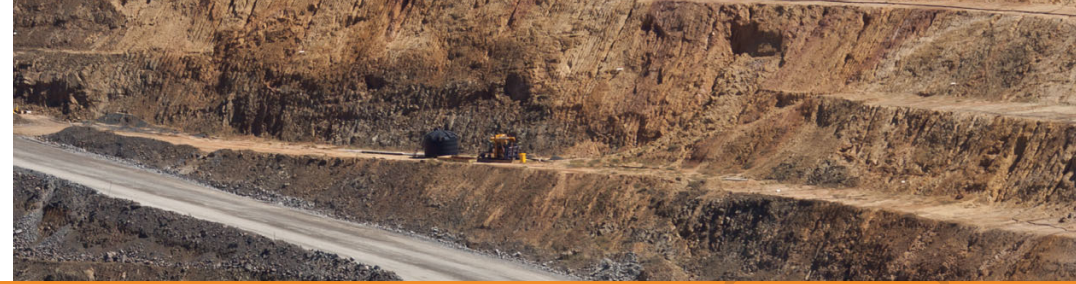
Light: infrequent traffic of light and heavy vehicles.
Ex: farm or rural roads



No traffic: Ex: stockpiles, walls

Operational improvements

- Up to **96%** reduction of dust emissions, even with the smallest particles
- More than **90%** reduction in water use
- Reduction in braking distance, thanks to better road adhesion : average 20%
- Better road stability
- Traffic resumes immediately after application
- More operational safety



Reduced operating costs

- Reduction in downtime due to heavy dust
- More than **90%** reduction in water use
- Cost-effective due to low number of applications
- Optimization of human and material resources
 - ☐ Operators, fuel, tires,...
 - ☐ Fleet size
 - ☐ Trucks maintenance
- More stable roads that require less grading
- Better road adhesion leads to more efficient trucks rotation



Environmentally friendly

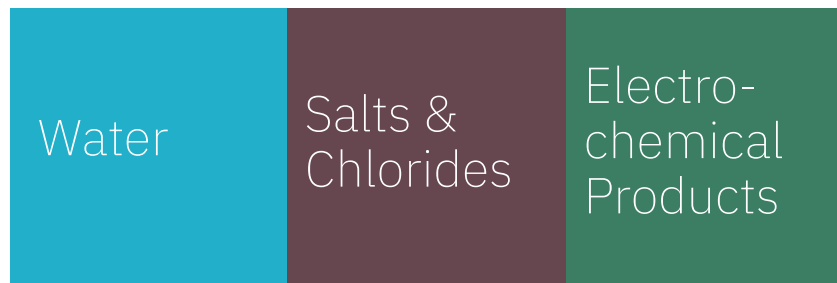
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First 100% bio-based and biodegradable competitive dust suppressant product in the world, specially designed for heavy-duty and harsh conditions of mining sites

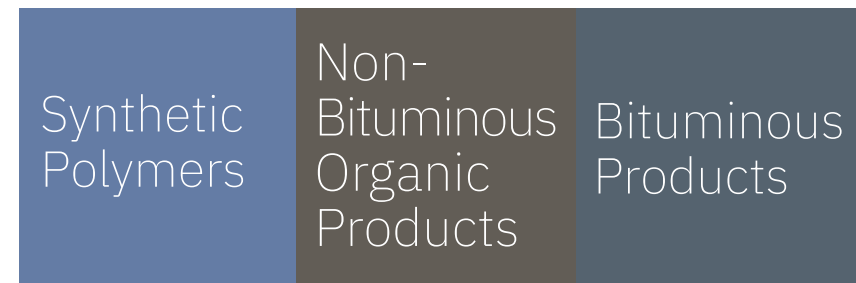
Current Dust Suppressant Alternatives

Humidifying Agents



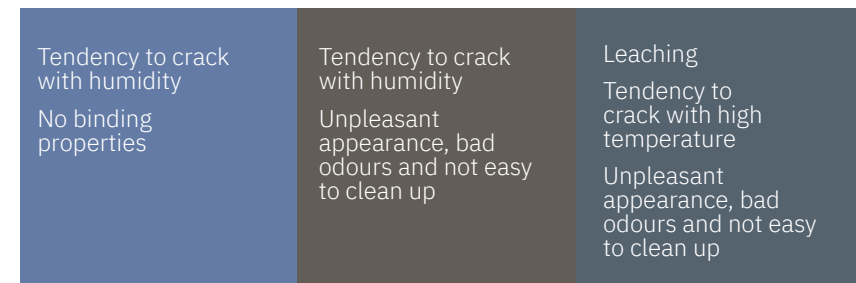
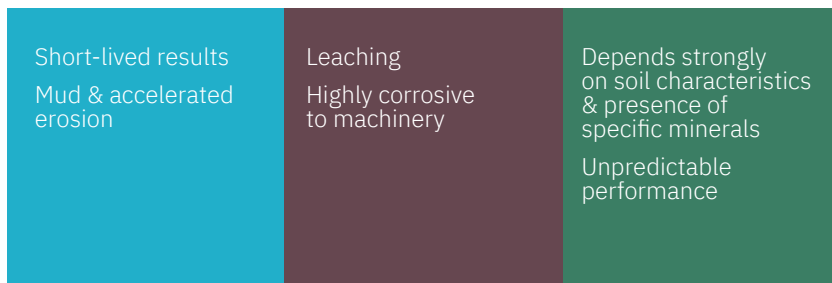
- | | |
|--|--|
| <ul style="list-style-type: none"> ■ Mg Chloride ■ Ca Chloride ■ Bischofite | <ul style="list-style-type: none"> ■ Sulphated Oils ■ Enzymes ■ Ammonium Chloride |
|--|--|

Crusting Agents



- | | | |
|---|--|--|
| <ul style="list-style-type: none"> ■ Acrylic Vinyl ■ Polyvinyl Acetates | <ul style="list-style-type: none"> ■ Lignosulfonates ■ Vegetable Oils ■ Molasses and sugar cane derivatives | <ul style="list-style-type: none"> ■ Tar ■ Natural Bitumen ■ Artificial Bitumen ■ Fluid Bitumen ■ Bituminous Emulsions ■ Asphaltic Bitumen |
|---|--|--|

Desavantages



Customized turn-key solution

Our ea1™ technical team considers each mine's specific needs and requirements to design the most efficient application protocol and frequency.

The high efficiency effect of the ea1 is measured by our technicians through two different methodologies, allowing to understand the dust's behavior coming from the treated surfaces and the surrounding environments :

Truck-mounted aerosol monitor: a laser photometer that measures emissions of different particle sizes, coming directly from the road.

The monitoring station: a stationary road-side device that monitors dust from the environment and captures the weather conditions and vehicle traffic.



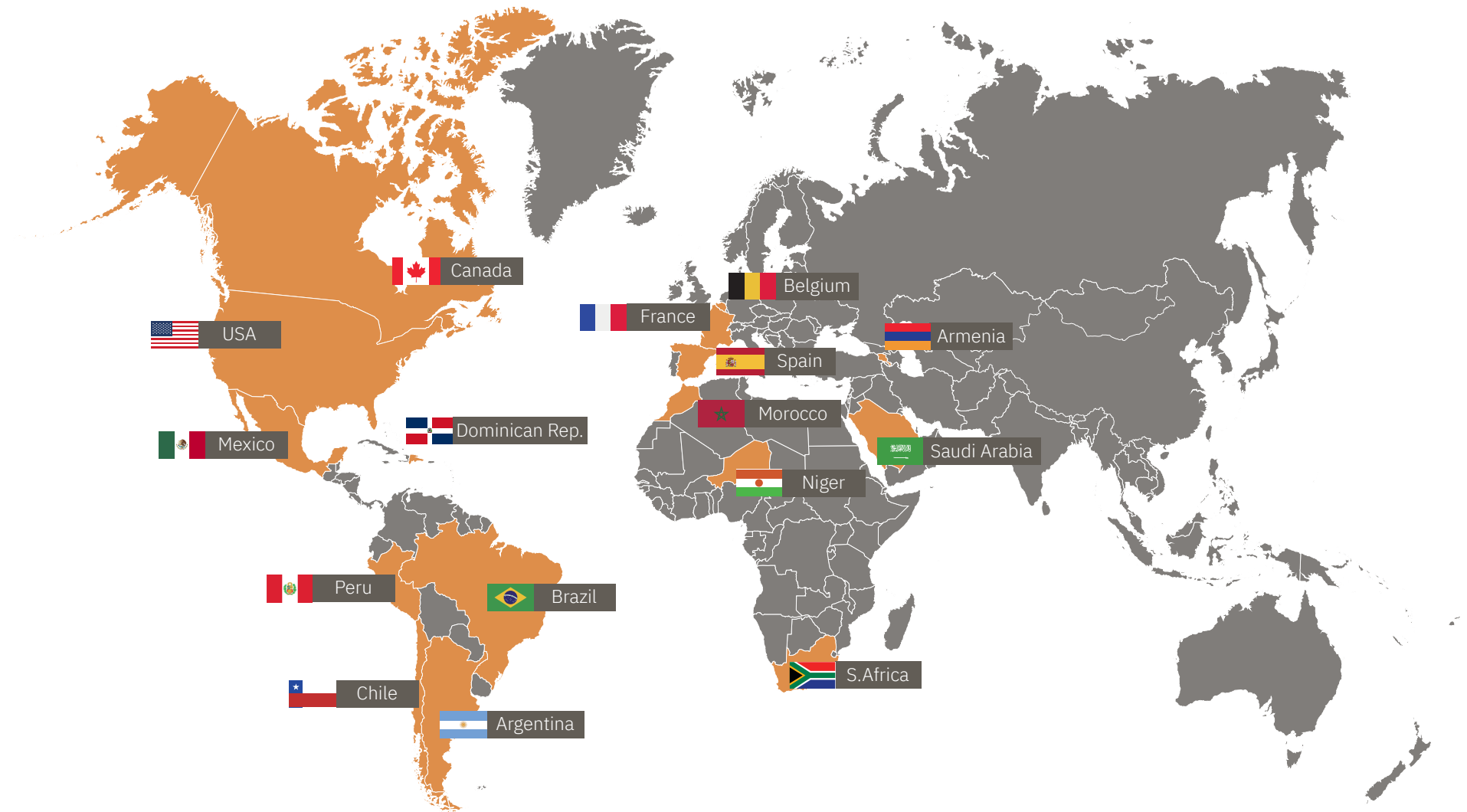
INTEGRATED CUSTOMER SUPPORT SERVICES

- Custom application systems
- Daily dust monitoring services
- On-site personnel training



Dust monitoring stations have several components that measure dust continuously over a period of more than 12 hours, record all vehicle traffic and record weather conditions in real time.

Earth Alive distributes ea1™ in 16 countries around the world, where it is applied in many different conditions: temperatures, altitudes, type of ores, etc...



Local is ideal

Formulated in Canada, produced locally

ESG concepts remain at the heart of our approach, even when it comes to logistics

Manufacturing locally optimizes logistics costs and reduces logistics risks. The possibility of being closer to the mine also means a lower carbon footprint.

We are always looking for allied blending plants that are closer to our clients.

Currently we produce in Canada, USA, Brazil, Europe, and South Africa. We are in the vetting process for allied plants in Mexico and in Peru.

We are also developing a project to have **modular blending plants delivered and installed right at the mine site**, as this would be the best logistics option, including **local communities in the blending**.

Product is formulated as a liquid concentrate, and can be delivered in IBC totes, tanker trucks, or flexitanks.



Typical protocol for road application

1 Road preparation



Scraping

In case the roadbed is too compacted, scraping should be done to a minimum of 15 cm to obtain optimal results

Grading

A grader is used to create an even surface. This step eliminates potholes and large rocks obtaining a high-quality roadbed

Light compaction

This step is done with a compacter. If no roller is available, heavy mining vehicles may be used

Water application

The surface must be wet prior to application (not soaked but visibly wet). Water facilitates an even penetration of the product

2 First & second application



- The speed of the trucks should be adjusted to obtain an application rate of 2L/m². This rate of liters per square meter must be kept for all applications
 - The first application's purpose is to inoculate the road with a critical mass of microbes.
 - This application is made at a high concentration
 - The second application is made approximately 7 days later, blended with water at a moderate concentration
- Depending on the soil type and climate conditions, it may be recommended to limit traffic for 1 or 2 hours after the first application

3 Maintenance applications



- Weather conditions and soil characteristics are the main considerations to determine the maintenance concentration and application frequency
- The standard maintenance application is performed every 14 days blended with water at a low concentration

Case study



Brazilian mine
Iron ore mining
5 weeks data collection

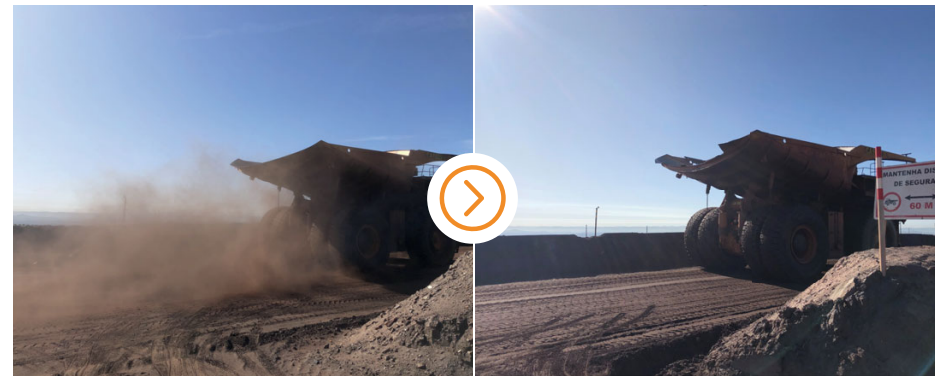
Dust related losses:

Haul Trucks had to be stopped for 287 working hours/year due to dust levels :

- ☐ Represents 191,500 tons of un-mined material
- ☐ And \$6,000,000 USD opportunity cost, corresponding to approximately a full day of production lost.

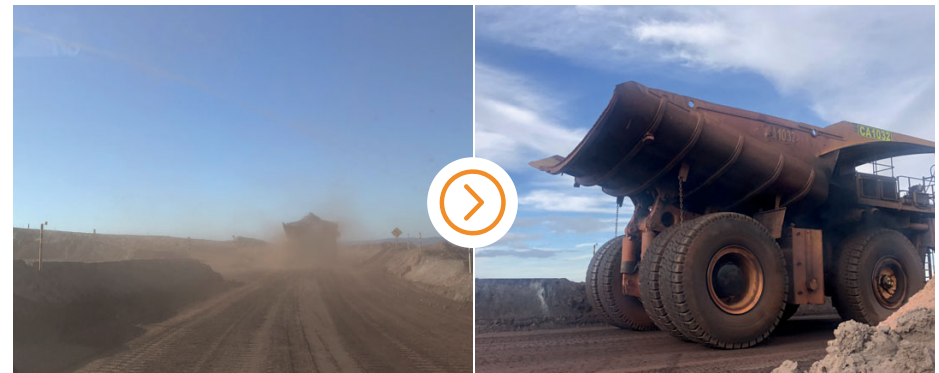
Once ea1™ applied, operational efficiency increased :

- ☐ 77% reduction in dust emissions
- ☐ More than 93% reduction in water use
- ☐ 287,000 m³ of water yearly saved during the dry season
(Approximately the water consumption of a city of 20,000 people over 3 months)
- ☐ Reduction of the water truck fleet size, save on the purchase of a new water truck
- ☐ Reduction in operator, fuel, & tire maintenance costs during dry season
- ☐ Increased time for other critical tasks



Before application

7 days after application



Global strategy

Dust suppression



ea1™

Once applied, ea1™ reintroduces natural biosurfactant-producing microorganisms into the ground that bind soil particles, retain soil moisture and create a firm and durable layer on the surface, reducing airborne dust.

- Easy application
- Operational improvement
- Operating costs reduction
- Environmentally friendly

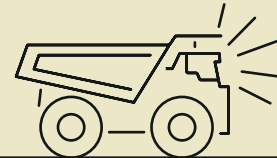


Industrial cleaning



RapidAll™

RapidAll JS is the one true all-natural, industrial cleaner that eliminates an extensive range of embedded dirt and the toughest greases on all sorts of vehicles such as trucks, heavy machinery and off-road equipments.



Soil rehabilitation



Soil biostimulants and biofertilizers

We offer a large range of natural and powerful microorganism-based products for active soil and vigorous plants from the roots up.

- Soil revegetation
- Land stabilisation



Making our planet cleaner for everyone

Earth Alive develops and distributes microorganism-based solutions related to mining dust control, agriculture & soil rehabilitation, industrial cleaning and water treatment. Earth Alive offers efficient options to industries that highlight the importance of ESG. Following this sustainability development approach, Earth Alive is a member of the United Nations Global Compact.





www.earthalivect.com

Earth Alive Clean Technologies inc.

1050 Côte du Beaver Hall

Montreal Canada H2Z 1S4

info@earthalivect.com

1 438 333-1680

