MICRONISED MINERALS

pH MANAGEMENT & CONTROL

INDUSTRIAL MINERALS

AGRICULTURAL MINERALS

FINE MILLING & BLENDS

Pursuing our vision of *"ENVIRONMENTAL TRANSFORMATION"*

pH MANAGEMENT

Proud holders of **Australian Patent** for "**Method and Apparatus for Acidic Surface Water Treatment**". MMS has developed an innovative in-situ acid mine water treatment process for decontamination of acidic water containing high levels of dissolved (bioavailable) metals stored on active and legacy mine sites.

INDUSTRIAL MINERALS

- QUICKLIME
- HYDRATED LIME
- BARITE
- CIVIL STABILISERS

AGRICULTURAL MINERALS

- CALCIUM CARBONATE
- DOLOMITE
- GYPSUM & LIME
- CATTLE FEED SUPPLEMENTS

MICRONISED MINERALS (MMS) a mineral earths company focused on offering high-quality mineral products and whole of service in innovative ways. Established in Darwin in 2007 to service the mining, oil & gas, civil & agricultural sectors throughout Northern Australia, MMS are minerals specialists for the manufacture & supply of industrial and agricultural minerals.

Our services portfolio includes:

- **Mine Process pH Control Treatment**: Provision of a whole of service approach including Product manufacture, Transport and Treatment hardware.
- **Engineering and chemical design**: Product development, in-house and third party laboratory testing, engineering and construction of large scale water treatment system.
- **Soil stabilisation**: Manufacture & supplier of reagents for acid sulphate soils for the civil and mining industries.
- **Agricultural products**: Manufacturer and supplier of agricultural soil treatment minerals.

Our modern purpose-built facility located in East Arm, close to the Darwin Port. With multiple road train access, road tankers, ISO & purpose-built tipping containers we are well-equipped to fulfil customer delivery requirements.

FINE MILLING & BLENDS: MMS' specialised manufacturing equipment, **Twin Vertical Roller Mills** with annual capacity of >100,000 tonnes production. It is infinitely managed by turbine classification for careful particle size management for exacting product sizes ranging from 5 to 250 micron. MMS ensures the production of high-quality fine ground minerals with the added capacity to accurately blend speciality products to suit customer requirements.

☎(08) 8947 1872 10, Campion Road, East Arm, Northern Territory 0828 www.micronisedminerals.com.au

pH Management and Control

Micronised Minerals (MMS) awarded *Australian Patent* for Method & Apparatus for Acidic Surface Water Treatment (Micro Reactor technology) in 2018 and is continuing the patent development of its locally manufactured reagent.

MMS has developed an innovative in-situ acid mine water treatment process for the decontamination of acidic water containing high levels of dissolved (bioavailable) metals stored on active and legacy mine sites. Through a Commonwealth Accelerating Commercialisation Grant MMS engaged GHD as an independent third-party consultant to implement a comprehensive water sampling & ecotoxicology assessment program to evaluate the effectiveness of the MMS in-situ acid mine water treatment process at a legacy mine pit within the Cosmo Howley area in Northern Territory.

This water treatment process uses a combination of patented Micro Reactor technology and MMS Reagent to treat water bodies containing high levels of dissolved metals in-situ. This evaluation was based on the treatment of a 1.3 gigalitre mine dam with an initial pH of 4 containing high levels of dissolved metals. Project treatment was completed within a 3-week timeframe including mobilisation and setup of dosing hardware and de-mobilisation from site.

GHD's evaluation of this project identified the MMS in-situ acid mine water treatment process significantly reduced the bioavailable metals within the water body and related toxicity. The treatment process greatly improved the discharge water quality so with dilution with river water, the water quality at the downstream compliance point will meet the ANZECC (2000) 90% species protection guidelines. When compared to the current caustic soda treatment processes being used on site, the improvement in water quality and subsequent reduction in toxicity after using the MMS Reagent compares favourably in price and detoxification outcomes.

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MMS QUICKLIME

(Calcium Oxide)

MMS QUICKLIME		
PROPERTIES	TYPICAL	RANGE
CaO Available	90%	88 - 92%
SiO_2	0.35%	1.0% Max
Al_2O_3	0.21%	0.5 Max
Fe_2O_3	0.08%	0.1% Max
MgO	1.0%	1.5% Max
SO_3	0.15%	0.19%
pH	12	12 - 12.4

PRODUCT HANDLING & STORAGE

MMS Fine Quicklime is classified as a fine grain material suited to pneumatic and mechanical conveying systems. Store in a cool, dry, well-ventilated area, removed from water or moisture, incompatible substances and foodstuffs. Ensure packages or storage tanks are adequately labelled, protected from physical damage & sealed. Avoid inhalation & ensure the product is in well ventilated areas. Where an inhalation risk exists, mechanical extraction ventilation is recommended.

PRODUCT SAFETY INFORMATION

Personnel should wear protective clothing, dust-proof goggles, preferably faceshield, PVC or rubber gloves and impervious boots. While using in large quantities, wear coveralls. Care should be taken to protect the product from moisture as it swells when moist and may burst containers. For full information, refer to the Safety Data Sheet for Quicklime

Calcium Oxide (CaO), commonly called "Quicklime" or "Burnt Lime" is a highly reactive chemical with variety of uses in the mining and industrial water treatment sectors. Quicklime is commonly used for its ability to stabilize pH, soften water, stabilize bio-solids, and precipitate nutrients.

Micronised Minerals **(MMS) Fine Quicklime** is a high quality calcium oxide product manufactured to a very fine grain size (typically less than 150µm), maximising the availability of Calcium Oxide for chemical processes. Quicklime is used by the mining industry to treat runoff and process waters from coal mining, metal mining and non-metal mines. Quicklime used with accurately designed slaking plants helps to neutralize acids from mining waters and precipitate metals and non-metals.
MMS has supplied individual clients up to 20,000 tonnes per annum of Quicklime utilising in-house designed innovative Handling and Storage Solutions.

Physical Properties	Typical	Range
Grain Size (<150 µm)	>90% passing	90 - 100 %
Bulk Density	950kg/m3	950-1100 kg/m3

MMS Quicklime services a variety of mining applications :

- Heavy Rare Earth Mineral Processing
- Acid Tailings & Water Treatment for Gold and Uranium mines
- Quick lime for domestic waste water treatment and industrial binder applications.
- Quick lime to mine sites for use with in-house slaking plants.

☑ Grind sizes available to customer requirements.
☑ Supplied with packaging options: Bulk tankers and Bulker Bags

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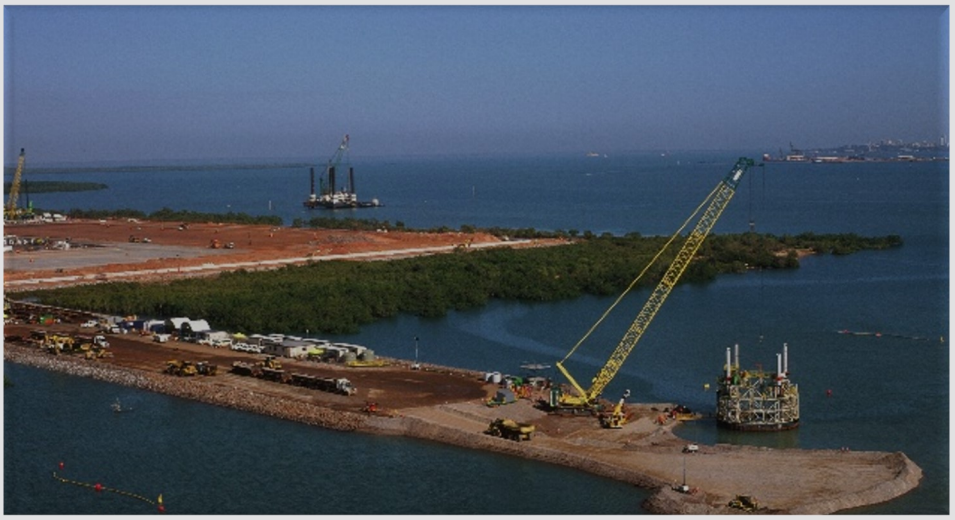
HYDRATED LIME

(Calcium Hydroxide)



Calcium Hydroxide [Ca(OH)2], also known as Hydrated Lime, is a fine, odourless white powder commercially produced by reacting Quicklime with sufficient water. It is used in many applications, including food preparation, water treatment, soil stabilisation and can be added to water to produce *Milk of Lime.*

MMS Hydrated Lime (slaked lime), is a high quality calcium hydroxide product manufactured to a fine grain size which maximises the availability of [Ca(OH)2] for chemical processes.

Hydrated Lime is used for softening pH and removal of heavy metals and impurities from potable water. Hydrated lime is a highly cost effective method for treating sewage sludge and animal waste from concentrated animal feeding operations.

MMS HYDRATED LIME		
PROPERTIES	TYPICAL	RANGE
CaO Available	70.0%	68 - 72%
SiO_2	0.07%	1.0% Max
Al_2O_3	0.20%	0.5% Max
Fe_2O_3	0.1%	0.2% Max
MgO	1.0%	1.5% Max
pH in slurry	12.4	12 Min

Physical Properties	Typical	Range
Bulk Density	450 kg/m^3	400-600 kg/m^3
Moisture Content	0.1%	1% Max

MMS Hydrated Lime services a variety of mining applications :

- Heavy Rare Earth Mineral Processing
- Acid Tailings & Water Treatment for Gold and Uranium mines
- Hydrated limes for domestic waste water treatment and industrial binder applications.
- Hydrated limes to mine sites for use with in-house slaking plants.

☑ Supplied with packaging options: 25 kg sacks and Bulker Bags

PRODUCT HANDLING & STORAGE

MMS Hydrated Lime is classified as a fine grain material suited to pneumatic and mechanical conveying systems. Store in a cool, dry, well ventilated area, removed from incompatible substances and foodstuffs. Ensure packages are adequately labelled, protected from physical damage, and sealed when not in use. Protect from moisture. Avoid inhalation and ensure to use the product in well ventilated areas.

PRODUCT SAFETY INFORMATION

Personnel should wear protective clothing, dust-proof goggles, preferably face-shield, PVC or rubber gloves and impervious boots. While using in large quantities, wear coveralls. For full information, refer to the Safety Data Sheet for Hydrated Lime.

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OUR CUSTOMERS

Vista Gold Australia Mt Todd Mine Pit
Whole of service treatment of 10.3 billion litres of acid mine drainage. Completed within a 4 month time frame.

Pacific Aluminium
Provision of contingent bulk containerised Quicklime and in-house engineered container discharge equipment system.

Katherine Water Treatment Plant
Provision of aluminum sulphate and dense soda ash.

Northern Minerals' Browns Range Project
Supply of high quality Chememan Quicklime for heavy rare earths mineral processing.

Kirkland Lake Gold Australia Cosmo Howley mine site
Supply of fine ground quicklime for on site water treatment plant.

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