

Improving Material Flow in Bauxite / Alumina Mining



Reducing Build-up, Carryback and Material Handling Challenges from Mine to Refinery

1. Bauxite Mining and Material Handling in Australia

Australia is one of the world's largest producers of bauxite and alumina, supplying both domestic refineries and export markets. Major operations are concentrated in Western Australia and Queensland, where bauxite is extracted using large-scale open-cut mining methods.

Northern Australia — Cape York, Weipa and Gove

Tropical humidity, heavy seasonal rain and cyclonic weather increase bauxite moisture and adhesion. Clay-rich fines form a sticky mass on buckets, truck trays, hoppers and chutes. Because deposits are shallow but extensive, long-haul distances magnify any loss in bucket fill, payload or discharge efficiency.

South-West Western Australia — Darling Range

Darling Range operations are shallow and widespread, with wet winters and hot, dry summers. Fine dust accumulates during dry periods, then combines with rain or residual moisture to form a compacted clay-like layer. This seasonal cycle increases carryback, build-up and flow restrictions across equipment feeding the Pinjarra and Wagerup refinery systems.



Why Australian Bauxite Is Particularly Difficult to Handle

Although the climate differs between north and south, both regions combine: shallow, laterally extensive deposits, long haul and material-transfer distances, high proportions of fines and clay minerals, strong sensitivity to moisture, progressive compaction on steel surfaces; and significant reliance on trucks, hoppers, chutes and conveyors.

For mine managers, carryback is not simply a cleaning issue. It reduces effective payload, transports non-productive mass across long distances, increases cycle time and fuel consumption, and creates additional downtime at loading and discharge points.

Material Handling Challenges

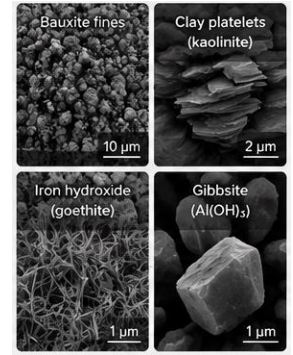


Understanding Material Adhesion, Where Build-up Occurs and How It Can Be Controlled

2. Why bauxite Adheres to Mining Equipment

Bauxite contains very fine, clay-bearing particles that settle into scratches, corrosion pits and other surface irregularities on trays, buckets and chutes. Moisture from humidity, rainfall or wash water forms capillary bridges between the particles and the steel, increasing adhesion.

Repeated loading and impact then compact the material into a dense, clay-like layer. Once this first layer forms, it traps more moisture and fines, allowing build-up to accelerate. **In simple terms: surface roughness + fine particles + moisture + compaction = progressive bauxite build-up.**



3. Main Cleaning and Unclogging Methods in Bauxite Operations

Australian bauxite mines typically use a combination of water, mechanical intervention and fixed flow-assistance systems. The selected method depends on the location of the build-up, its degree of compaction and whether the equipment can be safely isolated.

Equipment	Water washing	Mechanical cleaning	Vibrators / air cannons	Manual clean-out	Typical approach
Haul truck trays	✓	✓	✓	✓	High-pressure washing or scraping
Excavator / loader buckets	✓	✓		✓	Washing and scraping of compacted material.
Dozer blades / buckets	✓	✓		✓	Water cleaning or mechanical removal.
ROM bins / crusher hoppers	✓	✓	✓	✓	Water sprays, mobile-plant clean-out or flow-assistance devices.
Transfer chutes	✓	✓	✓	✓	Sprays, vibration, air blasts or isolated clean-out.
Crushers / screens	✓	✓		✓	Washdown and planned shutdown cleaning.
Stockpile reclaim systems	✓	✓	✓	✓	Water, mobile equipment and vibration systems.

Bauxite build-up should not be accepted as a normal operating condition. By addressing material adhesion at the source, operations can improve material flow, reduce cleaning requirements, lower water consumption and increase equipment availability throughout the mining and refining process.

Practical Results in Bauxite Operations



Reducing Build-up and Restoring Material Flow Across Critical Assets

1. UNDERSTAND: Severe chute obstruction prior to treatment

Significant bauxite build-up reducing effective cross-section and restricting material flow.



Operational impact

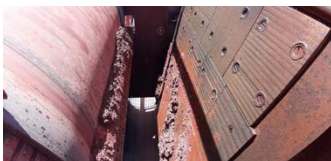
- Restricted flow: full obstruction every 27 minutes
- Increased cleaning demand: high consumption of water (cleaning system)
- Higher downtime: ~ 10 pauses per day for cleaning
- Reduced productivity

2. MEASURE: Measuring Chute Performance Following ECORA Trial Protocol

After ECORA application



After operation with ECORA



Chute 1: Clean flow path maintained with no significant obstruction.



Chute 2: Build-up significantly reduced during operation.



Chute 3: Doubled the time without obstruction.

**50%
reduction in
DOWNTIME**

*BEFORE: 28
minutes with
obstruction*

*AFTER: 47
minutes
without
obstruction
with ECORA*

3. APPLY: ECORA Solution Implementation



BEFORE



APPLY



AFTER

Chute: 80% reduction in build up material and no obstruction



BEFORE



APPLY



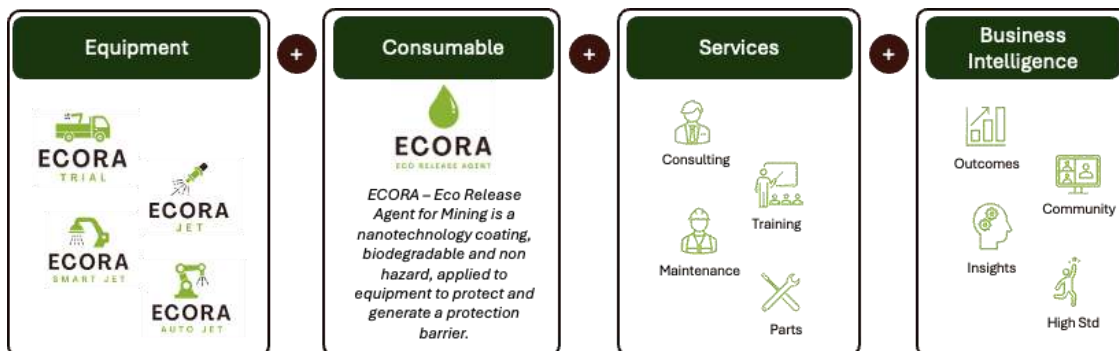
AFTER

Bucket: 80% reduction in build up material after 48 hours of operation

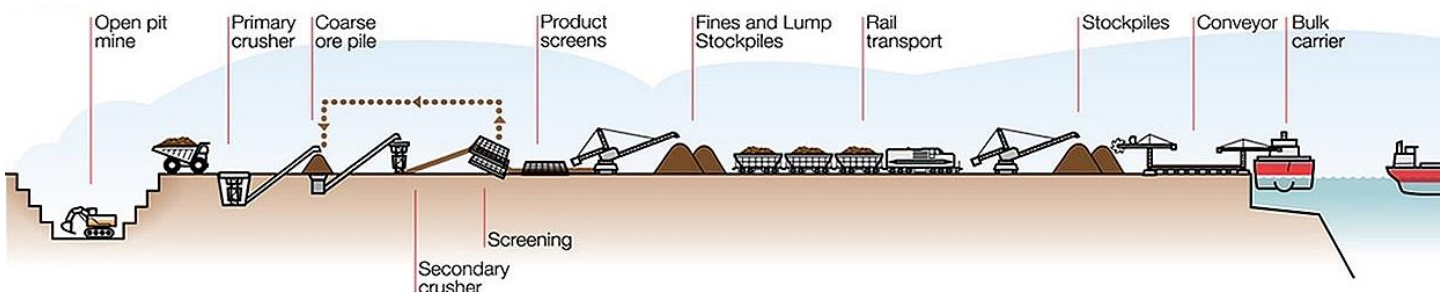


AT ECORA SOLUTIONS WE ARE OBSESSED TO SOLVE YOUR ISSUES WITH BUILD UP MATERIAL

Each of the four integrated components — equipment, consumables, services, and business intelligence - plays a critical role, and their combination delivers exceptional results. By aligning technology, eco-friendly release agent, automated application systems, expertise, and data, we ensure every solution is precisely tailored to each site's needs — driving performance, improving reliability, and achieving extraordinary outcomes.



ECORA SOLUTIONS IMPROVES THE MATERIAL FLOW IN YOUR MINE



BOOK YOUR TRIAL

LET'S MEASURE HOW MUCH ECORA CAN DO FOR YOUR OPERATION

At the end of the trial, ECORA provides a performance report comparing the baseline and treated periods, quantifying operational benefits and recommending the most suitable long-term application system, consumable rate, maintenance approach and monitoring plan.

Application is manual during an initial trial or delivered through portable, semi-automated or fully automated ECORA application systems. The application volume and frequency are adjusted according to the asset geometry, surface condition, ore characteristics, moisture level and operating cycle.

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