

Bauxite Residue In Australia

What is Bauxite Residue?

Bauxite residue, sometimes referred to as 'red mud', is the by-product of the Bayer process – an industrial chemical process for refining aluminium-containing ores in alumina (aluminium oxide), the raw material used to produce aluminium metal.

In the Bayer process, bauxite ore is dissolved using sodium hydroxide (caustic soda). Alumina is then extracted from the solution and the residual bauxite residue is sent to a storage area.

The characteristic red colour of bauxite residue results from the high concentrations of naturally occurring iron compounds in the original bauxite ore.

Australian bauxite ores vary in terms of their aluminium content and impurities such as silica. Bauxites found in Weipa QLD typically contain around 50 per cent available alumina with relatively low silica content, whilst the Darling Range WA bauxites contain only around 30 per cent available alumina and higher silica.

Alumina refineries endeavour to extract as much of the residual caustic as possible from the bauxite residue stream for reuse in the process; however, a residual amount of caustic makes it through to the disposal area. As a result untreated bauxite residues are alkaline.

Where is Bauxite Residue Stored in Australia?

Each of Australia's seven alumina refineries has associated bauxite residue storage areas :

- Gove, NT (Pacific Aluminium)
- Kwinana, WA (Alcoa)
- Pinjarra, WA (Alcoa)
- QAL, QLD (Rio Tinto Alcan)
- Yarwun, QLD (Rio Tinto Alcan)
- Wagerup, WA (Alcoa)
- Worsley, WA (BHP Billiton)

How are Bauxite Residues Treated and Stored in Australia?

Bauxite residue is typically stored in special holding areas consisting of impervious layers to prevent seepage into the groundwater.

Australian residue storage areas are designed in accordance with Australian National Commission on Large Dams (ANCOLD) guidelines, in conjunction with world-recognised engineering standards and in compliance with regional legislative requirements.

One technique used for bauxite residue storage in Australia is 'dry stacking', which involves depositing and drying the residue in thin layers to a high density, thus making it very stable and unlikely to flow in the event of a containment breach.

Another technique involves the use of a process called sea water neutralisation to reduce the alkalinity of the bauxite residue. This technique is used in conjunction with thickening techniques to obtain higher solids concentration in the residue, which is then dried using a combination of solar drying and mud farming techniques to achieve a density of 60-70 percent solids.

How are Bauxite Residue Areas Monitored?

All Australian alumina producers work closely with local regulatory authorities to ensure that their bauxite residue management practices comply with environmental and health standards.

Residue storage areas are inspected daily by specialised dam operations staff trained to recognise conditions that could compromise dam integrity, or indicate that an unsafe condition is developing.

All Australian bauxite residue storage areas are inspected independently to check structural integrity.

Water quality is also routinely monitored at all sites.



What is the Future for Australian Bauxite Residue Storage Areas?

All Australian alumina producers are investigating ways to reduce the long-term environmental footprint of bauxite residue storage areas, and to treat the residue so that it is more suitable for re-use or long-term management.

Techniques such as sea water neutralisation, as used at the QAL refinery, as well as Alcoa's carbonation and wash system that produces environmentally benign Red Sand™, are examples of innovative approaches to managing bauxite residue.

Australian alumina producers are committed to working with surrounding communities and other stakeholders in addressing all issues pertaining to bauxite residue storage and re-use into the future.

Australian Aluminium

The Australian aluminium industry consist of five bauxite mines, seven alumina refineries and six aluminium smelters, along with a number of aluminium fabricators (extruders and rolled product manufacturers).

In 2011 Australia was the largest producer of bauxite, second largest producer of alumina and fifth largest producer of primary aluminium metal.

Further Information

If you have any questions please call the Australian Aluminium Council on (02) 6267 1800 or visit us at www.aluminium.org.au.