GEHO®
Positive Displacement Slurry Pumps

High Concentration Slurry Disposal Solutions

Excellent
Minerals
Solutions

WEIR
MINERALS

Providing the alumina industry an eco-friendly and efficient red mud technology

High concentration red mud slurry disposal: dry stacking

Alumina refineries recover caustic liquor by thickening red mud to high solid concentrations. The natural retention of water at high concentration slurry creates a stable and environmentally safe disposal site. The need for a dam-water reclaim system with return water lines is often eliminated, or will be substantially smaller than in conventional systems. High concentration slurries form a shallow cone from the point of discharge by gravitational flow, eliminating erosion of the disposal site by run-off rainwater.

The disposed material will consolidate to a natural water balance, commonly unaffected by rainfall and resistant to dusting under windy conditions. This method is often referred to as 'dry stacking'.

Preserving nature and saving money

Costs for dam building and disposal area management are only a fraction of the cost of conventional lean slurry disposal systems, because of the compact and stable form in which the red mud is disposed.

High concentration slurries use substantially less water than dilute slurries. Typically, the water used decreases by a factor between 5 and 6, as shown below.

	Conventional system	**Dry stacking**
Typical solids mass concentration	15%	50%
Typical solids specific gravity	2.8	2.8
Dry tonnage	1,000 ton	1,000 ton
Water required	5,667 m³	1,000 m³
Total volume transported in m³	6,024 m³	1,357 m³

Four Geho piston diaphragm pumps transport red mud at the Alcan Gove project in Australia

Sloped disposal site at Alcan Gove, Australia

Red mud transportation, Windalco Kirkvine, Jamaica

Red mud transportation, Pingguo Aluminum Plant, China

Red mud and sand transportation, Alcoa San Ciprian, Spain

Dry stacking can also be applied to increase the storage capacity, as can be seen from the significant reduction in volumes disposed, and facilitate easy reclamation of a conventional disposal area by discharging a sloping cap into an existing wet deposit. Stable disposal eliminates possible dam failures and increases the lifetime safety of the disposal site and surrounding area.

To reduce the system operating costs, Geho piston diaphragm pumps are used. Geho pumps are specifically designed to handle abrasive slurries and achieve the highest availability, lowest parts usage and lowest energy consumption.

Disposal area, Nalco Damanjodi, India

Weir Minerals Netherlands: more than a pump supplier

Weir Minerals Netherlands has been actively involved in the development of high concentration slurry technology for red mud disposal and has provided technological design input for nearly all projects since first introduced in the 1980s. The experience obtained from applying Geho positive displacement slurry pumps on a wide range of high pressure applications enables Weir Minerals Netherlands to determine the project specific slurry characteristics and to optimize the slurry design parameters. By controlling the right slurry consistency, Weir Minerals Netherlands creates red mud slurry which is homogeneous and non-segregating and can therefore be pumped at very low transportation velocities without scaling or settling in the pipeline. This significantly reduces pipeline wear and maintenance.

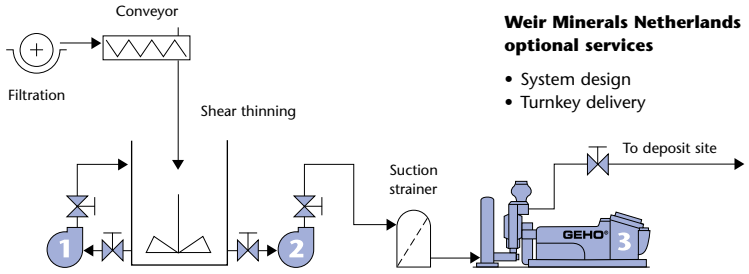
High concentration red mud slurry is discharged on the disposal area by natural flow with no need for mechanical spreading. At the right consistency, the red mud slurry forms a natural slope on the disposal area and releases no or very little water.

The abrasiveness and rheology of thickened red mud samples is determined at Weir Minerals Netherlands' in-house laboratory facilities. The test results provide the input for the design and optimization of the pump type selection and for the basic system design parameters and guidelines. The slurry consistency is carefully designed to reduce seepage of caustic soda and to utilize the maximum disposal site capacity.

Scope of additional services

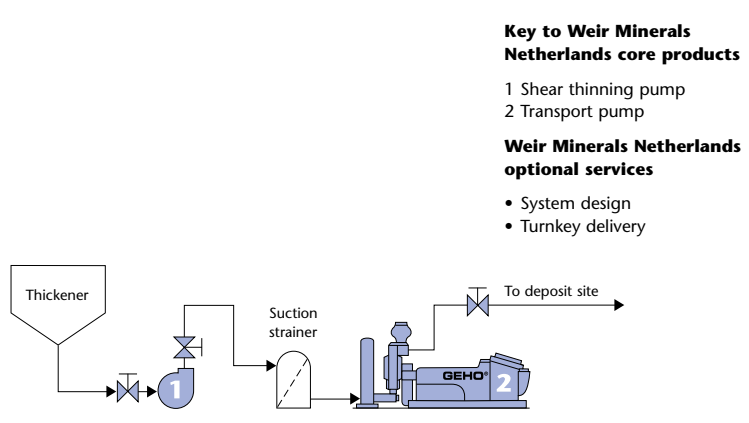
- Review of detailed design work provided by our customers or their consultants
- Basic design specifications for pipeline and equipment
- Turn-key thickened red mud transportation and disposal systems

Filter application

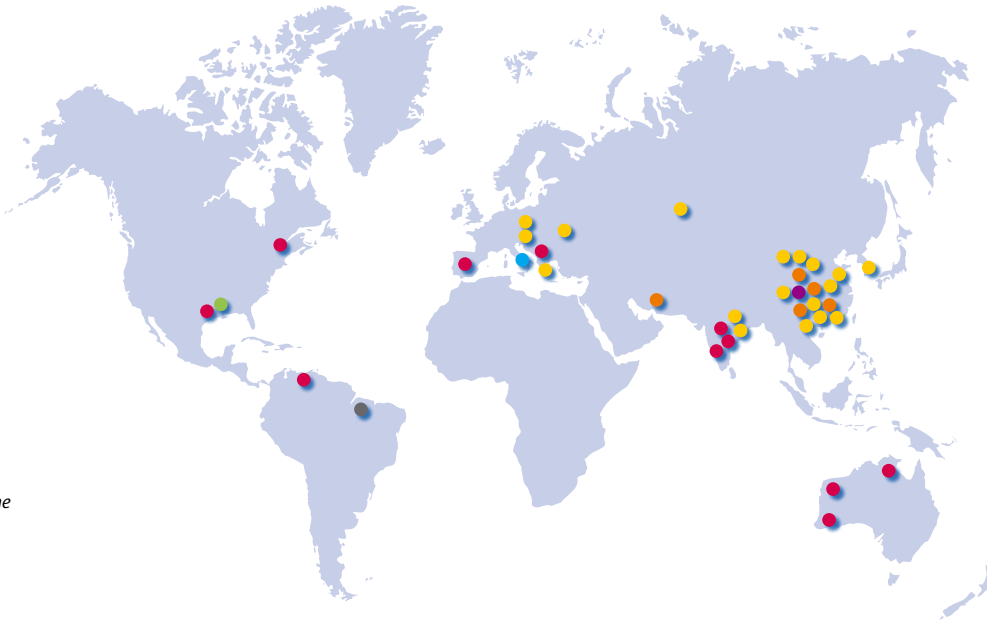


Disposal area, Nalco Damanjodi, India

Thickener application



Geho positive displacement pump applications in the alumina industry



- *red mud*
- *digester feeding*
- *red mud + digester feeding*
- *lime feeding*
- *sand disposal*
- *bauxite ore concentrate pipeline*
- *caustic feeding*

- Bauxite ore and beneficiated bauxite pipelines
- Digester feeding:
  - High temperature and autoclave
  - Tube digestion
  - Pressure decantation underflow for double digestion
- Red mud disposal:
  - Agitated vacuum filter cake
  - Thickener/washer underflow
- Sand disposal
- Lime feeding
- Caustic feeding

Please feel free to contact us for our brochures on these and other applications.

WARMAN® Centrifugal Slurry Pumps
GEHO® Positive Displacement Slurry Pumps
CAVEX® Hydrocyclones
ISOGATE® Slurry Valves
VULCO® Wear Resistant Linings

Iralco APPI Jajarm, Iran: digester feeding

Shanxi Alumina Plant, China: digester feeding

Zhongzhou Aluminum Plant, China: caustic liquor feeding

Paragominas, Brazil: long distance bauxite slurry pipeline transportation

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