

# REVOLUTIONARY GCL DELIVERS EXCEPTIONAL PERMEABILITY PERFORMANCE AND SAFELY CONTAINS CAUSTIC BAUXITE LIQUOR

ALCOA Aluminum and Ma'aden Mining created a joint venture in 2009 to build a fully integrated alumina refining and production facility in Ras Al Khair, Saudi Arabia. Red mud from the alumina refining process is contained in a disposal facility incorporating a composite liner system consisting of a geosynthetic clay liner underlying an HDPE geomembrane. CETCO designed a RESISTEX® GCL that demonstrated excellent compatibility with the caustic, saline liquor that is characteristic of this type of waste.



CETCO developed a membrane-laminated RESISTEX® GCL for the containment of caustic liquor from the bauxite refining process at the ALCOA-Maaden's integrated aluminum project in Ras Al Khair, Saudi Arabia. The 0.5 mm membrane component of the GCL was fully welded, with the GCL seams constructed in traditional overlapped fashion.

### PROJECT

ALCOA Maaden Bauxite Liquor Disposal Facility

### LOCATION

Ras Al Khair, Saudi Arabia

### PRODUCTS

RESISTEX® Plus CL GCL  
RESISTEX® Plus ST GCL

### PROJECT DATE

August 2013 – May 2014

### CHALLENGE:

Bauxite liquor or “red mud” contains extremely high levels of dissolved salts, metals, and caustic anions. Ordinary GCLs will not deliver the low permeability required to effectively contain this waste stream. Given the sandy soils in this part of Saudi Arabia, compacted clays also were not available. A different solution to this containment challenge was required.

### SOLUTION:

Working with the owner's consultant, CETCO characterized the leachate and tested a special version of RESISTEX GCL which was able to provide permeability values of less than  $1 \times 10^{-11}$  m/s upon direct hydration with the leachate. No other GCL tested for this project was able to achieve this permeability result in such a chemically aggressive leachate. Given the extremely challenging site conditions, it was additionally decided to furnish a membrane-laminated version of RESISTEX GCL so as to minimize the number of geosynthetic material deployments. The membrane-backed GCL was lastly overlain by 2 mm HDPE to form a robust composite liner system. CETCO not only provided the GCL, but also assumed installation responsibilities for the entire liner system.

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### RESULT:

CETCO manufactured and installed over 1.6M square meters of RESISTEX® Plus GCL for this project, meeting an ambitious construction schedule under intensely demanding conditions. The chemically aggressive leachate, extreme installation temperatures 46°C (115°F), frequent sand storms, violent thunderstorms, and damaging winds, this project represented unprecedented challenges for a GCL in terms of exposure conditions and performance requirements. Despite these challenges, the product and the installation team completed the project on schedule and within budget.



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[cetco@mineralstech.com](mailto:cetco@mineralstech.com) | [cetco.com](http://cetco.com) | 800.527.9948

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