

## ERDENET COPPER DUMP LEACH PAD, ERDENET, MONGOLIA

# Extreme endurance in harsh weather



<b>Industry:</b>	Mining
<b>Application:</b>	Heap Leach Pads
<b>Location:</b>	Erdenet, Mongolia
<b>Product:</b>	GSE® HD

## Overview

Mongolia is a mineral-rich, landlocked country located in East-Central Asia, with large reserves of coal, copper, and gold. The mining city of Erdenet, located 371 kilometers Northwest of the capital, was built in 1974 to exploit Asia's largest deposit of copper ore, and it is the location of the fourth largest copper mine in the world. Erdenet Mining Corporation (EMC), a joint venture between the governments of Mongolia and Russia, and RMC of the United States agreed to build a pilot plant to

manufacture pure copper cathode by using a weakened solution of sulfuric acid from low grade ore piles. Construction began in 1997, and 4 months later, the plant, registered under the name Erdmin Co., Ltd., started producing copper by dump leach process.

## Challenge

Mongolia experiences extremely harsh weather conditions, with long cold winters and short summers, during which most precipitation falls. The altitude of Erdenet is 1,400 m, and the city receives stronger sunlight radiation than the plain areas. Historical weather records show the average yearly temperatures can range from 21°C to -26°C, while some years have seen temperatures fluctuate up to 69 degrees between the highest and lowest recorded thermometer readings. These conditions create a challenge for the design engineers to find a geomembrane material that can perform when continually exposed to such extreme temperatures and UV radiation.



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## CASE STUDY

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### Solution

BKS Consulting Engineers and the design department of EMC specified 2.0 mm (0.7 in) thick Solmax **GSE HD** geomembrane for the bottom lining of the dump leach pad and 8 attached solution ponds. It was a single liner system, utilizing a geotextile layer under the geomembrane for added protection from any sharp rocks or protruding objects in the compacted tailings subgrade. In total, 100,000 m<sup>2</sup> (323,084 ft<sup>2</sup>) of liner were installed by Stroyinvest, a joint venture between Russian and local construction firms.

At the time of installation, it was the first job of this kind in Mongolia and included a 56 meter high dump leach pad, four pregnant solution ponds connecting with geomembrane lined ditches, two raffinate ponds, and a waste impoundment. The typical side slope angles for the ponds were 2:1 and the average depth was 4–6 m (13.1–19.7 ft). Due to different seasons, the water level of the ponds varied and a large portion of the geomembrane was exposed to weather conditions and UV radiation over long periods of time. Installation was completed within 4 months during the spring and summer of 1997.

On a visit to the site in 2013, engineers removed exposed samples of the liner that had been in service for 16 years and performed evaluation testing as per current GRI-GM 13 specifications. The laboratory evaluation on the exhumed samples revealed no significant reduction

in the physical and mechanical properties (density, tensile, tear, puncture, carbon black content and dispersion).

The liner showed a reduction in OIT values due to depletion of the antioxidant over time, but the levels are still relatively high and well within the specification of GRI-GM 13.

Based on calculations, this geomembrane is expected to continue working in its desired function for another 141 years. Erdmin monitors the underground water quality two times a month, and no contamination has been detected so far. In addition, the quality of cathode copper manufactured in this plant has been confirmed by independent evaluators Alex Steward Assayers to meet the “A” grade quality requirements of the London Metal Exchange.

**“We are very satisfied with the performance of the geomembrane applied in our dump leach pad. It helps us maintain a normal and effective operation in the facility.”**

**MR J BAATAR**  
**General Director, Ermin Co. Ltd.**



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