

Lining evaporation beds

The Atacama Desert, located at an elevation of 2,130 m (7,000 ft.) in Chile, is the driest desert in the world. Situated near borders with Bolivia and Argentina, the desert's harsh environment provides the region with precious minerals. One of its mineral-rich stretches is known as the Solar de Atacame. The Solar is an ancient seabed, and beneath its parched surface rest large reservoirs of salt solutions (brine). Clouds rarely form or hold over this expanse, providing an ideal locale in which to harvest salt in evaporation beds.

SQM, headquartered in Santiago, has mineral rights to a portion of the Solar. To extract the salt, huge artificial ponds are created. The average pond measures 1 m (3 ft.) deep, 2000 m (6,562 ft.) wide, and 600 m (1,969 ft.) long. Clay is added and compacted, followed by the installation of pre-fabricated panels of flexible PVC.

PVC has become a strong choice for lining evaporation ponds in these harsh conditions. The durable membrane material offers excellent chemical resistance, which is crucial to long-term exposure to pools of brine. It also possesses a low coefficient of expansion—thus is not prone to wrinkling—excellent lay-flat characteristics, and the ability to be pre-fabricated into large panels, resulting in the reduction of in-field welding.

Because the evaporation process requires a great deal of time, and any loss of brine solution (back into the subsurface deposits) sets back the harvesting operation, it is imperative that the liners used in these evaporation ponds are resistant to leaks and easily repairable if damage occurs.

The panels are approximately 15 m (49 ft.) wide by 295 m (967 ft.) long and weigh 6000 lb. (2,722 kg). On site the seams are welded together by using solvent pressure. The geomembrane is checked for leaks by utilizing electrical leak detection methods.

Once the ponds are completed, wells are sunk and the brine is pumped into the ponds. The sun and wind evaporate the water, leaving solid salt crystals. After approximately one year of exposure to intense sun and frequent winds, the evaporation ponds may yield 1 m of salt remains. The ponds are then mucked out using specially designed scrapers and loaders. The salt is processed on-site and separated by grind-

ing and flotation processes into different types of salt, mainly potassium chloride, potassium sulfate, lithium carbonate and boric acid. SQM is a world leader in production of salts used in fertilizers and provides 35% of the world's lithium, which is used for batteries and pharmaceuticals. **GFR**

Pat Diebel is a corporate technical manager for Canadian General Tower Ltd. and is president of the PVC Geomembrane Institute (PGI).



Photo 1. The large brine deposits beneath the desert's surface are a rich source for minerals. Lined evaporation beds are used to harvest salts.

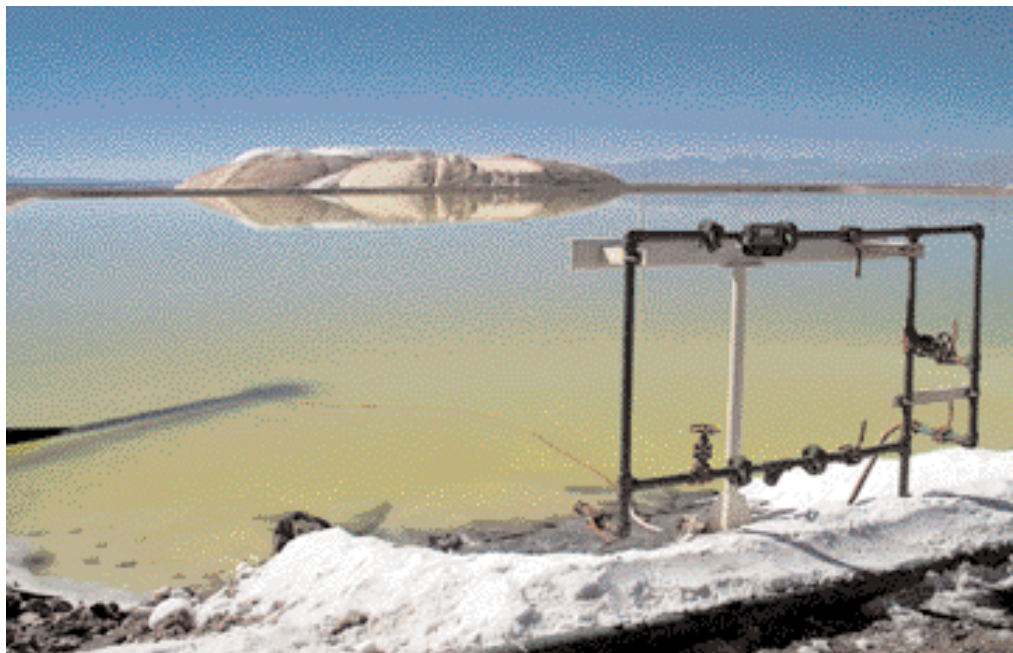


Photo 2. Pre-fabricated flexible PVC panels are seamed together on-site with solvent pressure. Brine is then pumped into the pits.

Photo 3. The evaporation process, even in the desert's harsh conditions, may take a year. The liners are durable enough for multiple harvest cycles.

