

# Technical Article Series

Circular screens help prepare slaked lime.

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# Circular Screen Separators Help Prepare Slaked Lime

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The United States must remove the salt from the Colorado River water to meet treaty obligations with Mexico. According to the terms of the treaty as specified in Minute 242, the U.S. must limit the amount of salt in the Colorado River as it passes from the U.S. into Mexico. This is no small task since farmers pump thousands of gallons of irrigation drainage water from wells in cropland which contain approximately 3000 PPM of dissolved salts. Also, reservoirs throughout the watershed create large evaporative surfaces increasing the salinity of the water.

Thirty years ago, Mexican farmers expressed concerns that the water from U.S. watersheds contained so much salt that their crops were suffering. The U.S. agreed to limit the salinity of the water delivered at Mexico's Morelos Dam to an average of 115 +/- 30 parts per million annually above the average salinity of Colorado River water arriving at Imperial Dam.

## Desalting Plant Design

To meet its obligations, the U.S. Bureau of Reclamation built the world's largest reverse osmosis desalting plant during the '80s and early '90s on a 60 acre site 5 miles west of Yuma, AZ. The purpose of the \$262 million desalting plant is to recover drainage water by desalting it.

The plant has an installed capacity to produce 73 million gallons per day (gpd) of desalted water from a total of about 100 million gpd of saline drainage water that enters the plant. Water entering the plant passes through traveling screens to remove trash and aquatic material and then through the pretreatment systems to remove solids in the water that would otherwise clog the expensive desalting membranes.

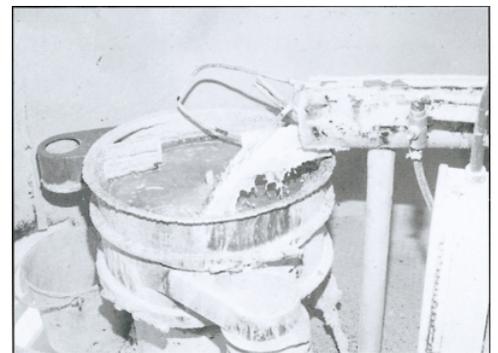
Pretreatment involves adding chlorine to prevent algae, bacteria and other organisms from growing. In the first pretreatment step, grit sedimentation basins remove heavy grit, sand, and gravel which fall to the basin bottom as water velocity decreases. A pumping plant moves this water to three Solids Contact Reactors (SCRs) that remove the finer suspended solids and soften the water. Lime and ferric sulfate are fed into three SCRs to form a sludge blanket. The lime is slaked with water and the lime slurry passes through a screen to ensure that creamy pebble-free solutions enters the SCRs. When the four square shaker-type screens failed to reliably separate oversize pebbles from the lime solution, Burns & Roe, a contract operator for the U.S. Bureau of Reclamation in Yuma, replaced the units with two Kason Vibroscreen Circular Screen Separators.

Designed with an operating capacity of 250 GPM, each of two 60-inch diameter units prevent pea-sized and other undissolvable chunks from entering three SCRs. Nozzles inside the units allow for water sprays to clean usable lime particles off the pebbles on the screens.

The 100 tons per day of slaked lime that pass through the screens flow to the SCRs where it is mixed with the salty water. The undissolved pieces move off the top of each of the screens, falling through the discharge spout into a container. Eventually, these solids are disposed of in a landfill.

The separator consists of a heavy-duty gyrator motor with eccentric weights attached to the shaft at the top and bottom ends of the motor. By adjusting the weights, the pattern of flow on top of the screen and the screening efficiency can be adjusted to achieve maximum throughput. The gyrator is rigidly mounted to the main screening assembly. It is supported by springs that allow the screen to vibrate freely while completely preventing vibrations from reaching the floor.

From the SCRs, the sludge moves through the bottom and into a sludge disposal system. Pipelines carry 360



*Approximately 100 tons per day of slaked lime pass through the Vibroscreen separator screens. Undissolved pieces of lime move off the top of each of the screens, falling through the discharge spout into a container.*

tons per day (dry weight) of the sludge from the plant to lined ponds for disposal and drying. As the sludge leaves the bottom of the SCRs, pipes carry the clarified water from around the top perimeter of the SCRs to dual media filters.

Filtered water flows to a clearwell and acid is added to lower the pH while large pumps force the water through the desalting units. About 9000 membranes desalt the water, removing more than 90% of the salts. A concrete-lined drain carries the extremely saline reject water to a slough at the gulf of California. Approximately 73 million GPD of desalted water is blended with smaller amounts of brackish water from the feed water canal and the appropriate mixture is discharged into the Colorado River where it flows to Mexico and is reused.