

West Texas Case Study

MEGA-Drain™ Stockpile Decant Solution for Industrial Sand Mining - Multiple Radial Stacker Application

An industrial sand operation producing clean-washed, sized, and dried sand for use in hydraulic fracturing operations in the oil and gas industry for the Permian Basin in Central West Texas and Eastern New Mexico.

Industrial Sand Mining

Traditional open-pit sand mining operation processed by hydrocyclone washing and separation plant. Sand is washed, sized and then stockpiled via two radial stacking conveyors at almost 675 tons per hour and stacked at roughly 18% moisture. The sand is dried with four dryers capable of 500 tons per hour combined – at 8% content feed – with potential increases of 115 TPH if the washed sand feed to the dryer is in the 5% moisture range.

The Failed System

The previously installed “Gen 1” stockpile underdrain system made with inconsistent strength and quality No. 57 stone drain gravel had outlived its useful life of 2-3 years, and decant piles were now taking 7–10 days to drain to the optimal 5% moisture feed dryer requirements. Gen 1 drains suffers failure from:

1. Silt and clay size particles blinding the interstitial space within the drain gravel envelope
2. Differential settling at the Gen 1 drain system margins, and
3. Prior system failure due to thermal expansion causing warping/surface mounding that is destroyed by loader buckets and contaminated into the feed stock, adding deleterious materials into the process.

MEGA-Drain™ Solutions < 5% Moisture in 12 Hours

MEGA-Drain™ water storage vault and collection system has 95% pore space and is designed for maintenance, cleanout, and longevity. This void space suddenly expands the hydraulic conductivity creating a vacuum effect drawing the stockpile moisture down to 5% (or less) moisture in under 12 hours. The Mega-Drain™ geocellular water recovery vault has a life expectancy of over 20 years.

Equipment Operations

Komatsu WA 500 and WA 600 front-end loaders with oversized buckets create deep rutting in very dry sand. Oversized equipment that damaged the original subsurface system could be accommodated with additional structural layer. MEGA-Drain™ installed Tough Cell by Paradox to accommodate large equipment resulting in nominal 3” rutting. Tough Cell was also utilized at the edges of the MEGA-Drain™ to eliminate differential settlement in equipment, keeping the operations front-end loaders above a designated “working” surface.

Economics

MEGA-Drain™ economics are robust. For an investment in the range of \$25 to \$35 per square foot installation of MEGA-Drain™, plant capacity was increased by 23% by removing the moisture bottleneck on the drier feed. Assuming a conservative \$7.5/ton EBITDA margin per additional ton of finished sand sold and an increase of 115 TPH process outputs equates to 856,000 additional tons sold per year with incremental EBITDA of \$6.4 million annually on a \$2.5 to \$3.5 million investment.

Conclusion

With MEGA-Drain™, washed sand could be fed to driers within 12 hours of washing and stockpiling. No longer is the washed stockpiled sand at over saturated conditions. The loader operations equipment is equipped with GPS machine control to allow the stockpile loader feed pile base to be maintained at a constant working elevation above the geosynthetic drain materials and run-surface.

