Case Study

In a traditional sawtooth design, leachate collection pipe is installed at the bottom of each lateral, and surrounded by gravel with geotextile wrap. The hydraulic performance of traditional landfill bottom liner systems significantly limits leachate recirculation and full-scale bioreactor operations. In addition, traditional designs require extensive coordination between specialized subcontractors, resulting in long construction schedules and high costs.

Recognizing this, Jones, Edmunds & Associates developed a non-traditional bottom liner system with increased hydraulic performance to meet the operational challenges of bioreactors and to allow for a streamlined construction process. The innovative design features a high flow tri-planar geonet in a configuration that eliminates the leachate collection lateral pipes, and a precast drop inlet that collects leachate from both the leachate collection and leak detection systems. The drop inlet design eliminates the need for pipe penetrations and their accompanying boots associated with more traditional liner penetrations and seaming techniques.

The overall performance benefits of the new bottom liner design over traditional designs include the significant increase in the hydraulic performance of the liner system. The structure and properties of the tri-planar geonet used in the leachate collection system greatly improves the hydraulic characteristics of the liner system. The robust collection system can more easily accommodate increased hydraulic loading rates resulting from...
leachate recirculation associated with bioreactor operations. Another system benefit includes the associated decrease in threat to the environment, due to very low expected maximum head on the liner. Modeling results show that less than a quarter of inches of head are expected on the liner. The potential for leakage has been reduced by having only one liner penetration and by improving the weld quality with the drop inlet design. The orientation and access of the drop inlet results in high quality welds, which greatly minimizes the potential for leachate leakage. Welding the penetrated geomembrane to the drop inlet permits the weld to be tested, which is not possible with traditional pipe.

Replacement of traditional collection laterals with a tri-planar geonet liner system has led to reduced construction complexity, duration (over 60%), and costs (over 25%). The elimination of collection laterals greatly simplifies the grading.