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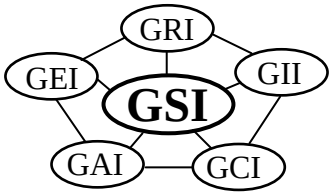

GRI White Paper #1

Do We Need Monitoring Wells at Double-Lined Landfills?

by

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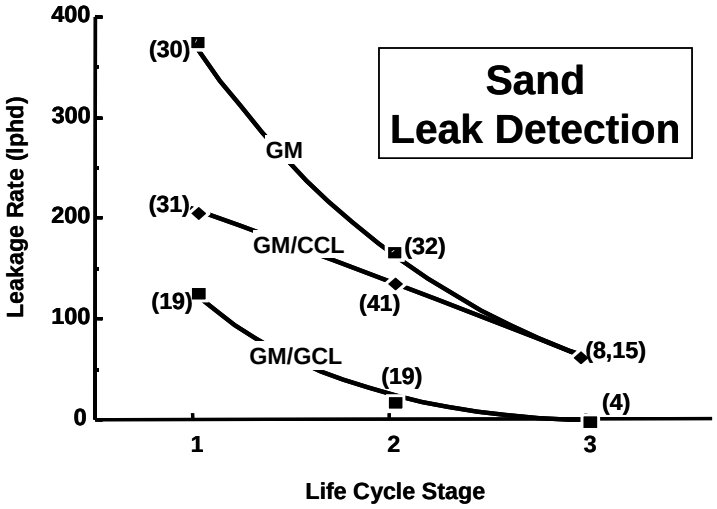
Do We Need Monitoring Wells at Double-Lined Landfills?

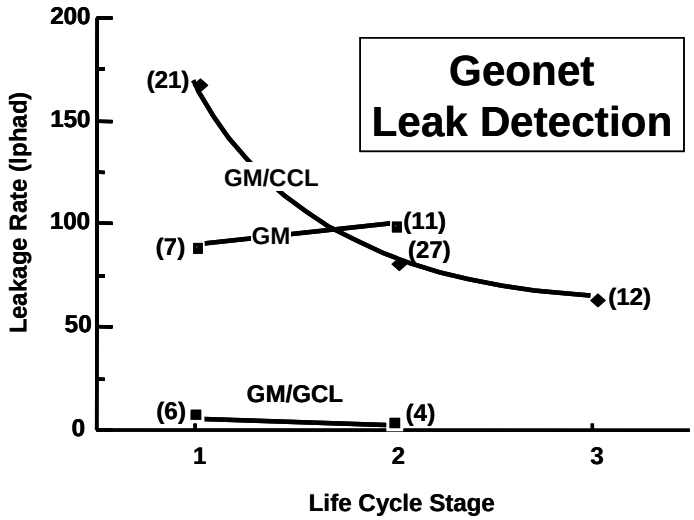
We currently have a very expensive redundancy system when both double-lined cells and monitoring wells are used at municipal solid waste landfills. Many feel that the array of monitoring wells is simply excessive in light of the performance of geosynthetic related double-lined systems that use geosynthetics.

Last year a national study conducted to determine the leakage rate through primary liners in double-lined municipal solid waste landfill containment systems for municipal solid waste was submitted to the U. S. Environmental Protection Agency. The study, *Assessment and Recommendations for Improving the Performance of Waste Containment Systems*, by R. Bonaparte, D. E. Daniel and R. M. Koerner is available at http://www.epa.gov/ORD/NRMRL/pubs/index.html and the document number is EPA/600/R-02/099. Monitoring data from 91 landfills consisting of 287 cells was analyzed. Average post-closure leakage rates of less than 100 liters per hectare per day (L/ha-d) in the post closure stage and less than 10 L/ha-d for geomembrane/geosynthetic clay liner systems attest to the outstanding performance of these liner systems. An approximate conversion to gallons per acre per day (gal/acre-day) is 10 L/ha-d equals 1.0 gal/acre-day.

The averaged data (number of cells in parentheses) are presented here in two sets of graphs, the difference being the type of leak detection layer—sand versus geonet composite. The type of primary liner—geomembrane (GM), geomembrane over a compacted clay liner (GM/CCL), or geomembrane over a geosynthetic clay liner (GM/GCL)—distinguishes the individual response curves. Data are illustrated on the

horizontal axes for three stages in the life cycle of the respective landfill cells: initial filling, active filling, and post-closure.





In the mid-1980's, when double lined landfills were first proposed, the concept of an "action leakage rate"—the rate high enough to require some remedial action—was discussed. Leakage rates above the action value were considered a concern, requiring additional monitoring or corrective action. The values discussed ranged from 200 L/ha-d to the capacity of the leak detection material, which is greater than 1,000 L/ha-d. The

actual performance values indicated on the graphs included here are significantly lower than the originally considered action values.

Thus, we now have the capability to contain leachate with excellent success rates and to monitor leakage while the entire enclosure is still being contained by a secondary, or lower, liner system consisting of a redundant geomembrane over a compacted clay liner, a geosynthetic clay liner, or both. This situation raises the question, Why do we still use an array of monitoring wells surrounding double-lined landfills to try to detect the incredibly low values of leakage that might get through the secondary liner system?

Yes, there are regulations and, yes, there is an entire business of well drilling and monitoring that accompanies all landfills, but both regulations and technical practices should be continually challenged and changed when and where appropriate. The likelihood of a leakage plume being generated through a double liner system and detected by monitoring wells is, at best, remote. Thus, the scenario many would suggest for future landfill leakage monitoring would be one that gives the landfill owner via the site's designer the option of using a double-lined system for municipal solid waste containment or a single lined system and the conventional monitoring wells. If the double-lined system is selected, monitoring wells should be required only when the leakage exceeds a preset value for the site in question.

Thus, the setting of a particular action leakage rate for a given site is critical. If the rate is exceeded, then and only then should an array of monitoring wells be required. Of course, a limited number of wells will always be required for initial site characterization before the landfill or cell is constructed.