

# DESIGNER'S FORUM

## Regulatory relations: geosynthetics and the EPA

By Gregory N. Richardson

**D**URING THE PAST FEW MONTHS, I have come to the startling conclusion that there is a lack of communication between the geosynthetic community—both designers and manufacturers—and the environmental regulatory community. This article is intended to highlight several issues of significant concern to landfill designers and to promote changes within the geosynthetic community that will lead to better awareness of such issues and, hopefully, to improved communication. Interaction between these groups is essential for three reasons: most designers have projects that are affected, manufacturers have a significant financial stake in what has been their largest growth market in the past decade, and regulators must achieve the maximum environmental protection at reasonable costs.

### Why designer and industry involvement?

The need for geomembranes in landfills is clearly stated in 40 CFR (Code of Federal Regulations), which was developed in the late '80s and early '90s with minimal industry input. Each state has adopted similar regulations that are equally or more restrictive than the federal code. Much credit for the technical features of these regulations goes to Robert Landreth, who guided the U.S. Environmental Protection Agency's (EPA's) Risk Reduction Engineering Laboratory until 1995. He solicited industry input during the preparation of EPA technical guidance documents and training courses, making it easy for both designers and manufacturers to participate. In essence, the industry could be passive and progress was still made.

Today, manufacturers of geomembranes, composite drains and geotextiles must credit their growth in the environmental field not to clever marketing or product positioning, but rather to the luck of having products that aid designers in protecting this nation's groundwater. Similarly, most designers must credit their success in implementing federal standards to the availability of these remarkable "geo" products.

How many of the designers who read this column regularly wonder how we would accomplish the difficult design requirements of modern liners and final covers without such tools?

### What are the current problems?

These days, excitement within the landfill industry frequently stems more from watching the ever-increasing consolidation of major companies than from technical developments. But we do have several fundamental problems that cry out for industry support to resolve them. A discussion of these key problems follows.

As an industry, we continue to quietly tolerate errors in Resource Conservation and Recovery Act (RCRA) Subtitle D (40 CFR 258) that encourage (require?) designers to place faulty final covers on unlined landfills. David Daniel and I wrote a position paper on this subject in 1995 (*GFR*, January/February) and received no industry support, comment or even acknowledgement. The position paper is reprinted immediately after this column. Maybe a second airing of this problem will help. At the time, we felt that covers for lined landfills were over-designed based on infiltration criteria, but they now seem more reasonable when viewed from the

perspective of New Source Performance Standards (NSPS) for air quality.

The real crime is the cost many local governments pay if a deficient final cover leads to groundwater contamination. Such contamination will be detected by current or future assessment programs. Subsequent remedial action for many of these landfills will involve implementation of the EPA's Presumptive Containment Remedy (see attached references) for municipal solid waste (MSW) landfills. The key to the presumptive containment alternative is construction of a final cover that properly uses geosynthetic components to limit infiltration.

RCRA Subtitle D permits placement of a soil-cover system over existing landfills that lack liner systems to allow approximately 300,000 gal/acre/year of infiltration. Such soil covers are hardly inexpensive—my cost studies show that typical defective covers average \$65,000/acre. Since 1993, I have designed no final cover system that would not satisfy the EPA's Presumptive Containment alternative. These guidelines call for a geosynthetic barrier and add approximately \$15,000 per 30,000 acres but limit infiltration to less than 500 gal/year. Such covers are now required only on liner landfills and those going through Comprehensive Environmental Response, Compensation,

Table 1. LEAKAGE OF ALTERNATIVE LINER SYSTEMS, GAL/ACRE/DAY (OTHMAN ET AL. 1998)

Type	GM <sup>1</sup> /GCL barrier			GM/CCL barrier			GM Only		
	1	2	3	1	2	3	1	2	3
Life cycle stage <sup>2</sup>									
Average flow	14	2.28	0.03	23	15	6.8	41	18	6.8
Minimum flow	0.0	0.00	0.00	0.13	2.4	0.00	0.81	0.0	0.02
Maximum flow	104	30	0.10	126	71	29	229	158	26
Number of cells	19	19	4	31	41	15	30	32	8
Number of landfills	3	3	1	11	11	4	11	11	4

<sup>1</sup> Geomembrane

<sup>2</sup> 1: as initially constructed. 2: during active waste placement. 3: with final cover in place.

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and Liability Act (CERCLA) or Superfund actions. If clients balk, I take them to one of our Superfund sites for an education regarding the very expensive federal landfill programs that lay in wait for remedial landfills.

On December 16, 1998, the EPA issued a memorandum that clarified the EPA Office of Solid Waste's policy on leachate recirculation in MSW landfills. Under current 40 CFR 258 requirements, leachate recirculation only is allowed in MSW landfills that have a liner with a 2-ft thick compacted-clay layer that has a permeability  $\leq 1 \times 10^{-7}$  cm/sec. Alternative composite liners that use geosynthetic clay liners (GCLs) are not currently allowed on sites where leachate will be recirculated to the waste.

The great irony here is that the EPA study clearly shows that the use of GCLs reduces the rate of leachate leakage from a composite liner system. This reduction in leachate volume with time is shown in the EPA data presented in **Table 1**. This chart identifies three typical stages in the life of a MSW landfill: 1) construction

and pre-operational, 2) operational, and 3) post closure.

One month after the 1998 EPA memorandum was released, I contacted all major GCL manufacturers to determine what they intended to do about this situation. Not one was aware of it.


Furthermore, no designer/manufacturer response has been formulated to date. While this is going on, EPA is conducting a series of seminars nationally in support of the recently implemented NSPS (40 CFR Part 60) clean air regulations. Guess what one of their key recommendations is? Leachate recirculation!

### Industry action

It is time for designers and manufacturers to become more active in the application of geosynthetics to environmental projects. Roadway and reinforcement applications serve as excellent role models. It never ceases to amaze me how much of the industry's time is spent on wall-reinforcement applications that represent less than 1% of geosynthetic production. The industry

needs similar programs that work closely with designers, EPA and state environmental agencies to correct both regulatory and application deficiencies. For every dollar spent in pursuing the Federal Highway Administration, Transportation Research Board, etc., our industry needs to commit a dollar to the environmental industry. The development of standards such as American Association of State Highway Transportation Officials (AASHTO) M288 demonstrates the tremendous positive influence that our industry can have when they become actively involved in development of design standards.

It may be that designers, as represented by the Solid Waste Association of North America (SWANA) and National Solid Waste Management Association (NSWMA), may have to take the initiative and contact the geosynthetic manufacturers and regulators to request a more active participation in our organizations. Both SWANA and NSWMA maintain excellent U.S. EPA liaisons that could benefit from support and involvement by the geosynthetic industry.

Though they share common interests, there is currently no forum for regular technical discussions between the waste industry (SWANA and NSWMA), the geosynthetics community, and the regulatory community (U.S. EPA and interested states). Having received good feedback from all three groups regarding past Designers Forums, I am soliciting ideas from readers on how to correct the current failure to communicate. Please feel free to e-mail suggestions to me at [greg@gnra.com](mailto:greg@gnra.com), and I will report the results in the future. 

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#### References

- Daniel, D.E. and G.N. Richardson. 1995. "Position Paper: The Role of Geomembranes and Geosynthetic Clay Liners in Landfill Covers." *GFR*. (vol. 13, no. 1, January/February).
- Othman, M.A., Bonaparte, R., Gross, B.A., and D. Warren. 1998. Evaluation of Liquids Management Data for Double-

- Lined Landfills, draft document prepared for U.S. EPA National Risk Management Laboratory, Cincinnati.
- EPA. 1991. OERR, EPA/540/P-91/001, *Conducting Remedial Investigations/ Feasibility Studies for CERCLA Municipal Landfill Sites*. February.
- EPA. 1993a. OSWER Publication 9355.0-47FS, EPA/540/F-93/047, *Presumptive Remedy: Policy and Procedures*. September.

- EPA. 1993b. OSWER Publication 9355.0-49FFS, *Presumptive Remedy for CERCLA Municipal Landfill Sites*. September.
- EPA. 1996. OSWER Publication 9355.0-67FS, EPA/540/F-96/020, *Application of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills*. December.
- EPA/U.S. Department of Energy. 1997. *Presumptive Remedy for Metals in Soils and Related Media*, draft document.