

## LONG-TERM PHYSICAL/BIOLOGICAL DEGRADATION OF BENTOMAT®

It is occasionally asked whether the components of Bentomat are susceptible to long-term chemical or biological degradation. With respect to the bentonite component, this mineral is already tens of millions of years old and will not undergo any structural changes under “normal” conditions of chemical and environmental exposure. However, chemical degradation *can* occur in applications where the bentonite contacts certain highly contaminated liquids. Biological degradation, on the other hand, is not possible, because bentonite is an inorganic mineral of no nutritive value to microorganisms.

With respect to the geotextiles, both are made from polypropylene, an extremely durable polymer that is also highly resistant to microbial degradation. The reason for this durability is polypropylene's stable molecular structure, which consists of multiple carbon-carbon bonds, which are the strongest in the natural world. Microbial degradation would require the breakage of these bonds, a process involving a large amount of initiation energy not available to microorganisms. Based on these structural considerations and the results of a variety of field studies, Koerner (1990) presents the results of several studies of geotextiles under conditions of soil burial which have consistently indicated that they have remained in “good to excellent” condition. Another study by Tisinger (1989) showed no degradation of the physical properties of a polypropylene geotextile buried for 11 years.

In addition to these field studies, extensive compatibility tests (via EPA Method 9090-Reference TR-227) have been conducted in which polypropylene geotextiles were immersed in biologically active landfill leachates. Please refer to TR-227 for details of EPA 9090 compatibility testing. This testing, conducted at elevated temperatures to accelerate degradation, showed no changes in tensile strength or puncture resistance over a 120-day test period (Polyfelt, 1992). The only mechanism by which polypropylene geotextiles have been shown to degrade is prolonged exposure to sunlight (UV degradation). However, because Bentomat must be covered as soon as possible after installation, such exposure is not possible, and UV degradation cannot occur.

Based on the large body of research performed on polypropylene geotextiles, it appears they are not susceptible to biological or physical degradation under normal conditions of soil burial or contact with landfill leachate. The bentonite component of Bentomat is also unlikely to be degraded due to its inorganic composition and its inherently stable mineral structure.

### References

- Koerner, R. M. (1990) “Designing With Geosynthetics” (2nd Ed.), Prentice-Hall, Inc., New York, pp. 111-112.  
Polyfelt Brochure, (1992) “Geotextiles for Waste Containment Systems,” Polyfelt, Inc.
- Tisinger, L. G. (1989) “Microstructural Analysis of the Durability of a Polypropylene Geotextile,” Proceedings from the Geosynthetics '89 Conference, San Diego, CA, pp. 513-524.