GEOSYNTHETICS...?
SOME GOOD THINGS TO KNOW!

Candid commentary on *Products*, *Properties* and *Applications*.

Woven Geotextiles

These fabrics are produced by interweaving yarns, usually *monofilament* or *slit film*, from two different directions. These fabrics are noted for their strengths and high modulus or low elongation.

Monofilament yarns are individually extruded, resemble fishing line, and are typically used to produce filter fabrics with high Percent Open Areas (POA) – a property that is critical for long term, free flowing filtration/drainage systems.

Slit film yarns are actually slit from a plastic sheet, resemble narrow ribbons, and produce fabrics with high modulus but low POAs. Their use should be restricted to separation, stabilization, and reinforcement applications.

Nonwoven Geotextiles

These multi-purpose fabrics are produced by interlocking and/or fusing randomly oriented *continuous* or *staple* filaments by mechanical needle-punching, thermal heat setting or fusing, or chemical bonding. These fabrics are felt-like and noted for their various thicknesses, tight (high) AOS, and low modulus (high elongation).

Continuous filaments are continuously extruded (theoretically endless), and needlepunching is usually the only finishing process required.

On the other hand, *staple filaments* are short, typically 1 to 4 inches, and usually require heat or chemical fusing for additional strengths.

Nonwoven fabrics are multi-purpose and are best suited for separation, membrane protection, and non-critical filtration applications.

Modulus

This physical property is a measure of a material's *resistance to elongation under load*. Generally speaking, the lower the elongation the higher the modulus. *High* modulus is critical to any project requiring reinforcement and is typically found only in woven geotextiles and geogrids.

Note: A fact frequently overlooked is that many woven geotextiles are designed for reinforcement, have strengths equal to or greater than the majority of geogrids, and have been used successfully in reinforcement applications since the early 70's and at a fraction of the cost of geogrids!!!

Clogging Resistance:
AOS, EOS, Permeability and Permittivity (???)

Unfortunately, too many specifications are being written that rely solely on the above 'retention' and 'flow' characteristics as a safeguard against clogging. Although each plays a significant role in or the success or failure of drainage/filtration systems, it's possible that the filtration system may still fail if site-specific soil tests are not performed to determine the content and type of migrating fines, and whether or not 'Percent Open Area' values need to be considered[1].

Percent Open Area (POA)

This was one the first criterion specified by the USACOE for "Plastic Filter Cloth" in the early 60's, and its importance is no less relevant today. POA is the area of distinct, direct, and measurable openings of a geotextile that is not occupied by filaments, fibers, or yarns. It is the only assurance that a free flowing 'filter cake' will form on the upstream side of the fabric, and not be threatened with migrating soil particles becoming lodged in the geotextile itself, thereby allowing the filter cake to do its intended job.

Note: *Some* clogging is a natural occurrence of all filtration systems, and independent studies have repeatedly shown that POA is the single most important property to consider when resistance to clogging is essential. Only certain types of woven geotextiles can achieve percentages high enough to be effective.

Porosity

A laboratory 'calculation' of the percent of voids in the total volume of a *nonwoven* geotextile.

Note: Attempts to equate Porosity with *Percent Open Area* as an *'Apparent' Open Area Qualifier* to establish *Clogging Resistance Criteria* have been ongoing. This 'theory' has not yet been validated. The tortuous paths that soil particles must travel through nonwoven fabrics can make them very susceptible to clogging with certain types of soils. Nor does it take into account any load being placed on the fabric during and after installation, and is therefore not a true indicator of the geotextile's behavior in the field.

[1] See *"Why Percent Open Area"* and *"Independent Research on Fabric Clogging"* included in this package.