

## Animal Waste Containment

### GEOSYNTHETIC APPLICATIONS

Over the years, geosynthetics have been used extensively in landfill and mining operations and in potable water applications such as canal and reservoir liners. More recently, geosynthetic use has spread to aquaculture applications such as fish and shrimp farming. This recent expansion into the field of animal production has also led to containment of animal waste by-products in various agricultural applications.

Pig farms are currently the largest consumer of geosynthetics in the animal waste containment arena. Some states and local environmentalists are pushing regulations that require ponds associated with cattle, chicken and other livestock farms to be lined to prevent contamination.



[GSE Geosynthetic Products]

### MATERIAL SELECTION

There are several reasons geosynthetics may be used to line these animal waste ponds - public sentiment, location in an environmentally sensitive area, lack of available clay nearby or simply the desire to have the most secure containment possible. Once the decision is made to utilize geosynthetics, one must choose from a variety of different materials that are available.

GSE HDPE geomembranes are well suited for these types of applications due to their excellent chemical resistance and their permeability which is the lowest of any geomembrane material in use today. In fact, one farm of 10,000 hogs produces as much waste as a city of 40,000 people. This statistic highlights the fact that people use significant quantities of water for bathing, cooking and other domestic use. As one might imagine, there are large volumes of animal waste materials that are degrading at an accelerated rate producing vast quantities of methane gas. The permeability of the geomembrane material must be very low so the methane cannot escape through the membrane. If required for slope stability, GSE HD textured HDPE geomembrane may be used.

### CONTAINMENT SYSTEMS

Increased environmental awareness coupled with the increased size of many animal farms has led many companies to seek more environmentally friendly alternatives of treating and releasing animal waste products than a stand alone compacted clay liner. To prevent such environmental catastrophies as fish kills, algae blooms and groundwater contamination, many of these companies are looking to geosynthetics as a more cost-effective and more secure containment alternative.



Typical Cattle Farm

### A DURABLE GEOSYNTHETIC FOR ANIMAL WASTE CONTAINMENT

An HDPE geomembrane used in applications that require excellent chemical resistance and endurance properties.

Geomembranes are being used to line holding lagoons, anaerobic treatment ponds and evaporation ponds in waste facilities. Geomembranes are not the only geosynthetic that can be utilized in animal waste containment, GSE nonwoven geotextiles can be used to provide protection to the geomembrane by cushioning against uneven subgrade and GSE HyperNet can be utilized for ultimate protection as part of a leak detection system in a double lined pond. Alternatively, a GCL can be used to line these ponds.

Geosynthetic Clay Liners (GCL) because of their self-sealing capabilities and their geotextiles are suited for these lagoons as a single source liner. It is not necessary to add other containment liners or other geotextiles to protect the GCL as these are all substantially built into the manufacture of the GCL. For additional hydraulic containment GSE BentoLiner CNSL has an impermeable coating on one side of the geotextiles to give the GCL further hydraulic containment.

### TYPICAL CONFIGURATION OF PONDS

The animals are raised in large barns with sloping concrete floors. At predetermined intervals, a series of powerful water jets are used to move the waste material down the floor and into the lagoon(s). Once in the lagoon, degradation of the waste may be accelerated by the use of anaerobic microbes. As the microbes degrade the animal waste, some effluent is introduced into the evaporation pond through spillway(s) between the lagoons and the evaporation pond. This effluent is allowed to evaporate. Once the evaporation is complete, more effluent is introduced into the evaporation pond and the process is

repeated.

### IMPORTANCE OF INSTALLATION QA/QC

While the quality of the geomembrane is very important, the job is not complete until the material is installed. Every geomembrane manufacturer guarantees their material is 100% spark tested and free of pinholes. Since the geomembrane, as manufactured, is not a source of leakage in the field, installation QA/QC is of paramount importance. Any leakage detected after completion of the pond will be a direct result of damage during deployment and installation of the material. Although this damage will be unintentional, the end result will be the same leakage.

In a typical landfill application, it may take months for waste to generate enough gas or liquid flow for a small hole to create problems. However, in this application, a hole the size of a quarter can allow enough gas to become trapped beneath the geomembrane to generate whales large enough to protrude above the water level in a few days. Because even small holes can cause very costly problems, it is imperative that these types of installations be performed only by installation crews with the experience and capabilities to install geosynthetics without causing damage to the geomembrane.

Additionally, it is critical that proper QA/QC testing be performed during and after installation. This testing includes vacuum box testing, air-channel testing and proper welding technique. For further quality assurance, electrical leak surveys may be performed or electrically conductive GSE Leak Location geomembrane may be used so

that the entire membrane may be tested after installation for any penetrations. GSE Leak Location also allows for future testing of the waste containment pond to ensure the containment application remains leak free.

### THE FUTURE

Using geosynthetics in animal waste containment is gaining in popularity both out of necessity for containment and cost advantages and containment properties versus clay linings systems. Installation QA/QC procedures must be followed in every instance. Most typical landfill installations have leak detection systems or leachate drainage systems in place which help to mitigate small leaks that may be caused during installation. Most animal waste facilities do not have this luxury. As mentioned previously, a small hole can allow enough methane underneath the liner to produce a whale 20 foot high in days. That is the type of problem no one wants to encounter. Not the animal producer - not the installer. The use of GSE geomembranes and GSE QA/QC personnel can help to prevent this problem.

### ENGINEERING SUPPORT

The GSE Engineering Support Staff is comprised of multidisciplinary product professionals to support you across a range of project requirements. This includes knowledge in geomembrane, geosynthetic clay liners, geonet, geocomposite, nonwoven geotextile and concrete protection products and application solutions. Rely on our technical staff to help you solve your project issues.

GSE is a leading manufacturer and marketer of geosynthetic lining products and services. We've built a reputation of reliability through our dedication to providing consistency of product, price and protection to our global customers.

Our commitment to innovation, our focus on quality and our industry expertise allow us the flexibility to collaborate with our clients to develop a custom, purpose-fit solution.

**[ DURABILITY RUNS DEEP ]** For more information on this product and others, please visit us at [GSEworld.com](http://GSEworld.com), call 800.435.2008 or contact your local sales office.

