

## **PROTOCOL SEALING A LEAKING LAGOON**

**GOAL:** Determine the cause of seepage and implement a solution to stop it.

**POLICY:** The maximum allowable seepage is ¼-inch per day. Ideally, water in the lagoon should be maintained between 3 and 5 feet.

### **PROCEDURE**

Excess seepage can lower the water in the lagoon to unusable levels. Seepage can commonly be attributed to areas of permeable soils in the bottom or sides of the lagoon. Different methods can be used to reduce the seepage. Before any investment is made in sealing a lagoon, an evaluation of the problem area by a trained soil scientist, engineer, or technician is beneficial. Contact the local Natural Resources Conservation Service and/or the county sanitarian for assistance on sealing leaking lagoons. Once the cause of seepage is reasonably determined, the best and most practical method for sealing can be chosen.

#### **Sealing with earth blankets**

Sites with too little clay to prevent excessive seepage can be sealed by an earth blanket compacted over the leaky area.

- 1) The best blanket material should have a good mix of particle sizes from small gravel or coarse sand to fine sand, silt, and clay in the desired proportions. The clay particles should make up about 20 % of the weight.
- 2) The area to be sealed should be prepared by draining the lagoon and permitting the area to dry.
- 3) The area should then be worked with a disc, tiller, or similar equipment and the blanket material uniformly spread over the area in 6- to 8-inch layers. Each layer should be thoroughly compacted by a roller before the next layer is placed. Generally, two or three layers is adequate.
- 4) For this method to be practical, a suitable borrow area should be close enough to permit hauling the blanket material at a reasonable cost.

#### **Sealing with flexible membrane lining**

This method, though generally expensive, is perhaps the most effective because it eliminates virtually all seepage when properly installed. Flexible membranes made of plastic, rubber, or similar materials are placed as impermeable liners in the bottom of the lagoon.

- 1) All membranes should be constructed of high-quality materials and should be certified by the manufacturer to be suitable for use as liners.
- 2) The area to be lined should be drained and allowed to dry until the surface is firm, and can support the people and equipment that must travel over it during installation of the lining.

- 3) All rocks, stumps, hard clods, and other materials that could damage the liner should be removed from the surface before the liner is laid.
- 4) The liner should be installed according to the manufacturer's recommendations and specifications.

### **Sealing with bentonite**

Bentonite is a high-swell clay material suitable for use on soils having a high proportion of coarse-grained materials and insufficient clay. Bentonite absorbs several times its own weight of water and when completely saturated can swell 8-20 times its original volume. Bentonite can be purchased in bag or bulk as a powder or in pellet form. Farm supply stores, co-ops, or well drillers often supply bentonite.

- 1) The area to be treated must be drained and dried prior to applying the bentonite. (Dumping bentonite in the water in an undrained lagoon does not work and can have detrimental effects on the water quality.)
- 2) Bentonite is mixed with the existing coarse material soil. Rates of application vary from 1-3 pounds per square foot, depending on the site material.
- 3) The mixed soil must be thoroughly compacted. The saturated bentonite will swell to fill the voids and pores, sealing the lagoon.
- 4) Upon drying, bentonite returns to its original volume, so it is not usually suitable for lagoons with a wide fluctuation in water level.

### **Sealing with soil dispersant**

Excessive seepage can occur in a lagoon even in clay soils because the clay particles are arranged to form an open, porous, or honeycomb structure. Applying small amounts of certain chemicals to these porous materials can disperse them and reduce soil permeability. These chemicals are referred to as dispersing agents.

- 1) Prior to application, the area should be drained and dried.
- 2) Sodium chloride (common salt), sodium tripolyphosphate (STPP), and tetrasodium pyrophosphate (TSPP) are all effective dispersing agents. Commercial phosphatic fertilizer should *not* be used. Farm and feed supply stores and co-ops often supply the proper type of salt or dispersing agent. The dispersing agent should be applied at a uniform rate and thoroughly mixed into each 6-inch layer treated with a disc or tiller.
- 3) Rates of application range from 0.05-0.33 pounds per square foot depending on the type of soil and type of dispersant used.
- 4) Each treated layer should then be thoroughly compacted.