



Sealing with Bentonite

BY STURGIS MATERIALS, INC.

POND SEALING WITH BENTONITE

Historically, clays have been used to provide earthen seals. Modern technology recognizes that sodium bentonite, a clay having superior qualities, will provide a better barrier to the movement of fresh water through soils.

Sodium bentonite is a unique material. In the presence of fresh water bentonite will swell. Depending on the quality of the bentonite and of the water, the bentonite will increase several dimensions in volume. When exposed to large volumes of fresh water, bentonite will continue to expand forming a "gel" slurry and eventually going into a state of free swell; breaking down into its smallest dimensions, resulting in muddy water. To prevent this from occurring in a "sealing" application the dry bentonite is protected by mixing it with the soil and then compacting into a sealing blanket.

It should be noted that the presence of salt or salt water can have a negative effect on the ability of the bentonite to fully hydrate and develop a satisfactory seal.

HOW MUCH SODIUM BENTONITE DO I NEED?

Soil type and pond size are the key factors in determining the amount of sodium bentonite required to seal ponds. Normally, coarse soils require more bentonite. If the size of pond is known and the type of

Bentonite Application Rate Chart

Soil Type	Application Rate (lbs./ft ²)
Clay to Silt	2
Fine to Medium Sand	3
Coarse Sand to Fine Gravel	4
Coarse Gravel and Rock	5+

soil is available, this chart gives a good estimate on the amount of bentonite needed to seal pond. The chart is based on water depths of up to eight (8) feet.

For depths greater than 8 feet: Since greater water depths increase the pressure on the bottom of the pond, increase the application rate listed in the chart above by one pound per square foot for every 8 feet of additional water depth. For example, add one pound per square foot to the "Application Rate" for depths of 8' to 16'. Add two pounds per square foot to the "Application Rate" for depths of 17' to 24', and so on. Performing a SOIL TEST is another good way to estimate. You can perform the soil test yourself using the "Bucket Method" described [here](#).

SITE PREPARATION

Remove boulders, tree stumps, roots and foreign objects. Grade and level as necessary & cover exposed sand and gravel or any other area that obviously would leak with a "preliminary base" of the local clay. Sides or banks should have a slope in the range of 3:1.

BENTONITE

The amount of bentonite required depends on the type of soil to be sealed. A soil engineering report would be helpful however a simple and cost-free analysis is described here:

THE BUCKET METHOD

In the bottom of a 5 gallon pail, drill 20 to 25 holes about an eighth to quarter inch diameter. Gather enough soil from the area to be sealed to fill about 3 inches of the pail. You can either select the most porous soil which is sand, or a mixture of soil taken from several areas of concern in order to present an average soil.

In this soil, mix 1 to 2 pounds of the selected bentonite and tamp down in the bottom of the pail. Into this, pour a gallon or two of water; wait and see if the bentonite as it swells, provides the necessary seal. This should only take a minute or two. If not, repeat the process and increase the amount of bentonite by half a pound until the water is contained within the pail.

The bottom of the pail represents about one square foot. When you know how many pounds of bentonite it takes to seal the pail, then you know how many pounds per square foot to distribute and roto-till into the pond, dam, or other earthen structure.

APPLICATION:

The required amount of bentonite is uniformly applied over the area of concern. Mix dry bentonite into the top 4 inches of the soil to be sealed. Moisten the working area with a spray of fresh water and compact, taking care not to puncture the sealing layer. In some instances the decision has been made to apply a second layer, consisting of compacted local clay approximately 2 inches thick. This is done to

protect the bentonite-sealed area. The sealed area never becomes hard but remains soft and plastic. Effort should be made to prevent punctures by hoofed animals, people or vehicles.

A Final Word

Experience indicates that in a bentonite-sealing project, the majority of success is dependent upon proper installation. The use of high quality sodium bentonite, adequate coverage and uniform placement are important for successful sealing. Bentonite is not a miracle or a magic material, it is just a tool to help you achieve a desired result and like any tool it must be properly used.

The "Sprinkle Method" is the process of dropping the bentonite through standing water. There is no possible way to determine exactly where the bentonite will settle making this a true hit & miss proposition. In addition as mentioned before, a situation of free swell will occur that does not contribute to a long term seal. If this is the best alternative for application, it should be noted that while sodium bentonite is not toxic, the powder residues from the package can settle on gill plates of fish and suffocate them.