

Agitation and Manure Solids



to



The whole purpose for pumping is to remove the manure solids from the lagoon which are limiting the holding capacity of the incoming waste water.

The above lagoon was a 5 million gallon lagoon that had not been pumped for over 5 years. It was full of manure solids with grass growing on top of the solids all around the sides of the lagoon.

In order to pump this lagoon it had to be completely agitated and the floating grass mat chopped and mixed into the slurry.

Proper Agitation

Without proper agitation you will not be able to effectively remove the solids, you will just remove top water. When pumping slurry out of a lagoon the effluent or slurry will come from the source of least resistance; so getting the pit well mixed is paramount. You need to mix the lagoon solids into a product the consistency of a milk shake.

Agitation is used to first loosen up the solids and mix them into a slurry that can easily flow toward the suction pump. Then the agitators are continuously used throughout the pumping process to keep the slurry in suspension so the solids do not settle out.

There are two primary types of agitators. These types are the traditional stick agitator which is operated by the PTO on the back of a 250 hp tractor. The second type is the newer technology agitation boats.

Traditional Stick Agitators

The traditional stick agitators are a type of horizontal agitation. It uses a prop or nozzle to stir up the solids and keep them in a horizontal circular motion. The nozzle is used to break up floating solids and to wash the solids from off the lagoon banks. The prop is used to move a large volume of slurry and gradually mix the bottom solids into suspension.

The stick agitator if used as the only type of agitation must be moved around the lagoon edge to effectively loosen and keep in suspension the solids in the whole lagoon. The stick agitator should be moved every 20 to 30 minutes.

When all the solids have been suspended the traditional stick agitator is positioned to create a horizontal slurry swirl to keep the slurry moving and the solids in suspension during the whole pumping process.

The stick agitator is also used as a force feeder to pull the manure slurry from off the lagoon bottom and feed the lead centrifugal pump. The lead pump will pressurize the slurry to 180 psi and push the effluent down the fire hose to the next booster pump in line.

Agitation Boat Technology

In 2011 a huge game changing agitation technology was developed. This was the advent of the agitation boat. This was putting a large centrifugal pump and nozzles on a floating boat and moving the boat by remote control around the lagoon creating vertical agitation.

This allows the manure solids in the middle of the lagoon to be effectively agitated. It can easily move around the lagoon without having to make a mess out of the lagoon banks by using a traditional stick agitator that has to move around the top of the lagoon banks. The newer agitation boats also have a rotating nozzle which allows the banks to be washed down.

The agitation boat is used in conjunction with the traditional stick agitator to create both vertical and horizontal agitation. This one-two punch combination is the most effective agitation and method of moving solids.

The use of the agitation boat is usually limited to lagoons that are larger than 1 surface acre and holding more than a million gallons. The agitation boats need at least 2-3 feet of top water in order to float and be used. The agitation boats need to be pulled from the lagoons when the slurry level reaches about 3-4 feet from the bottom.

Lagoons with Excessive Amounts of Solids

When a lagoon has less than two feet of top water and is choked with solids on the surface it creates a lagoon that grows grass and weeds on top of the manure solids. This type of situation does not allow the use of the floating agitator. The pumpers will then start mixing the solids while adding water at one spot in the lagoon. This creates a slurry pocket which is pumped out as additional water is constantly added to allow the rest of the solids to be broken up and mixed to keep the manure slurry at about a 12-14%.

When a large enough slurry pocket is created the pumpers will add the use of the agitation boat. The boat will then work away at the sides of the solids until all of the manure solids are worked into suspension.

It takes one part water to one part solids to create a manure slurry that will flow. If the manure slurry is too thick it will not flow to the suction force feeder pump and will start to suck air or pull thinner top water. This best thickness of solids to effectively work the lagoon is 12-14%. This has enough water to easily flow as well as dilute the nutrient value to allow a more even application of fertility on the field.

The thickness of solids is a large contributor to the cost of pumping as it takes lots of agitation expense to make the manure pumpable. Thick solids also create lots of psi friction loss in hoses and pumps. More pumps working closer together are required to move these thick solids to the field.