Dry Tons Removed vs. Gallons Pumped

The goal is to remove solids from your lagoon; what is it costing per dry ton?

The value and purpose of pumping a lagoon is to give the producer more capacity for incoming water and manure solids. This capacity is often lost by the accumulated sludge or solids that remain after the water has been irrigated off or evaporated.

Most custom pumpers bill for their services by the gallons of liquid slurry removed. As a result, most customers only look at the price per gallon as they make their buying decisions. They may decide to use a pumper who promises less cost per gallon. ***BUT, is that really the best overall cost to clean your lagoon?***

The real metric or determining factor is how many solids are being removing per gallon of slurry. If ***Pumper A*** is pumping the slurry at 6% it will take 3,771 gallons to remove one dry ton of sludge. However, if ***Pumper B*** pumps the slurry at 12% it will only take 1,784 gallons to remove the same one dry ton of sludge or solids.

If ***Pumper A*** is charging 1.2¢ per gallon to pump it would cost you $45.25 *(3,771 x .012¢/gal. = $45.25)* to remove one dry ton of solids. If ***Pumper B*** is charging 1.36¢ per gallon it would only cost you only $24.26 *(1,784 x .0136/gal = $24.26*) to remove the same dry ton of solids.
(See chart on back of this paper for number of gallons to pump to get one dry ton at a specific percent of solids)

So, paying more per gallon for pumping thicker solids is actually costing you less overall to clean out the same lagoon. Your *total cost* for a clean lagoon will almost always be less to pump thicker than it will be to pump thinner slurries. The exception is pumping thick slurries long distances away from lagoon. Then there are too many pumps required to get the slurry to the field; more pumps will cost you more to get the slurry there.

So How Thick is Thick Enough? It takes water to move solids. There is only so thick of a slurry that you can pump before the friction loss will reduce the volume and pressure through the hose. When the pump can no longer move the solids, the hose become ***"slugged"*** or plugged. At that point it is a total mess to remedy the situation. Then the pumper has to uncouple each hose segment and blow out each 1/8th mile of hose where it lies. In a 8" main line hose, that means there will be 1,723 gallons of slurry on the ground every 1/8th mile; or they have to push the plugged slurry in the line back to the lagoon.

So, what is the magic, cost effective, no problems percent of solids to pump. It really depends upon four factors: 1) the type of solids being pumped … lots of fiber in the slurry or lots of sand, 2) the size of the fire hose being used to pump it through, 3) how much horse power does your pumping engines have. 4) and the number of pumps being used.

We recommended pumping slurries at 12% to 14% dry matter or solids for the best N-P-K nutrient distribution.

How do you calculate how many gallons it takes to remove one ton of dry solids?

The calculation is easy once you know the percent of solids in the slurry being pumped, and the corresponding weight of that gallon of slurry. The only way to know that is to get a certified lab report taken of the slurry being pumped and refer to the chart below for the weight of that slurry. Your pumper should be able to provide you with a certified lab sample every 30 to 40 acres on which the slurry is being land applied. This shows you the percent of solids being pumped and the N-P-K nutrient values delivered to your fields.

Once you have the percent of solids, then plug those numbers into the following formula:

Gallons = 2000 pounds per ton ÷ (pounds per gallon of slurry x % of solids)

If you are pumping 12% slurry the following would hold true: *1,784 = 2000 ÷ (9.34 x .12)*

Since the mathematical weight per gallon of slurry depends upon the percent of heavy solids that are in the gallon it would take some mathematical calculations or use the chart below to know what that is.

Gallons it takes to Pump a Dry Ton of Solids from a Lagoon

Weight of a Gallon of Plain Water = 8.34

% Solids	Weight of Gallon Slurry	Weight of Solids	Gallons/ Dry Ton	% Solids	Weight of Gallon Slurry	Weight of Solids	Gallons/ Dry Ton
0.0%	8.34	0.00	- - -	10%	9.17	0.83	2,180
0.5%	8.38	0.04	47,723	11%	9.26	0.92	1,964
1.0%	8.42	0.08	23,743	12%	9.34	1.00	1,784
1.5%	8.47	0.13	15,751	13%	9.42	1.08	1,632
2.0%	8.51	0.17	11,755	14%	9.51	1.17	1,503
2.5%	8.55	0.21	9,358	15%	9.59	1.25	1,390
3.0%	8.59	0.25	7,761	16%	9.67	1.33	1,292
3.5%	8.63	0.29	6,620	17%	9.76	1.42	1,206
4.0%	8.67	0.33	5,765	18%	9.84	1.50	1,129
4.5%	8.72	0.38	5,100	19%	9.92	1.58	1,061
5.0%	8.76	0.42	4,568	20%	10.01	1.67	999
5.5%	8.80	0.46	4,133	21%	10.09	1.75	944
6.0%	8.84	0.50	3,771	22%	10.17	1.83	893
6.5%	8.88	0.54	3,464	23%	10.26	1.92	848
7.0%	8.92	0.58	3,202	24%	10.34	2.00	806
7.5%	8.97	0.63	2,974	25%	10.43	2.09	767
8.0%	9.01	0.67	2,776	26%	10.51	2.17	732
8.5%	9.05	0.71	2,600	27%	10.59	2.25	699
9.0%	9.09	0.75	2,445	28%	10.68	2.34	669
9.5%	9.13	0.79	2,305	29%	10.76	2.42	641

- The best overall percent of solids is 12% to 14% dry matter; when you consider nutrient distribution and least amount of problems when pumping.
- If you need to remove sand from a lagoon it is better to pump thick as this will prevent the sand from dropping out of solution too fast.

Pump More Gallons or Pump Less Gallons with Thicker Solids …

Lagoon Pumping & Dredging has purchased a *state-of-the-art* in-line solids meter. This gives constant readings of the percent solids being pumped as it is being pumped.

This allows the customer to make on the spot decisions of whether they wish to have the manure slurries pumped at thicker solids, billed at the higher prices; or to add water to thin the slurry down and then pay less per gallon.

While the cost per gallon is higher to pump thicker solids, you will be pumping less gallons to clean out your lagoon; less gallons saves money. *It is less expensive in your total bill to clean a lagoon at higher percent of solids* than it is to pay lower prices but have to pump more gallons. *(Ask our salesman to show you the relative costs to remove a dry ton of solids while pumping at various % of solids in slurry)*