



Sludge Testing Protocol

At Medora Corporation, we believe the standardization of the definition of sludge and the procedure to measure sludge is important when analyzing pond performance in a wastewater treating facility.

When more than one person is involved, measuring sludge depth quickly becomes confusing, frustrating, and suspect. Every person has his or her own idea of what sludge is, what it looks like, and the depth where it starts in the pond. Our team has developed a definition of sludge and a sludge measurement procedure. With these standards we can compare sludge measurements from year to year, or from pond to pond. We have a high confidence level in the accuracy of the values regardless of the individual who measured the sludge.

Sludge Definition: We divide the sludge into two categories; (a) the slurry, and (b) the weight-bearing sludge. We chose a submerged weight of 0.125 pounds per square inch (psi) as the dividing line between slurry and weight bearing sludge. If the sludge density is light and cannot support 0.125 psi, then we consider it slurry. If the sludge density is high enough that it will support 0.125 psi, then we consider it weight-bearing sludge. Our experience has shown that both kinds of sludge exist in most primary and some secondary treatment ponds during normal operations.

The slurry is not self-leveling over large areas and can be brown, gray, green or black in color. The weight bearing sludge is usually dark brown or black in color and very dense. (See Figure 1.)



Figure 1: Water Samples at Various Levels in a Primary Wastewater Lagoon.

Equipment Required

Modifications to this equipment list will be made as technology changes or we improve our sludge measurement procedure.

- One portable sampler pump that includes peristaltic pump head with clear tubing, control panel, reversible flow and prime/purge function, single-turn potentiometer for speed control, on indicator and three-position power/reversing switch, rechargeable battery encased in a high-visibility yellow housing.
- 1/4" I.D. X 25' of clear tubing. This clear tubing required for use in peristaltic pump head. Will wear out due to pump action.
- 1/4" I.D. X 25' of clear braided PVC tubing with markings every 6". Length required dependent on pond depth.
- One 0.125 psi (submerged) weight.
- Quick connect fittings for weight and tubing.
- One blunt end pole. Length required dependent on pond depth.





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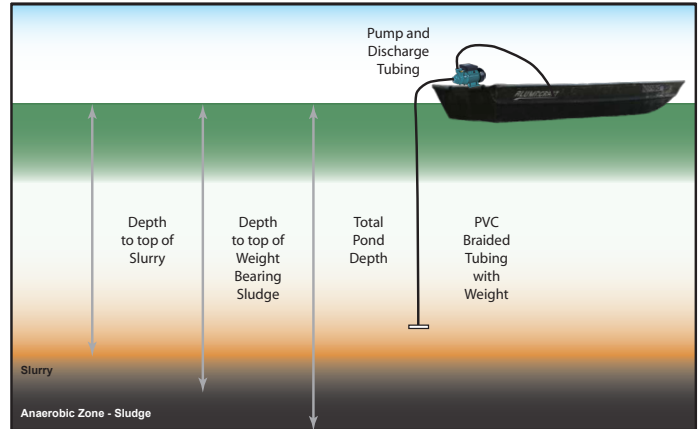
Sludge Measurement Procedure

Medora Corporation installation and service crews always measure sludge depths at multiple locations in the pond. The equipment listed above is connected and tested on shore, placed in our boat and moved to different locations in the pond. We use the following sludge measurement procedure at each location.

Step 1: Stop boat and install the 1/4" clear tubing in the pump head with enough tubing to discharge fluid back into the pond. Turn peristaltic pump on.

Step 2: While the pump is running, slowly lower the 0.125 psi weight into the pond fluid with the 1/4" braided tubing. (NOTE: The 1/4" braided tubing is attached to the 0.125 psi weight with a quick connect fitting.)

Step 3: As the weight is lowered observe the color of the fluid in the tubing before it enters the peristaltic pump. At some point the water color will suddenly change, usually dark brown or nearly black. This is the top of the slurry depth. Turn off pump.



Step 4: Continue lowering the weight slowly until sludge supports the weight. This is the top of weight bearing sludge. **Step 5:** Pick up weight above slurry depth, turn pump on and circulate fluid. Repeat Steps 3 and 4 to verify slurry depth.

Step 6: Pull weight above slurry and purge tubing contents.

Step 7: Pull weight above fluid surface. Turn peristaltic pump off and put equipment in boat.

Step 8: Pick up blunt end pole and jab through weight bearing sludge to bottom of pond. This is the bottom of pond depth.

Step 9: Move boat to next sludge measurement location and repeat Steps 1 through 8.



Additional benefits also occur from monitoring and observing the fluid in the suction and discharge tubing as well as the discharge fluid pumped back into the pond while the weight is lowered. First, we are obtaining a visual profile of what the pond fluid looks like from the surface down to the top of the weight bearing sludge. Second, if desired we can obtain fluid samples from the discharge tubing at different depths for later analysis. Obtaining this information at different depths can be a tremendous aid in determining the condition of a pond.



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Sludge Test Data Report

The following data sheet is an example of a Sludge Test Data Report that would be submitted by our Medora Corporation installation and service crew. We perform this testing and submit these reports on all Medora Corporation installations in wastewater pond systems.

SLUDGE TEST DATA

LOCATION: _____
 DATE: _____
 CELL #: _____

ALL MEASUREMENTS TAKEN FROM POND SURFACE AND RECORDED IN INCHES.

TEST POINT	#1	#2	#3	#4	#5	#6
TOP OF SLURRY	42	44	46	48	47	47
TOP OF WEIGHT BEARING SLUDGE	64	56	66	58	67	59
BOTTOM OF POND	72	74	73	72	74	73
FREE WATER	42	44	46	48	47	47
THICKNESS OF SLURRY	22	12	20	10	20	12
THICKNESS OF SLUDGE	8	18	7	14	7	14
TOTAL POND DEPTH	72	74	73	72	74	73

POND AVERAGE	
FREE WATER	45.7
THICKNESS OF SLURRY	16.0
THICKNESS OF SLUDGE	11.3
TOTAL POND DEPTH	73.0

SLURRY COLOR: _____ Brown _____
 SLUDGE COLOR: _____ Dark Black _____
 SECCHI: _____ 10" _____

Comments: _____

