

Effluent Treatment for Intensive Aquaculture Systems

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Why are we considering intensive systems?

- All animal production operations produce waste
- In pond culture, waste solids are processed within the pond, effluent water is discharged



Why are we considering intensive systems?

- With intensive systems, we have the potential to make an operation more ‘environmentally friendly’
- Effluent can be concentrated in a ‘point source’ discharge



Effluent treatment with a Geotube[®]

Steps to consider:

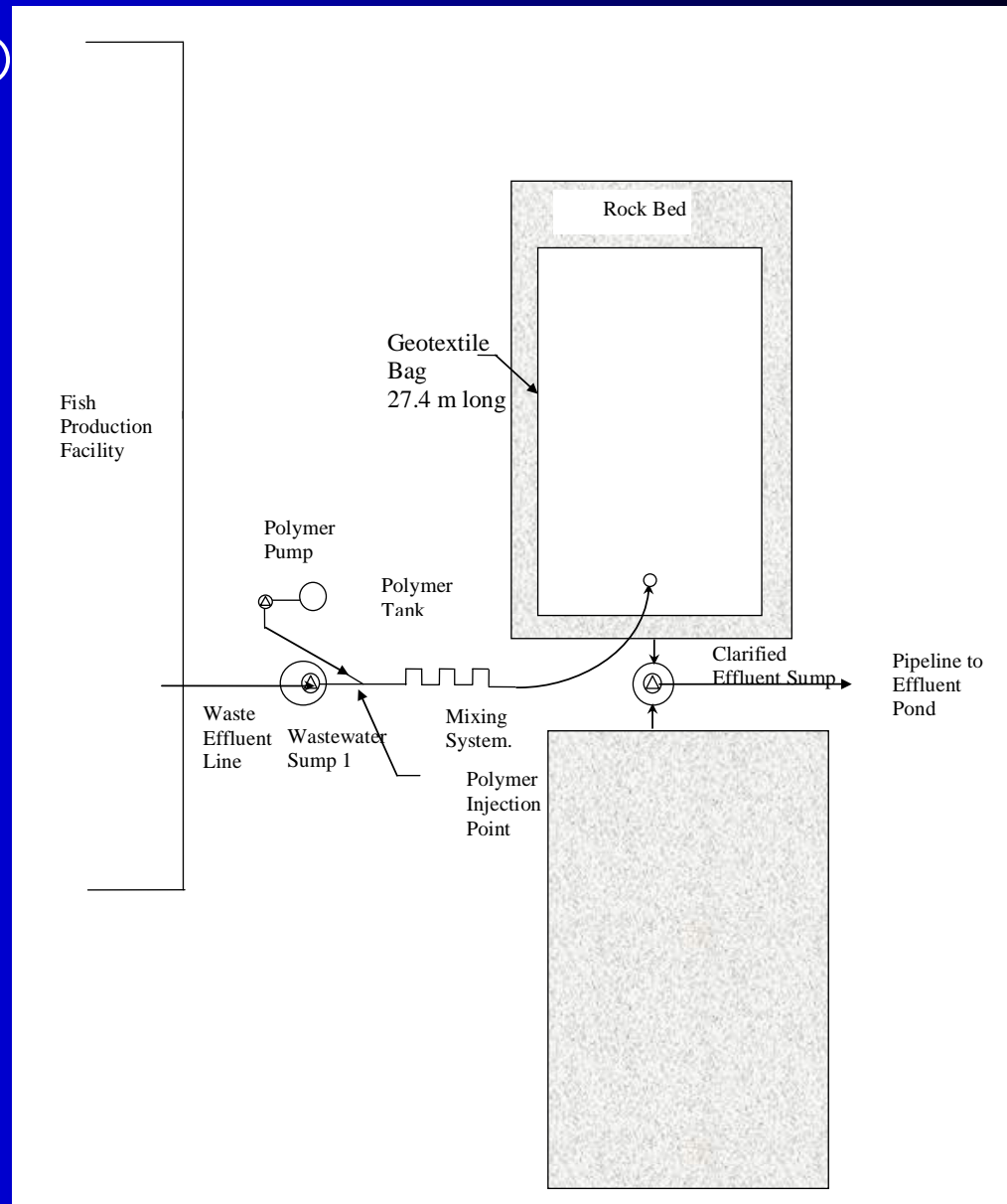
1. Collection of the discharge effluent
2. Application of organic polymer as a coagulant
3. Collection of solid waste
4. Collection of clarified effluent
5. Discharge or further treatment

What is a Geotube[®]?

- Geotextile bag
- Manufactured by TenCate[™] Geosynthetics
- Approx. 400-micron pore size

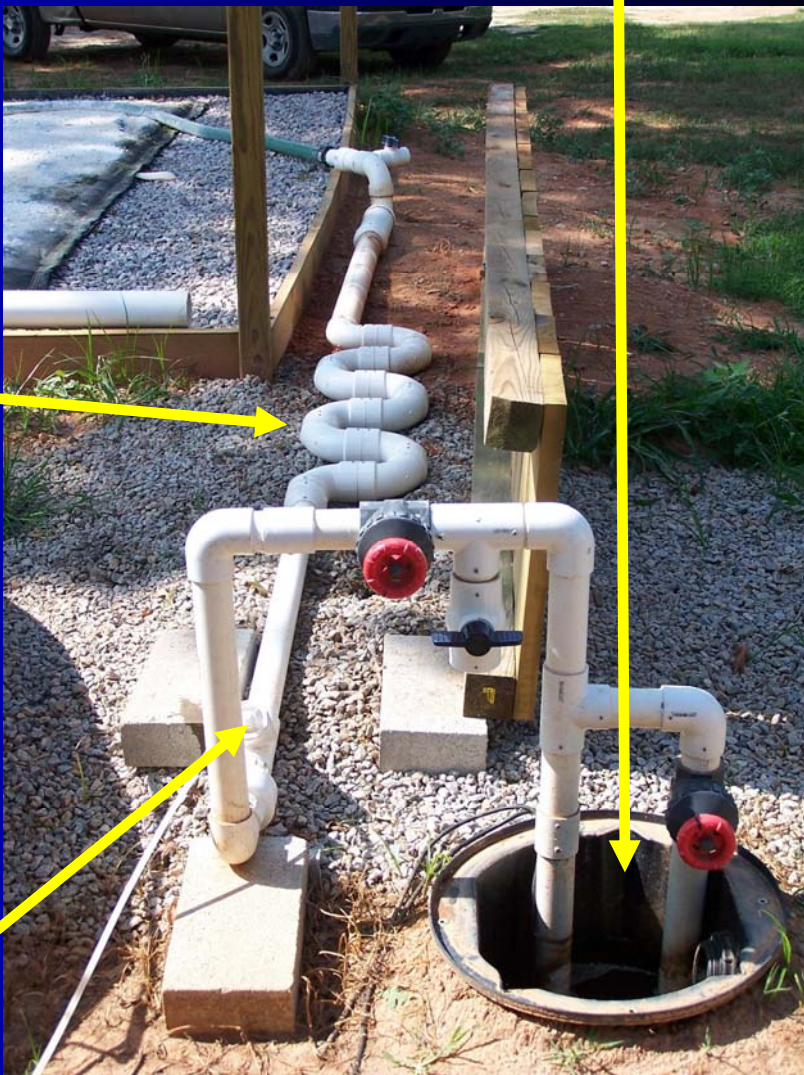


General Geotube[®] layout

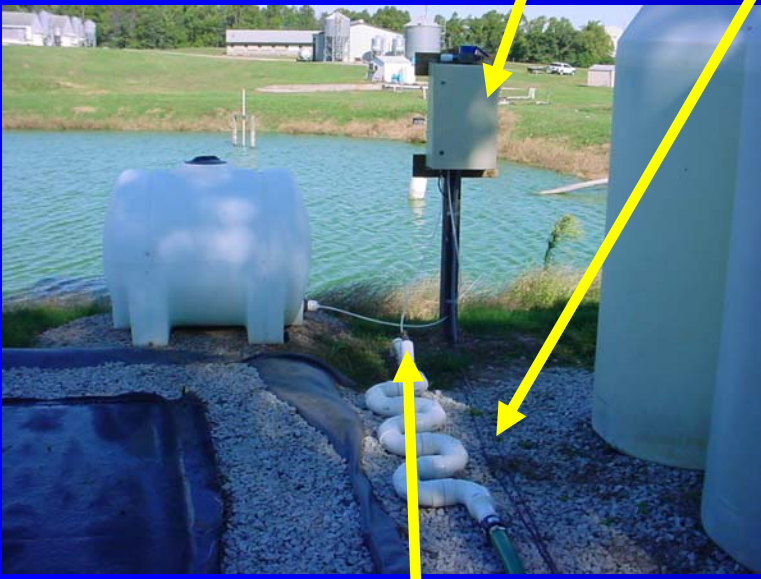




Injection pump



Dirty water sump



Polymer injection point (wye)

Mixing elbows





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The coagulant

- Organic polymer
 - high cationic charge
 - binds to solids rapidly
 - referred to as ‘liquid velcro’
- Numerous formulations available for various water conditions





Geotube[®] influent



Geotube[®] effluent

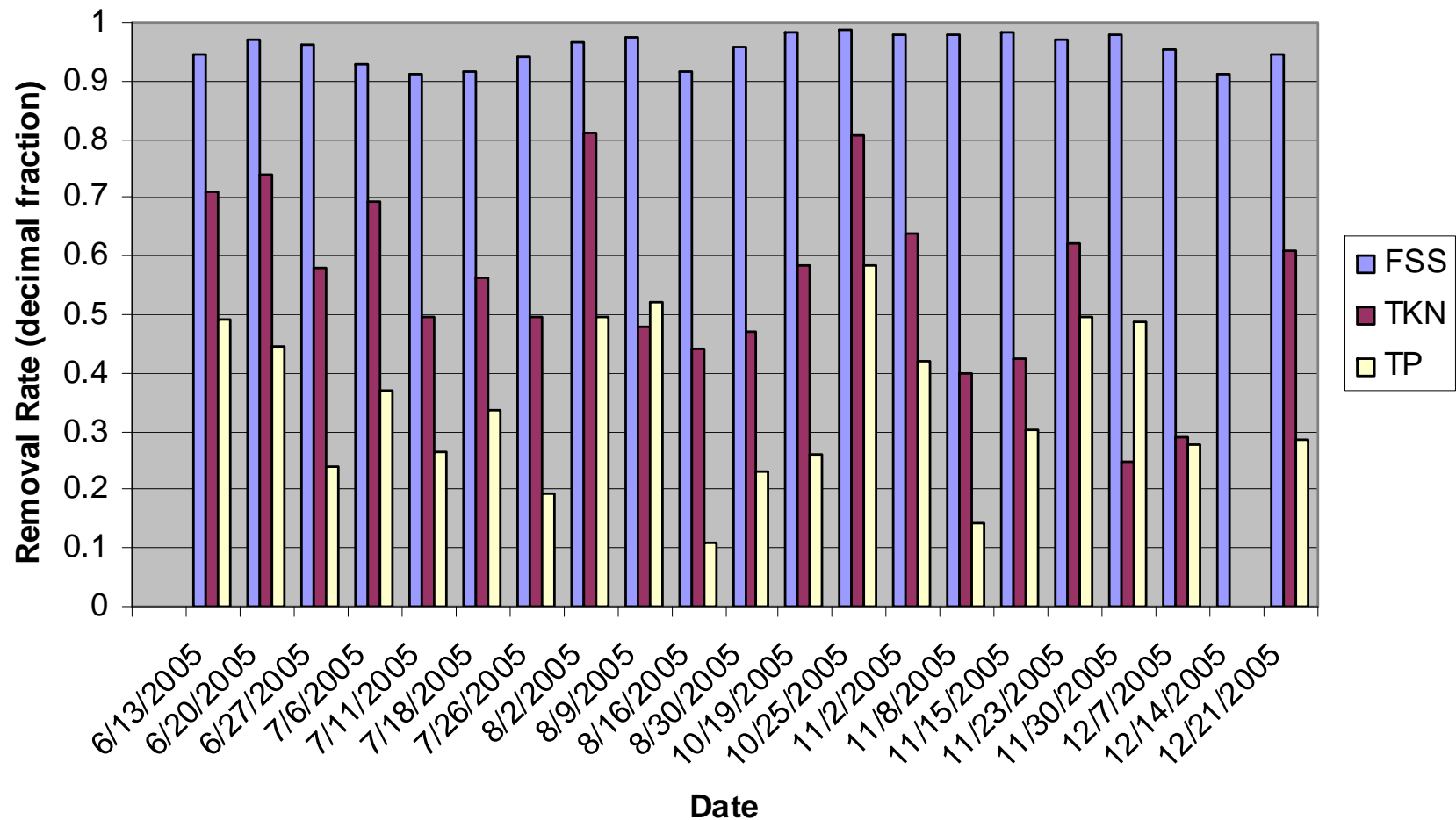
Results of 6-week Trial

	TKN	TAN	Nitrite	Nitrate	TP	COD	FSS
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Geotube IN	39.1	1.9	4.3	117	21.8	1410	1060
Geotube OUT	16.2	7.5	5.6	55.8	14.4	162	46.7
Reduction	59%	-292%	-31%	52%	34%	88%	96%

Intermittent inflow = 35 - 40 liters per minute

Constant outflow = 14 liters per minute

Results from Geotube[®] I, Final



After 10 Weeks of Dewatering



12,099 kg feed
4,545 kg sludge
17.7% dry weight
82.3 % moisture

Hychem Hyperfloc CE 1950 Polymer
26.8 liters used = \$136
Approx. 0.45 ml polymer per kg feed

Proposed Geotube[®] System Components for a 140 mt Farm

\$2,874 Hyperfloc Annual
\$6,404 Two Geotubes
\$17,116 Total system

Major Materials and Component Options					
Sized for a commercial scale facility with production of up to 300,000 pounds per year.					
One system, two bags					
Component	Description	Quantity	Unit Cost	Units	Cost
A	3" PVC Pipe & Fittings				
B, M	Sump 1	2	\$ 141.90	each	\$ 283.80
B, M	Sump Cover	1	\$ 83.60	each	\$ 83.60
B	Sewage Pump	1	\$ 234.75	each	\$ 234.75
C	Polymer Pump	1	\$ 345.00	each	\$ 345.00
C	Tubing from pump	1	\$ 23.50	roll	\$ 23.50
D	Polymer Storage Tank	1	\$ 337.95	each	\$ 337.95
D	Hyper Floc Polymer, CE1950G	30	\$ 95.80		\$ 2,874.00
E	Injection Components				
E	2" diameter PVC Y	1	\$ 4.00	each	\$ 4.00
E	2" x 1/2" PVC Reducer Bushing	1	\$ 3.00	each	\$ 3.00
E	hose adapter	1	\$ 4.50		\$ 4.50
F	Mixing System				
F	2" x 3" PVC reducer bushing	2	\$ 6.40	each	\$ 12.80
F	3" PVC Elbows	13	\$ 12.00	each	\$ 156.00
F	2" PVC Male Adapter				\$ -
F	2" Polypropylene Male Quick Disconnect	2	\$ 4.60	each	\$ 9.20
G	2" Hose to Geotube	20	\$ 3.20	ft	\$ 64.00
G	2" Polypropylene Female Quick Disconnect	2	\$ 11.15	each	\$ 22.30
G	2" x 3" PVC reducer bushing	1	\$ 6.40	each	\$ 6.40
G	3" PVC Elbows	1	\$ 12.00	each	\$ 12.00
J	3" Bulkhead fitting	1	\$ 17.50	each	\$ 17.50
L	Male Adapter, 3"	1	\$ 9.00	each	\$ 9.00
M	Sewage Pump	1	\$ 234.75	each	\$ 234.75
H	90 ft x 30 ft Geotube	2	\$ 3,202.00	each	\$ 6,404.00
	Liner for containment structure	2	\$ 1,417.00		\$ 2,834.00
	Lumber for containment structure	2	\$ 595.00		\$ 1,190.00
K	Stone, #5 washed, 12 tons	80	\$ 25.00	tons	\$ 2,000.00
*Notes: Aquatic EcoSystem is the sole distributor of GeoTubes in the United States					\$17,166.05
Aquatic EcoSystems, Inc.					
2395 Apopka Blvd					
Apopka, FL 32703					
877 347-4788					
www.aquaticeco.com					

After three-step process



Geotube
IN

Geotube
OUT

Denitrification
OUT

After biofilter
and ozone