

Geothermal Workshop: Ground Water Source Heat Pump

Alternative Energy Applications

By

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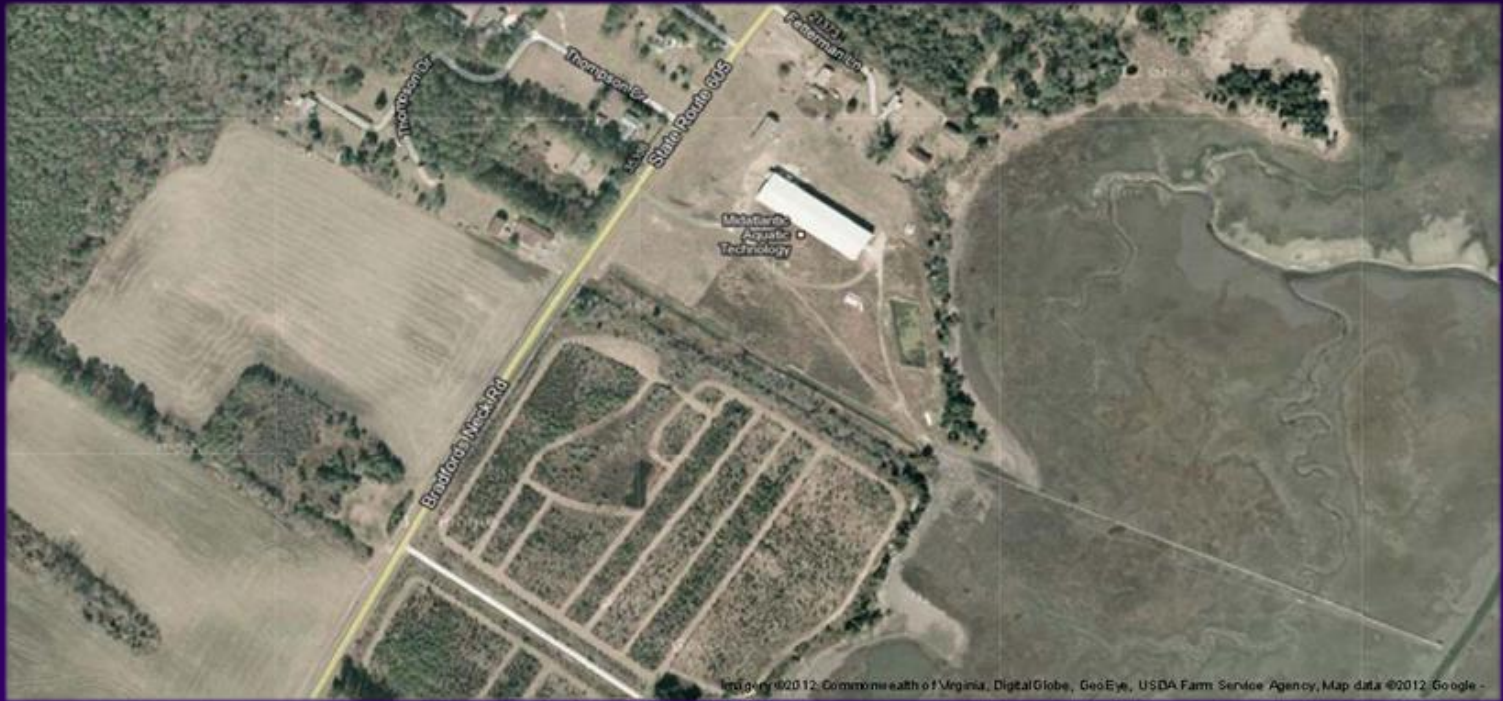
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Energy Considerations at Brandsford Fish Farm



Energy Conservation, Wind for Electrical Generation, Solar Thermal Applications and Ground Water Loop Cooling were considered to reduce Equipment and operational costs.

Wind Direction and Speed Analysis Over Time Used to Determine Specific Turbine Economic Viability

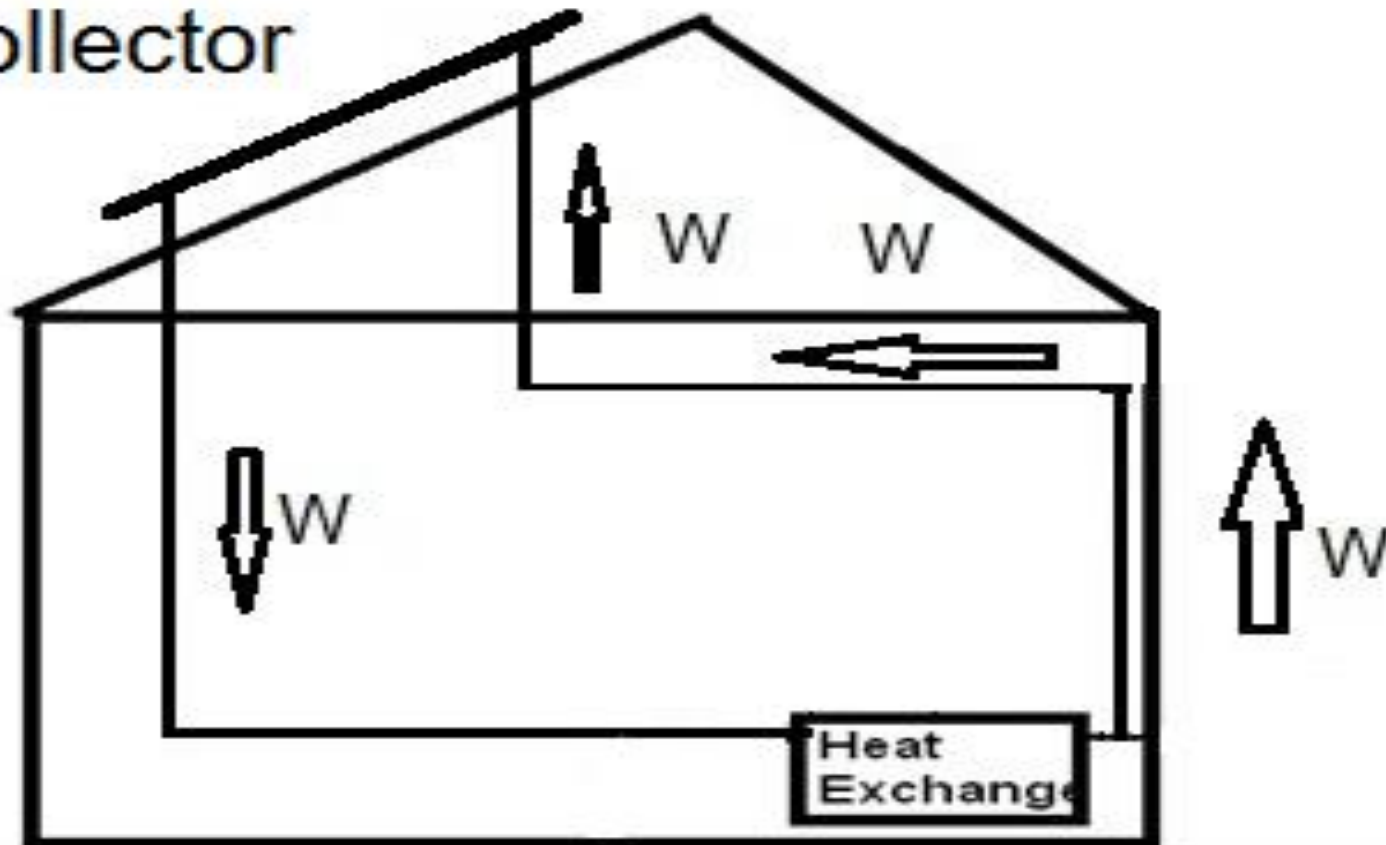


Solar Panels Heat Water for System Winter heat

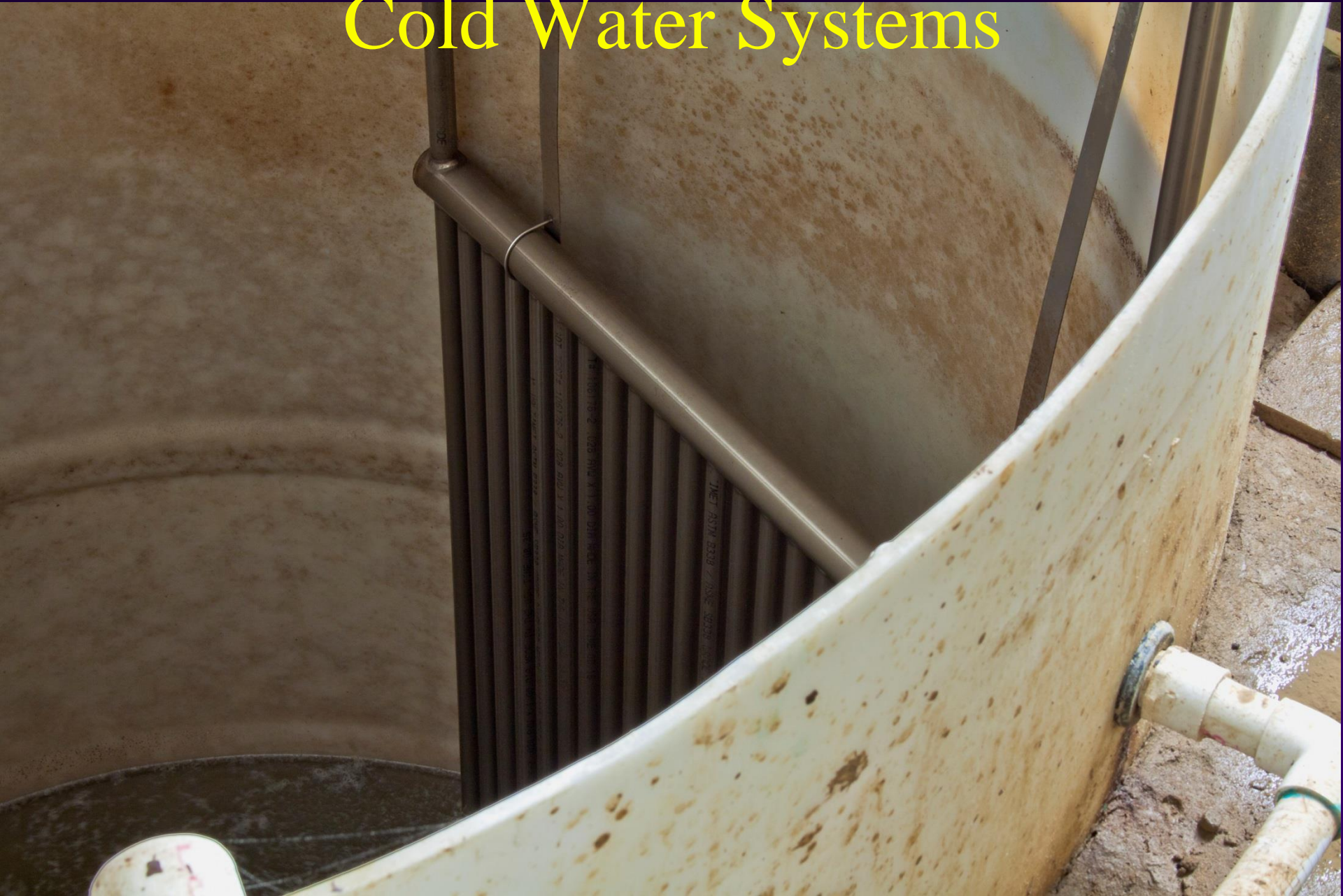


67 KW Hot Water Drain Down Solar Collector

Solar
Collector



Titanium Heat Exchanger for Hot and Cold Water Systems



Heat Exchanger, Hot Water Storage and Backup Gas Boiler



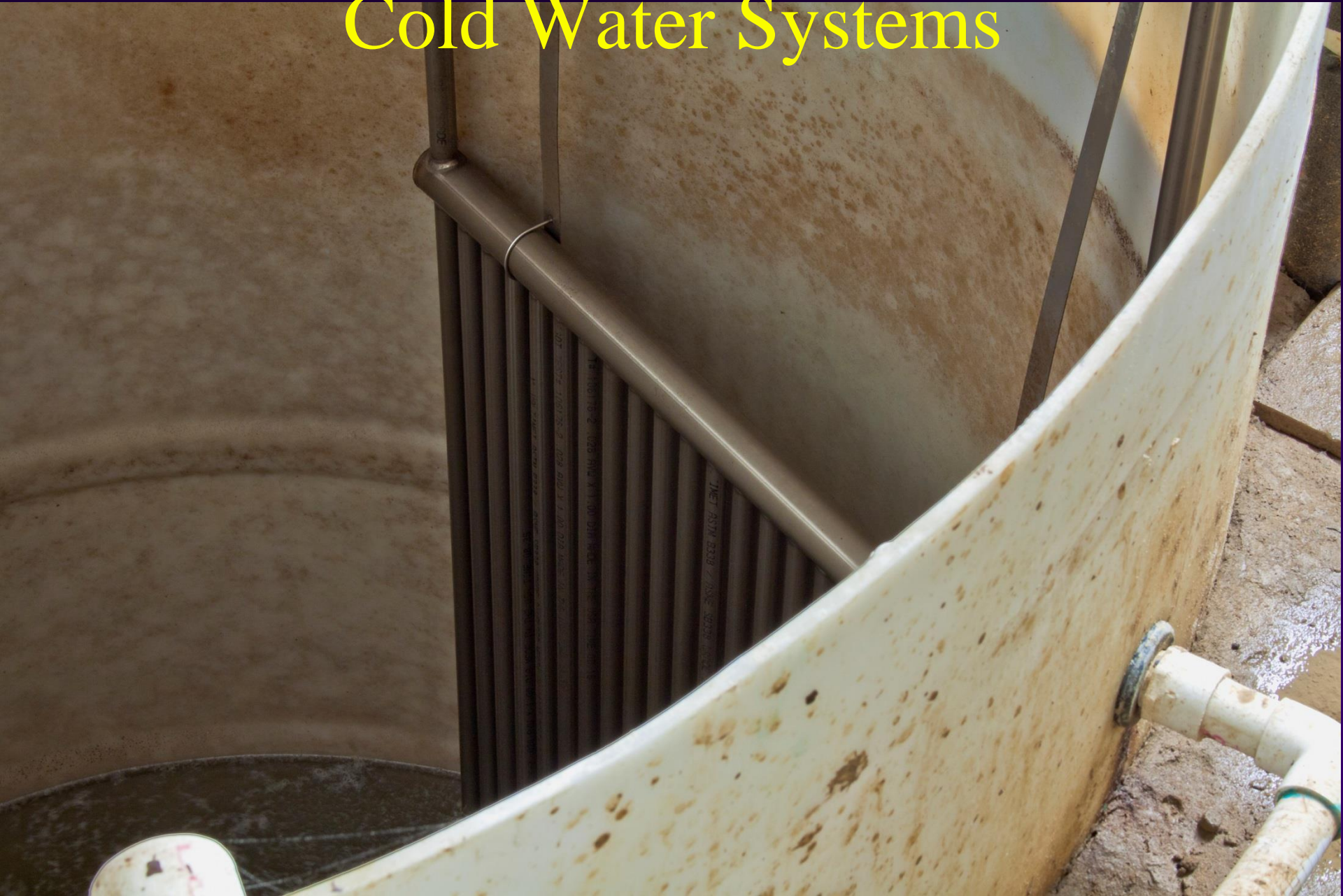
Controls for the Solar Thermal Water System



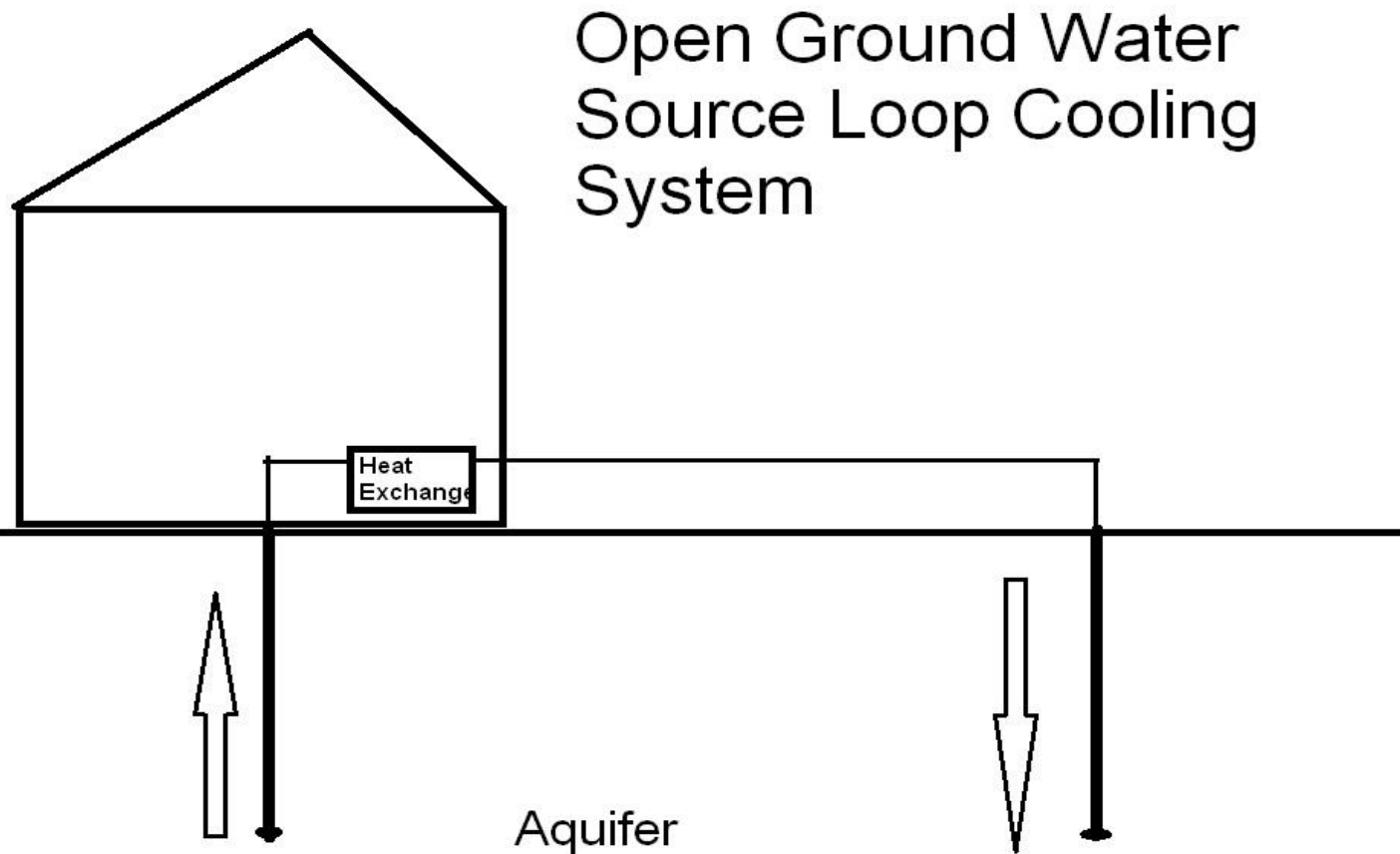
Maintain Consistent Water Temperature for Fish Growth



Titanium Heat Exchanger for Hot and Cold Water Systems



Ground Water Loop Cooling



Introduce the Ground Water Source Heat Pump

The Ground Water Loop flowing through the Titanium Heat Exchanger maintains the summer fish environment to a moderate 70 ° F by using the cooling capacity of the 60 degrees F ground water. For further efficiency the 72 ° F Titanium Heat Exchanger return water is directed through the ground water Source Heat pump cooling other important aquaculture and air space in the facility. At this time no air to air cooling systems are used.



Clipboard with pen

Red-handled screwdriver

1.18

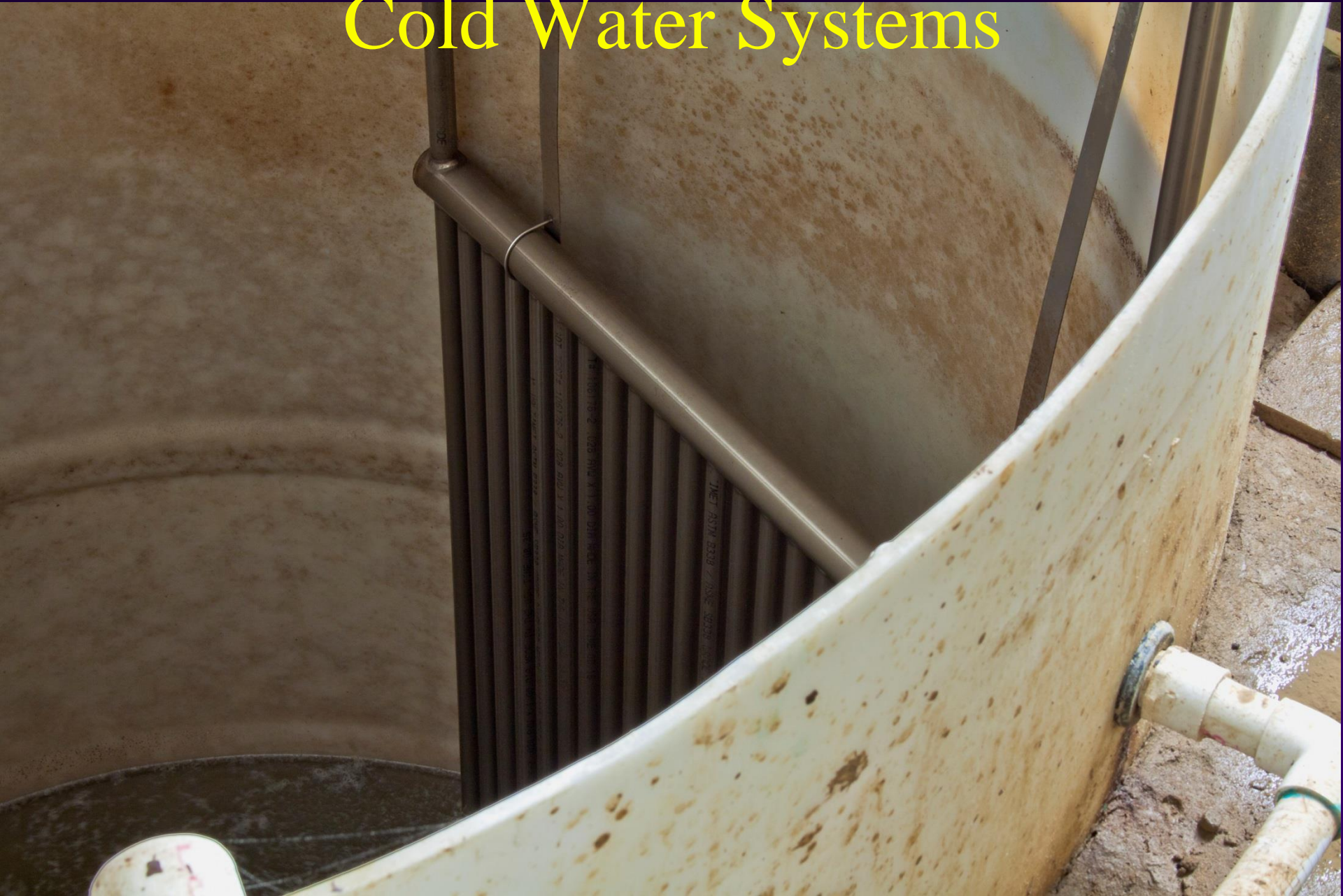
WATER SOURCE

Water Source
Call 1-800-855-6666

WARNING

Red-handled spray bottle

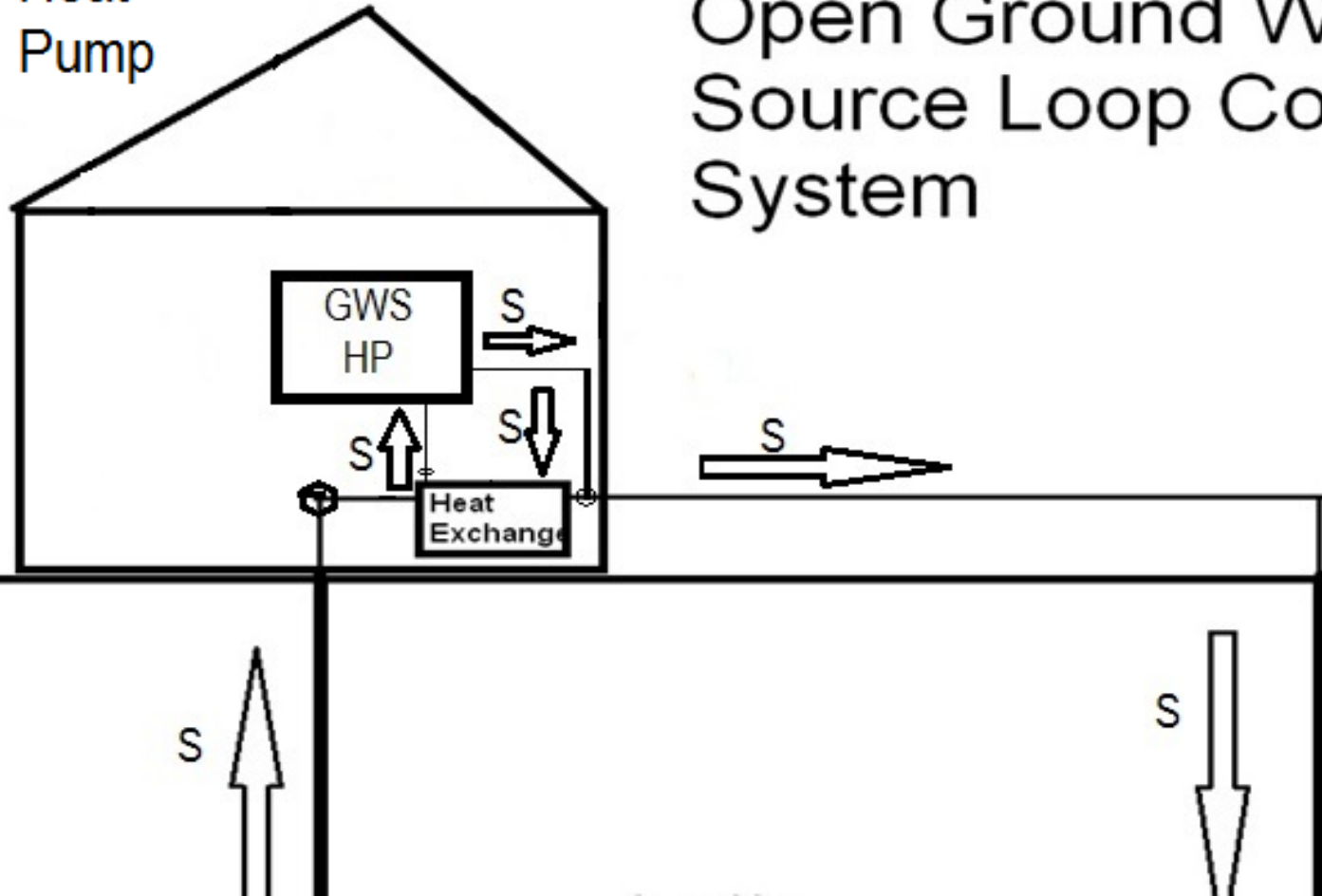
Titanium Heat Exchanger for Hot and Cold Water Systems



Ground Water Source Loop and HP Cooling

Ground Water Source
Heat
Pump

Open Ground Water
Source Loop Cooling
System

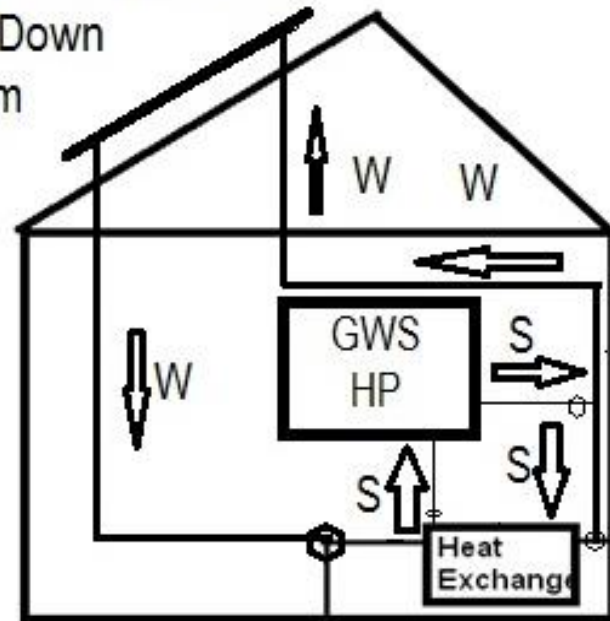


Two 22,000 Gallon Fish Tanks

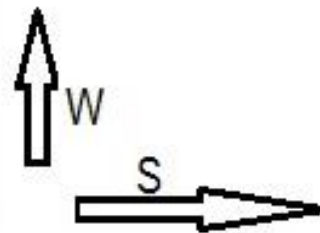


Solar Heating, Ground Water Source Loop and HP Cooling

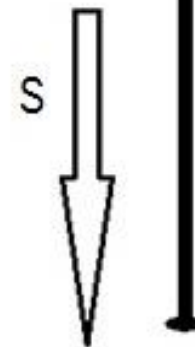
67 KW Solar Collector
Drain Down
System



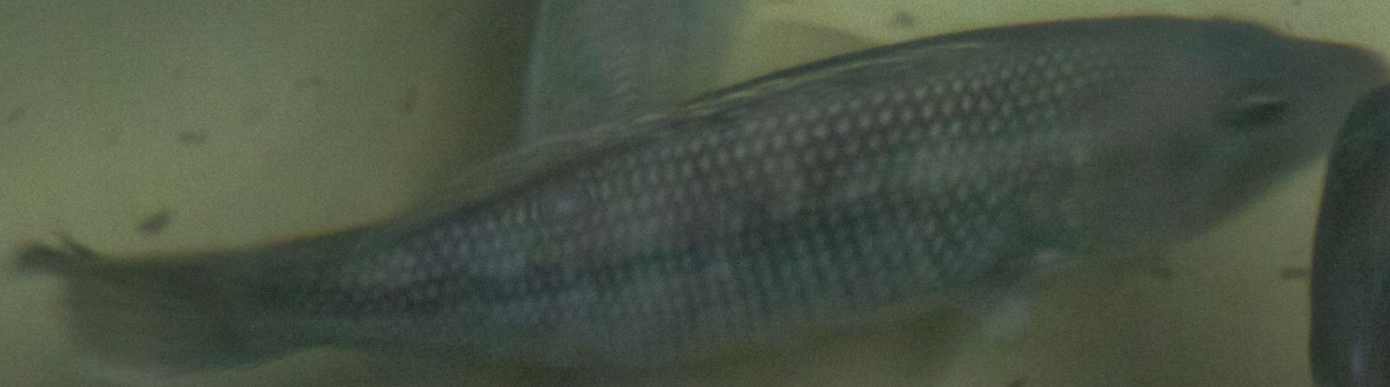
Open Ground Water
Source Loop Cooling
System



Aquifer



Content Fish



Virginia/Mid-Atlantic Regional Aquaculture
Best Management Practices (BMPs) Training Workshop

Questions?

Photography Credits

- Slide 2 Google Arial photo
http://maps.google.com/maps?hl=en&q=quinby+VA&bav=on.2,or.r_gc.r_pw.r_qf.&bpcl... 11/27/2012
- Slides 3, 6, 7, 8, 10&16 Pictures taken by Janet Krenn, Virginia Sea Grant, Communicator, VIMS, Gloucester Point, Va.