



NEWEA 2019 Annual Conference & Exhibit

Boston Marriott Copley Place
January 27 – 30, 2019

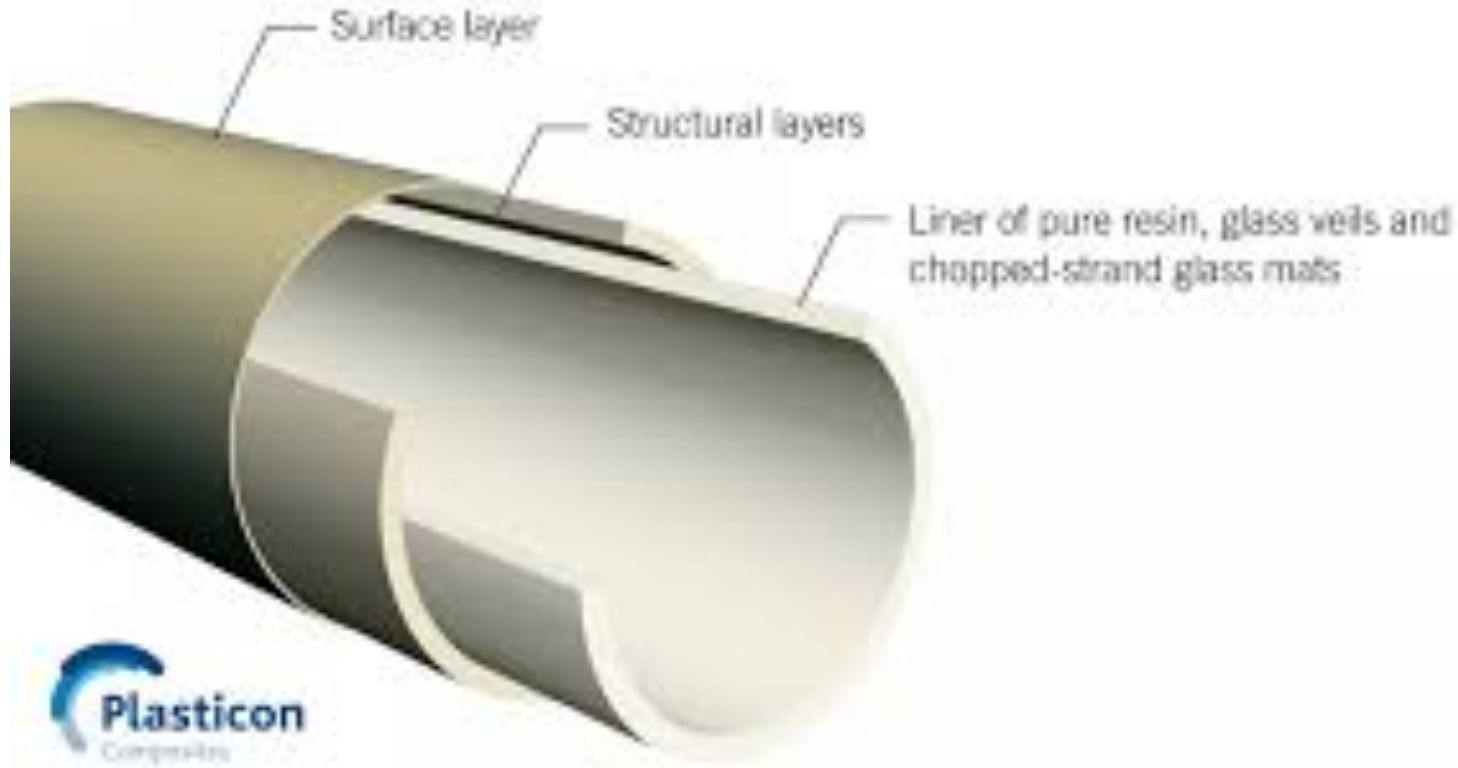
Technical Session #13 – Asset Management
Panel 2 – Putting Inspection Practices to Work

Case Histories for Fiberglass Odor Control Assets

Richard J. Pope, PE, BCEE

Vice President
Director of Odor Services
Hazen and Sawyer





Fiberglass Reinforced Plastic - FRP

- **Features**
 - Durable
 - Strong
 - Corrosion Resistant
 - Vapor Phase
 - Liquid Phase
 - Poor Conductor
 - Flexible
- **Fabrication**
 - Fiberglass
 - Resins
 - Additives
 - Curing
- UV Impact
- Maintenance
- Field Work

MOC* Competition

- Stainless Steel
- FRP
- Aluminum
- Concrete
- Wood
- Fabric



Preferred

Depends on Location

Less Durable – Smaller Systems

***MOC – Materials of Construction**

Wastewater Odor Control Conditions



- Moisture
- Hydrogen Sulfide
- Sulfuric Acid/Low pH
- Chlorides

As a MOC – Can be fabricated to resist these!

Wastewater Odor Control - Applied Chemicals

- Sodium Hypochlorite
- Ferric Chloride
- Ozone
- Hydroxyl Radicals
- UV
- Hydrogen Peroxide
- Potassium Permanganate
- Sodium Bisulfite



Largest Wastewater Corrosion Concern

- Almost always present
- Very low odor threshold
- Directly corrosive to metals
- Converted to Sulfuric Acid (H_2SO_4)
 - Corrosive to most materials

Common for surface pH to be <2.0

Hydrogen Sulfide

Critical Importance of FRP for Odor Control

Five Key Elements of Odor Control:

- **Cover**
- **Contain**
- **Convey**
- **Treat**
- **Discharge**

FRP Plays an Important Role
in Each Element



Where to Find Them:

- Tanks
- Basins
- Channels
- Distribution Structures
- Wet Wells

Covers



Contain

How to hold the Odors:

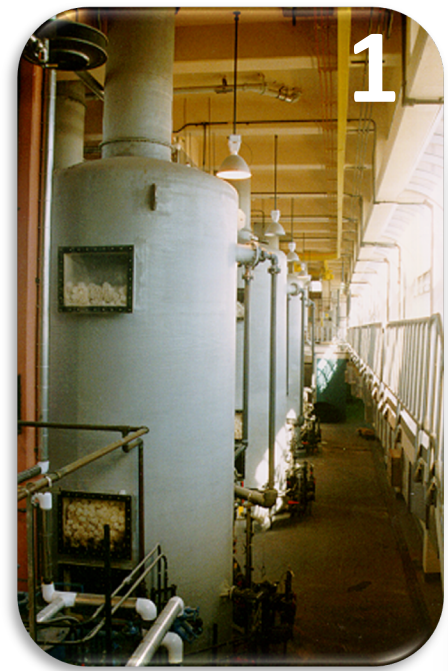
- Fans
 - Maintain Negative
- Caution-Corrosive Env
 - Moisture
 - H₂S
 - Chlorides
 - H₂SO₄



Convey

Elements to Move Odors:

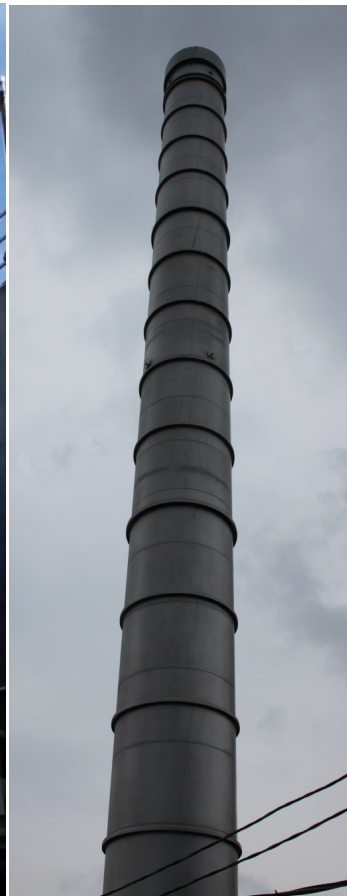
- Duct Work
- Plenums
- Air Distribution
- Particulate Traps



Odor Control Technologies:

- Wet Scrubbers (1)
- Biofilters (2)
- Biotrickling Filters (3)
- Activated Carbon (4)
- Dry Medias (5)

Treatment



Discharge

Exhaust Stacks:

- Back-Up Service
 - Residuals
 - Bypass
 - Ineffective Treatment



Treatment

Chemical Storage:

- NaOCl
- NaOH
- H₂O₂
- FeCl₂, FeCl₃
- KMnO₄
- Bisulfite



*Case Study I:
Hidden Systemic Misrepresentation*

Situation

- UrbanWWTP
- East Coast
- Activated Carbon Vessels
- Caught Fire
- Investigation
 - Tested FRP
 - Wrong Resin
 - Inadequate Sb_2O_3^*

* Antimony Trioxide – ATO.

History

- **Odor Control System**

- Wet Scrubbers followed by Activated Carbon

- **Engineer**

- Caustic Impregnated Carbon
- FRP Vessel Design
- Updated Specs
- Providing Durable/Long-Lasting FRP Vessels
- Necessary Performance Tests
 - Hardness, Acetone, Visual, Hydrostatic, Performance



History

- **Owner – Steps to Protect**
 - **Retained Independent Consultant**
 - **Review Site Fabrication**
 - **Witness Performance Tests**
 - **Check Before Leaving Shop**



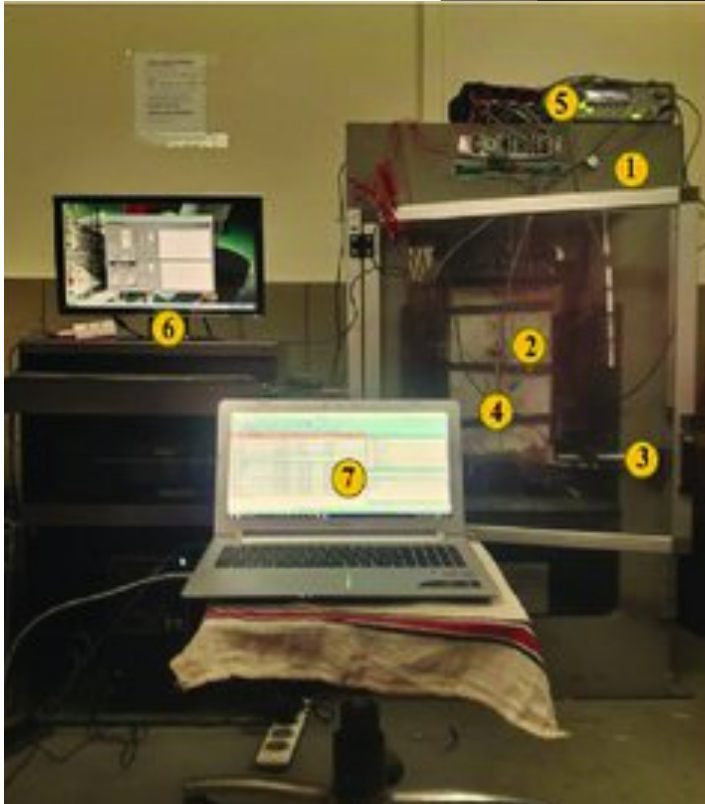
History



- **Carbon Fire**
 - Vessel & Duct Damage
 - FRP Samples
 - Laboratory Evaluation Results
 - Wrong Resin
 - Inadequate ATO
- **FRP Vendor – “Make Whole”**
 - Given Second Chance

History

- **Second Chances!**
 - Work with Owner
 - Make Good on New FRP
 - Fabricated New Vessels
 - Test Coupons Evaluated
 - Wrong Resin
 - Inadequate ATO
- **FRP Vendor – FIRED!!!**
 - Banned from future FRP Fabrication



Lessons Learned

- **Protect Yourself**
- **Test Coupons**
- **Review Spec**
- **Inspect Fabrication Shop**
- **Seek Assistance**
 - **FRP Experts**





*Case Study II:
Like It **OR** Replace It!*

Situation

- Urban WWTP
 - East Coast
- Wet Scrubbers
 - Operating >20yrs.
- Technology Evaluation
- Investigation
 - Keep Vessels
 - New Vessels

History



- **Odor Control System**
 - Wet Scrubbers
 - Vertical, Chemical, Packed-Tower
 - FRP
- **Engineer**
 - Technology Evaluation
- **Owner**
 - Decision: Keep or Replace?

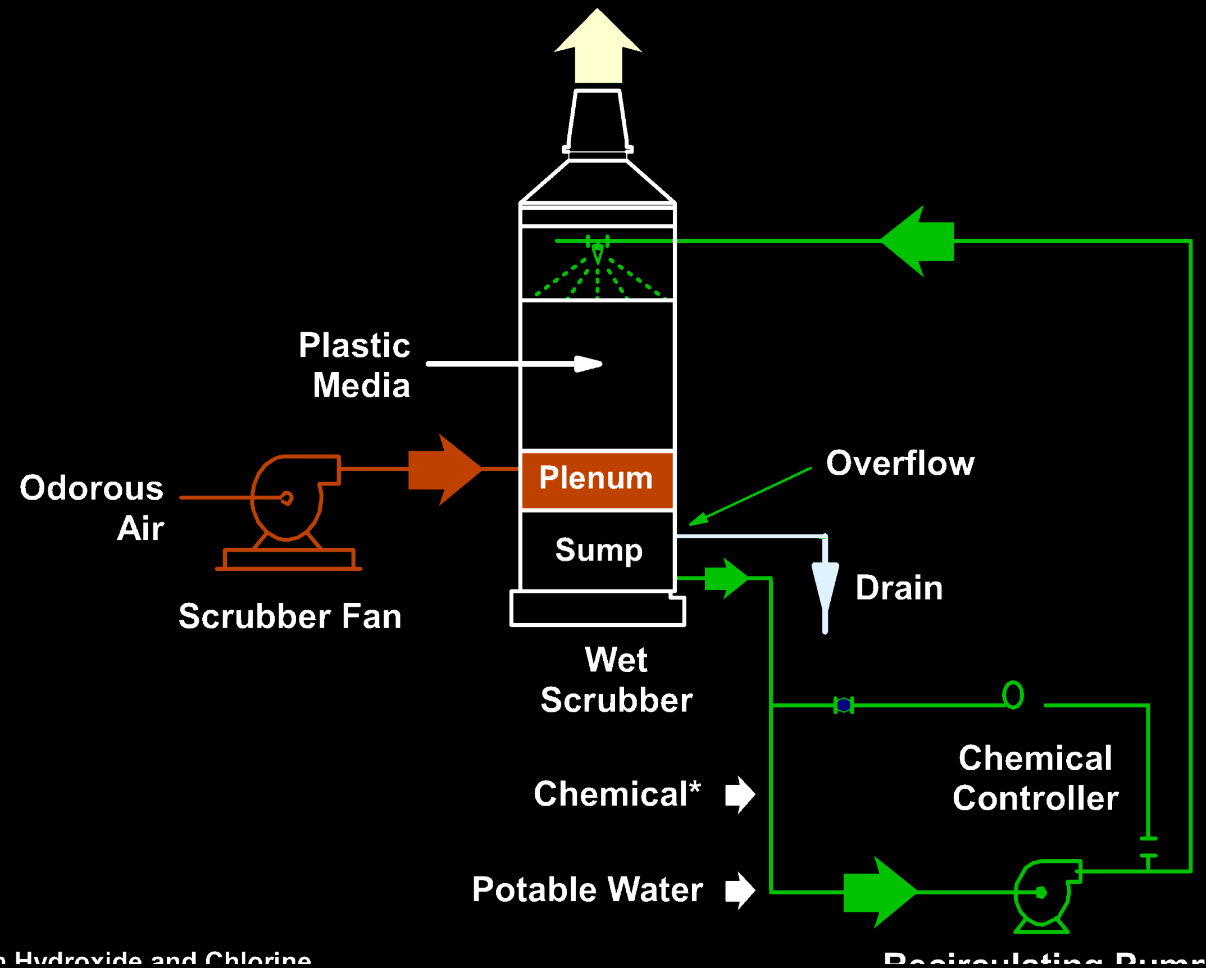
History

- **Engineer – Technology Evaluation**
 - **High Flow, Moderate H₂S**
 - **Indoor, Small Area**
 - **Wet Scrubber – Good Fit**
 - **Smallest Footprint**
 - **Effective Treatment**
 - **Flexible Operation**



History

- **Engineer – Technology Evaluation**
 - **High Flow, Moderate H₂S**
 - **Indoor, Small Area**
 - **Wet Scrubber – Good Fit**
 - **Smallest Footprint**
 - **Effective Treatment**
 - **Flexible Operation**



History

- **Owner**
 - **Keep Technology**
 - **Inspect FRP Assets**
 - **Independent Expert**
 - **Vessel, Grating, Fan, Duct**
 - **Current Condition?**
 - **Last for 25+ More Years?**



History

- **Condition Assessment Results**
 - **Outside**
 - **No UV Impacts (Indoor)**
 - **Inside**
 - **No Chemical Impacts**
 - **Recommendation**
 - **Green Light**



Lessons Learned

- **Indoor FRP**
 - No UV
 - No Exterior Damage
- **Chemicals**
 - Minimal H₂S
 - Control Moderate Chemicals
 - Limited Impact - Repairable
- **Condition Assessment Important**





Case Study III: Inspection Required

Situation

- Collection System
 - Tunnel Drop Structure
 - Texas City
- Carbon Adsorber - Small
 - HDPE Shell
 - FRP Grating Support
- O&M Responsibility
 - Uncertain
- Loss of Effectiveness

History

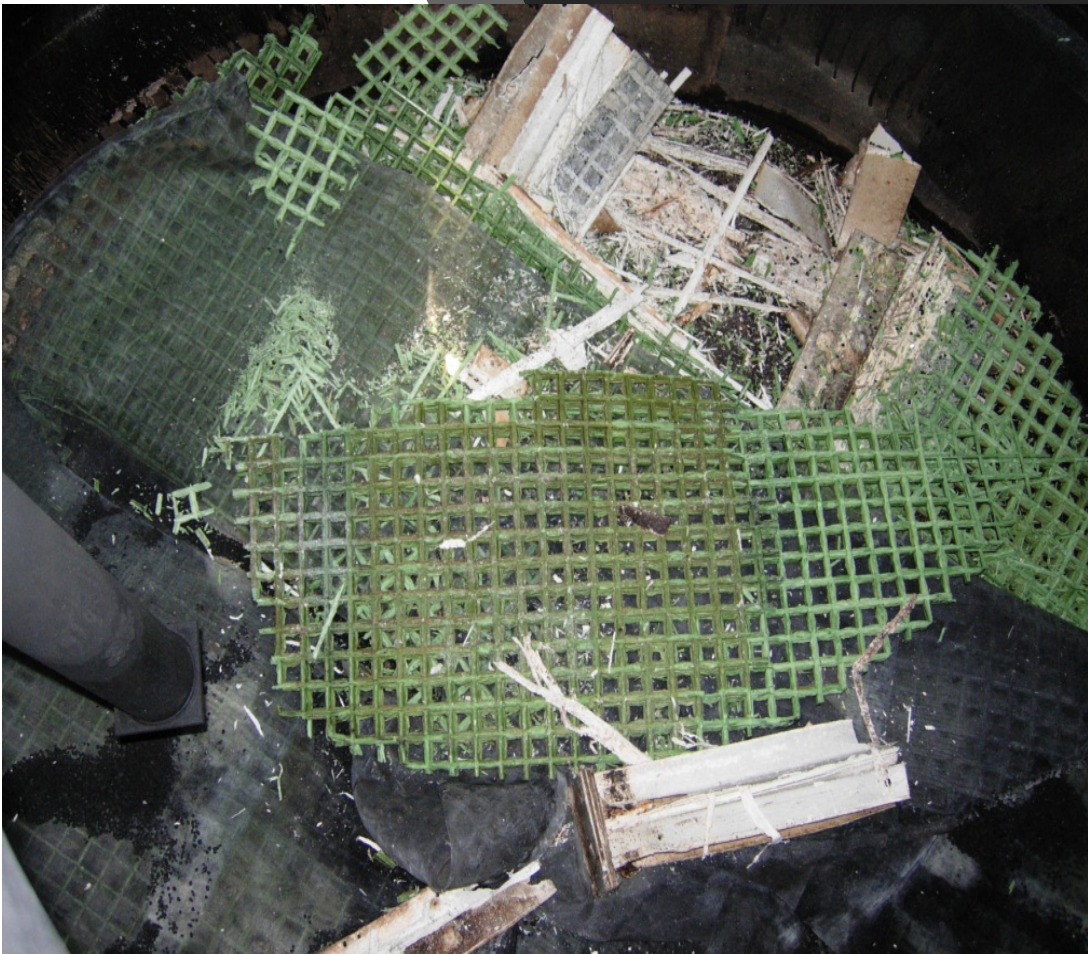


- **Collection System Odor Control**
 - Remote Location
 - Unoccupied
 - Occasional Visit
- **Situation**
 - Highly Variable Odors
 - Community Nearby
 - Odor Complaints Increase

History

- **Owner**
 - **No Ownership of Carbon System**
 - **Other's Responsibility**
 - **Only Monitored Fan**
 - **System Failed**
 - **Noticed Due to Complaints!**

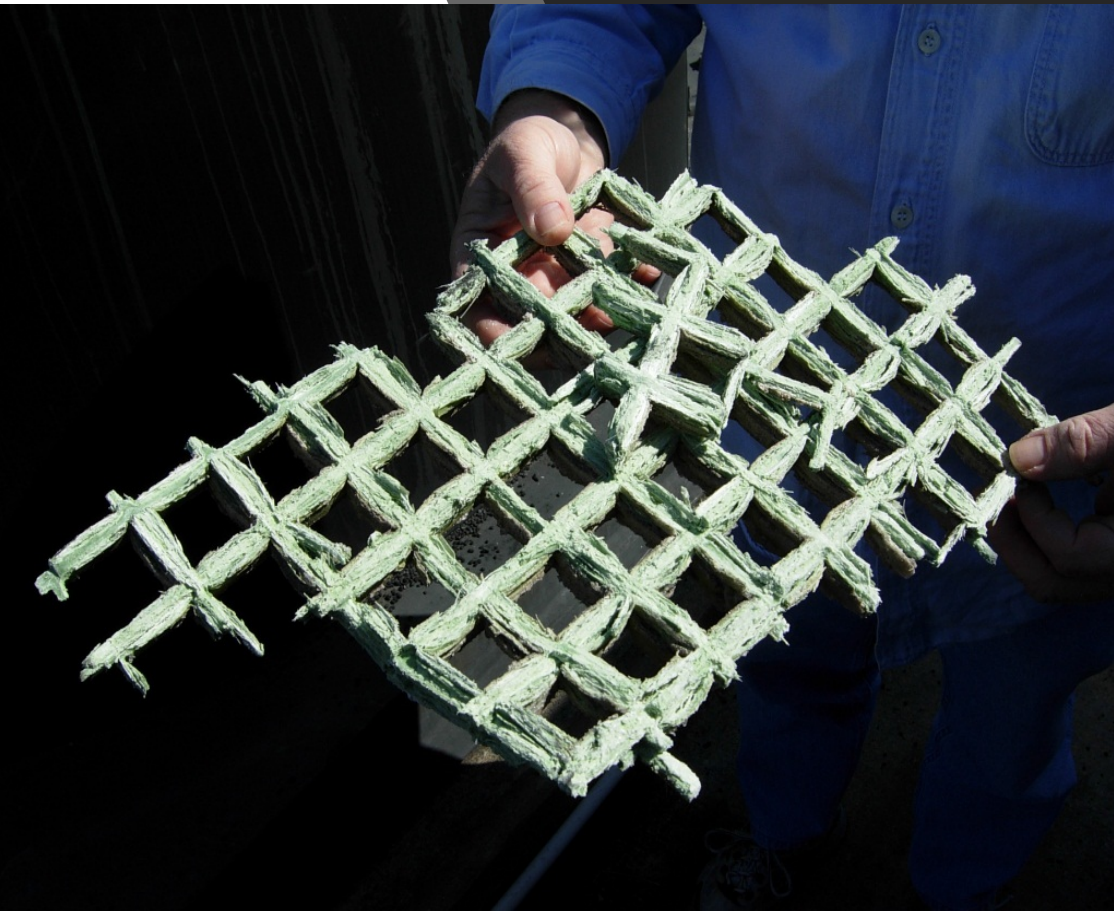
History



- **Conducted Condition Assessment**
 - **Inspected Unit**
 - **Adsorber Shell Fine**
 - **Low pH Water Build-Up**
 - **Grating Support Collapse**
 - **Grating Damaged**
 - **Carbon Bypassed**

History

- **Owner**
 - **Repaired Support**
 - **Replaced FRP Grating & Carbon**
 - **Assign O&M Duty Responsibilities**



Lessons Learned

- Remote Odor Control
- Routine Monitoring
- System Inspection
- Drain Sump Water Accumulation



FRP Odor Control Assets



Detailed Condition Assessment
Verify Status



Major Investment
Exterior/Interior Inspection



Ameliorate Corrosive Conditions
Drain Low pH Sump Water

So, ...
What's in
Your FRP



Contact
Dick Pope at
Hazen and Sawyer
914.450.6735 (Cell)
rpope@hazenandsawyer.com

