High Strength Wastewater

Presented to

The 4th Annual NC Environmental Health Symposium

By

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Intros

- Steve Barry
  - President of AQWA Inc.
  - NC Grade 4 Biological Operator, Subsurface Operator, Surface Irrigation
  - BA, Texas A&M 1994. Major: Biology, Minor: Chemistry

AQWA Inc. is a family owned business formed in 2002. We sell and service advanced wastewater treatment systems all over the Carolinas (and now Virginia!)

Agenda:

1) BOD - What is it? Why is it a problem? What do we do about it?
2) FOG - What is it? Why is it a problem? What do we do about it?
3) Nitrogen - What is it? Why is it a problem? What do we do about it?

What is BOD really?

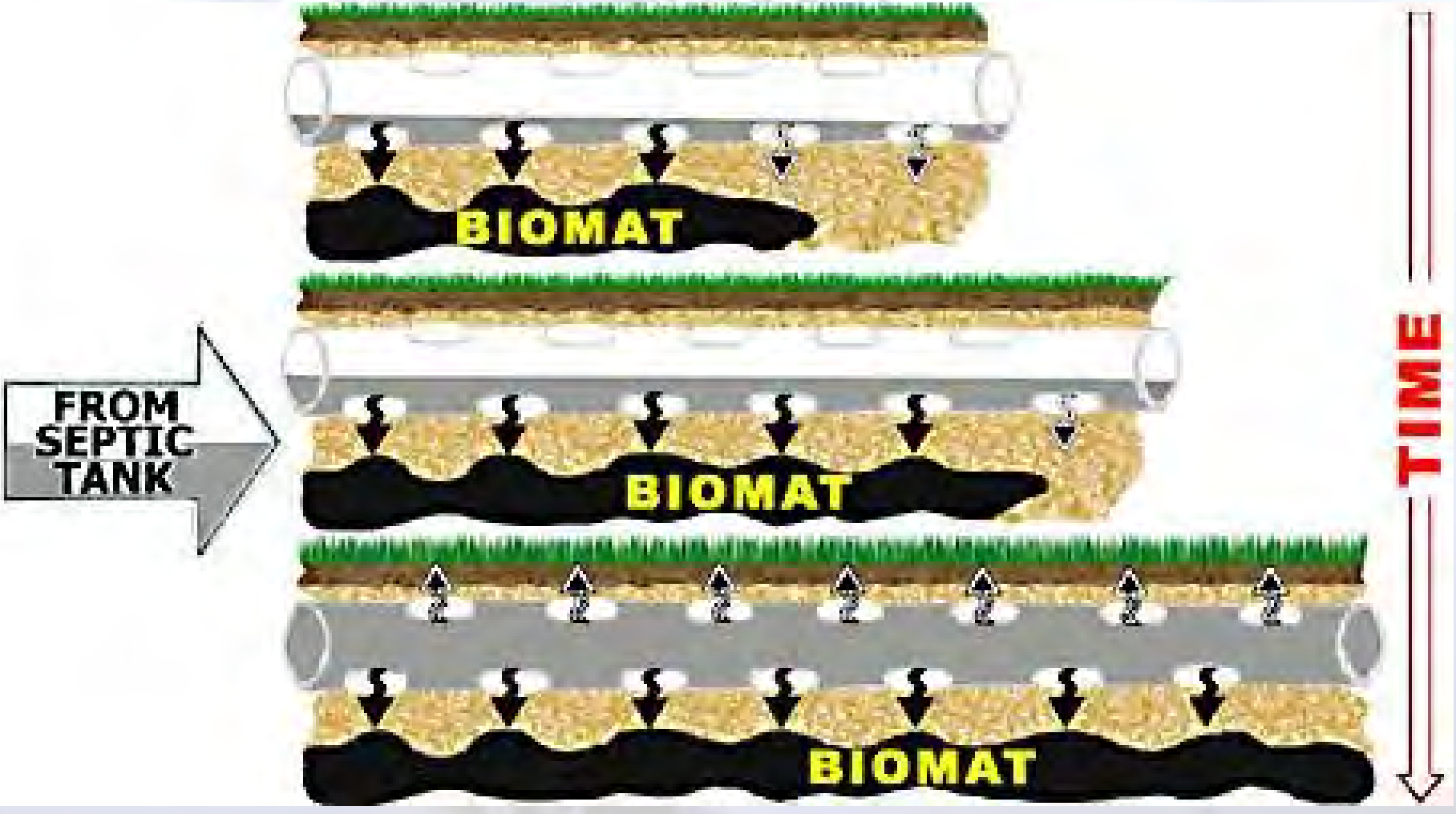
- BOD5 - Five Day Biochemical Oxygen Demand
  - BOD is a measurement of the OXYGEN DEMAND of the wastewater.
  - More food allows the growth of more microbes. The microbes consume oxygen. The more oxygen they consume the higher the BOD5 Reading
  - Therefore it’s really an indirect measurement of the “strength” or concentration of food in the wastewater.

BOD = cBOD + nBOD

Constituent	Concentration, mg L^{-1}		
	Strong	Medium	Weak
Total solids	1200	700	350
Dissolved solids (TDS)	850	500	250
Suspended solids	350	200	100
Nitrogen (as N)	85	40	20
Phosphorus (as P)	20	10	6
Chloride[1]	100	50	30
Alkalinity (as $CaCO_3$)	200	100	50
Grease	150	100	50
BOD_5	300	200	100

So what's the problem with BOD?

It increases our biomat on our drainfield!



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So we know what high BOD effluent is and where it comes from. What do we do about it?

- Eliminate the introduction of it!
- Spread it out over a wider area.
  - Reduce the LTAR
  - Equal Distribution!
- Increase treatment to reduce BOD on drainfield.
  - Increase tankage.
  - Add appropriate sized/designed “pre-treatment”

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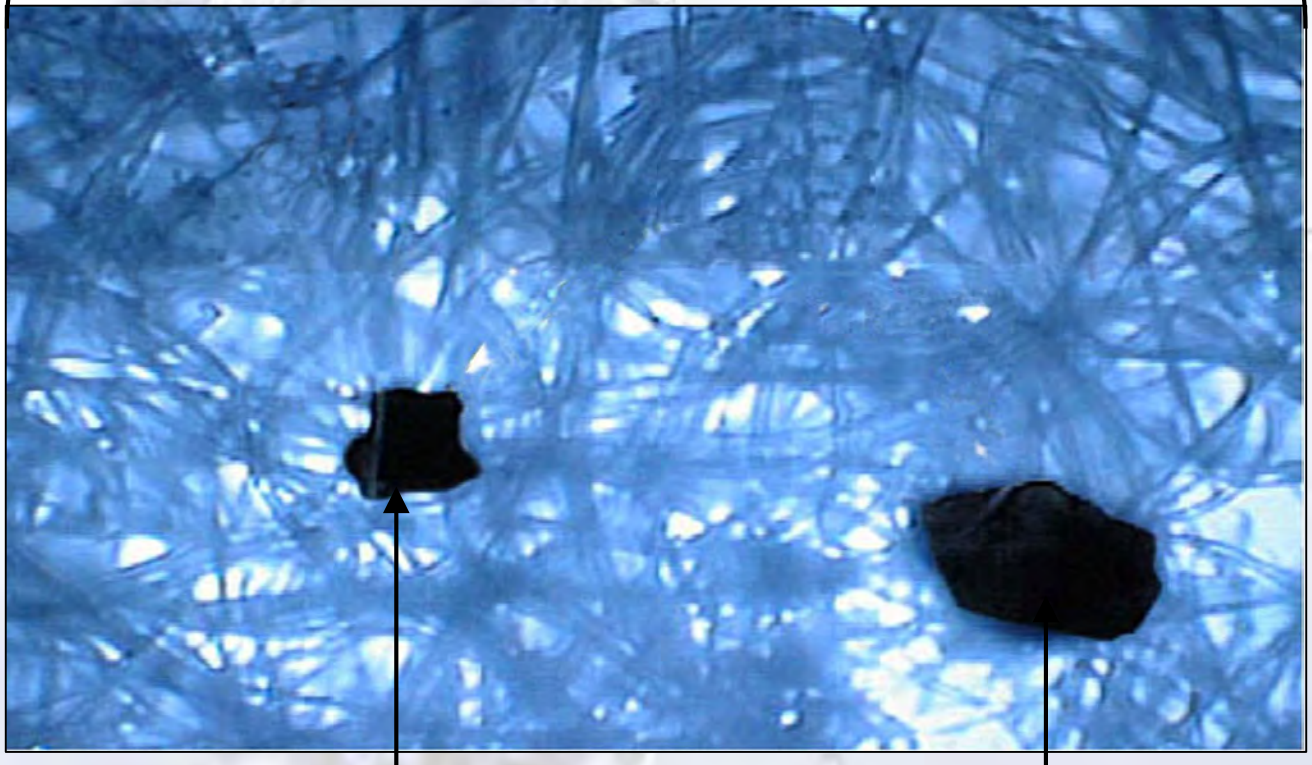
Textile



Sand

Gravel

FOG

Minneapolis will charge residents for sewer repairs if they put fat down the drain

The city has spent $1 million since 2012 unclogging fat-blocked sewers.” November 2018

What is FOG?

- FATS
- OILS
- GREASE

OK Yeah we know that….but what does that mean?

FOG

Temperature is the differentiating factor.

- Solid at room temperature = FATS
- Viscous liquid at room temperature = OILS
- Nonviscous “liquid” at room temperature = GREASE

Ok. So what does that mean to us? Why is it a concern?

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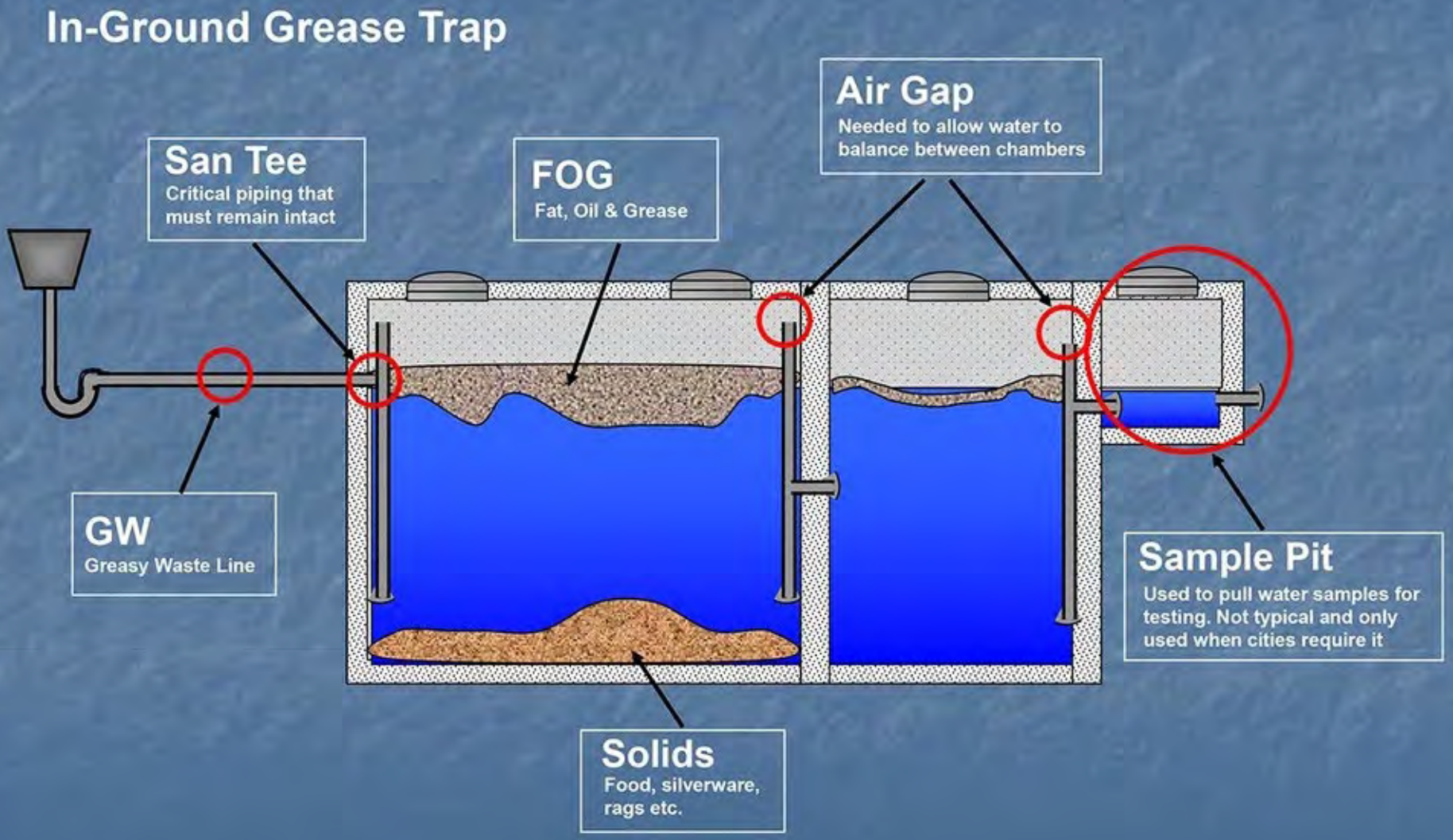
FOG

So what do we do about FOG?



Nitrogen

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Constituent	Concentration, mg L^{-1}		
	Strong	Medium	Weak
Total solids	1200	700	350
Dissolved solids (TDS)	850	500	250
Suspended solids	350	200	100
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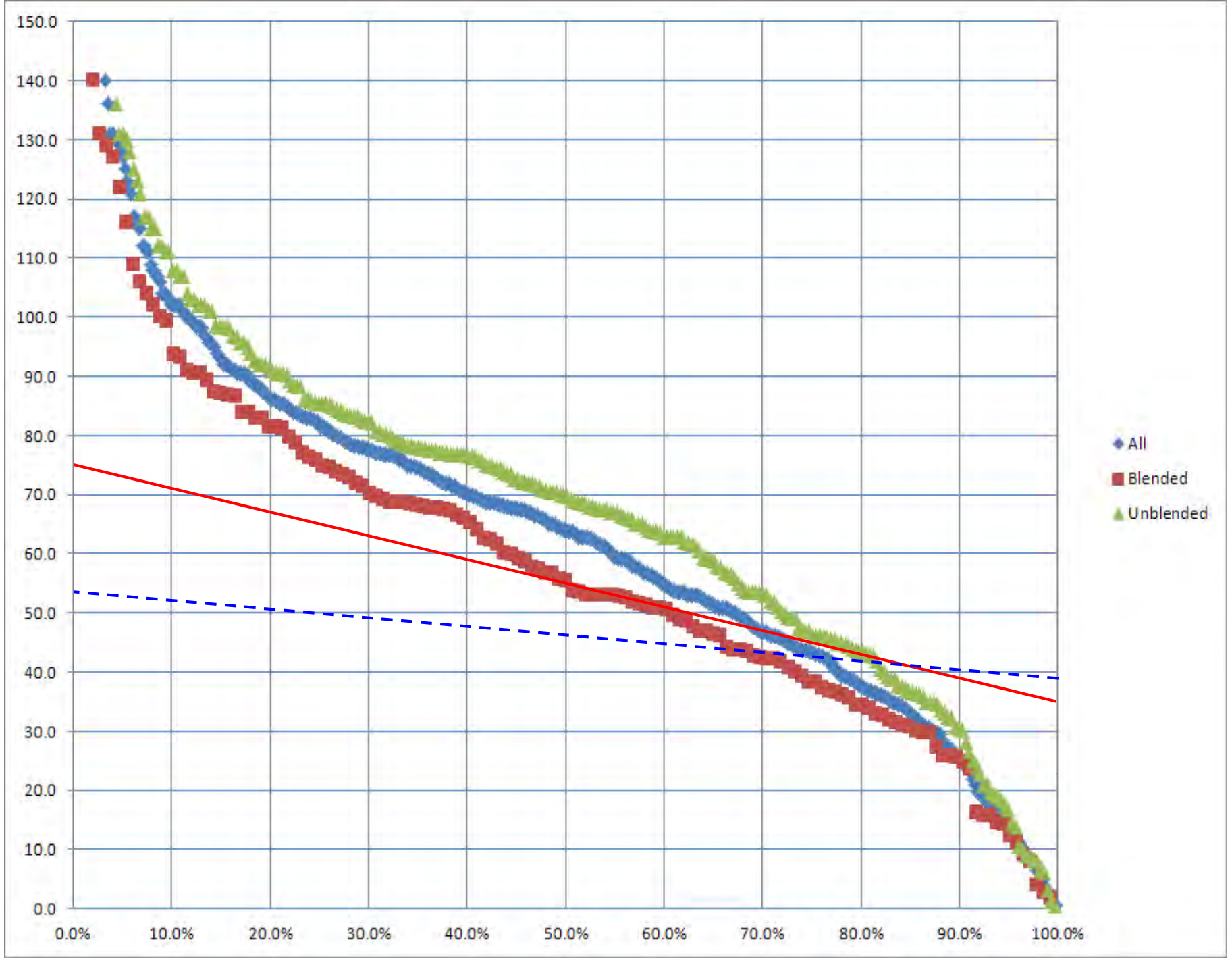
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All
Blended
Unblended

North Carolina reminds public to avoid Chowan River algal blooms

POSTED 5:30 PM, AUGUST 8, 2018, WTKR

Photo from Florence...but did we contribute to it?

Methemoglobinemia

Yes, high nitrates in surface and groundwater is bad. What's it got to do with us?

- Onsite systems *can* be significant contributors, especially in localized areas.
- Conventional onsite systems typically reduce very little nitrogen. It's just converted.
- As we increase water efficiency, influent and effluent concentrations go up.
- If we don't remove it or spread that nitrogen load over a wider area, we WILL increase groundwater nitrogen levels eventually.

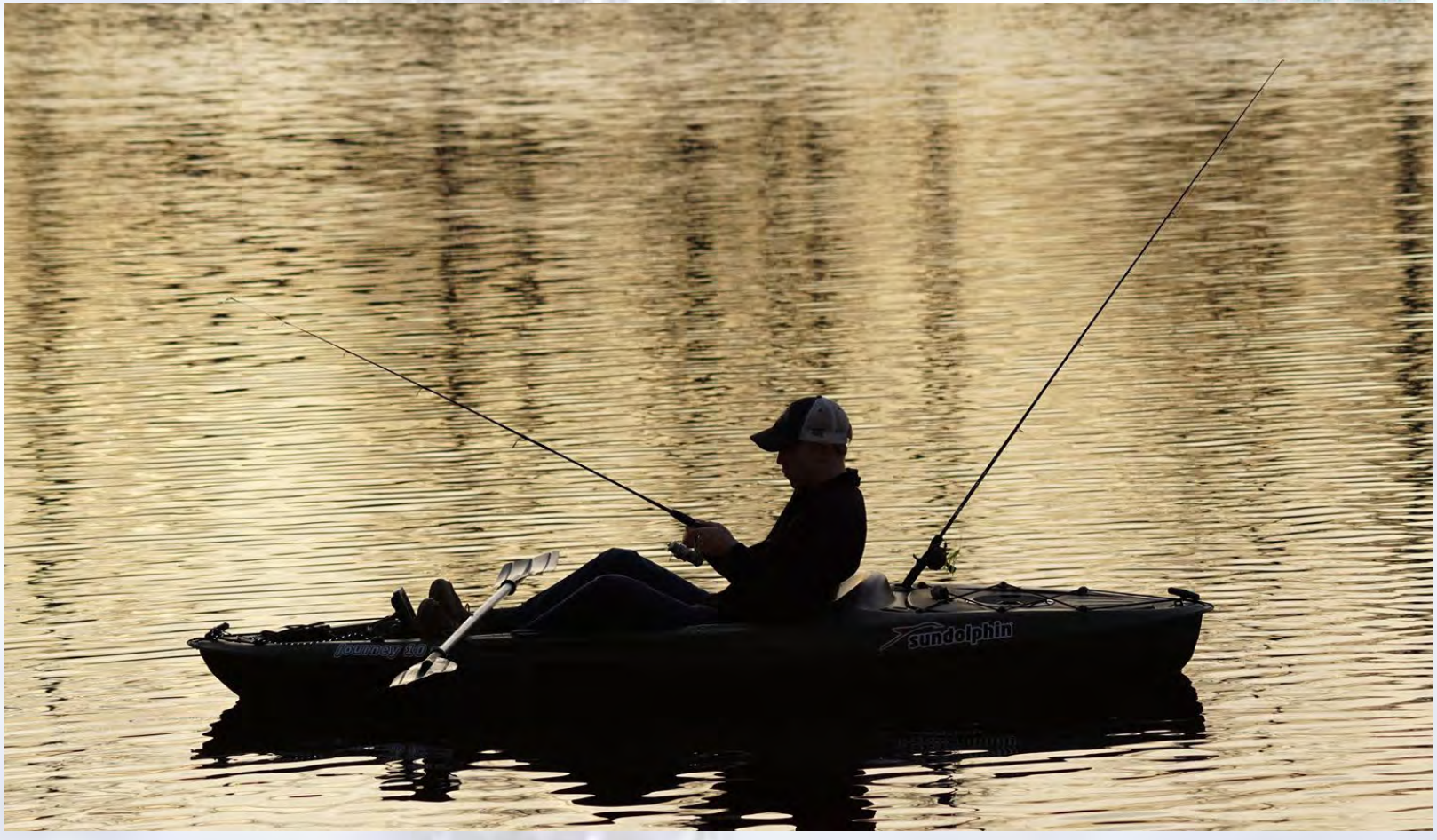
nBOD

- High influent nitrogen can cause treatment system problems. TRUE or FALSE?
- High influent nitrogen can lead to early drainfield failure. TRUE or FALSE?

So we have a potential for high effluent nitrogen. What do we do about it?

1. Don’t ignore it.
2. Decrease density. This may mean decreasing LTARs or putting in place growth control through zoning ordinances.
3. Put systems in shallow - near the root zones. Drip!
4. Use denitrification systems (TSII or Re-use)
    a. Schools
    b. RV Parks
    c. Mobile Home Parks
    d. Near water
5. Combination 2, 3, and/or 4.

Our careful work matters!



If you would like any of this presentation or have questions about it, please feel free to contact me at our website **www.aqwa.net**