NUTRIENT REMOVAL
by Re-Engineering Wastewater O&M Practices:
Improving Treatment, Saving Money &
Reducing Carbon Footprint

GRANT WEAVER, PE & WWTP Operator
President
THE WATER PLANET COMPANY

www.cleanwaterops.com
Without a **Heart**, it's just a machine.

2014 Southwest Airlines
One Report™
Optimizing wastewater treatment for nutrient removal

Today
Operators Make a Huge Difference!
Nitrogen Removal
  Wastewater Habitats
  Design Theory
  Process Control
Phosphorus Removal
  Habitats, Theory & Process Control
Case Studies

Tomorrow
Cost-Savings / Sludge Reduction Modifications
Review
Group Discussion & Design
Plants receiving Nutrient Removal O&M support

Traditional Approach
As an analogy, let’s assume ...

I have a six year old car that squeaks and sputters. I’m looking for advice.
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Re-Engineering Approach
The Right Equipment?

Empowered, Effective Operations?
Kitchen?

Chef?
Golf clubs?

Golfer?
Car ...

... and ...

Driver!
If it is all about the equipment ...

... then what are we, irrelevant?
Re-Engineering / Optimizing Operations provides ...

Lower Operations & Maintenance Costs
  Less Chemicals
  Less Electricity
  Less Sludge Production

Lower Capital Costs by reducing the Scope of Facility Upgrades

Improve Sustainability
  Less Chemicals
  Less Electricity
  Less Sludge Production
Hardly an unproven “technology”...

Amherst, Massachusetts    Athens North Mouse Creek, Tennessee    Athens Oostanaula, Tennessee    Barnstable, Massachusetts    Bartlett, Tennessee
**Tennessee facilities**

- Athens North Mouse Creek
- Athens Oostanaula
- Bartlett
- Cookeville
- Crossville
- Livingston
- Manchester*

**East/Middle Tennessee**
- Baileyton
- Chattanooga
- LaFollette
- Norris
- Oak Ridge
- West/Middle Tennessee
- Collierville
- Humboldt
- Lafayette
- Millington
- Nashville
Re-Engineering wastewater operations to create better homes for Bacteria
Making the Treatment Plant a Good Home for the Bacteria that Live there

By understanding where bacteria live...
Knowing a bit about technology...
And, being willing to experiment...

It isn’t all that difficult to make your treatment plant work better: BOD, TSS, Nitrogen & Phosphorus Removal.

At little to no cost: monetary (capital, O&M) or environment.
A Preview of what Might be Possible at the Plants we are working with ...

Greater than 50% Nitrogen Reduction
Greater than 50% Phosphorus Reduction
Capital Cost: as little as ZERO
   No New Tanks
O&M: generally, a cost SAVINGS
   No Chemicals
   Less Electricity
   Less Sludge
Carbon Footprint: REDUCED
<table>
<thead>
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<th>Location</th>
<th>t-N Before</th>
<th>t-N After</th>
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<tbody>
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<tr>
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<td>5</td>
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<tr>
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<td>5</td>
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<tr>
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<td>15</td>
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**Phosphorus Removal without Facility Upgrades**

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<td>0.3**</td>
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</table>

* with chemical addition
** without chemicals
Wastewater Library & Webinars
Introductions
Introductions: You!
40 years of biological wastewater treatment experience including 15 years of hands-on experience optimizing phosphorus and nitrogen removal.

Wastewater facility design – new construction and facility upgrade.


Grant Weaver, President
The Water Planet Company

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MIT Post-Graduate Studies in Environmental Toxicology
Oklahoma State Master of Science in Bio-Environmental Engineering
Kansas State Bachelor of Science in Biology
Professional Engineer (CT and PA)
Wastewater Operator (CT, MA, NH, RI)

40 years of biological wastewater treatment experience including 15 years of hands-on experience optimizing phosphorus and nitrogen removal
Wastewater facility design – new construction and facility upgrade
N&P training for wastewater operators in Connecticut, Massachusetts, New Hampshire, Tennessee, and Montana

g.weaver@cleanwaterops.com
Contract Operator

Dozen small wastewater treatment plants in Connecticut; most with Nitrogen and Phosphorus limits.

Nutrient Removal Consultant/Trainer

"Re-engineer" wastewater treatment facilities to remove N&P without facility upgrades.

Same results for as little as one percent the capital cost.

More sustainable – less construction, reduced chemical and utility use.

Annual O&M savings – less chemicals, electricity & sludge disposal.

Package Treatment Plant

Developing "turnkey" package treatment plant for small municipal lagoons with strict N&P limits.
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Making sustainably clean water