

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



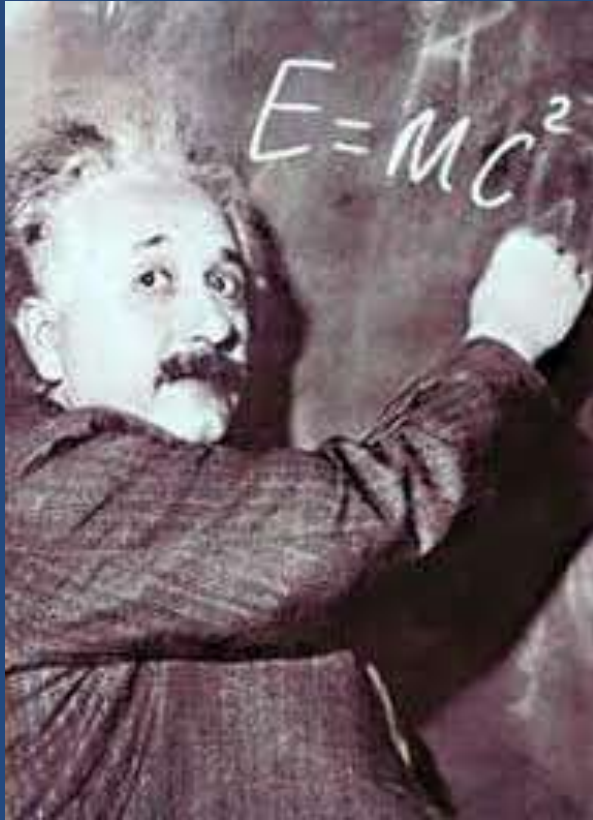
Southwest 

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

Amherst, Massachusetts Athens North Mouse Creek, Tennessee Athens
Oostanaula, Tennessee Barnstable, Massachusetts **Bartlett, Tennessee**
Big Sky, Montana Billings, Montana Bozeman, Montana Chinook,
Montana Colchester-East Hampton, Connecticut Columbia Falls, Montana
Conrad, Montana Cookeville, Tennessee Crossville, Tennessee Dillon,
Montana **East Haddam, Connecticut** East Helena, Montana
Easthampton, Massachusetts Farmington, Connecticut Greenfield,
Massachusetts Hamilton, Montana Hardin, Montana Helena, Montana
Kalispell, Montana **Keene, New Hampshire** Lewistown, Montana Libby,
Montana Livingston, Tennessee Lolo, Montana **McKinleyville, California**
Missoula, Montana Montague, Massachusetts Newburyport,
Massachusetts New Hartford, Connecticut Northfield, Massachusetts
Nottingham MUD, Texas Palmer, Massachusetts Plainfield North,
Connecticut Plainfield Village, Connecticut Portland, Connecticut South
Deerfield, Massachusetts South Hadley, Massachusetts Suffield,
Connecticut Sunderland, Massachusetts **Upton, Massachusetts**
Westfield, Massachusetts Windham, Connecticut

Traditional Approach



your design solution

{ web video print app }

As an analogy, let's assume ...

*I have a six year old car that squeaks and sputters.
I'm looking for advice.*



As an analogy, let's assume ...

*I have a six year old car that squeaks and sputters.
I'm looking for advice.*



Re-Engineering Approach



The Right Equipment?



Empowered, Effective Operations?





LIVINGSTON WASTE WATER TREATMENT PLANT



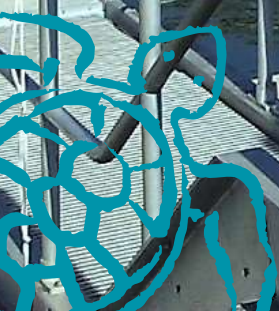






ATHENS UTILITIES
BOARD

RUSSELL



Kitchen?



Chef?



Golf clubs?



Golfer?



Car ...



... and ...

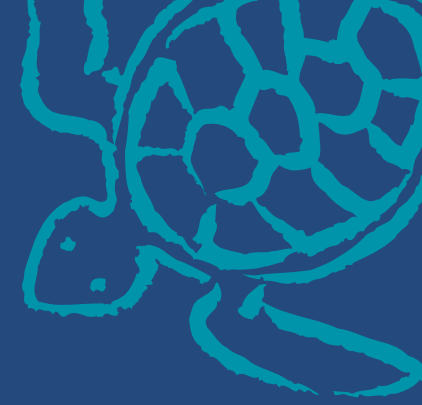


Driver!

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**
Big Sky, Montana Billings, Montana Bozeman, Montana Chinook,
Montana Colchester-East Hampton, Connecticut Columbia Falls, Montana
Conrad, Montana Cookeville, Tennessee Crossville, Tennessee Dillon,
Montana **East Haddam, Connecticut** East Helena, Montana
Easthampton, Massachusetts Farmington, Connecticut Greenfield,
Massachusetts Hamilton, Montana Hardin, Montana Helena, Montana
Kalispell, Montana **Keene, New Hampshire** Lewistown, Montana Libby,
Montana Livingston, Tennessee Lolo, Montana **McKinleyville, California**
Missoula, Montana Montague, Massachusetts Newburyport,
Massachusetts New Hartford, Connecticut Northfield, Massachusetts
Nottingham MUD, Texas Palmer, Massachusetts Plainfield North,
Connecticut Plainfield Village, Connecticut Portland, Connecticut South
Deerfield, Massachusetts South Hadley, Massachusetts Suffield,
Connecticut Sunderland, Massachusetts **Upton, Massachusetts**
Westfield, Massachusetts Windham, Connecticut

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

Nitrogen Removal without Facility Upgrades



	<u>t-N Before</u>	<u>t-N After</u>
Athens N Mouse Creek	NC	5
Athens Oostanaula	NC	5
Bartlett	NC	5
Cookeville	25	5
Crossville	NC	15
Livingston	NC	5
Manchester	10	6



Phosphorus Removal without Facility Upgrades

	<u>t-P Before</u>	<u>t-P After</u>
Athens N Mouse Creek	3	2
Athens Oostanaula	0.5*	0.3**
Bartlett	3	1
Cookeville	3	1
Crossville	NC	3
Livingston	3	2
Manchester	3	0.3

* with chemical addition
** without chemicals



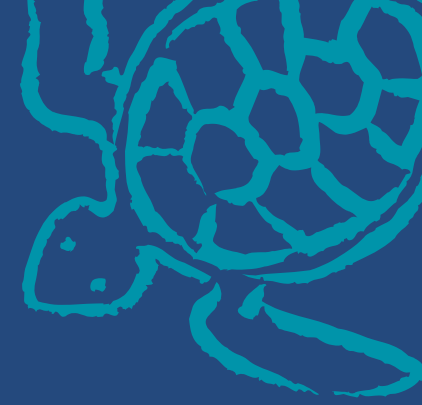
www.cleanwaterops.com/wastewater-science/



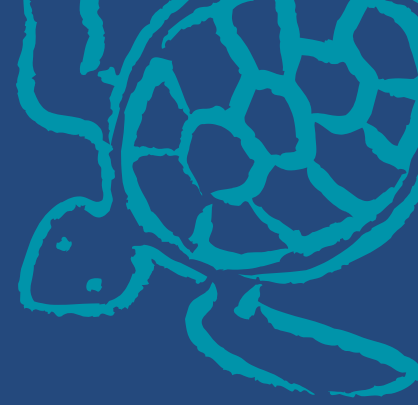
Wastewater Library & Webinars



Introductions



Introductions: You!



*Grant Weaver, President
The Water Planet Company*



g.weaver@cleanwaterops.com

Grant Weaver, President
The Water Planet Company

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



The Water Planet Company



The Water Planet Company

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.





THE WATER PLANET COMPANY

Making sustainably clean water

