



Clean Water
for Clean
Energy™

DUG EAST: “Water Workshop”
Return & Reuse Panel

Robert P. Cathey, CEO
November 13, 2012



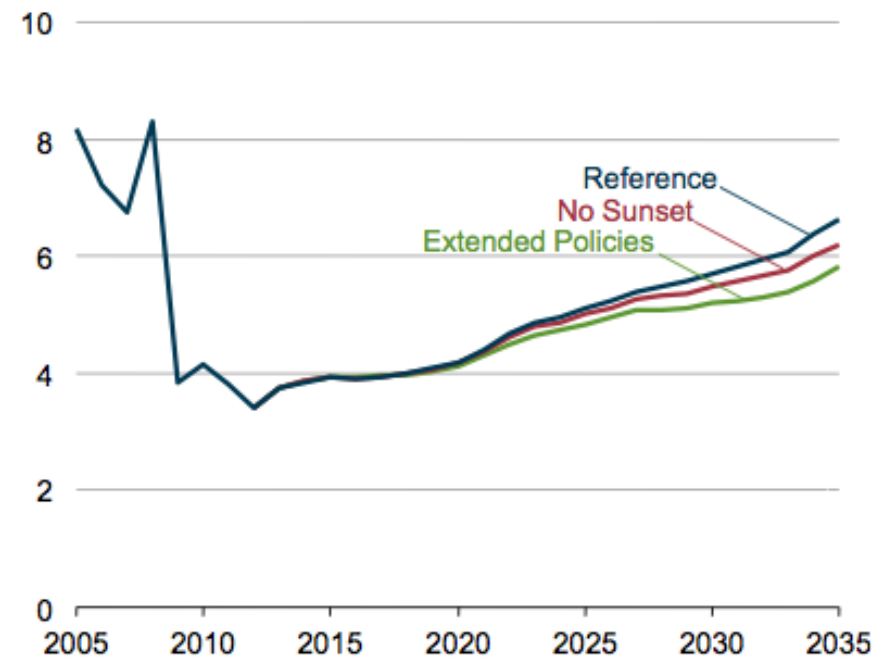
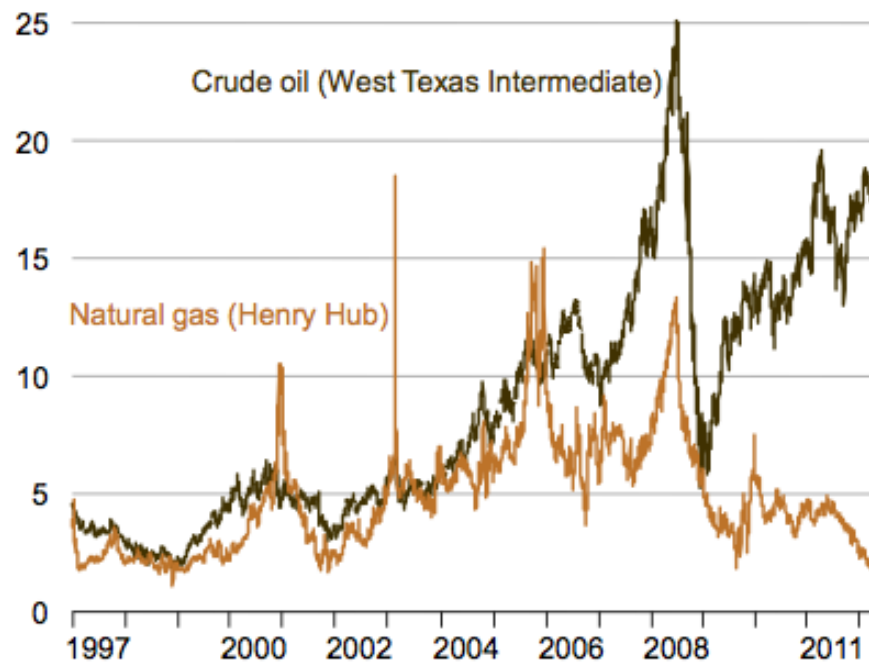


Today's Agenda

- Oil & Gas Industry Challenges
- Water Treatment Challenges
- Water Treatment Strategy
- Company Introduction
- Technology Overview
 - About Ozonix®
 - Products & Services
 - Benefits & Capabilities
- Oil and Gas Applications
 - Microbial Control Validation
 - Scale Control Validation
- Case Studies
 - Arkansas – Fayetteville Shale
 - Oklahoma – Woodford Shale
 - West Texas – Permian Basin
 - Pennsylvania – Marcellus Shale
- Environmental Impact
- Industry Recognition



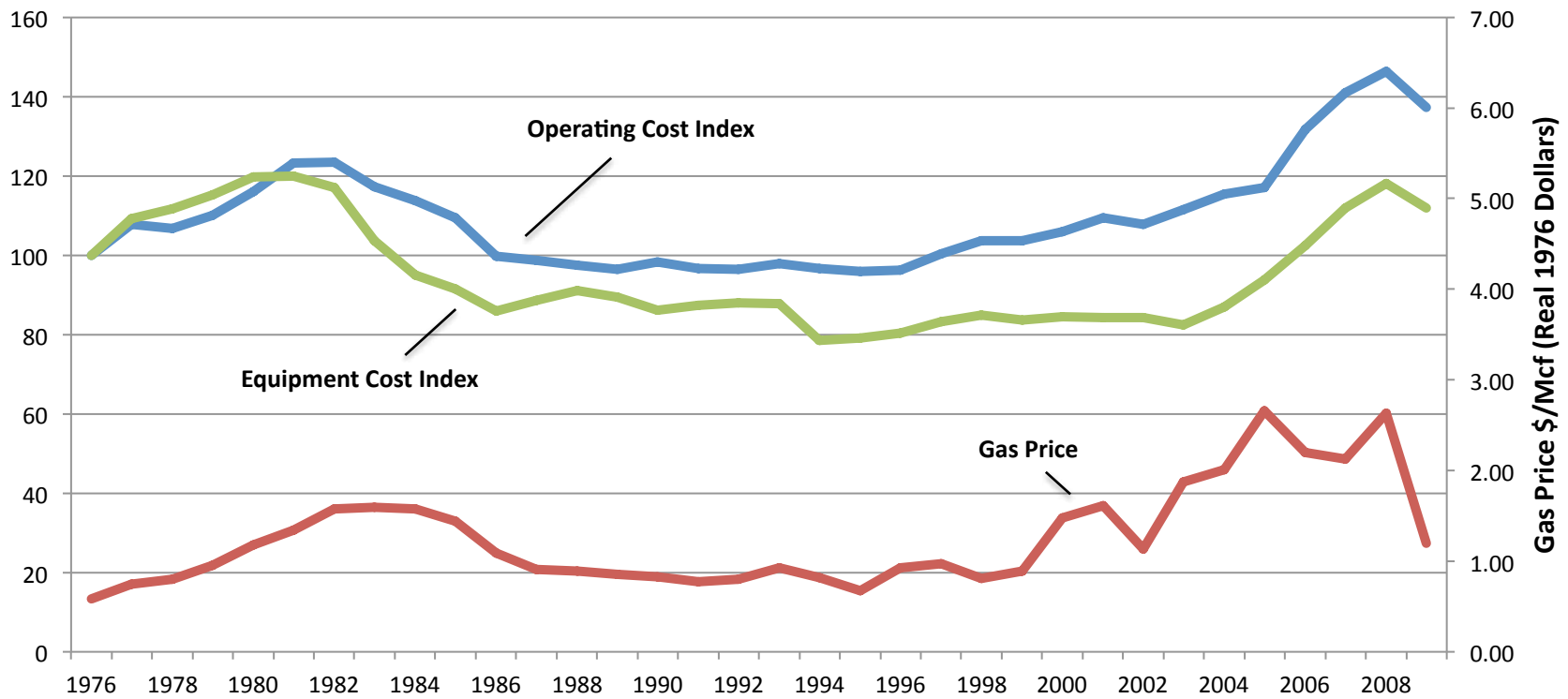
Gas Prices are Down Not Coming Back Soon



Source: Energy Information Administration, Annual Energy Outlook 2012



Operators Must Reduce Costs

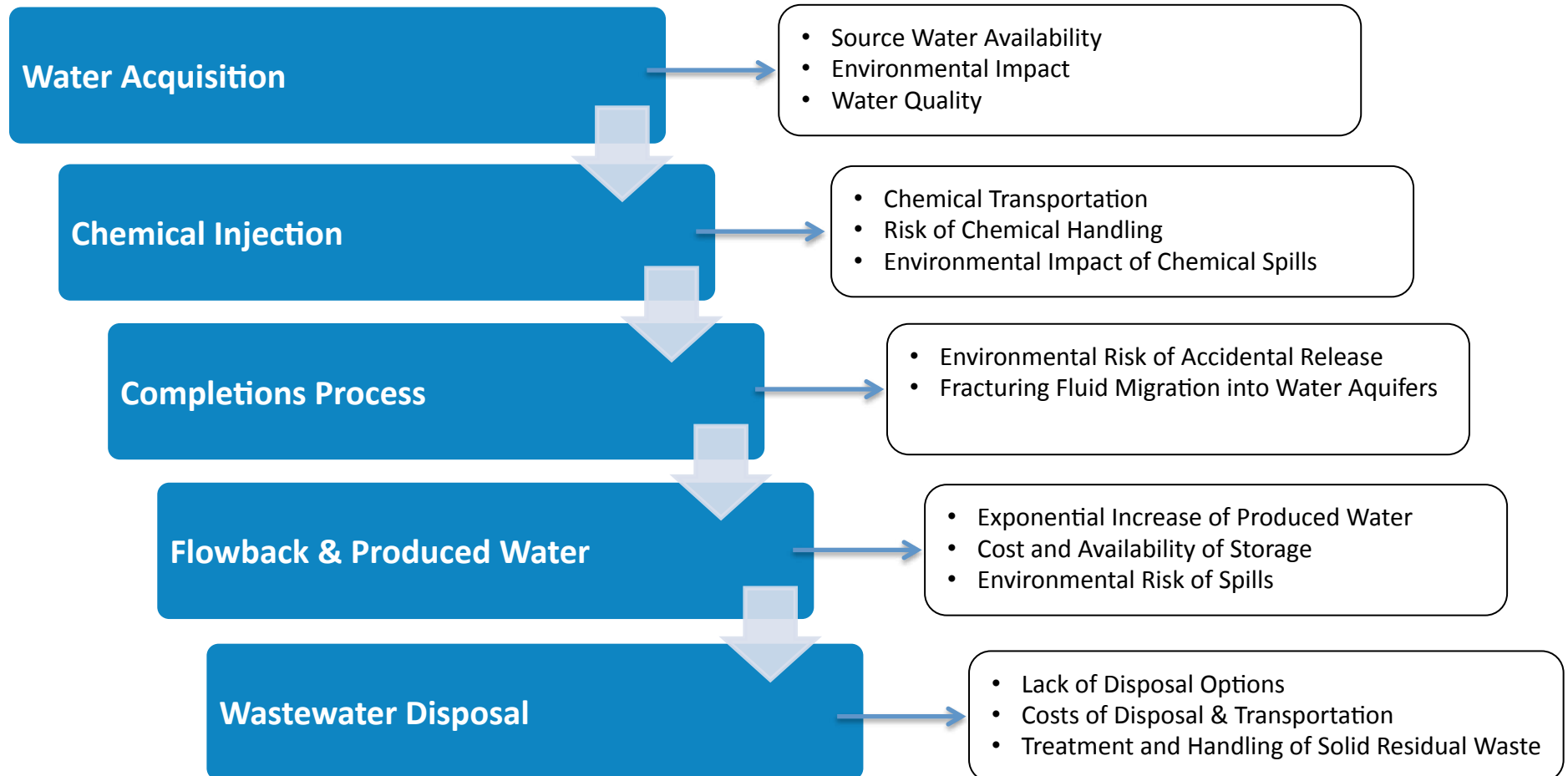


Indices for Gas Equipment and Annual Operating Costs and Gas Prices in Real 1976 Dollars

Source: Energy Information Administration, Office of Oil and Gas

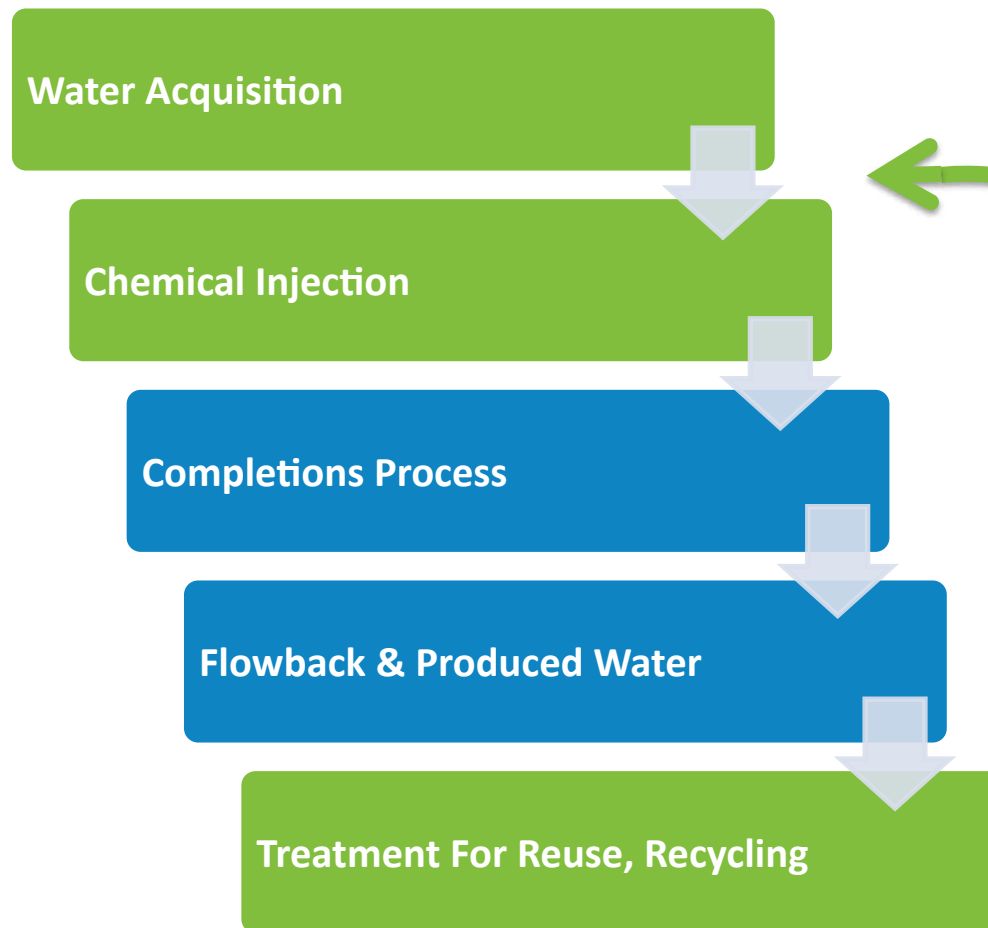


Water Related Task Associated Challenges





Water Has Become a Major Industry Concern



Recycling flowback and produced water is now a PRIORITY

Ecosphere's Approach:

- Chemical-Free Treatment
- Disinfection Treatment with a Patented AOP
- No Waste Stream



Microbial Control & Scale-Inhibition



- Microbial Induced Corrosion (MIC)
- Sulfate Reducing Bacteria (SRB)
- Acid Producing Bacteria (APB)
- Calcium-Carbonate
- Barium Sulfate
- Hydrogen Sulfide
- Iron-Sulfide



Historic Fresh Water Fracturing Methods

- Biocides
- Scale Inhibitors
- Corrosion Inhibitors
- Surfactants
- Fresh Water Treatment Costs:
\$0.10 to \$0.70 Per Bbl

Flowback and Produced Water Challenges

- More Organics, Bacteria, Heavy Metals, Frac Chemicals, TDS, TSS
- Requires More of the Traditional Chemicals Previously Used
- Potential for H₂S Souring, Corrosion, Scale, etc.
- Compatibility Issues with Anionic Friction Reducers
- Compatibility Issues with Gel Systems
- Leaching Minerals from the Formation



1. Sourcing and Disposal

- A Traditional Strategy
- An Inefficient Use of Resources



2. On-Site Water Recycling

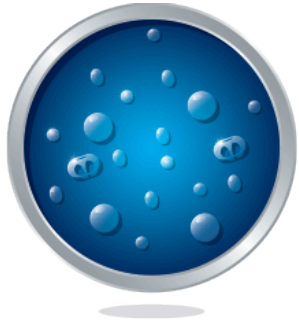
- Recycled Water Treated and Cut with Fresh Water
- Treated Water is Used as the Fracturing Fluid



3. Off-Site Water Recycling

- Water is Transported via Truck or Pipe
- Flowback and Produced Water is Treated at a Centralized Location





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**HYDRODYNAMIC
CAVITATION**

OZONE

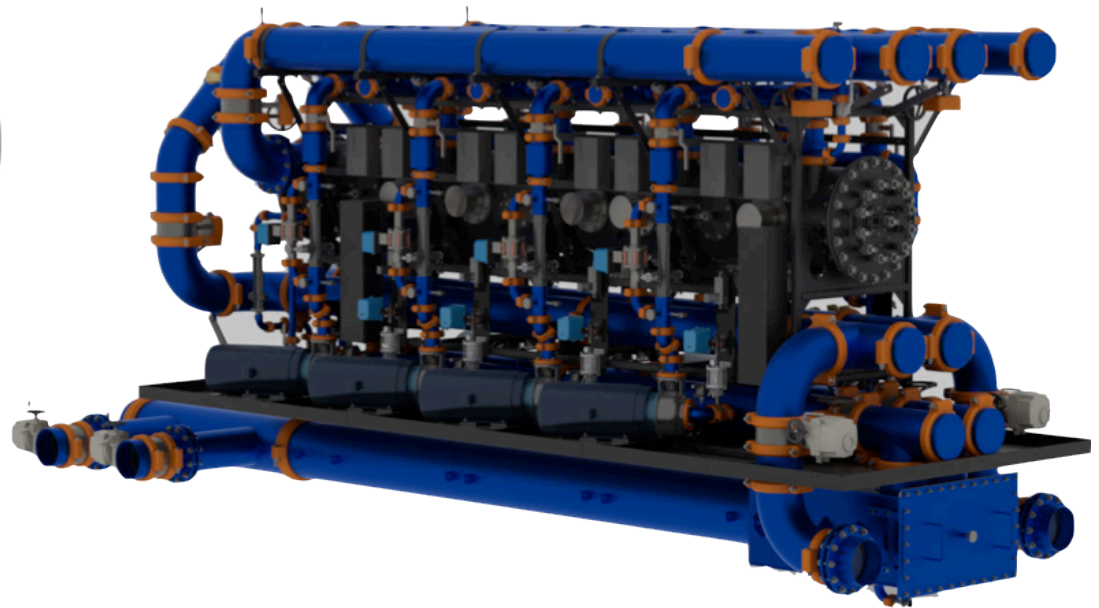


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**ACOUSTIC
CAVITATION**

**ELECTRO
OXIDATION**



U.S. Patents: 7,699,994 / 7,699,988 / 7,785,470 / 7,943,087

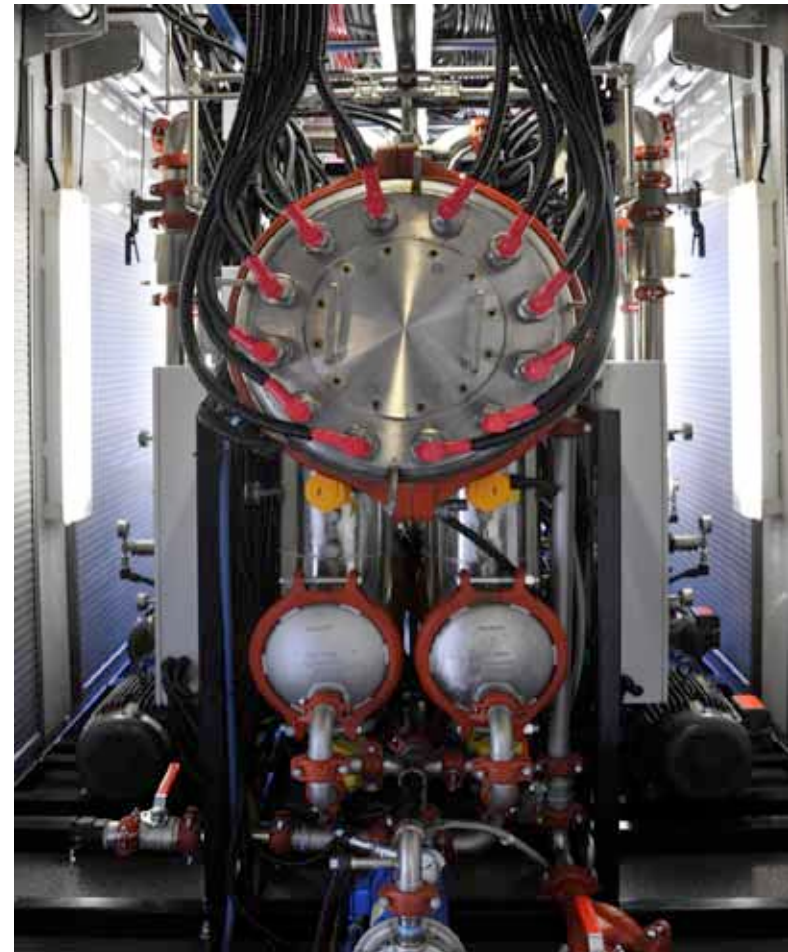


Benefits

- REDUCE COSTS
- PRODUCE BETTER WELLS
- Eliminate Bacteria & Prevent Scale
- Destroy Highly-Resistant Biofilms
- Reduce Chemical Handling & Costs
- Oxidize Oil & Grease, H₂S, Iron, etc.
- Recycle Water for Re-Use
- Preserve Vital Water Resources

With Ozonix® Everyone Wins

- Environmentally Friendly
- Customer Friendly





OZONIX® EF10, EF20, EF60 & EF80



RECYCLES
10
BPM

Performance Features

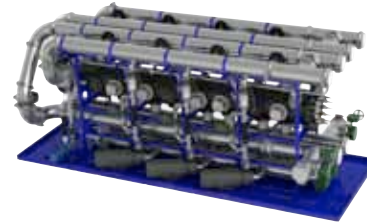
- 420 gallon per minute flow rates
- Self-contained mobile frac tank



RECYCLES
20
BPM

Performance Features

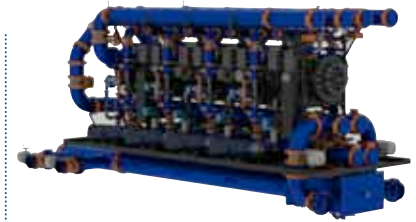
- 840 gallon per minute flow rates
- Self-contained mobile frac tank



RECYCLES
60
BPM

Performance Features

- 2,520 gallon per minute flow rates
- Self-contained 53' mobile trailer



RECYCLES
80
BPM

Performance Features

- 3,360 gallon per minute flow rates
- Self-contained 53' mobile trailer









Proven Microbial Control



45 Billion SRB / ml



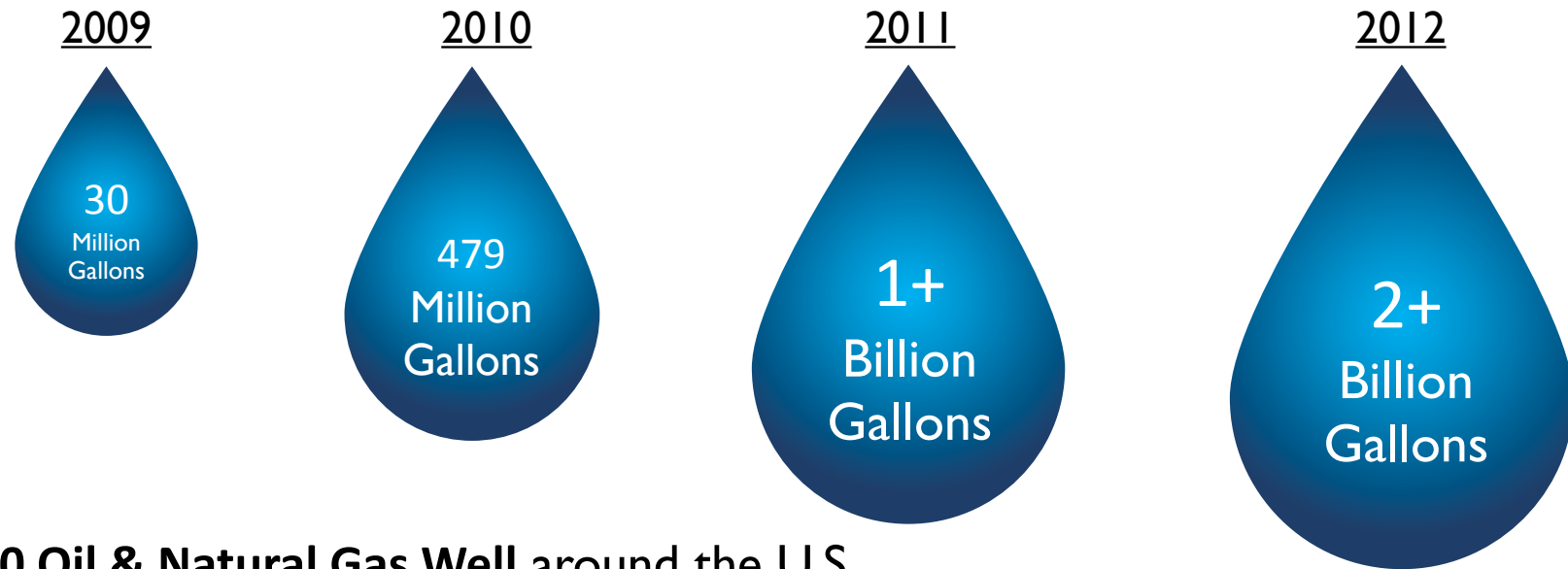
95 SRB / ml

One Pass Treatment at 3,360 GPM

*Source of the influent water (tested by an independent laboratory) was a 30k bbl storage pit of 100% produced water from the Fayetteville Shale



2+ Billion Gallons of Water Recycled



- **610 Oil & Natural Gas Well** around the U.S.
- **1.6+ MILLION Gallons of Chemical Biocide Eliminated** from Fracturing Operations
- **Multiple Long Term Contracts:**
 - Arkansas – Fayetteville Shale
 - Oklahoma – Woodford Shale
 - Texas – Permian Basin



Validated Case Studies from Major Shale Plays

Billions of Gallons Treated:

- Fayetteville Shale
- Woodford Shale
- Eagle Ford Shale
- Permian Basin
- Marcellus Shale

Ozonix® Treatment Facts:

- 51,418,796 bbl Treated
- 2,159,589,432 Gallons Treated
- 610+ Wells Completed
- 120 bbl/min Capabilities



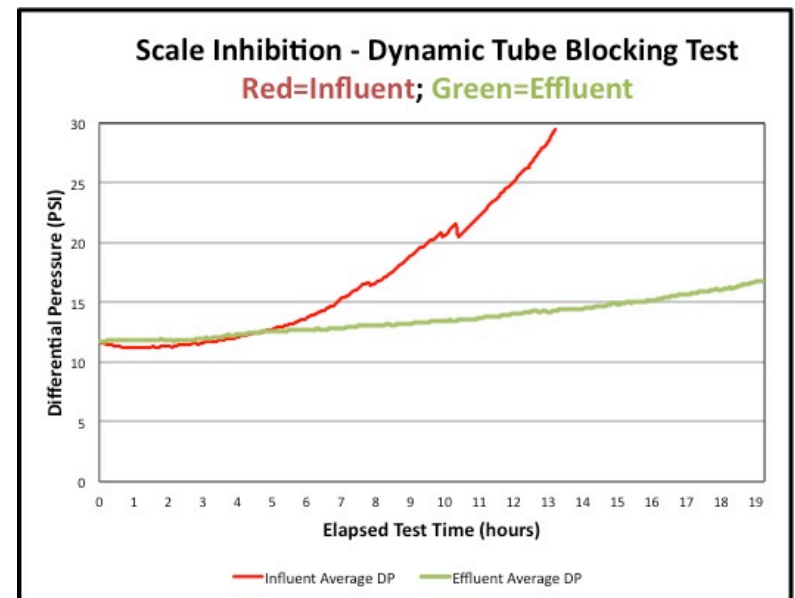
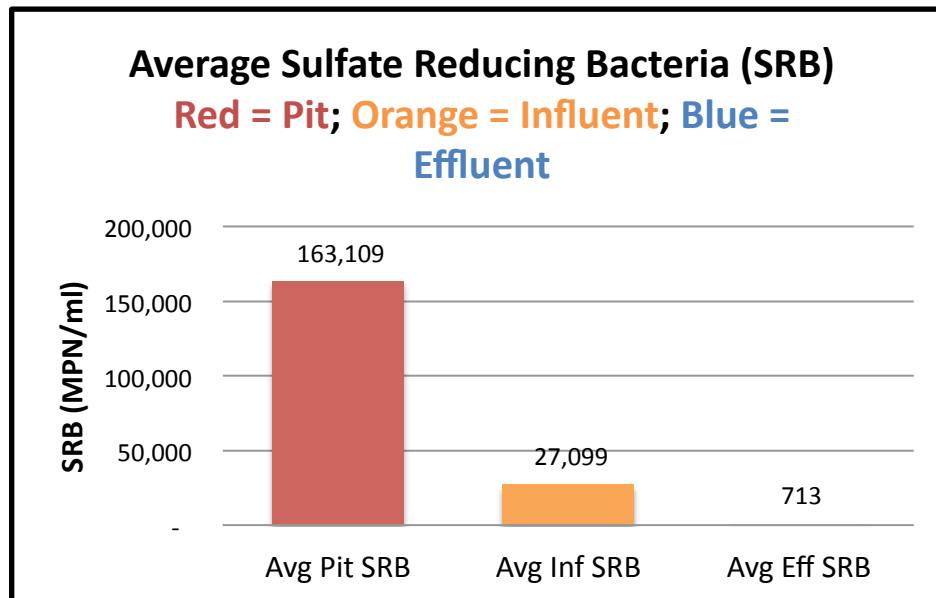


Fayetteville Shale, Arkansas

On-Site Frac Fluid Treatment with 40% Recycled Water at 120 BPM

Woodford Shale, Oklahoma

100% Produced Water Recycling

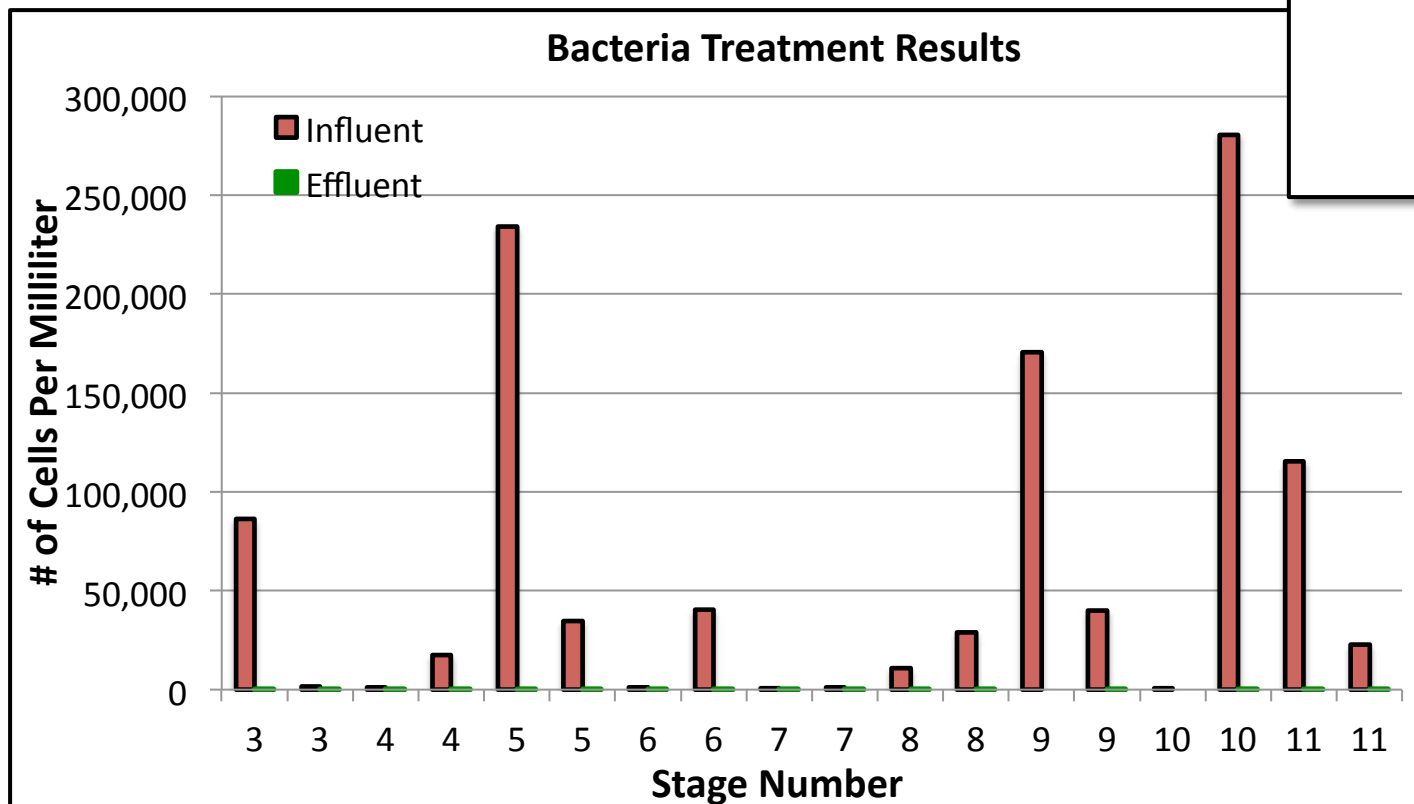


*Lab Data Provided by American Interplex Corporation; Compilation of 468 Lab Samples Taken From 142 Wells



Permian Basin, West Texas

On-Site Frac Fluid Treatment 80/20 Fresh Water/Flowback Mixture Ratio at 80 BPM



**99.98%
REDUCTION**



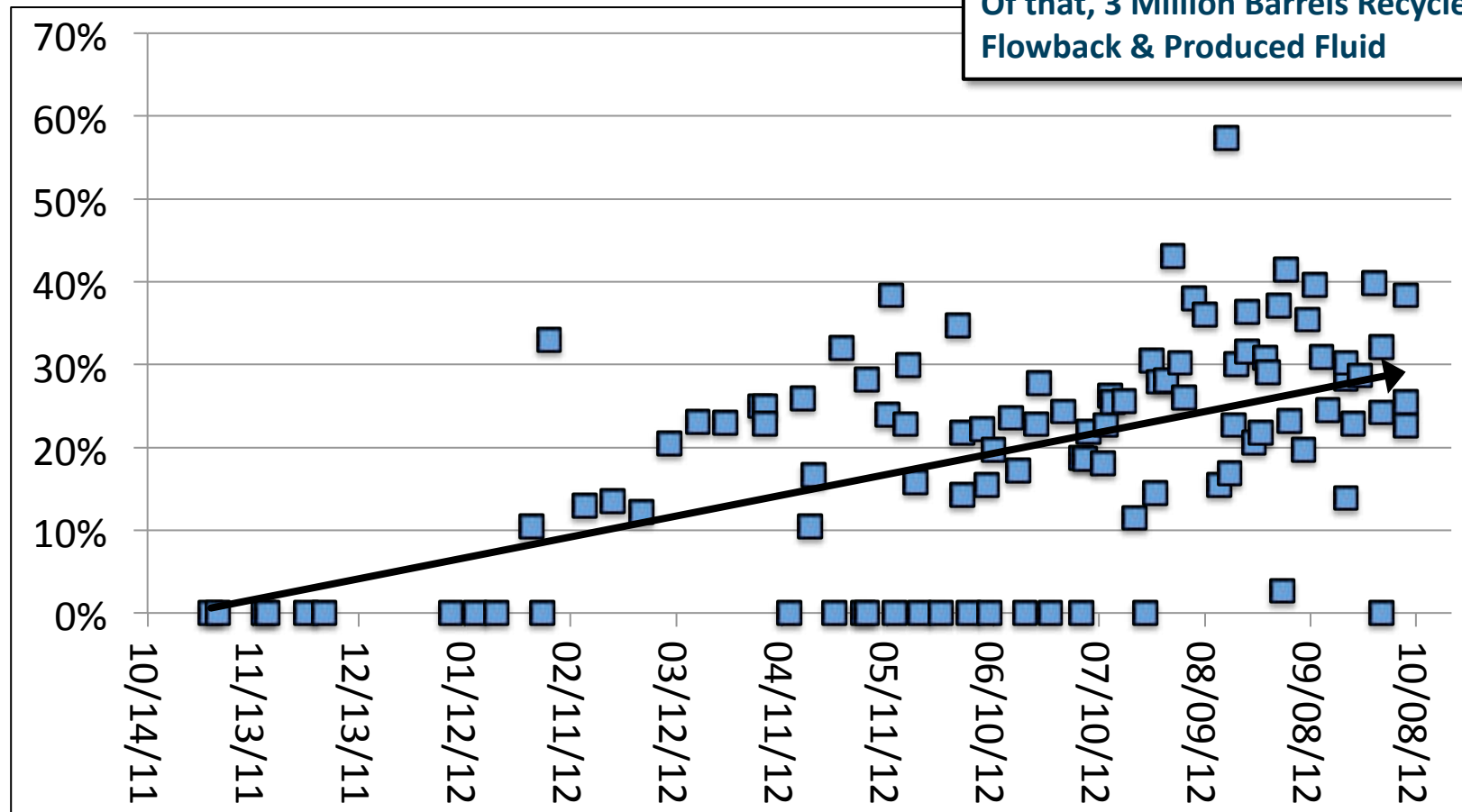
*Source of Case Study is EES' Sub-Licensee Hydrozonix, from Operations in the Permian Basin, West Texas.



Permian Basin, West Texas

Increasing Use of Flowback and Produced Fluid

120 Wells Completed
14 Million Barrels Treated
Of that, 3 Million Barrels Recycled
Flowback & Produced Fluid

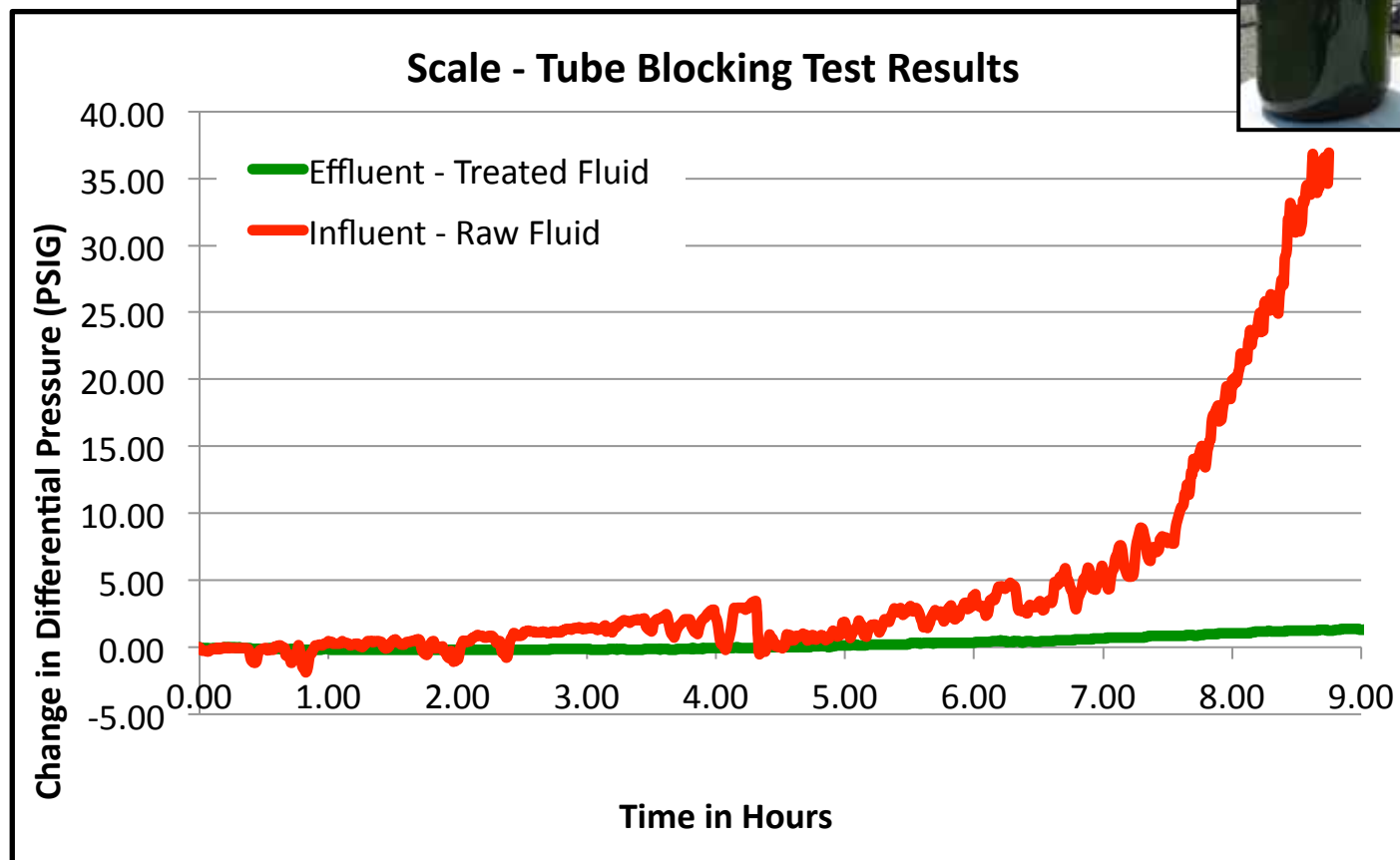


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Marcellus Shale, Pennsylvania

Produced Water Recycling



*Source of Case Study is EES' Sub-Licensee Hydrozonix, from Operations in the Marcellus Shale, Pennsylvania



2012 Product Leadership Award

North American Disinfection Equipment for Shale Gas Wastewater Treatment – Best Practices

By: Frost & Sullivan



“One of the Dominant Providers of Water Treatment for the Shale-Gas Industry”



“Techno-Economic Assessment of Water Management Solutions”



Selected as 3x (2010, 2011 & 2012) TOP 50 Water Companies
“Building Momentum for Advanced Water Technology Solutions”



U.S. Oil and Gas Service Provider

HYDROZONIX

www.Hydrozonix.com

Global Energy Service Provider



www.EcosphereTech.com



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