Turning Produced Water from a Pain to an Asset: Optimizing Water Recycling

Ashwin Dhanasekar

Research Manager | The Water Research Foundation
Evolution of The Research Foundation
Advantages

• One source for “One Water” research
• Greater knowledge base
• Leverage funding
• Eliminate duplication of research
The integrated organization represents the evolution of water research issues, the overlap between water and wastewater, and efficiencies to be gained through a consolidated research program.

Learn more at www.waterrf.org and www.werf.org
What constitutes Produced Water Management?

- **Freshwater Management**
  - Sourcing, Contracting, Delivery

- **Produced Water Management**
  - Analysis, Treatment, Customized Oilfield Application, Delivery

- **Disposal / Treatment Water Handling**
  - Analysis, Treatment, Disposal

- **Water Remediation – ReUse for Beneficial Uses**
  - Analysis, Treatment, Market Analysis, Customized Market Applications, Delivery
    - Drilling and Completions
    - Irrigation
    - Industrial needs
    - Municipal uses
    - Regulatory Water Rights Replacement (Augmentation)
Current Trend

Fresh Water Source ➔ Drilling / Fracturing ➔ Produced Water Storage ➔ Disposal

- Trucks cause road damage
- 90% Disposal

© 2018 The Water Research Foundation. ALL RIGHTS RESERVED.
Current Picture with Treatment for oilfield reuse

1. Fresh Water Source
2. Drilling / Fracturing
3. Produced Water Storage
4. Disposal
5. Treatment
Water Treatment has become a Commodity for oilfield uses

Treatment philosophy is “Fit for Purpose”
The Ultimate Solution – Multiple Reuse options
The Big Picture

Water Management Technology

Fresh Water Source
- $V_{\text{fresh}}$
- $WQ_{\text{fresh}}$
- $T_{\text{fresh}}$

Drilling / Fracturing
- $V_{\text{frac}}$
- $WQ_{\text{frac}}$

Produced Water Storage
- $V_{\text{produced}}$
- $WQ_{\text{produced}}$
- $T_{\text{produced}}$

Treatment
- $V_{\text{treatment}}$
- $WQ_{\text{treatment}}$
- $T_{\text{treatment}}$
- $C_{\text{treatment}}$

Alternative Surface Use
- $V_{\text{surface}}$
- $WQ_{\text{surface}}$
- $T_{\text{surface}}$

Disposal
- $V_{\text{disposal}}$
- $WQ_{\text{disposal}}$
- $T_{\text{disposal}}$
- $C_{\text{disposal}}$

Fresh Water Management Technology

Optimize by Alternative Surface Use

Surface Use
- $V_{\text{surface}}$
- $WQ_{\text{surface}}$
- $T_{\text{surface}}$

Treatment
- $V_{\text{treatment}}$
- $WQ_{\text{treatment}}$
- $T_{\text{treatment}}$
- $C_{\text{treatment}}$

Disposal
- $V_{\text{disposal}}$
- $WQ_{\text{disposal}}$
- $T_{\text{disposal}}$
- $C_{\text{disposal}}$
Freshwater Management

- Estimation of Water required for Drilling & Completions
- Identification of water resources geospatially available
- Analyze Historical data
- Summarize by Zone / Area / Development Plan / Campaign
- Spatially estimated water needs based on geo-interpolation.
Produced Water Management

- Analyzing water produced over time for a single dataset
- Equations developed based on historical data analysis
- Summarize by Zone / Area / Development Plan / Campaign
- Spatially estimated water production based on geo-interpolation. Temporally predicted.
Produced Water Quality Modeler

- Analyzing water produced over time for a single dataset
- Equations developed based on historical data analysis
- Summarize by Zone / Area / Development Plan / Campaign
- Spatially estimated water quality based on geo-interpolation. Temporally predicted.
Alternative Beneficial Reuse – Geospatial Optimization

SWD Well
Treatment
Drilling & Fracing
Fresh Water
Current Scenario

Workable Solution for Surface Reuse
The Key to Economically Successful Remediation Is Optimizing the SYSTEM

- Optimization for Every Scenario
- Feed more Data, reap more benefits!

- Water treatment is only part of the solution
- Despite claims of a “silver bullet”, economic water treatment is a commodity business
- Treatment should be “fit for purpose” and no more