Successful Oilfield Water Management

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Unconventional Shale Development *Pioneered in Texas*.

- It all started with the Barnett Shale.
- Small independents unlocked the resource.

TEXAS OFFERS THE RIGHT CLIMATE

- Regulatory: Regulators that understand Oil & Gas.
- Politically.
- Economically. The Texas economy is linked to O&G.

Water Management – *the Past*…

- Water was viewed as an afterthought.
- Volumes increased over time – were simply a cost of production.

UNCONVENTIONALS ARE DIFFERENT

- Water is needed BEFORE the resource can be developed.
- Water treatment was viewed as a science project – interesting but not integral.

Water Management – *the Present*…

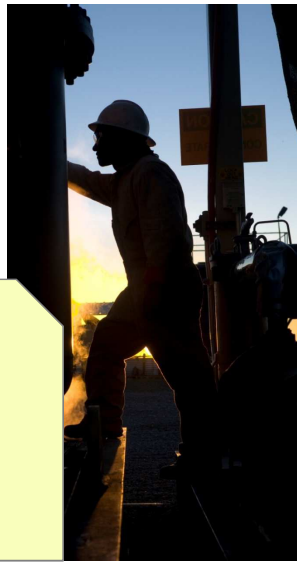
- America is waking up to the fact that it is becoming energy independent.
- Water is vital to the development.
- Experience is becoming more important. Black Boxes are going away.

RECYCLING IS BECOMING NORMAL

- Water is being recognized as essential.
- Supplies & disposal can be limited.
- The Texas drought has raised the profile of water availability in areas like West Texas.

Water Management – *the Future*…

- Water must be used more effectively to ensure continued development.
- Industry wide codes and best practices will emerge for water recycling.
- PW is becoming viewed as an asset.



RECYCLING WILL BE A NORMAL PART OF SHALE PRODUCTION

- Recognized leaders in this space will emerge.
- Water-related businesses will be bundled (supply, transport, recycling, disposal).

The TWRA supports all viable water recycling technologies and their vendors.

www.txwra.org

New RRC Recycling Rules

① Very Positive. After discussion with industry and TWRA, the RRC made some very reasonable changes from earlier proposed rules.

② The RRC made a statement we fully endorse (Ch 3, pg. 7):

"*With the adoption of this rulemaking, the Commission sets up a regulatory framework in which recycling is a viable alternative to disposal, but allows the operators to make their own water and waste management decisions.*"

Permit by Rule

This is probably the biggest win.

a. If a producer re-uses their PW with no treatment or adds their own treatment (i.e.: filter) this is fine (within the oilfield).

b. Why then should a permit be needed if a 3rd party performs treatment (filter or other)?

Now any operator that recycles for their own re-use is essentially "permit-by-rule".

Multi-Lease, Multi-Operator

- The “on-lease” vs. “off-lease” stipulation was scrapped. The new definition is “non-commercial fluid recycling.”
- We can now recycle from multiple leases and multiple operators as long as the facility is under the jurisdiction of an oilfield operator.

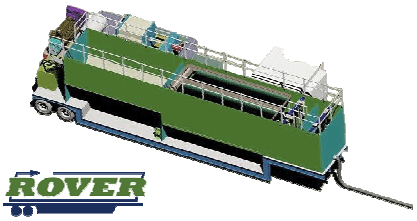
  For example, PW from a SWD can be recycled and sold to another producer as frac supply water.

The Big Question

Saltwater or Freshwater?

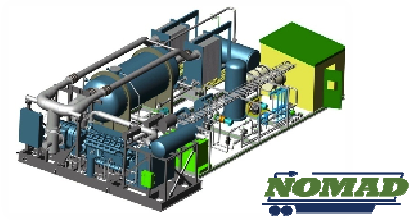
Saltwater

- Lower cost (minimal treatment).
- Difficult logistics (storage + transport)



Freshwater

- Higher cost (thermal distillation).
- Lower risk – store and transport freshwater.



Charting a Logical Path

Saltwater

- Lower cost (minimal treatment).
- Difficult logistics (storage + transport)

Freshwater

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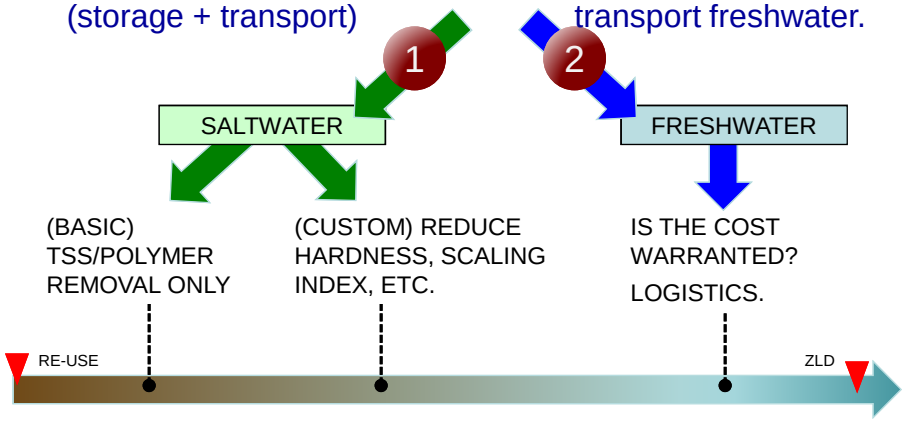


Devon NOMAD Installation – Freshwater

Mobility Key to Logistics

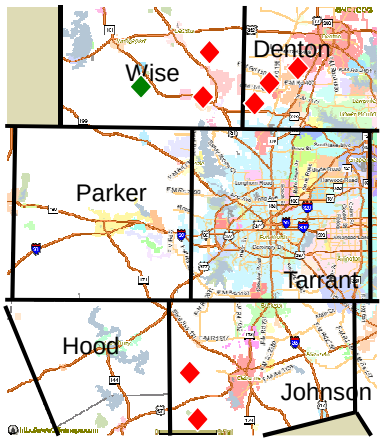
Devon's recent water recycling locations

Devon has two units operating at one strategic location:

- Lateral "C" (S Wise Co.)

Past locations:

- Johnson Ranch (E Wise Co.)
- Godley (W Johnson Co.)
- Circle R (W Johnson Co.)
- Dove Hill (SW Denton Co.)
- McCurdy (SW Denton Co.)
- Spain (SE Wise Co.)
- Casto (SW Denton Co.)

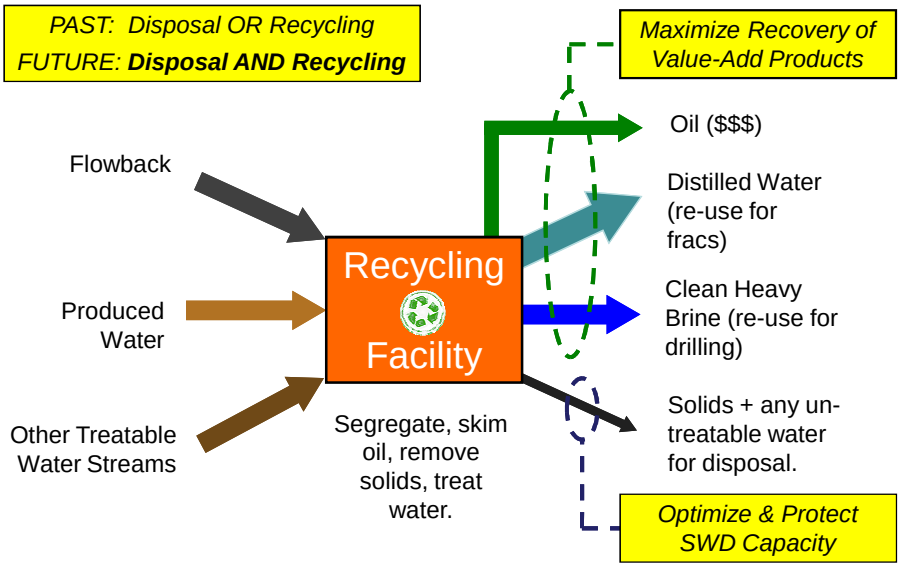


14 Sites total (since 2004)

NYSE: DVN www.devonenergy.com

Recycling Center – Hub for Water

PAST: Disposal OR Recycling
*FUTURE: **Disposal AND Recycling***



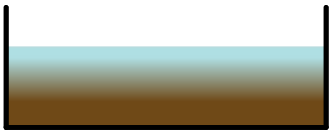
ROVER Permian Project – Clean Saltwater

- Customer using PW as source water.
- High H_2S (~200ppm)
- FQWM and Select put together a package deal for customer (containment, transfer and recycling).

Before / After ROVER Treatment

ROVER Solids Control

1 Direct re-use or "floc-n-drop" into containment.



- Solids build up & reduce effective volume of containment.
- Bacteria blooms.
- Lower cost initially.
- Expensive clean-up.

2 Remove solids prior to containment.

- Keep solids out of recycled water containment. 100% volume available for HF supply.
- Clean brine can be stored longer.
- Dry solids can be buried on location.

ROVER Permian Project – Clean Saltwater

- Keep solids out of recycled water containment
- Prevents bacteria blooms & messy cleanup
- PW is now a resource

New Trends

① Pit covers (prevent evaporation).

② Combine Recycling & Disposal (not Recycling *OR* Disposal).

③ More use of brackish water and saltwater – be careful about hydrogeology.

④ Have a common sense discussion with parties involved:

- *Landowners are often writing leases stating that E+Ps must buy groundwater from them.*

⑤ Incentivize, not mandate recycling (i.e.: TWRA). www.txwra.org