

PIONEER

NATURAL RESOURCES

Pioneer Water Management and Initiatives

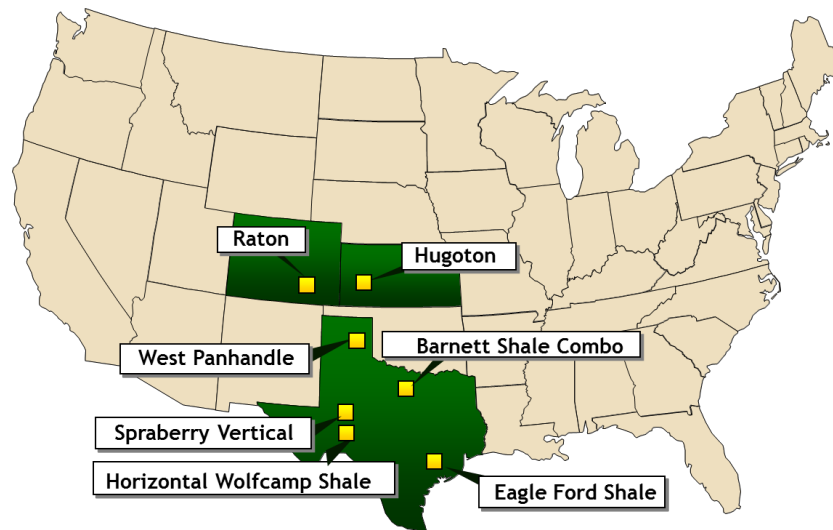
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February 13, 2013



Large Independent E & P

Enterprise value	~\$15 Billion
Proved reserves	1.1 Billion BOE*
Employees	3,500+
Operated wells	10,000+
Headquarters	Dallas
Other Offices	Anchorage Denver Midland

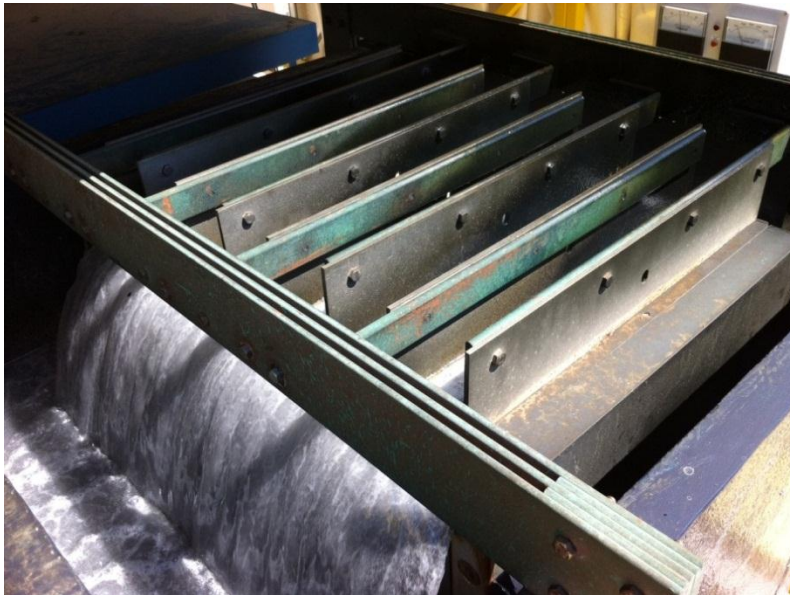
* as of 12-31-11



Objective: Use Less Fresh Water

Options Available

- Reduce water needed per well
- Use brackish water instead of fresh
- Recycle/reuse produced water
- Prevent evaporation



Benefits of Water Management

- Reduce fresh water use – a shared resource
- Potential long-term cost savings
- Reduce trucks on road
- Recycling reduces water disposal



Challenges to Water Management

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- **Economics: biggest challenge**
 - **Environmental**
 - **Produced water storage**
 - **Transport**
 - **Regulations**
 - **Variability**
 - **Water quality**
 - **Infrastructure**
 - **HF design**

- Water management studies
- Study of acceptable water quality for HF by basin
- Industry groups focused on water management
- Improved water tracking and quality measurements



- **Reduced water use in selected areas: 13 to 40%**
- Expanded use of brackish & gray waste water
- 10 Water pilots testing new technologies
- Constructed first two H11 produced water pits
- Initiated water source well quality testing plan
- Initiated groundwater fluid level monitoring
- Install 2 pilot water pit covers to prevent evaporation
- **Planning 10,000 BWPD recycling project for 2013**

Front end



Back end

Pioneer's first H11 pit in Barnett



“Building a good gel is critical.”

Suspended Solids

- Remove suspended solids & some dissolved solids
- Mobile systems
- Does not remove salt from water
- Examples: EC, nano/ultra-filtration or clarifier

Reverse Osmosis

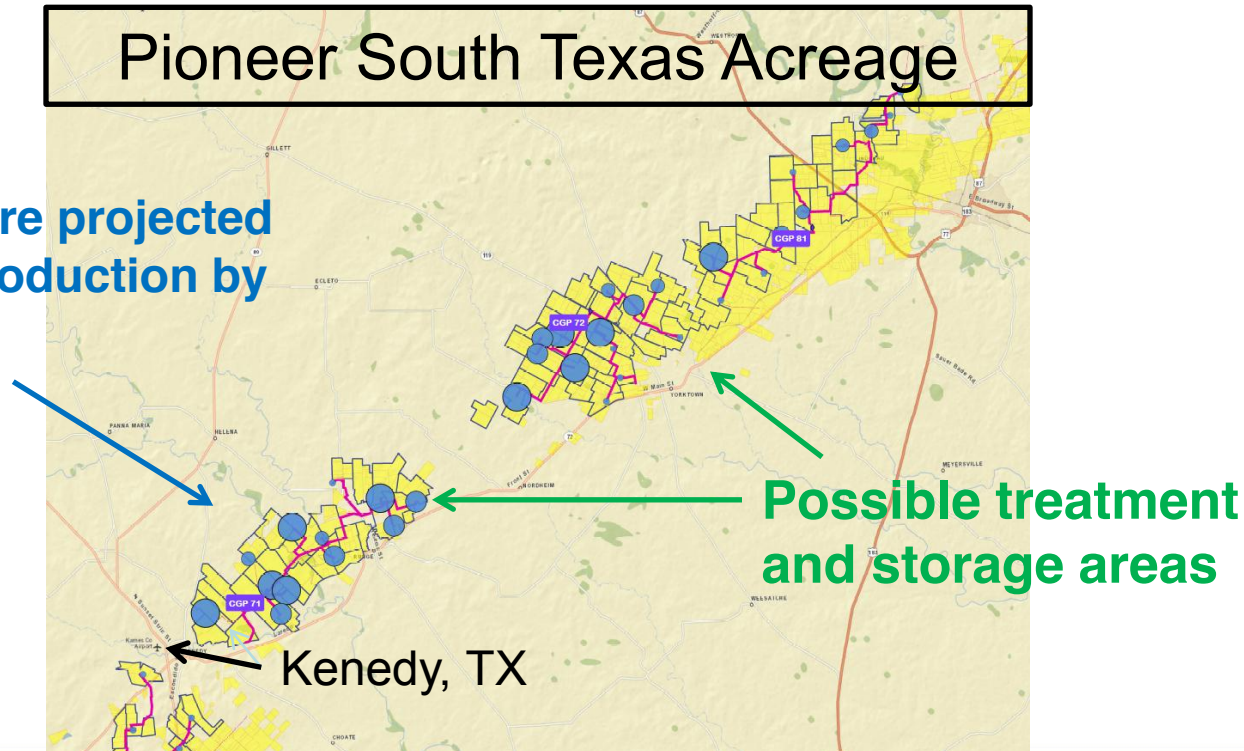
- Mobile treatment for salt removal
- More economic than evaporative system
- Limited by TDS Level of 50,000 ppm

Distillation - Mechanical Vapor Recompression

- Less mobile
- Highest cost
- Removes salt – lowers risks

- Accumulate water in central location – economics of scale
- Treat produced water - not interfere with HF design
- Store treated water until next new well drilled
- Transport produced water in leak-proof lines

Blue circles are projected
2013 water production by
tank battery



- O&G uses about 1% of the Texas water
- Latest study projects flat to declining water consumption
- O&G progress to reduce fresh water use is ongoing
 - Reducing water per well where possible
 - Brackish use is rising
 - Recycling efforts continue
 - Solutions to reduce water consumption vary
 - Service & producing companies continue researching solutions