Devon's Energy Water Conservation

2011 Oklahoma Governor's Water Conference
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Oct. 18, 2011 Norman, Oklahoma

devon

Devon Today

Proved reserves: ≈ 2.9 billion BOE
(12/31/10)

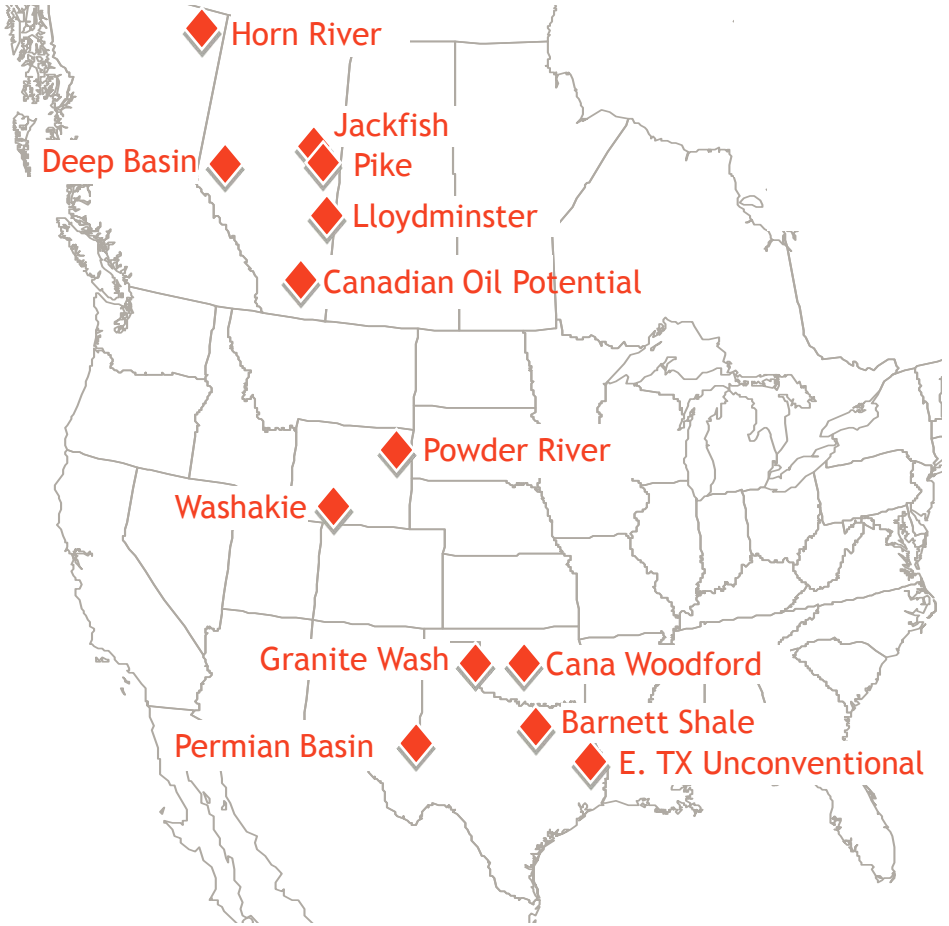
Current production: ≈ 660 MBOED
(Q2 2011)

Sales revenue mix: 59% liquids
41% gas
(Q2 2011)

Significant midstream business

2011 operating profit: ≈ $530 million projected

Enterprise value: ≈ $30 billion

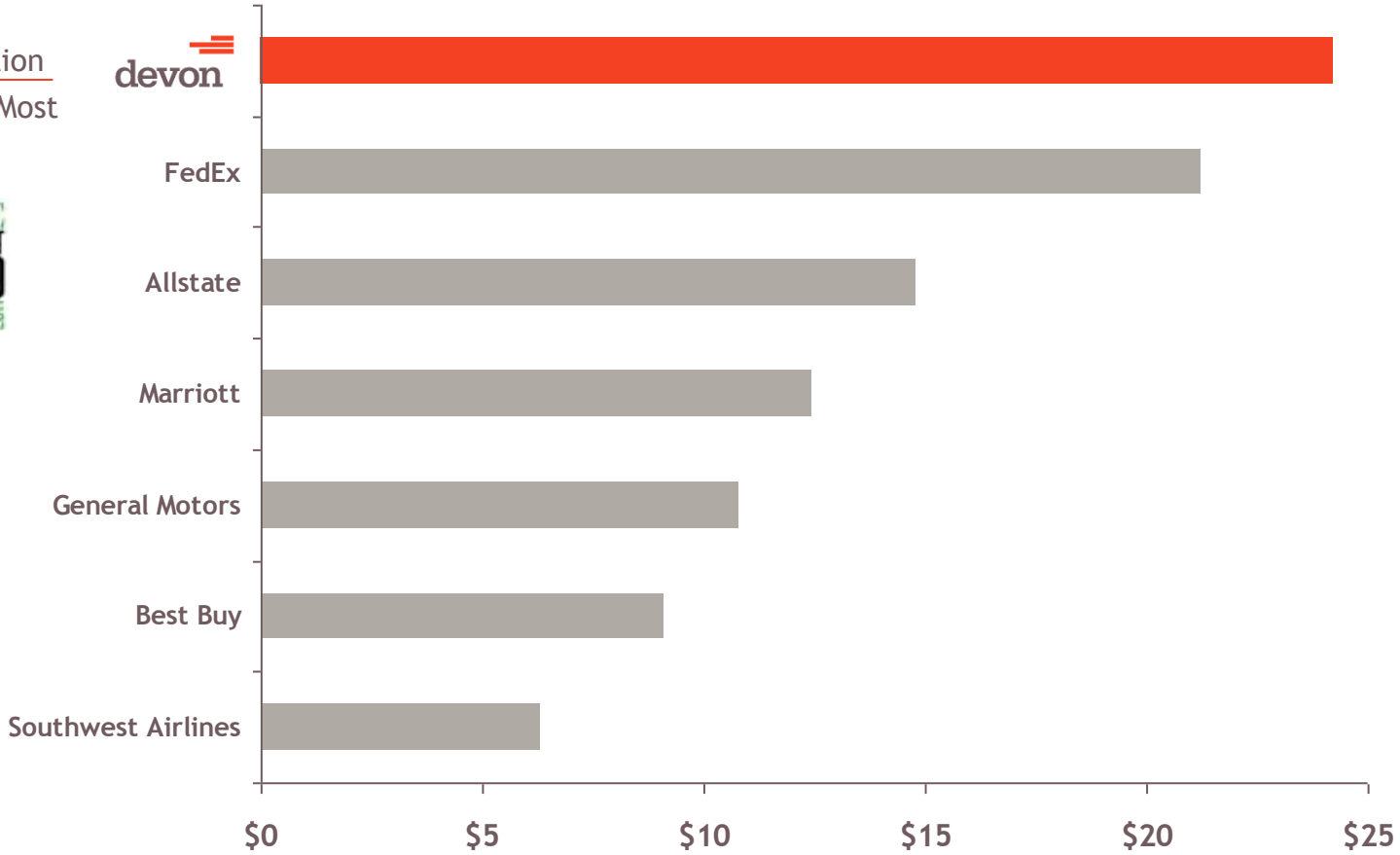


Larger than you might think…
Enterprise value

US $, billions

#1 Innovation
Fortune's Most Admired

FORTUNE WORLD'S MOST ADMIRED COMPANIES 2011

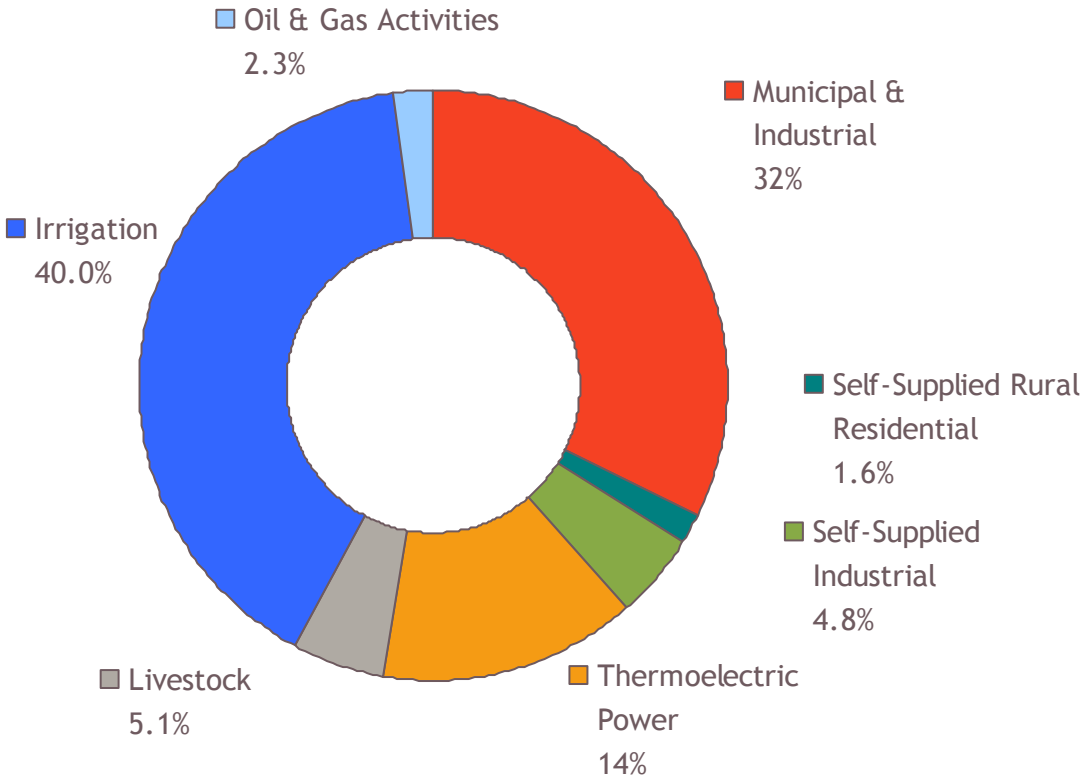


Source: Enterprise value as stated on Yahoo! Finance on Oct. 3, 2011.

Hydraulic Fracturing
3-7 day process

- Typical horizontal gas or oil well can require approximately 6 million gallons of water
  - This represents the equivalent amount of water used for nine Olympic size swimming pools
- Flowback: A portion of the injected water recovered in the first few weeks
- Produced water: Water that is naturally present in the formation; it is recovered over the life of the well

Projected Water Demand
State of Oklahoma - 2010

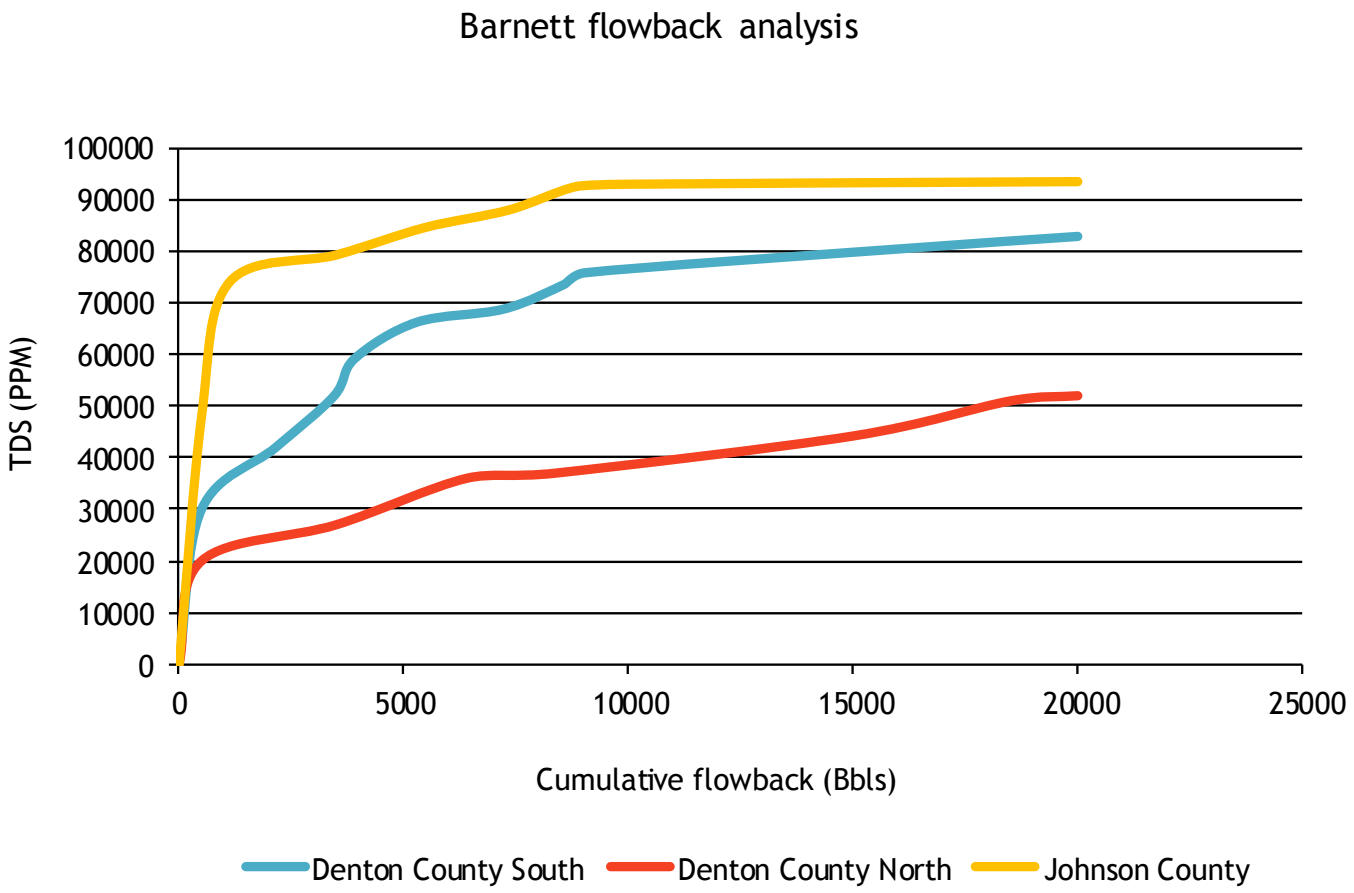


SOURCE: Oklahoma Water Resources Board

Characteristics of Flowback/Produced Water – Highly variable

Sample	Cana (OCC Presentation)	Cana (OCC Presentation)	Cana - Devon Devon sample	Marcellus (OCC Present	Marcellus (OCC Present	Barnett Shale - Devon sample	Barnett Shale - Devon sample	PB - St. COM 5 - Devon sample	Sea Water
Spec Gravity	1.036	1.026	1.0110	1.012	1.17	___	1.015	___	___
pH	7.51	7.92	6.98	6.61	6.05	6.68	7.0	8	___
Bicarb	717	1010	244	259	76	___	634	1594.4	94
Chloride	29400	19400	9000	6290	153000	74100	4000	111935.0	19730
Sulfate	0	34	103	67	0	___	620	1052.0	3100
Calcium	1058	630	444	476	20100	___	265	2200.0	451
Magnesium	265	199	268	49.6	1690	387.3	22	747.0	1330
Barium	94.8	49.4	5.0	6.24	657	173.9	5	6.5	___
Strontium	179	107	___	74.3	5049	1751	0	536.0	___
Total Iron	25.7	4.73	17.92	14	67.6	164.1	5	26.0	0
Aluminum	.21	0.17	___	.38	.1	___	___	___	___
Silica	___	33.8	___	___	___	___	___	___	___
Boron	27.1	28.2	___	8.82	80.4	___	___	___	4.5
Potassium	273	192	___	85.8	2273	___	___	945.0	___
Sodium	16450	10960	4895.0	3261	61400	___	2782	68874.9	11307
TDS	**49300**	**33300**	**15019**	**10800**	**252000**	**97900**	**8238**	**187872.4**	**36092**
TSS	246	57	___	30	32	___	___	___	___

Barnett Shale Flowback Analysis



Water Sustainability Principles

- Devon is committed to the principles of conservation and re-use of water where feasible through the following:
  - Educating and working closely with governmental authorities and members of the public concerning water usage needs and the necessity of water management
  - Identifying usage needs, determining resource availability and monitoring water use
  - Applying conservation practices and identifying opportunities to improve water use efficiency
  - Employing economically and operationally feasible alternatives to fresh water usage
  - Advocating for appropriate regulations on water use and re-use
  - Continuing to employ prudent operating practices to ensure the protection of surface and groundwater
  - Planning for operations to continue if water availability becomes constrained

Planning Considerations for Water Management

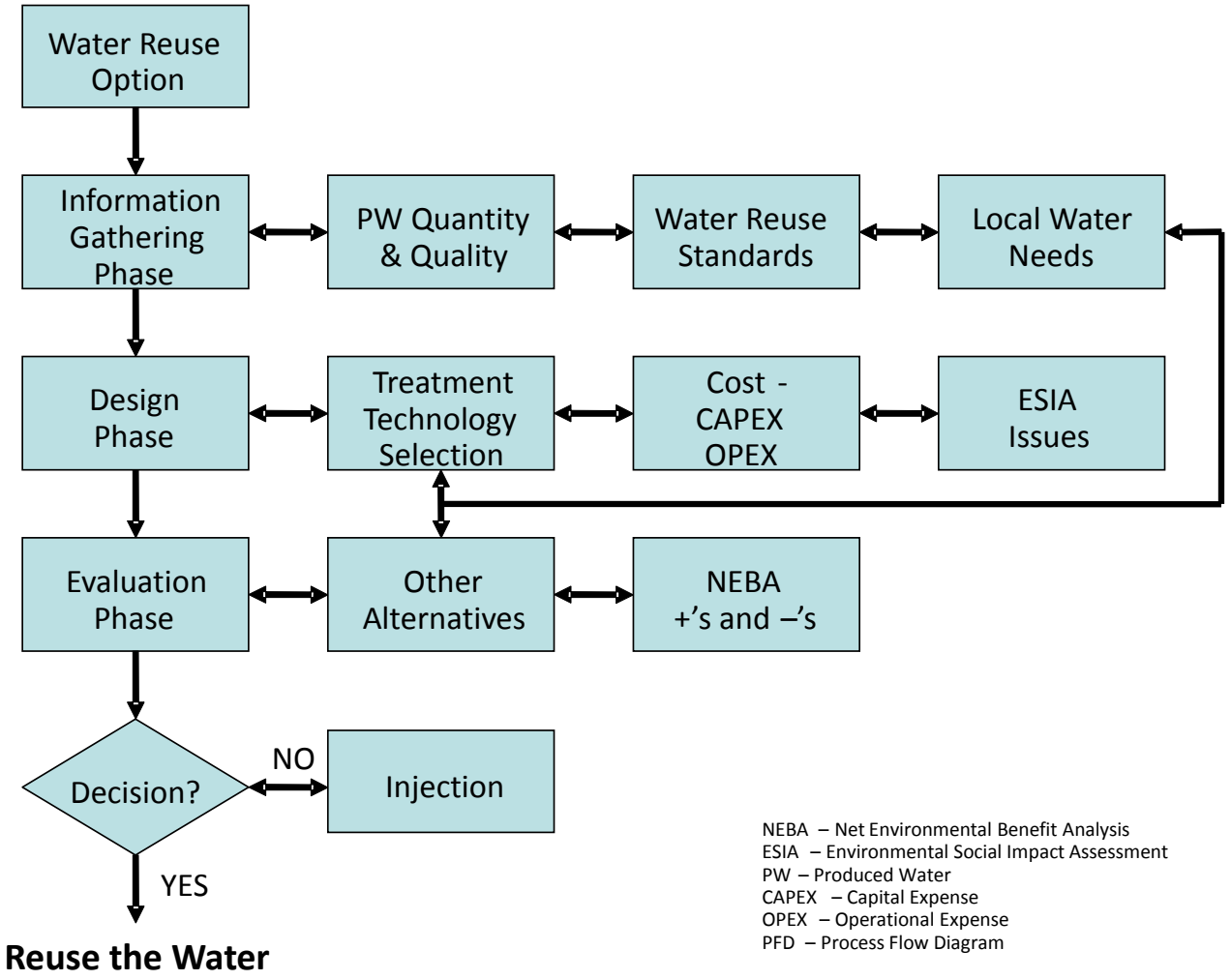
- Acquisition and quantity/quality of source water
- Compatibility of the water with the formation rock and frac fluid engineering design
- Logistics of transporting the water
- Produced water quantity/quality
- Storage requirements of the frac water
- Cost of the required level of treatment
- Reuse or dispose of water

Treatment Required for Recycling
Multiple levels

- Water recycling is reusing treated wastewater for beneficial purposes
- Recycling can satisfy the demand as long as it is adequately treated to ensure the correct water quality
  - Primary treatment to settle and coagulate off the solids may only be necessary
  - Advanced treatment may be needed to eliminate chlorides and other undesirable constituents
    - Distillation is an advanced form and is very energy intensive
  - Some amount of “make-up” water will be needed

Produced Water Reuse Evaluation Process Flow Diagram

Jim Myers, Chevron presentation to 11/19/10 SPE luncheon



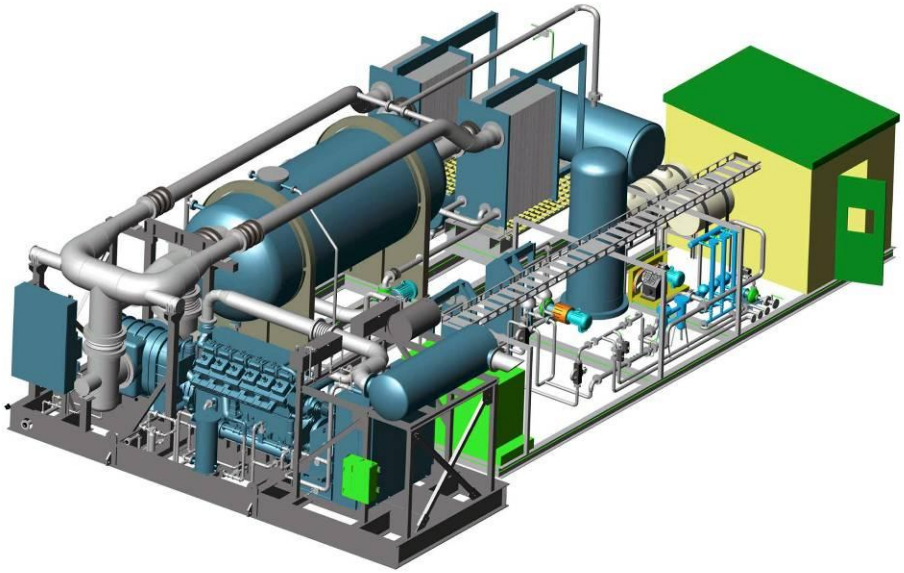
NEBA – Net Environmental Benefit Analysis
ESIA – Environmental Social Impact Assessment
PW – Produced Water
CAPEX – Capital Expense
OPEX – Operational Expense
PFD – Process Flow Diagram

Regulatory Hurdles
Considerations for recycling

- This opportunity relies on the approval of permits for centralized commercial recycling impoundments
  - Enhanced construction and design requirements
    - Impoundments are larger than those historically permitted
    - Remain in place thereby exceeding “temporary” thresholds
    - Equipped with redundant leak detection systems
    - Public Comments
- However, some states are equipped with a risk-based permitting structure to encourage recycling - Oklahoma Corporation Commission (OAC 165:10-7)

Mobile Heated Distillation System
Devon and Fountain Quail Water Management

- Approved by the Railroad Commission of Texas in 2005
- Implemented in 2005
- Vaporizes frack flow-back water and condenses it into clean, distilled water
- Remaining concentrated water removed for disposal or utilized for controlling pressures in another well completion as a “kill fluid”



Water Recycling Results
Fountain Quail

- 22,500 bbls/day at peak
- 13.9 million barrels processed (584million gallons)
- 10.8 million barrels of distilled water generated (454 million gallons)
- 100+ wells fracked with recycled water

Opportunities for Water Recycling
Cana Woodford Shale

- Exceptional flowback and produced water quality in the Cana Woodford Shale
  - Very low total dissolved solids (TDS)
  - Flowback water quality is approximately 12,000 TDS
  - Produced water quality is approximately 20,000 TDS
  - Potential exists to reuse these fluids, thus reducing the demand for fresh water

- Current quantities available for reuse:
  - 26,000 barrels per day of produced fluid from 196 wells

Cana-Woodford Water Recycling Facility

- Water will be moved into concrete-lined settling basin
- Solids will settle to the bottom of the basin before the water is separated for removal of remaining oil/natural gas liquids
- The water will go into a 500,000-barrel pond for storage before being sent by pipeline to be reused
- A disposal well is being drilled next to the recycling facility to handle excess water

Ongoing R&D Promoting Additional Reuse Opportunities

- Devon working with industry peers to partner with the Shale Gas Water Research Center
- Center will perform testing, chemistry research and analysis, and complete water management in shale and unconventional oil/gas production
- Center will perform rigorous testing with respect to a variety of water related issues to establish the best protocols for treatment, reuse, and recovery

Thank You.