

guernsey

ENGINEERS
ARCHITECTS
CONSULTANTS

REALIZE THE DIFFERENCE

PRESENTATION

Water Supply and Uses The Reality in 2012



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Kevin Alexander, PE, Separation Processes Inc.



Governor's Water Conference
Southern Hills Marriott Hotel
Tulsa, OK

November 13, 2012

AGENDA



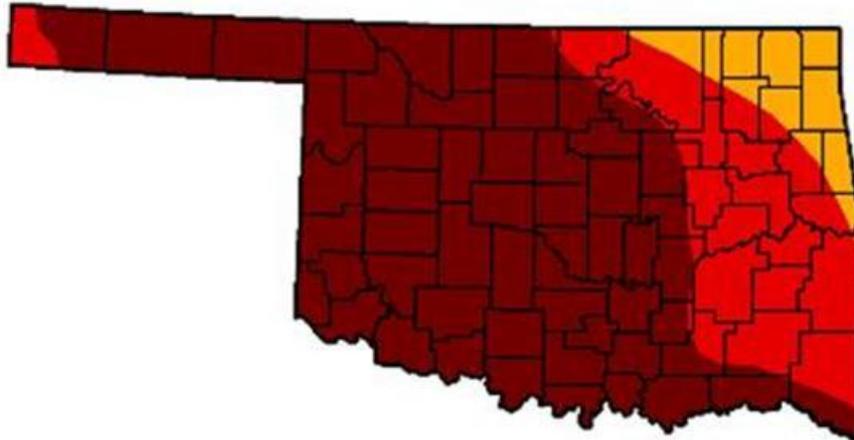
- Oklahoma Water History
- Conventional Water Supplies
- Non-conventional Water Supplies



OKLAHOMA WATER HISTORY



Drought...



D2-D4	D3-D4	D4
100.00	92.59	68.93



U.S. Drought Monitor

Oklahoma

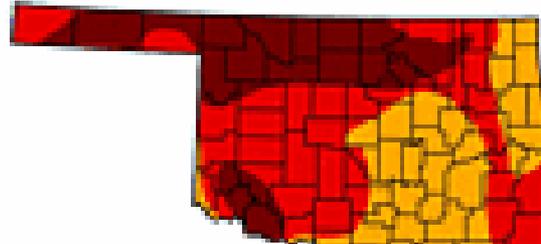
October 30, 2012

Valid 7 a.m. EDT



Drought Conditions (Percent Area)

	None	Light	Mod	Severe	Ext	
Current	0.00	100.00	100.00	99.43	97.84	97.13
Last Week (reclassified)	0.00	100.00	100.00	99.43	99.79	97.13
3 Months Ago (reclassified)	0.00	100.00	100.00	98.99	71.80	0.00
Year of Onset (reclassified)	94.83	85.17	78.79	92.98	27.48	0.00
Year of End (reclassified)	0.00	100.00	100.00	99.98	99.23	92.29
One Year Ago (reclassified)	0.00	100.00	100.00	99.98	99.23	92.29

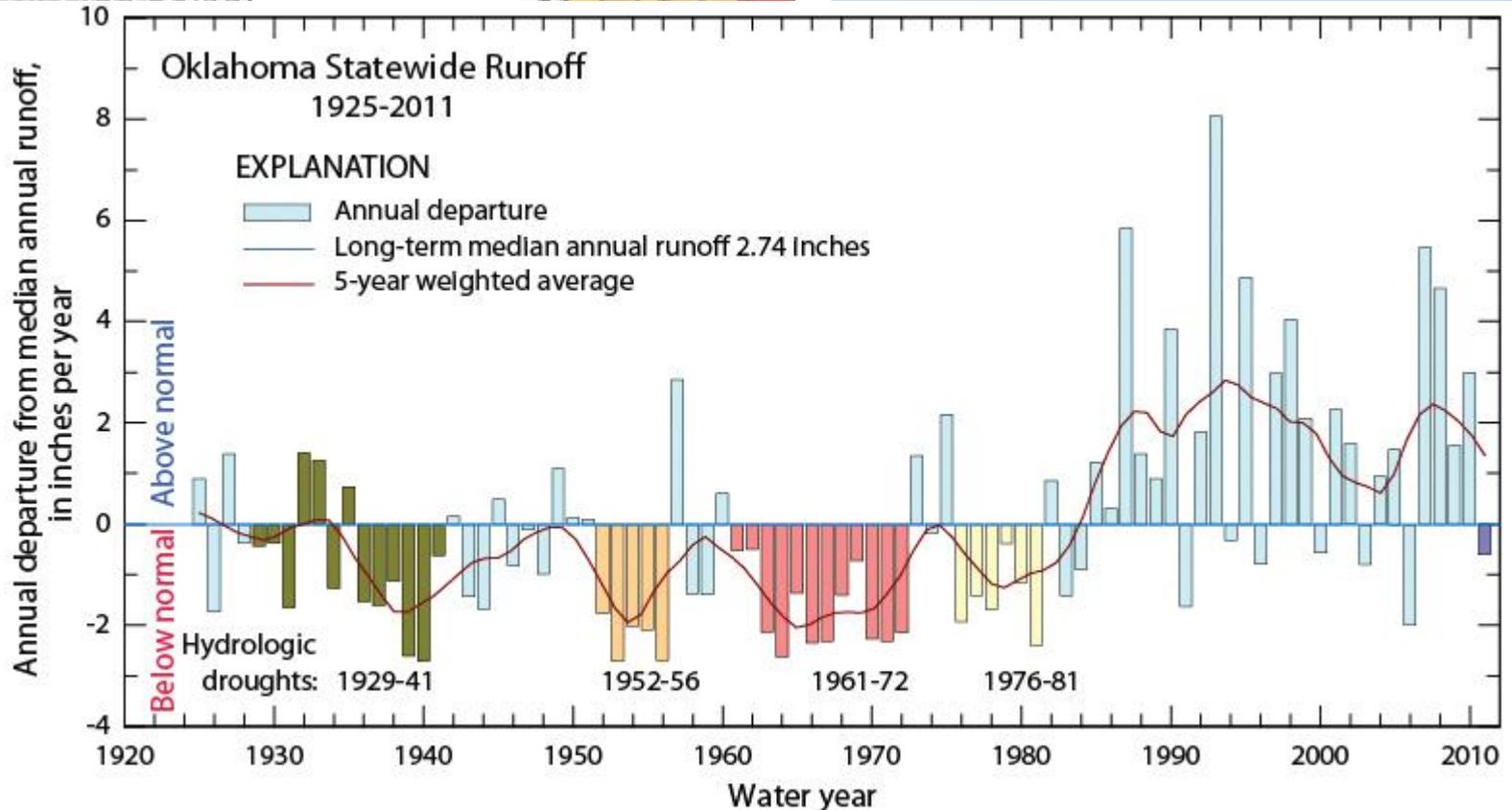


Legend

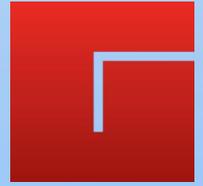
- 0-2 Drought - Light
- 3-5 Drought - Mod
- 6-9 Drought - Severe

The Drought Monitor does local conditions may vary for forecast statements.

<http://droughtmon>



OKLAHOMA WATER PLANNING 1980 TO PRESENT



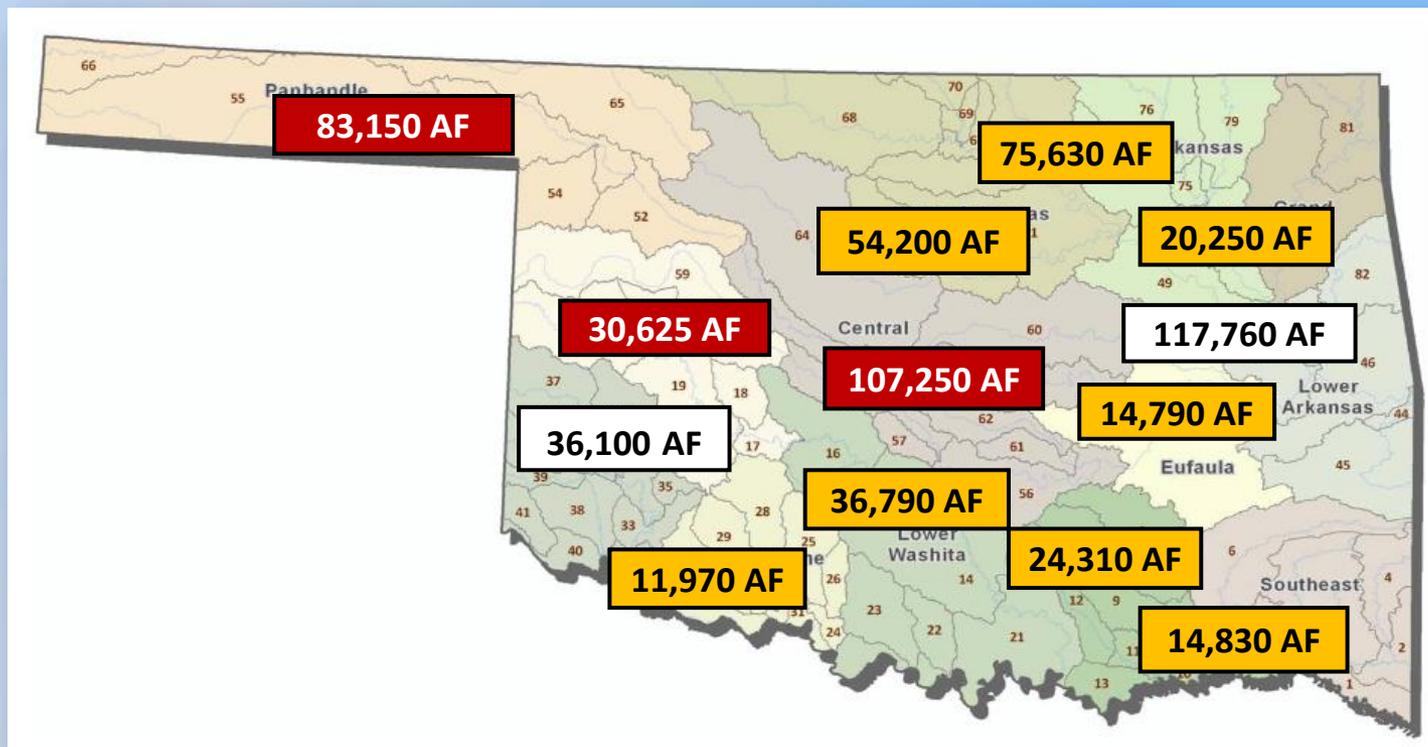
- Officially identified/adopted water conveyance from east to west
- Conveyance concept updated in 2011 as a part of the Oklahoma Comprehensive Water Plan (OCWP)
- Updated surface water supply opportunities throughout the state by identifying the most available potential reservoir sites in the state



OKLAHOMA COMPREHENSIVE WATER PLAN (OCWP)



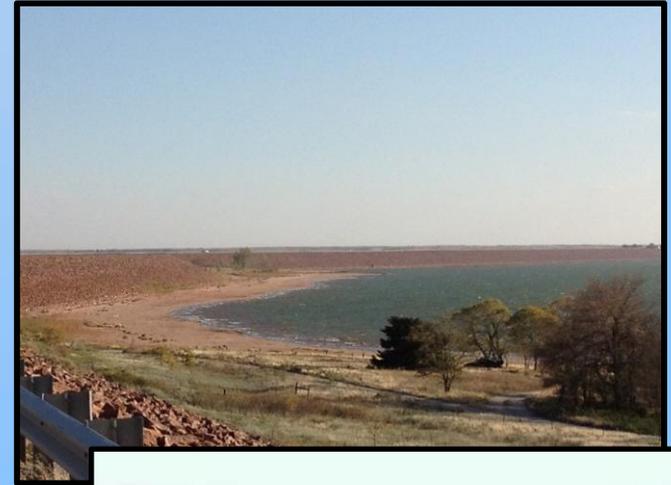
- Adopted in 2012
- Identified regional demands
- Conservation
- What is occurring across the State today?



CONVENTIONAL WATER SUPPLIES



- Using traditional supplies and methods
- Groundwater/expand wellfields
 - Enid
 - Ponca City
- Increase supply from reservoirs
 - Intake & Pipeline
 - Ft. Cobb Reservoir
 - Foss Reservoir
 - Re-allocation
- Combination of groundwater and surface water
 - Sunflower H2O Initiative (OK & KS)

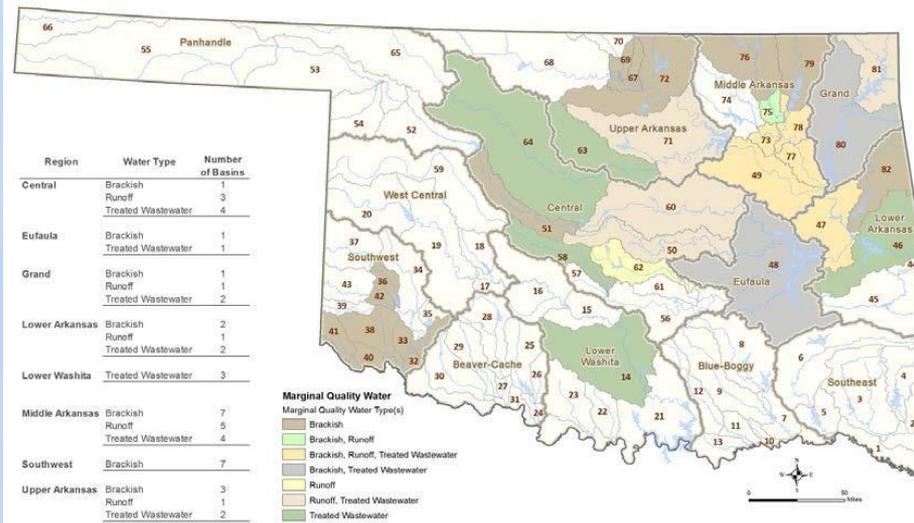


NON-CONVENTIONAL WATER SUPPLIES



- Marginal water (1,000 to 10,000 TDS) vs. brackish water (>10,000 TDS)
 - Red River (100 to 13,600 mg/L)
 - Canadian River (126 to 3,410 mg/L)
 - Washita River (219 to 3,480 mg/L)

OCWP Basins with Potential Uses for Marginal Quality Waters



Oklahoma Surface Water Resources
Streams of Oklahoma



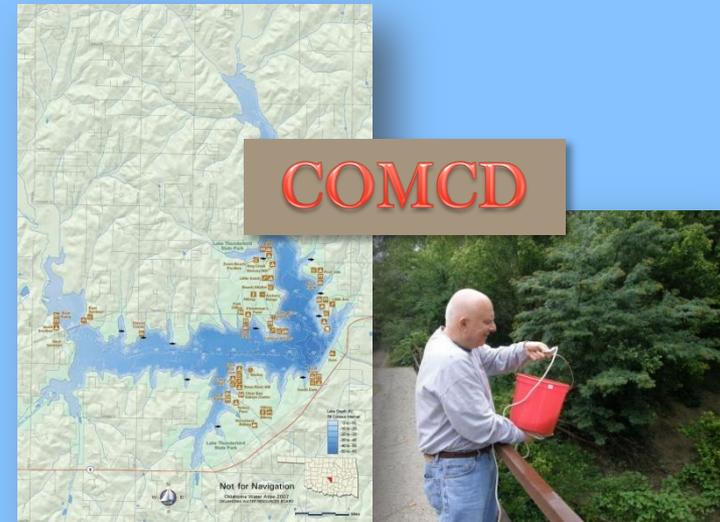
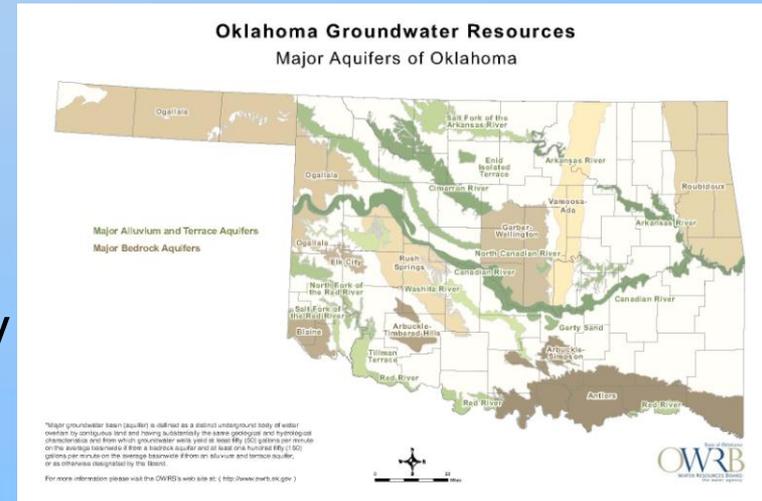
This map shows the streams of Oklahoma digitized at a scale of 1:100,000. For more information please visit the OWRB's web site at: <http://www.owrb.ok.gov/> 10/10/2011



NON-CONVENTIONAL WATER SUPPLIES

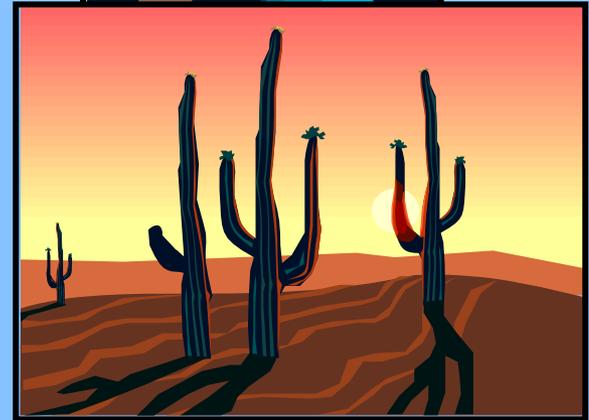


- Surface water
 - Foss Reservoir
- Groundwater
 - Central Oklahoma Water Resources Authority (COWRA) Canadian County Communities
- Reuse
 - Guymon
 - Central Oklahoma Master Conservancy District (COMCD) (Lake Thunderbird/Norman, Midwest City, Del City)
 - Oklahoma City & Lawton Power Plants



CURRENT WATER ISSUES AND INDUSTRIAL PERSPECTIVE

- Conservation-No WQ Improvement
- Groundwater Overdraft - Brackish
- Surface Water Fully Allocated
 - TOC/Hardness/Salt Importing
- Alternative Water Supplies
 - Water Reclamation
 - Brackish Desalination
 - Urban Runoff
 - Seawater Desalination
- **SUSTAINABLE WATER**



CONSIDERATIONS FOR **SUSTAINABLE** WATER

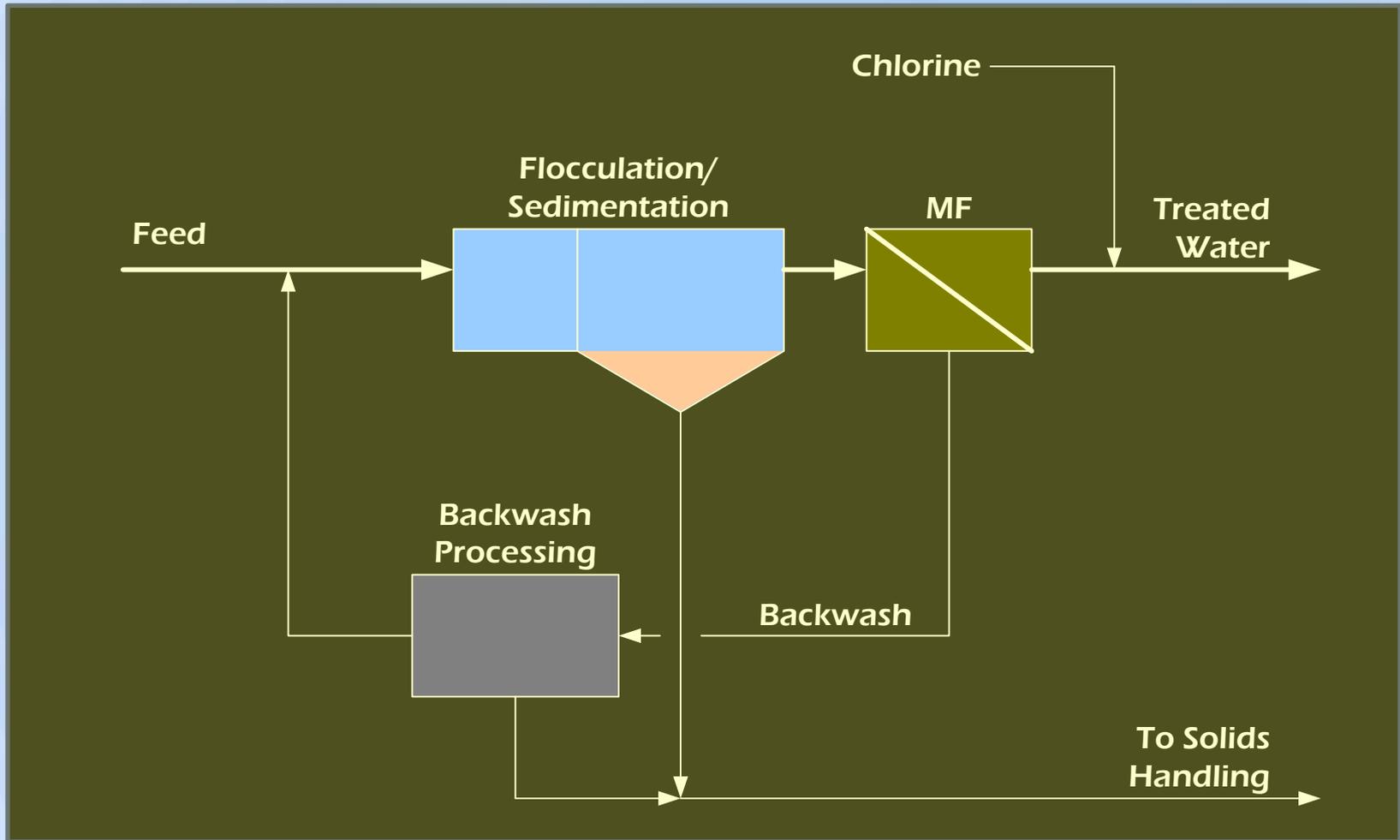
Simple Costs	Environmental/ Social	Sustainable
Surface Water	Conservation	Conservation
Traditional Recycle	Groundwater	Traditional Recycled
Conservation	Traditional Recycle	Groundwater
Groundwater	Surface Water	Urban Runoff
Advanced Reuse	Advanced Reuse	Advanced Reuse
Seawater Offsets	Urban Runoff	Seawater Offsets
Urban Runoff	Seawater Offsets	Surface Water

MEMBRANE SOLUTION

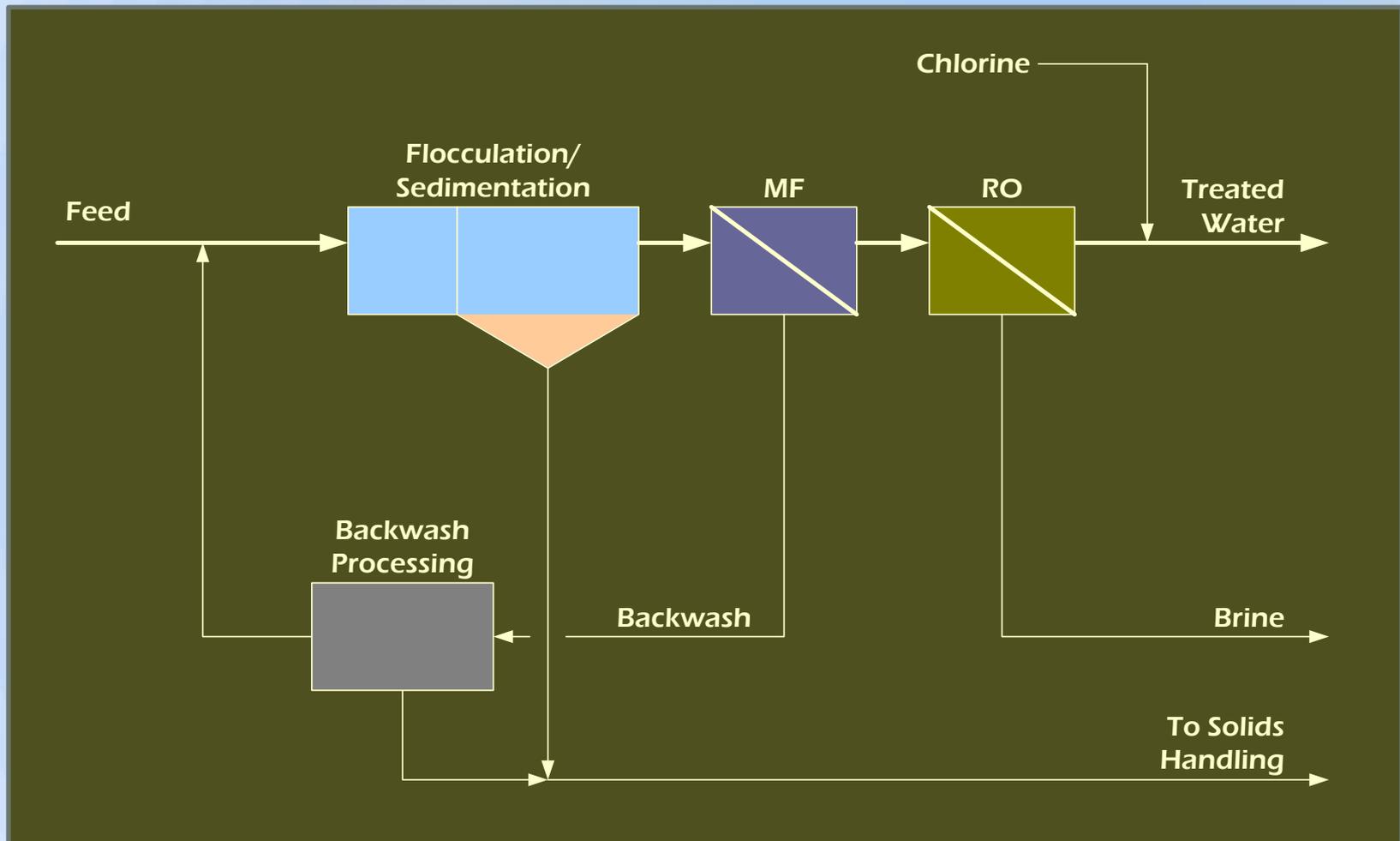
- Allow Production of Engineered Water Quality
- Change Conventional Wisdom
 - “Recycle/Reuse” versus “Disposal”
 - Philosophy is to “Produce Water” versus “Treat Wastewater”
- Contaminant Removal to Levels that allow Use of Water



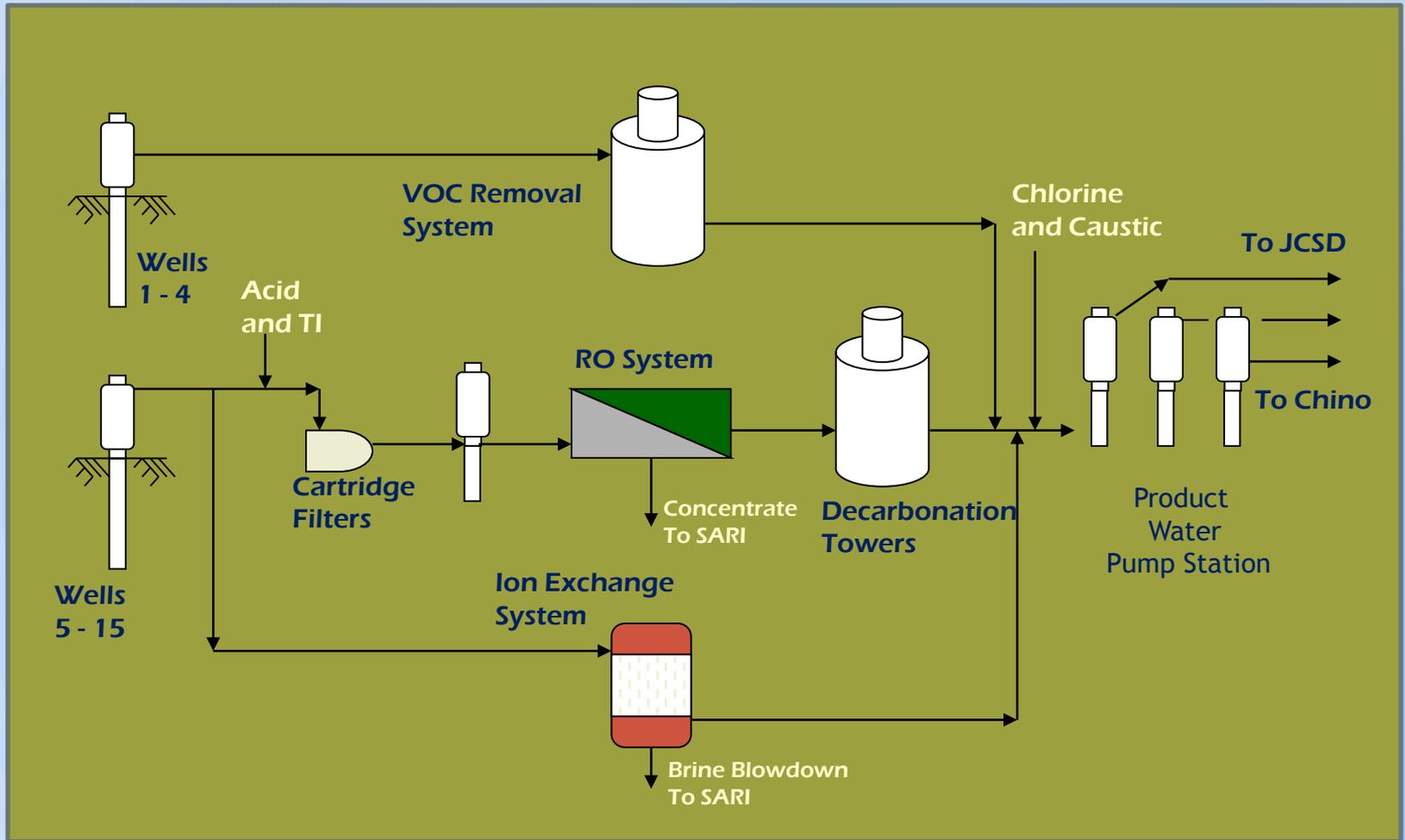
SURFACE WATER FILTRATION



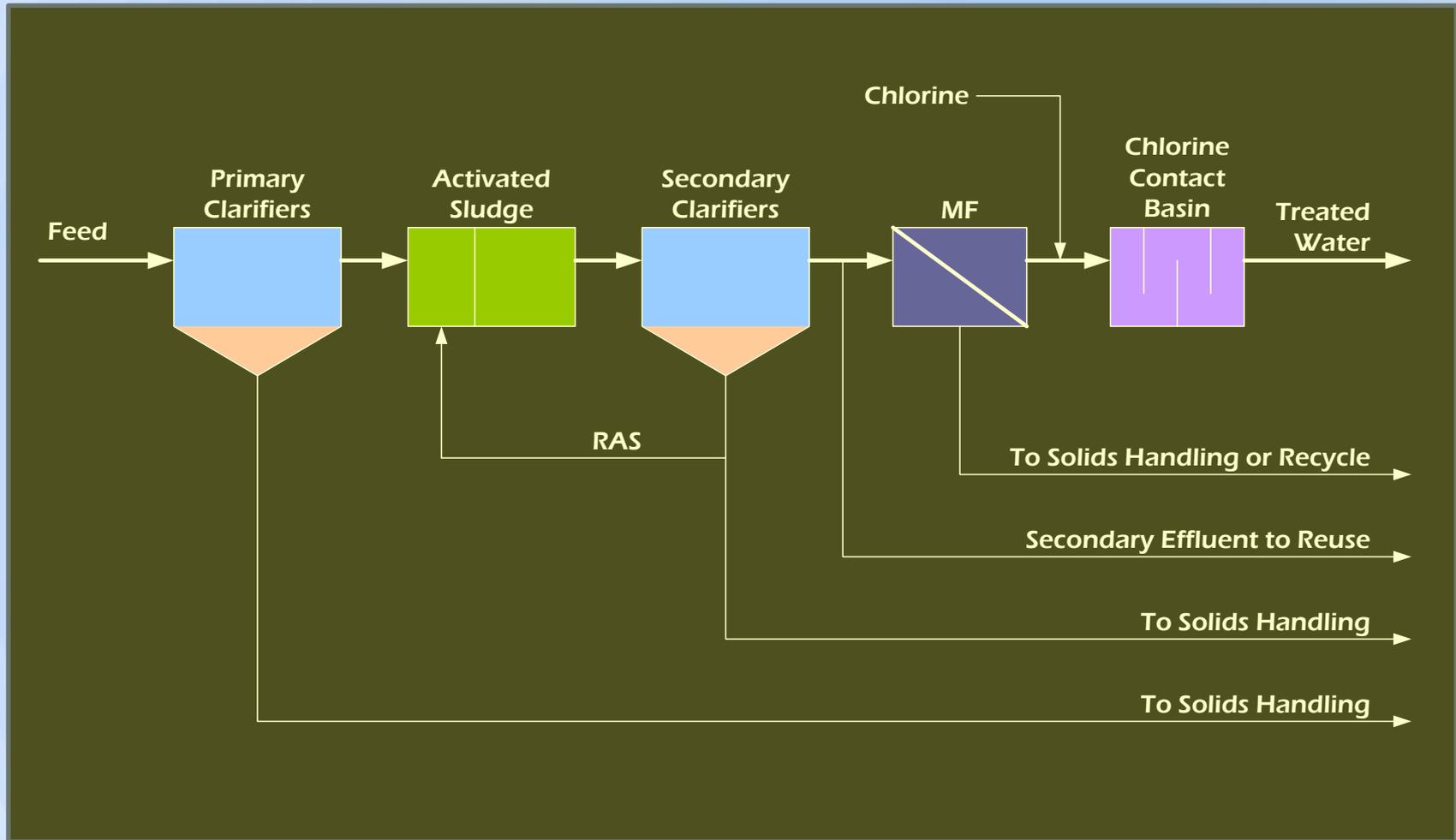
SURFACE WATER FILTRATION WITH TDS CONTROL



EXAMPLE GROUNDWATER TREATMENT SYSTEM



WATER RECLAMATION PROCESS



AQUIFER RECHARGE

