

# ARKANSAS OIL & GAS COMMISSION

## Fayetteville Shale Overview

For  
North Carolina Delegation

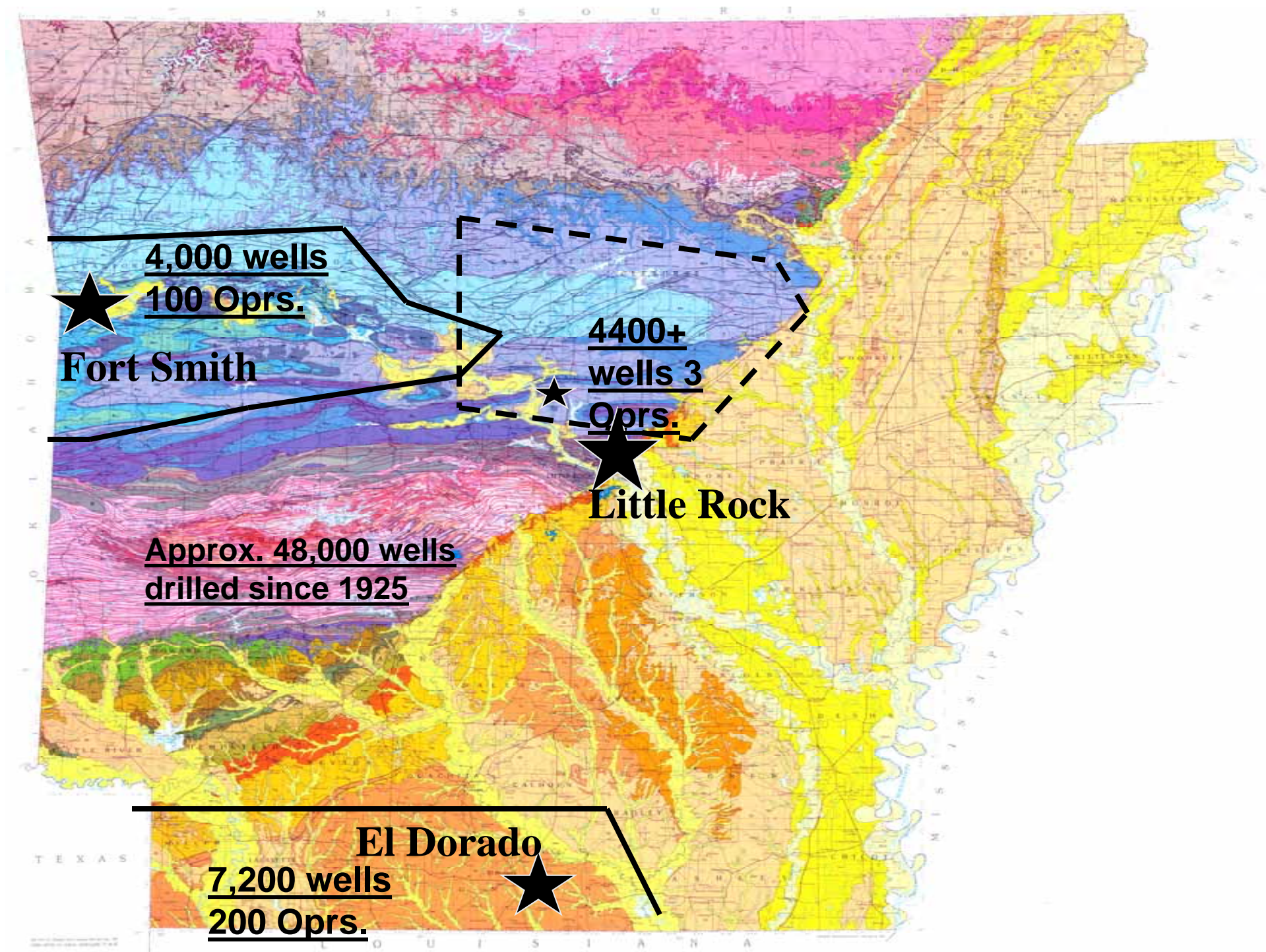
# Arkansas Agencies Regulating Water Sources, Storage and Disposal

- **ANRC: Arkansas Natural Resources Commission**
- **AOGC: Arkansas Oil and Gas Commission**
- **ADEQ: Arkansas Depart of Environmental Quality**
- **USACE: US Army Corps of Engineers**

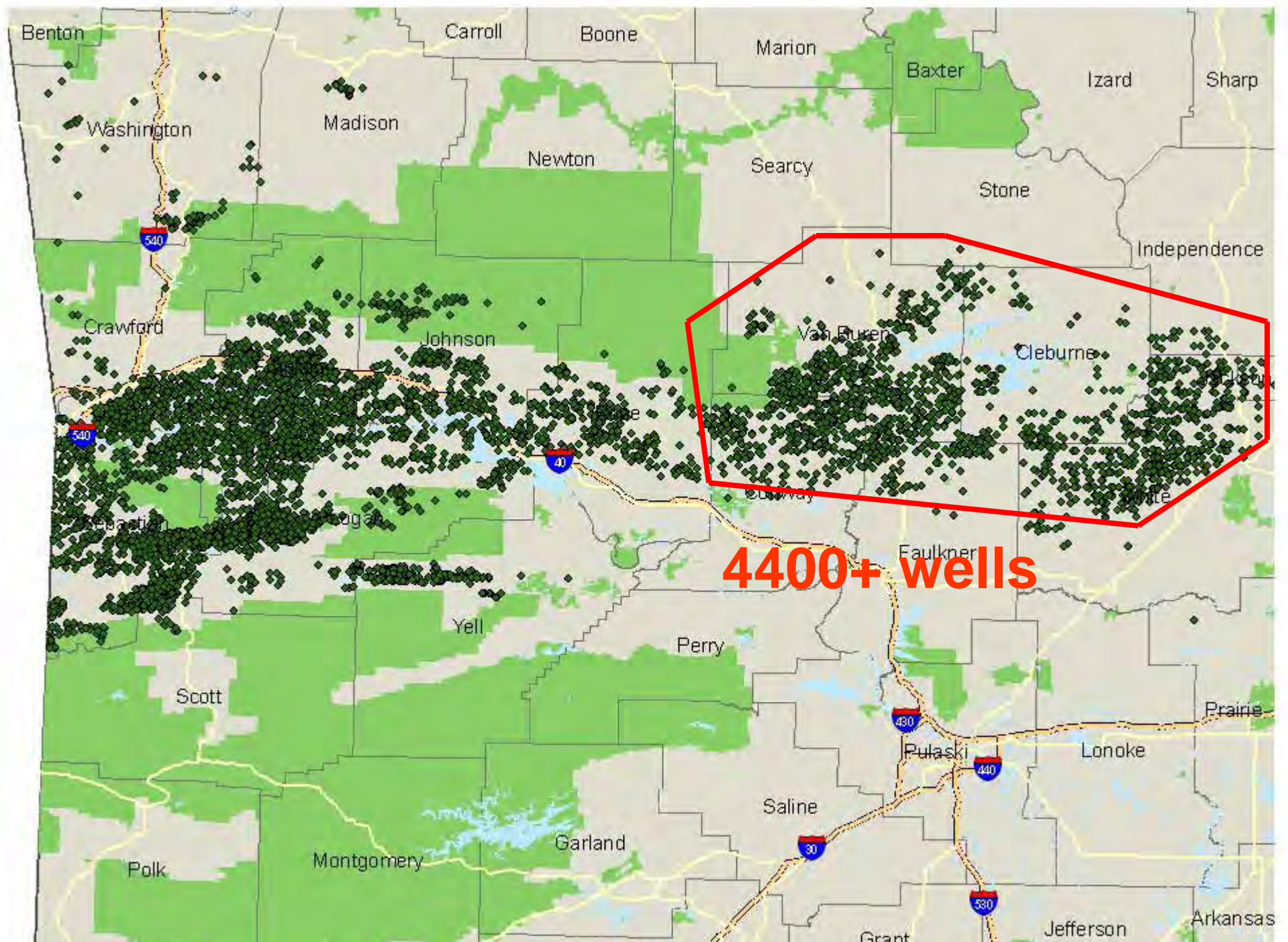
# Commission Structure

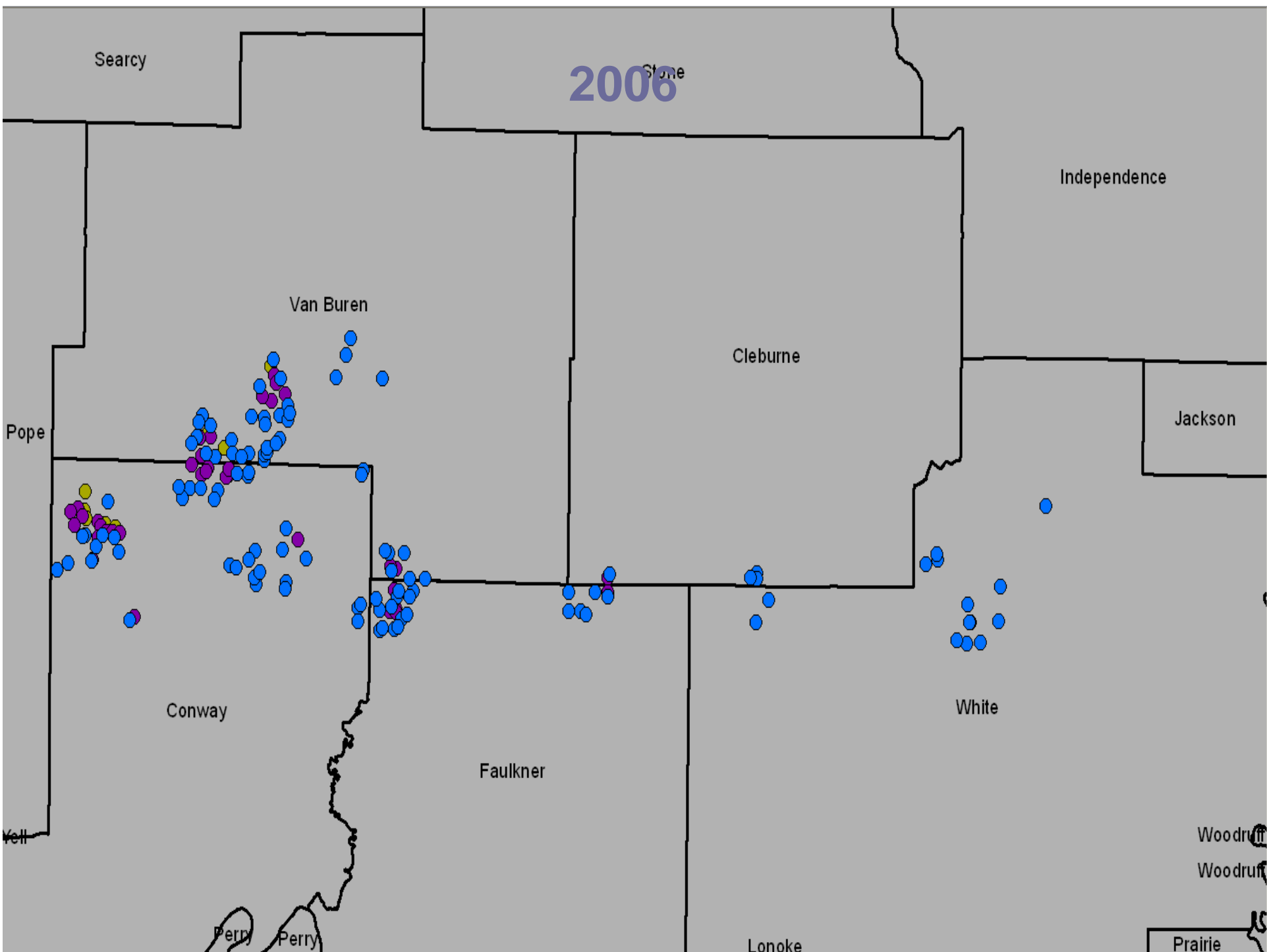
- **9 Commissioners:**
  - Governor appointed, 6 year terms, no term limitations, member terms staggered. Promulgates regulations.
- **Director:**
  - Hired by Commissioners with approval of the Governor, serves at the pleasure of the Governor. Serves as Commission Secretary, non-voting member. Administers regulatory program.
- **Staff:**
  - Hired by Director, currently authorized 40 full-time employees & 10 “extra help” positions. Implements regulatory program.

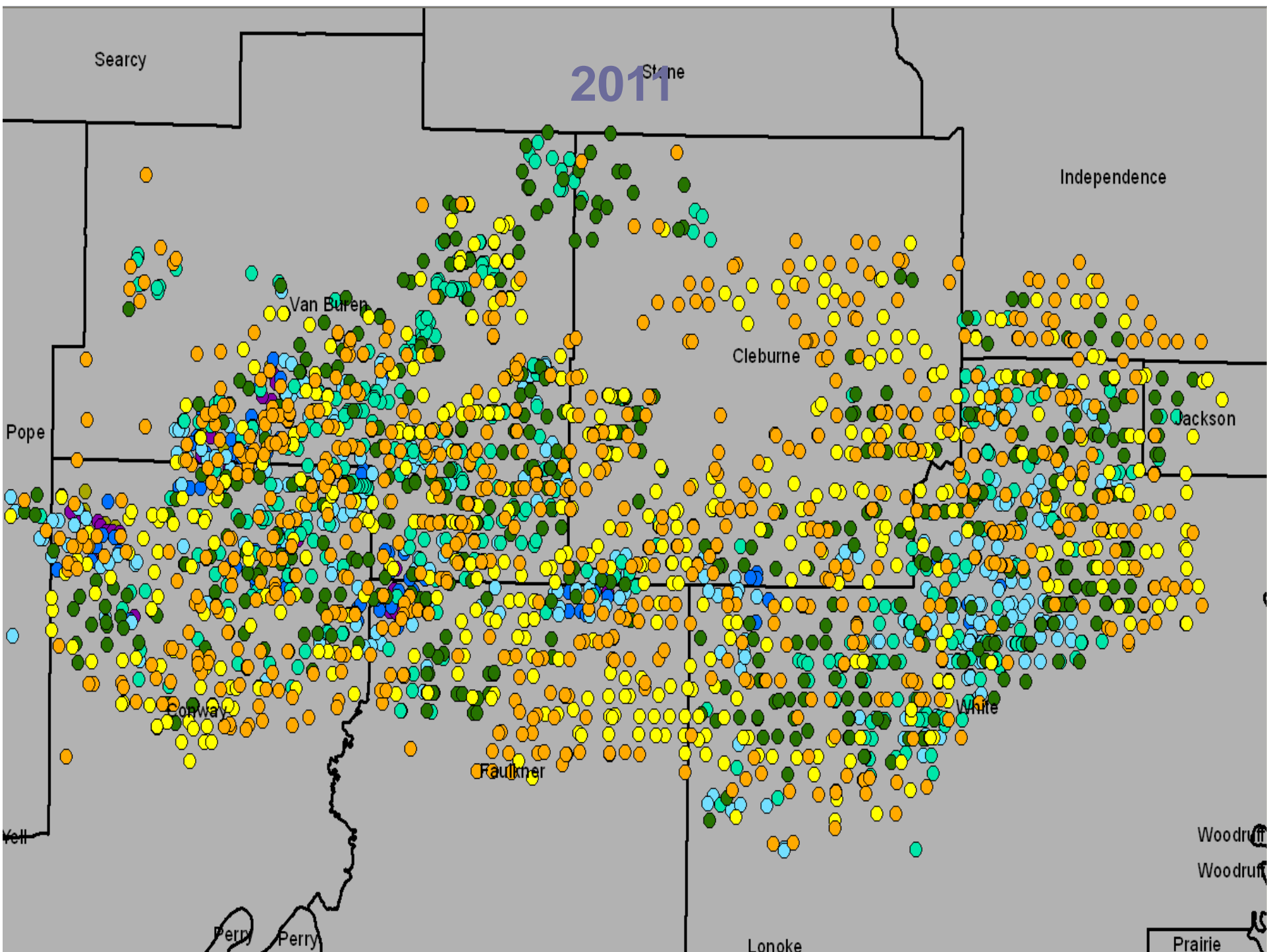






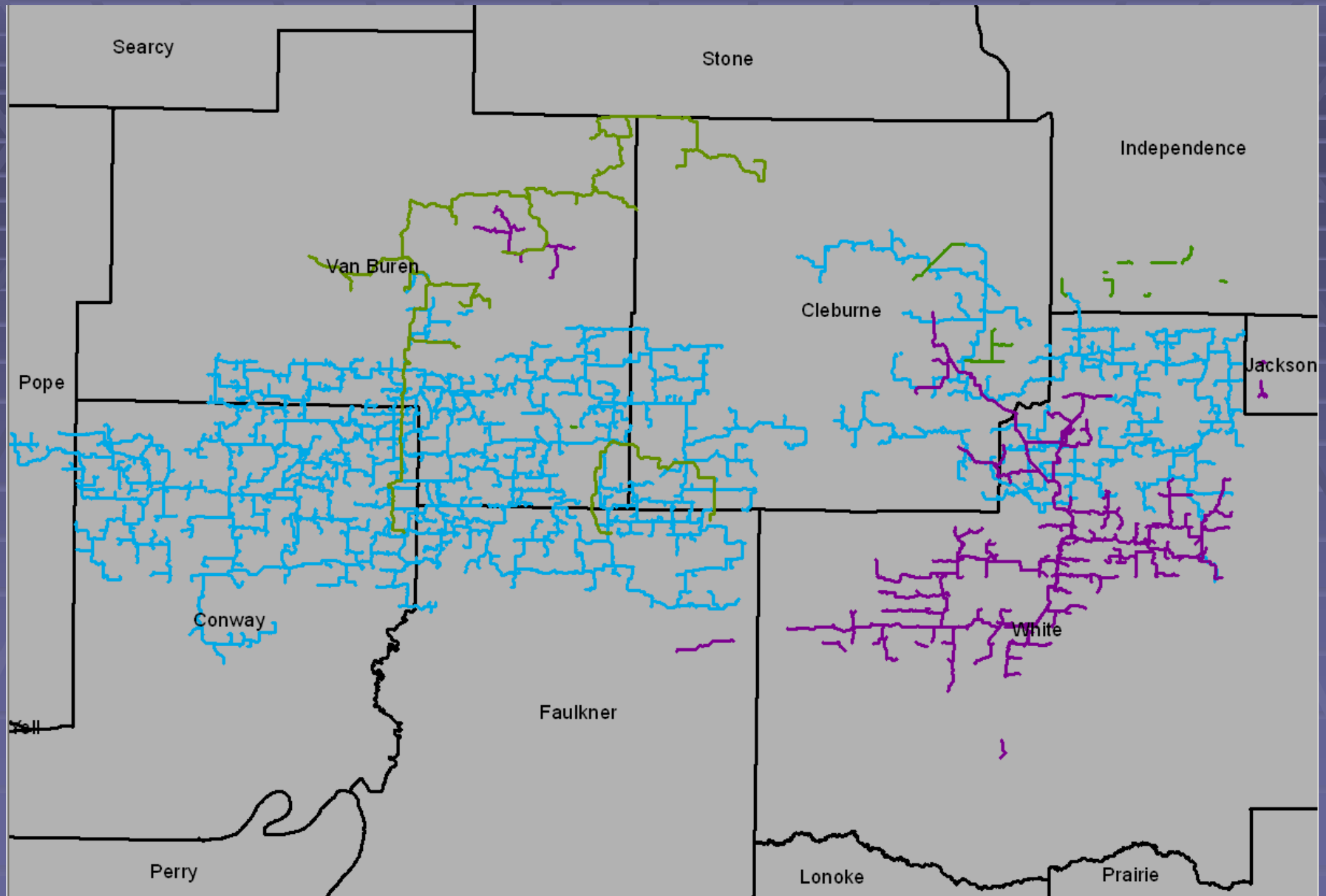








# 2800 Miles Of Gathering Pipeline





# Natural Gas Production Information

- **Production Information:**

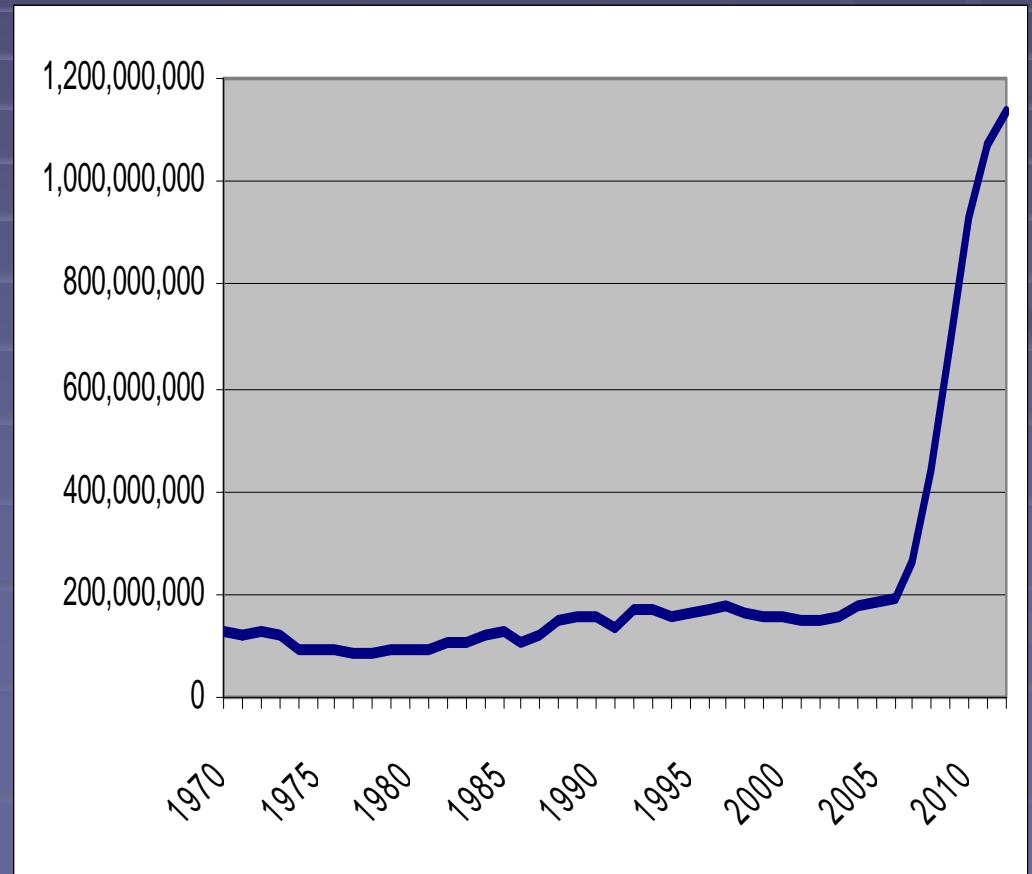
- 2006 – less 200 bcf. 2011 - over 1 tcf. Approximately 88% from the Fayetteville Shale, 12% from the Arkoma Basin.
- AR - consume less than 250 bcf per year.

- **# of Producing Gas wells in AR:**

- 2012 8538

- **# of Producing Wells in FS:**

- 2006 165
- 2007 574
- 2008 1290
- 2009 2138
- 2010 3033
- 2011 3835
- 2012 4406



# Development Issues

- Public Concern
- Significant Economic Benefits
- Water Use
- Water Contamination
- Waste Disposal
- Noise, Dust, Truck Traffic
- Seismicity
- Chemical Disclosure
- Spills



Can Be Addressed  
With Regulatory  
Requirements

# Commission Response

(since 2006)

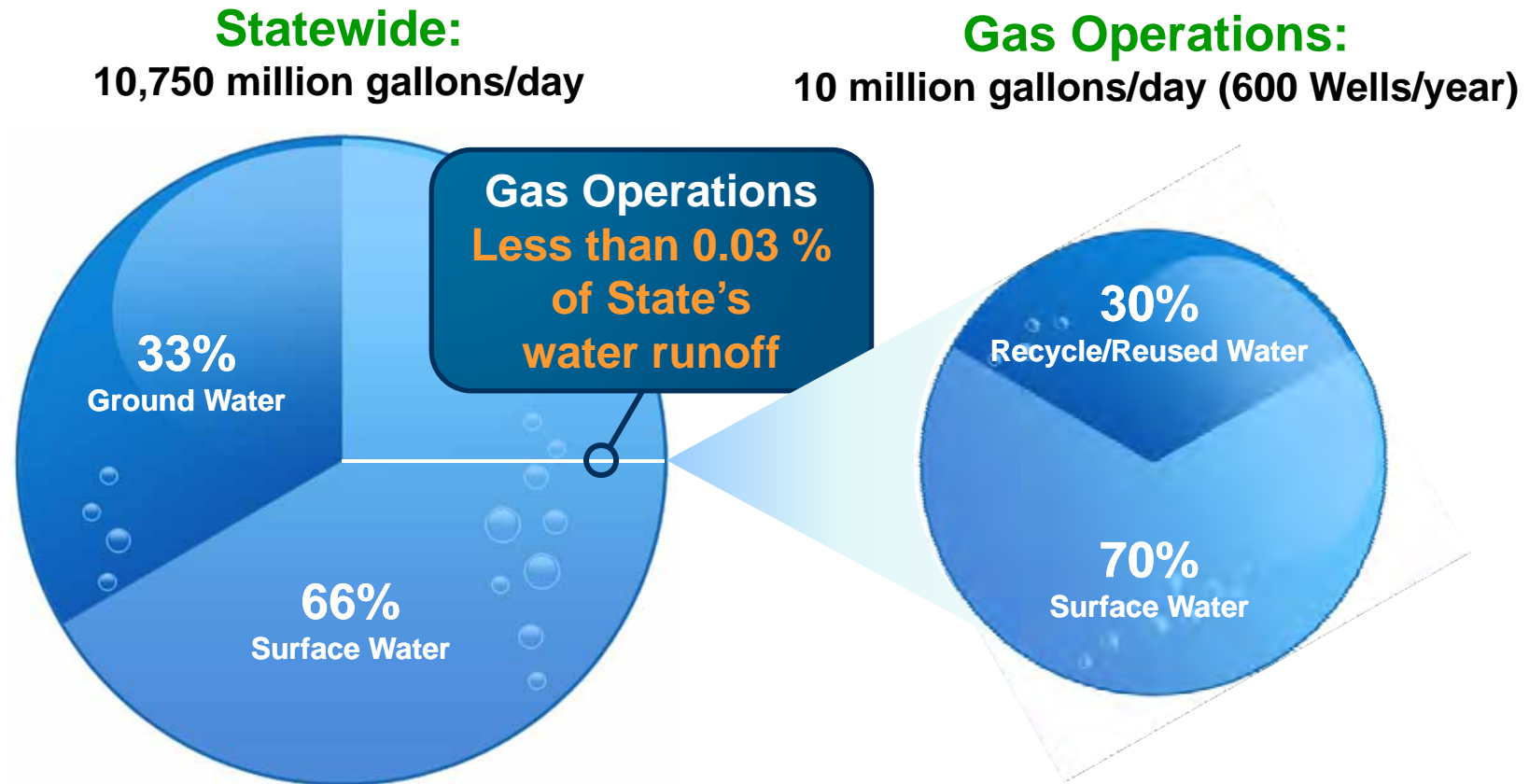
- 16 staff positions added  
(technical, legal and field)
- Fayetteville Shale area field office established
- 107 rule modifications
  - At least 30 obsolete rule repeals
  - 8 new rules adopted
  - 69 amendment to existing rules
    - B-43 – Amended 5 times since 2006.



# Recent Regulatory Initiatives

- Revised Drilling Pit Regulations Providing for Recycling of Hydraulic Fracture Flowback Fluids to Reduce Water Use—**General Rule B-17.**
- Public Disclosure of Contents of Hydraulic Fracture Fluids —**General Rule B-19.**
- Cross-unit Wells — **General Rule B-43.**
- Rule Regulating Noise Levels at Non-Wellhead Compressor Stations— **General Rule D-20.**
- Moratorium — Disposal Wells — Amendment **General Rule H-1**

## Fayetteville Shale Water Demand/Supply – Perspective



- In Arkansas, 43,000 million gallons/day is generated in run-off.
- Capturing surface water by building ponds utilizes water that would otherwise be lost.

Source: Arkansas Water Plan and AOGC estimates

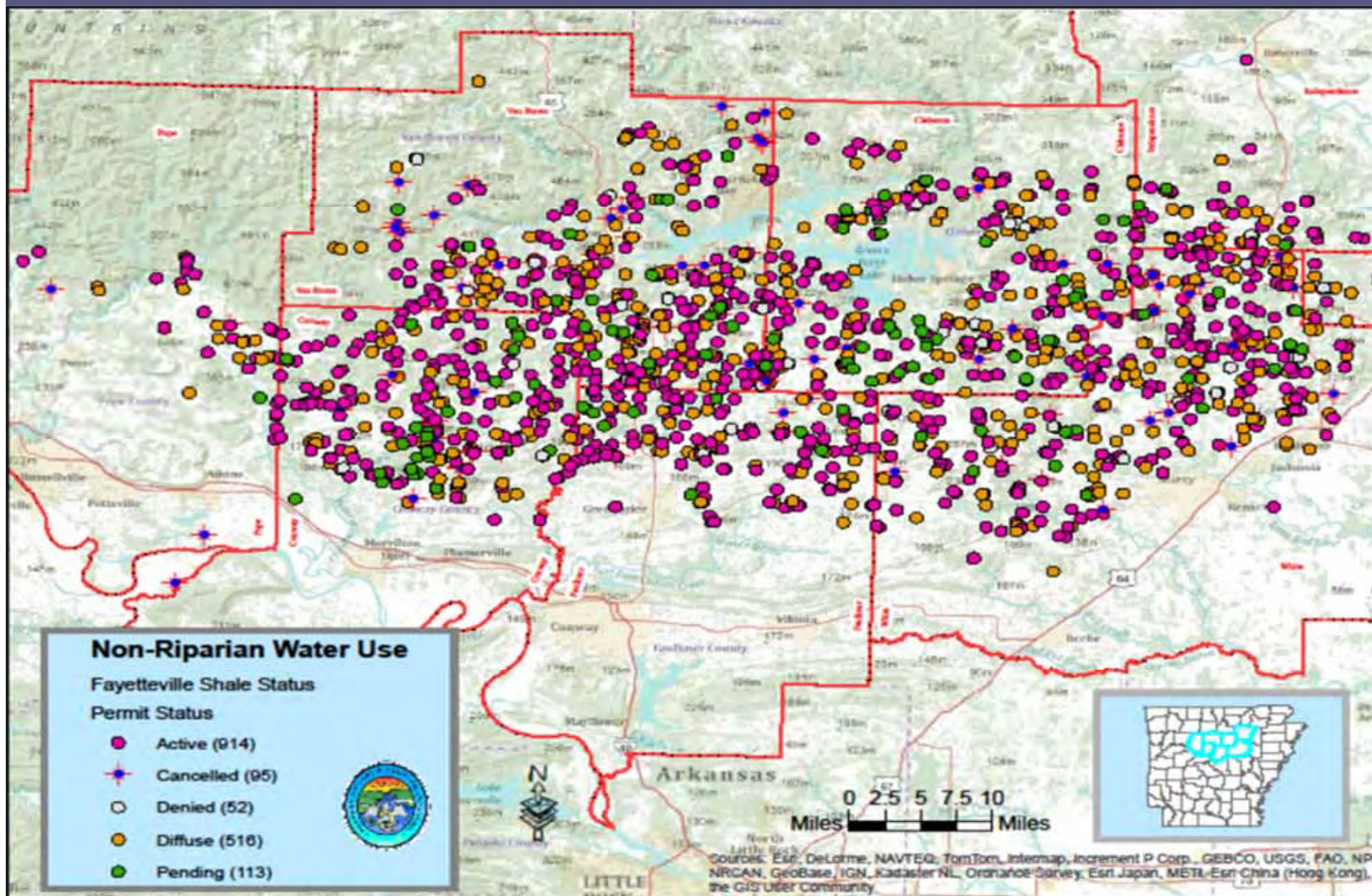
# **“Shale” Gas Industry Water Sources**

- *The current industry water use consists of an average mix of 70% freshwater and 30% recycled water (recycled water use increasing, rules adopted to facilitate use).*
- *Essentially 100% of the freshwater use from surface water sources (still and moving) .*
- *Fresh groundwater sources not used, geologic limitations on quantity.*
- *Brackish groundwater source may have potential, not currently used, regulatory agencies have not yet established regulatory framework for use (currently under review).*



# ANRC Non-Riparian Permits

Status of Natural Gas Industry Applications/Permits- (October 2013)

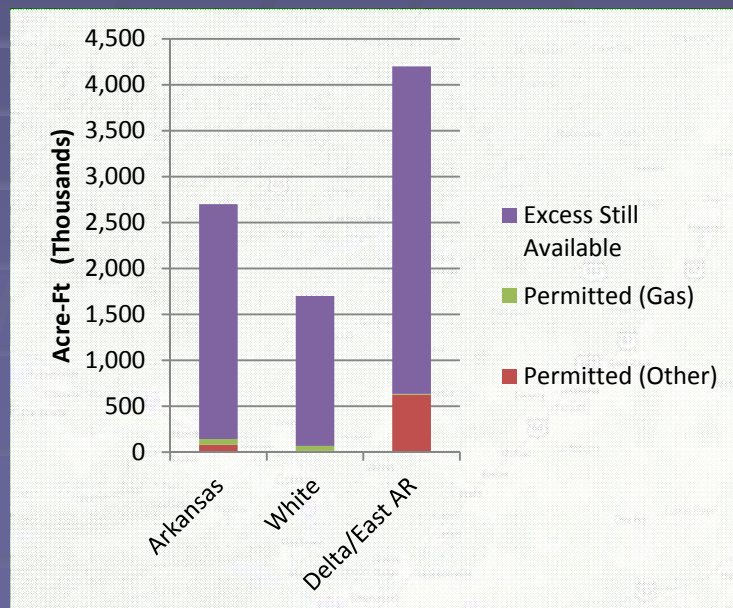






# Excess Surface Water *Non-Riparian Use & Availability*

Volume in Basin (Acre-Ft)	Arkansas	White	Delta/East AR
Total Excess in Basin	2,700,000	1,700,000	4,200,000
Remaining Excess	2,557,145	1,632,044	3,567,019
Non-Riparian Permitted (Municipal/Ag.)	80,050	13,420	624,280
Non-Riparian Permitted (Gas Industry)	62,805	54,536	8,701



*Currently only  
0.03% of  
available excess  
surface water  
allocated*



Prepared in cooperation with (in alphabetical order)  
the Arkansas Natural Resources Commission, Arkansas Oil and Gas Commission,  
Duke University, Faulkner County, Shirley Community Development Corporation, and  
the University of Arkansas at Fayetteville, and  
the U.S. Geological Survey Groundwater Resources Program

## **Shallow Groundwater Quality and Geochemistry in the Fayetteville Shale Gas-Production Area, North-Central Arkansas, 2011**

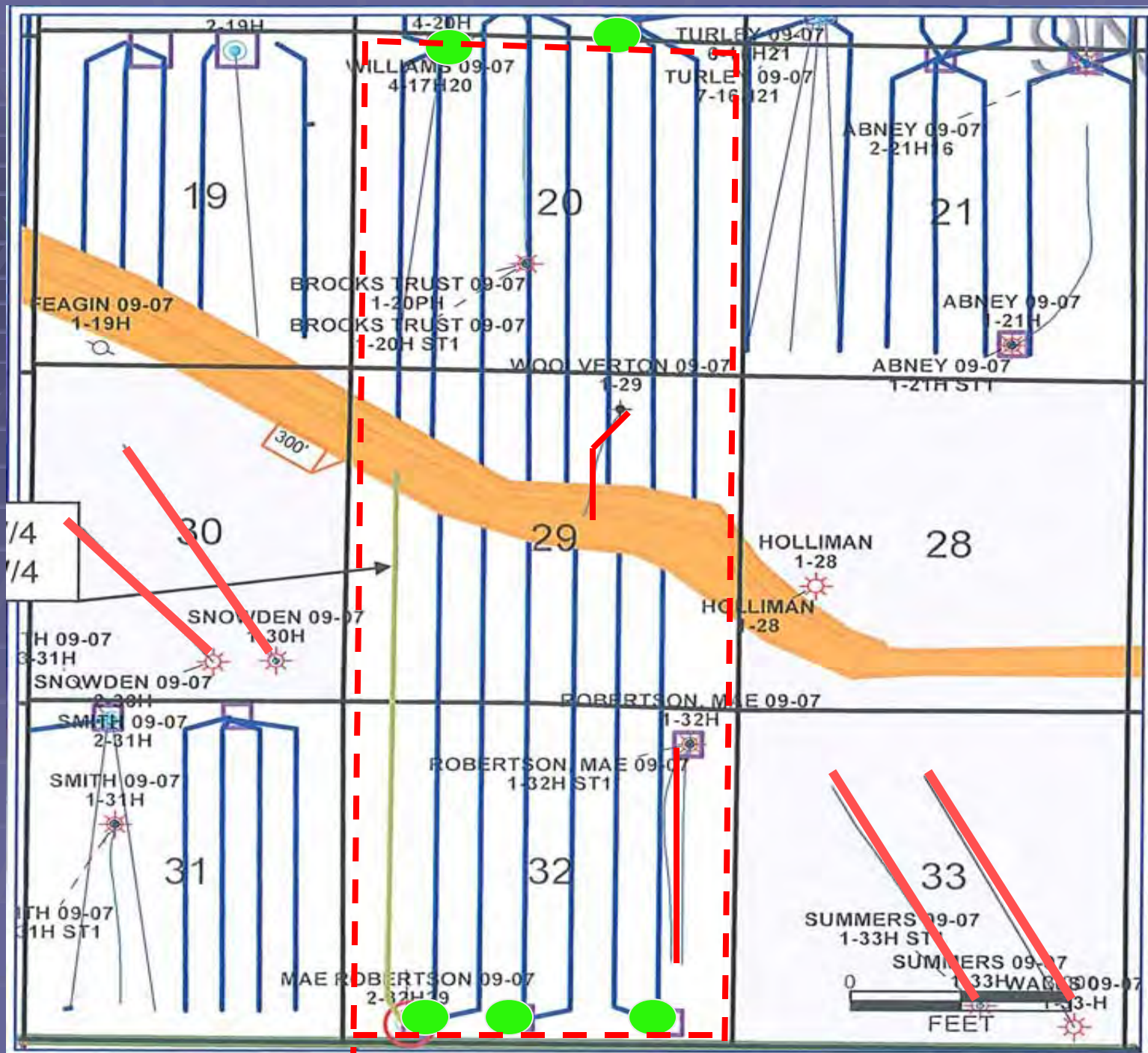


Scientific Investigations Report 2012–5273



A photograph of an oil drilling rig in a rural field. The rig is a tall, white metal structure with yellow accents, standing in the middle ground. It is surrounded by various pieces of equipment, including a red vertical pipe and several blue storage tanks. The rig is situated in a green field, with a line of trees and a clear blue sky in the background. The foreground is filled with green grass, and the top of the image is framed by the branches and leaves of a tree. The text "B-43 – Minimize Drilling Footprint and Maximize Resource Recovery Utilizing Cross Unit Wells" is overlaid in orange on the lower half of the image.

**B-43 – Minimize Drilling Footprint  
and Maximize Resource Recovery  
Utilizing Cross Unit Wells**







**B-17 AOGC/ADEQ Joint Rule - Revised  
Drilling Pit Regulations Resulting in  
Reduced Water Use by Providing for  
Recycling of Frac Flowback**

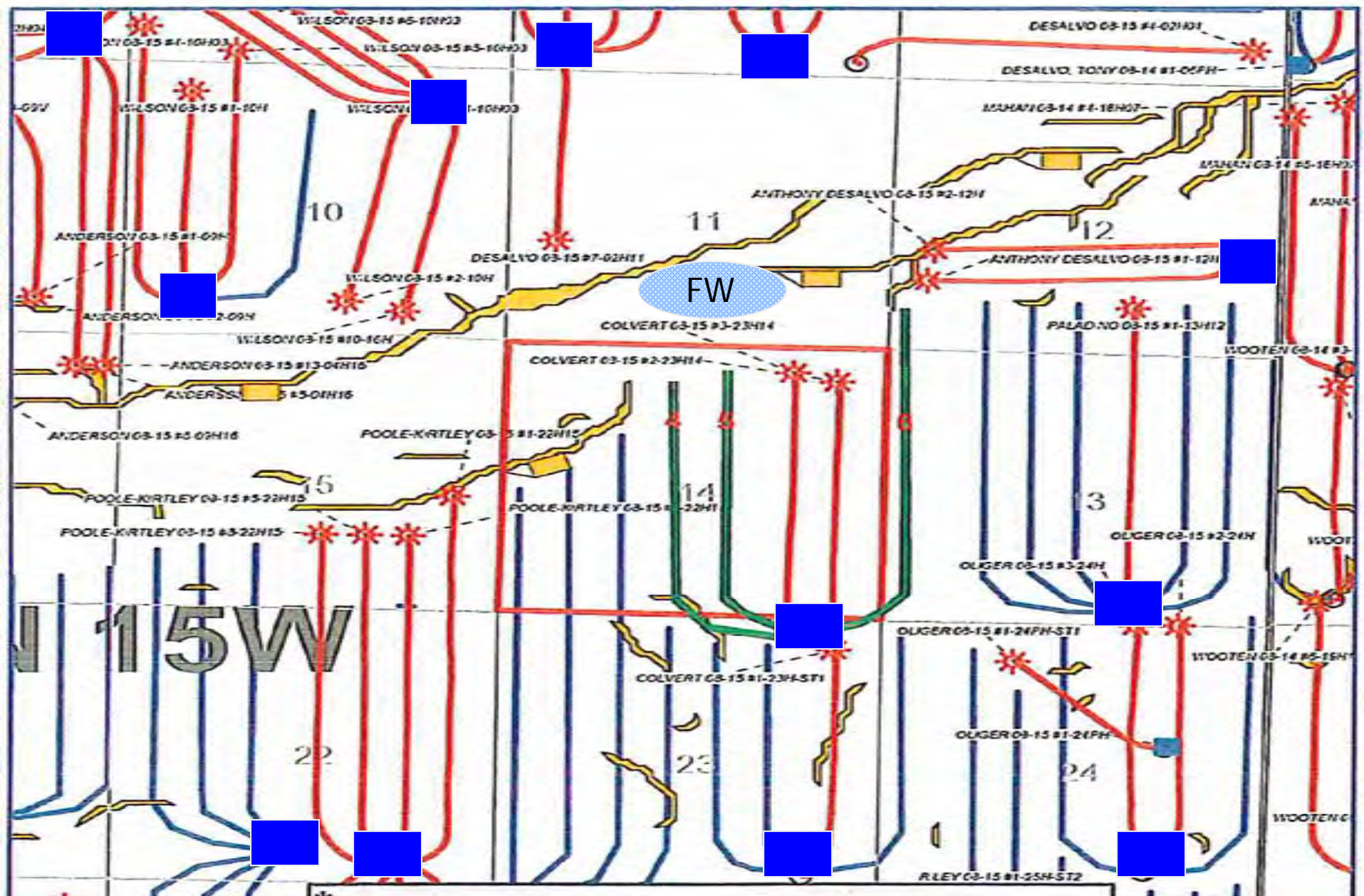


# Multiple well pad showing reserve pit as component of the Rule B-17 authorized water storage, recycle and re-use system

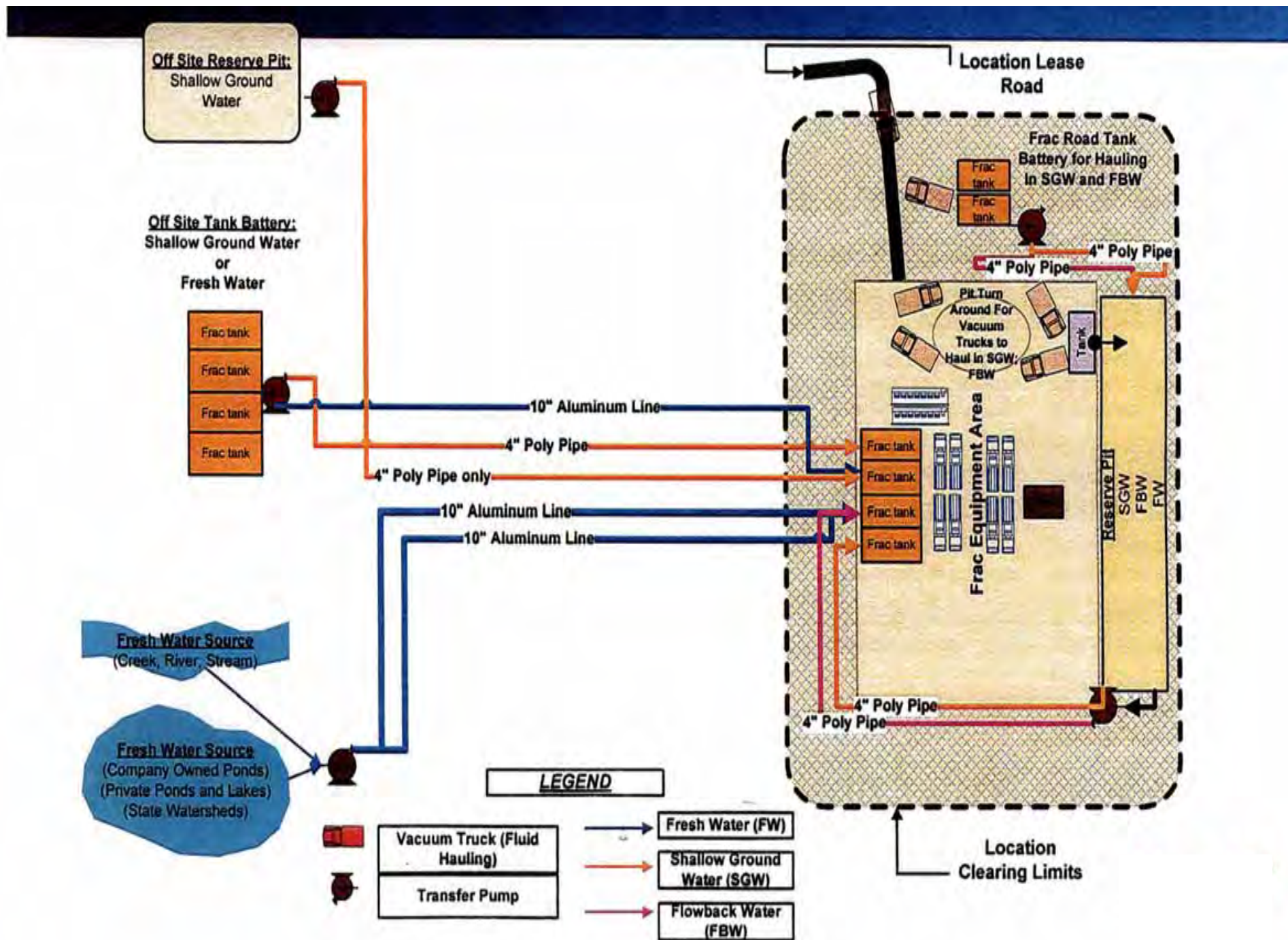




## Multi Well Drill Pads Facilitates Reserve Pit Use For Re-use/Recycle System



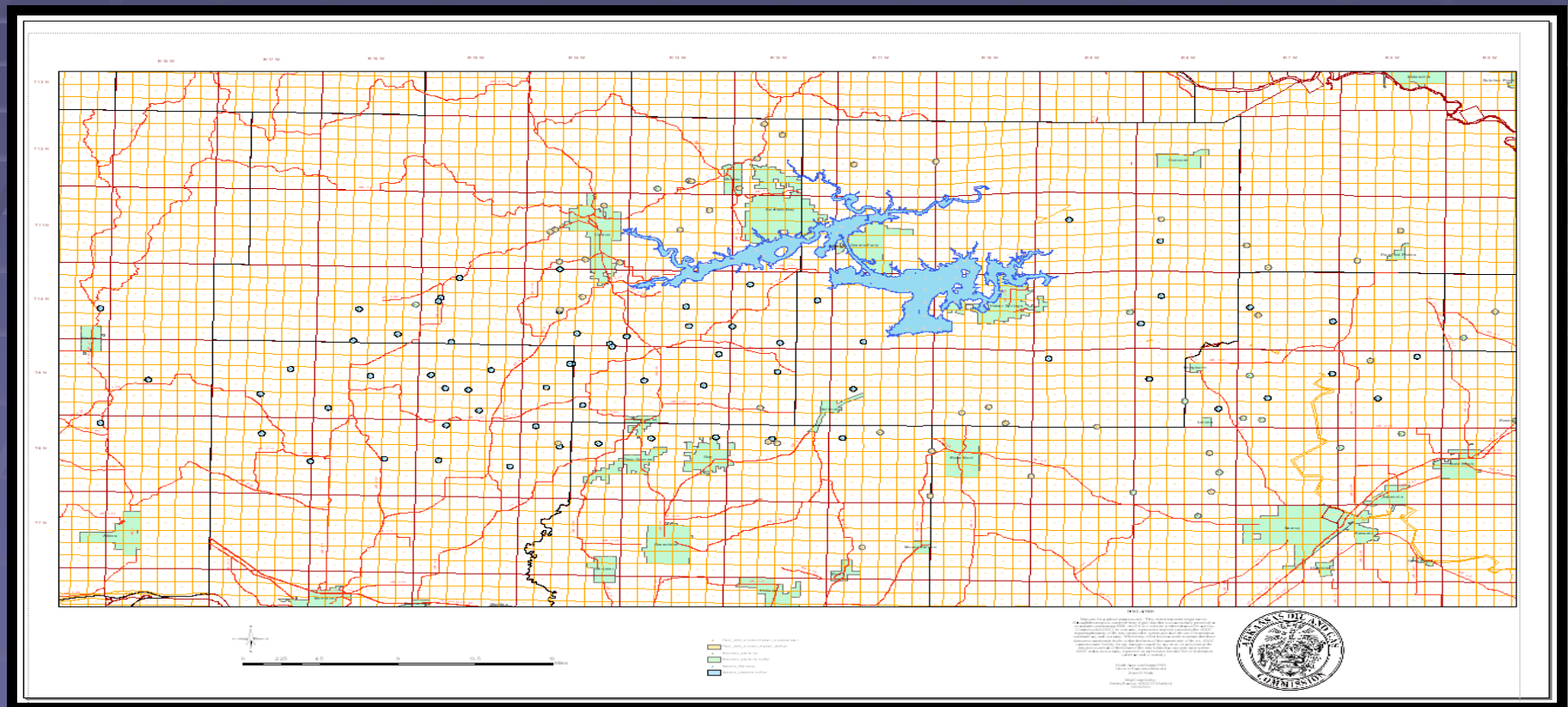






# Compressor Station Noise Mitigation

Compressor Sites in  
Fayetteville Shale Play –  
Approximately 130



# B-19 -Public Disclosure of Frac Chemicals and Well Construction Standards









Hearings ▾

Fayetteville Shale Information

Mineral/Surface Owner Info ▾

Well Fracture Information

Gas Severance Tax ▾

Maps ▾

Document Image System

Well Data

[Pipeline Info](#)



[Rules & Regs](#)

[Forms](#)

[Permit/Completion Report](#)

[Annual Report](#)

[Permissive](#)

[County Gas Sales](#)

[Operator Information](#)

[Field Rule Summaries](#)

[Our Mission](#)

[State Resources](#)

[Industry Resources](#)



## Commission News and Alerts

[2012 Hearing Schedule](#)

[Fayetteville Shale Casing Requirements as of June 1, 2011](#)

[Online Payment Service](#)

[Permanent Disposal Well Moratorium Area](#)

[2011 Hearing Schedule](#)

## Proposed Rules

[Notice of Rule Change - General Rule B-17 \(Well Drilling Pits & Completion Pits Requirements\) Public Comment Ends January 17, 2011](#)

[General Rule B-17 Draft \(Well Drilling Pits & Completion Pits Requirements\) Public Comment Ends January 17, 2011](#)

## New Final Rules

[Rule A-5 \(Enforcement Procedures\) Effective February 2, 2012](#)

[Rule H-1 \(Class II Disposal And Class II Commercial Disposal Well Permit Application Procedures\) Effective February 2, 2012](#)

[Rule D-20 - \(Noise Level Requirements for Non-Wellhead Compressor Facilities\) - Effective November 1, 2011](#)

[Rule B-17 - \(Drilling Pit and Completion Pit Requirements\) - Effective October 3, 2011](#)

## Operator Procedural Information

[General operator requirements for a permit to drill or transfer a Well](#)

To report emergencies, incidents, spills, spud activity, file Form 2A, 11, or well bore information for north Arkansas please contact the Fort Smith Regional office [via email](#) or by calling 479-646-6611

To report emergencies, incidents, spills, spud activity, file Form 2A, 11, or well bore information for south Arkansas please contact the El Dorado Regional office please contact [via email](#) or by calling 870-862-4965

[Commissioners](#)

[Staff Contacts](#)

[Regional Office Division Map](#)



Director's Office

[301 Natural Resources Dr. Ste 102](#)

[Little Rock, AR 72205](#)

501-683-5814

501-683-5818 (Fax)



El Dorado Regional Office

[2215 West Hillshoro El Dorado, AR 71730](#)

870-862-4965

870-862-8823 (Fax)



Ft. Smith Regional Office

[3309 Phoenix Ave. Ft. Smith, AR 72903](#)

479-646-6611

479-649-7656 (Fax)









## Well Fracture Information

### Wells Permitted with Intent of Fracture Stimulation

Only wells subject to General Rule B-19 are contained in the file. The well records consist of the Form 2 – Drilling Permit Application and Form 3A – Well Fracture Stimulation Report. Well files not yet containing a Form 3A have not yet been fracture stimulated. A well file designated as “Amended” indicates the original permit application has been amended and the copy shown is the amended Form 2.

Companies Performing Fracture Treatments	Form 1	Chemical List	Form 37
Calfrac Well Services Corp. - Denver, CO	<a href="#">Form1</a>	<a href="#">Chemical List</a>	<a href="#">Form 37</a>
Schlumberger Technology Corporation - Sugarland, TX	<a href="#">Form1</a>	<a href="#">Chemical List</a>	<a href="#">Form 37</a>
Multi-Chem Group, LLC - San Angelo, TX	<a href="#">Form1</a>	<a href="#">Chemical List</a>	<a href="#">Form 37</a>
Cudd Pumping Services, Inc. - Houston, TX	<a href="#">Form1</a>	<a href="#">Chemical List</a>	<a href="#">Form 37</a>
Halliburton Energy Services, Inc. - Houston, TX	<a href="#">Form1</a>	<a href="#">Chemical List</a>	<a href="#">Form 37</a>
Weatherford Artificial Lift Systems, Inc. - Houston, TX	<a href="#">Form1</a>	<a href="#">Chemical List</a>	<a href="#">Form 37</a>
Superior Well Services, Inc - Indiana, PA	<a href="#">Form1</a>	<a href="#">Chemical List</a>	<a href="#">Form 37</a>
Baker Hughes Oilfield Operations, Inc. - Houston, TX	<a href="#">Form1</a>	<a href="#">Chemical List</a>	<a href="#">Form 37</a>
Gore Nitrogen Pumping Service, LLC - Seiling, OK	<a href="#">Form1</a>	<a href="#">Chemical List</a>	N/A

### Rule B-19

Form 1 - Required Registration for Performing Fracture Stimulation		
Form 2 - Permit Form Required to Perform Fracture Treatment		
Form 3A - Well Fracture Stimulation Report		
Form 37 - Request for Trade Secret Exemption		



[Home](#)

[AOGC Webmaster](#)





FORM 3A  
WELL FRACTURE STIMULATION REPORT

Submit form to Registrar at District office

☐ Fort Serra Regional Office  
 3500 Phyllis Street  
 Fort Sills, Montana 59701

SECTION 4. INTEL DESCRIPTION: BUSH & COVULETS									
Personal file	44308	Adm. Div.	100	INITIALS	980220 JMC				
Serial No.	980220-19674	File	85-534	Address	515 W. Grand Ave.				
Dist. Office	3	Threats	NEW	Phone	1400	City	Portland	State	OR
Index	BLAS	Source	SAAS	Referral		County	CLATSOP	Zip	97130-4834
Inter. Comments (Date)	9/5/92/1	Work Comments	9/5/92/1	Case	288-674070	File			
Inter. Comments (Date)	9/5/92/1	Work Comments	9/5/92/1	Case	288-674070	File			

2890 KIM ET AL. TREATMENT INTERVAL AND BASE FLUIDS USED

[illegible]

## SECTION 2: LIST OF ACTIVITIES USED (include program or activities)

[illegible]

## SECTION 8: CONCENTRATION OF ALL CHEMICAL CONSTITUENTS OR CHEMICAL FAMILY NAME USED IN FRACTURE TREATMENT

[illegible]

### SECTION 2. FRACTURE HEIGHT INFORMATION

Calculated Fracture Height Designed to be Achieved: Measured from Chalkline at Completion	173 Feet	Estimated TVD Measured at Top of Calculated Fracture Height	3452 Feet
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**CERTIFICATE**

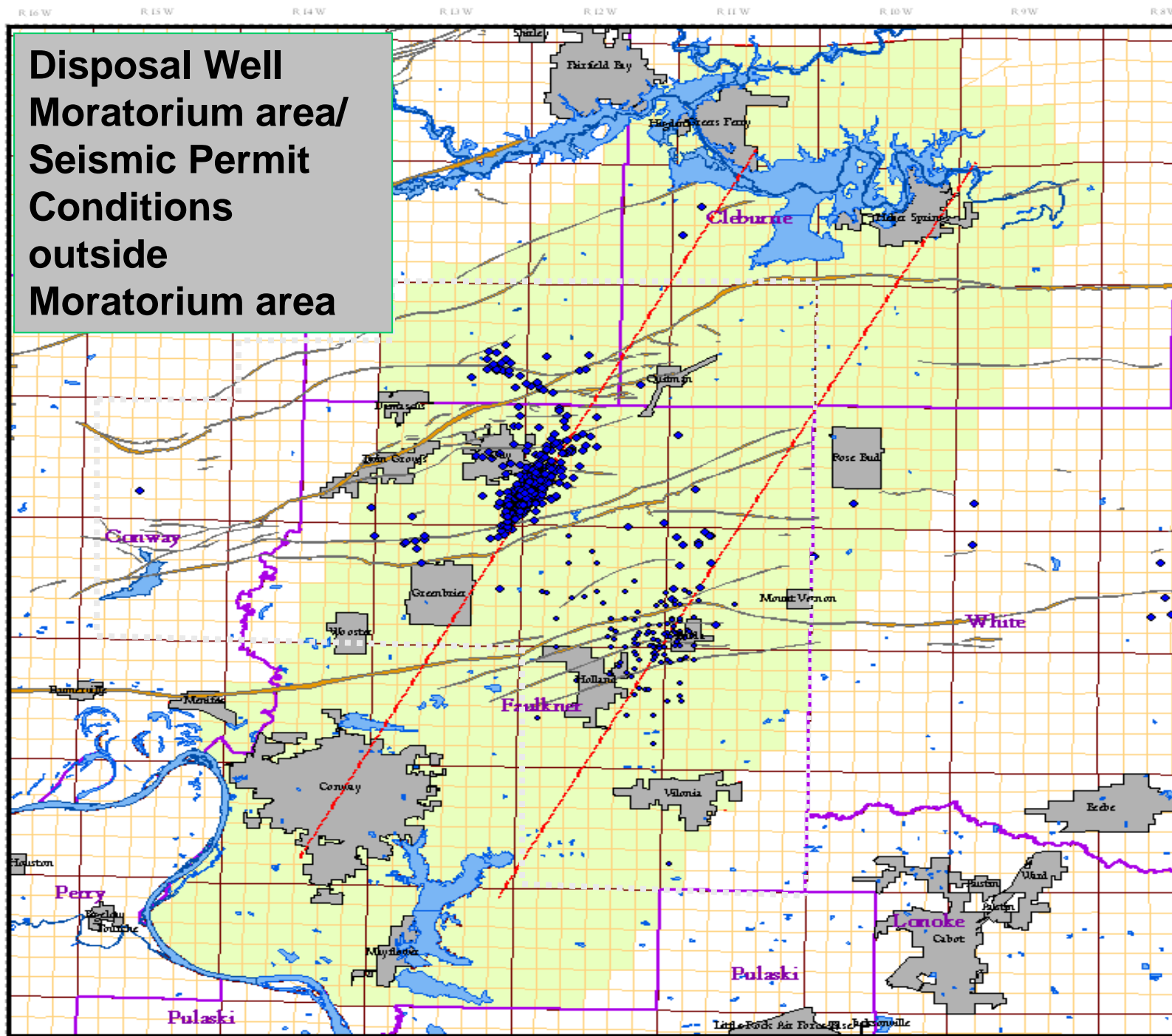
I declare under the penalties of perjury that this report has been prepared by me and to the best of my knowledge is true, correct, and complete.

RECEIVED  
JUL 05 2011

7/19/91

Golden L. Whistler

**Disposal Well  
Moratorium area/  
Seismic Permit  
Conditions  
outside  
Moratorium area**



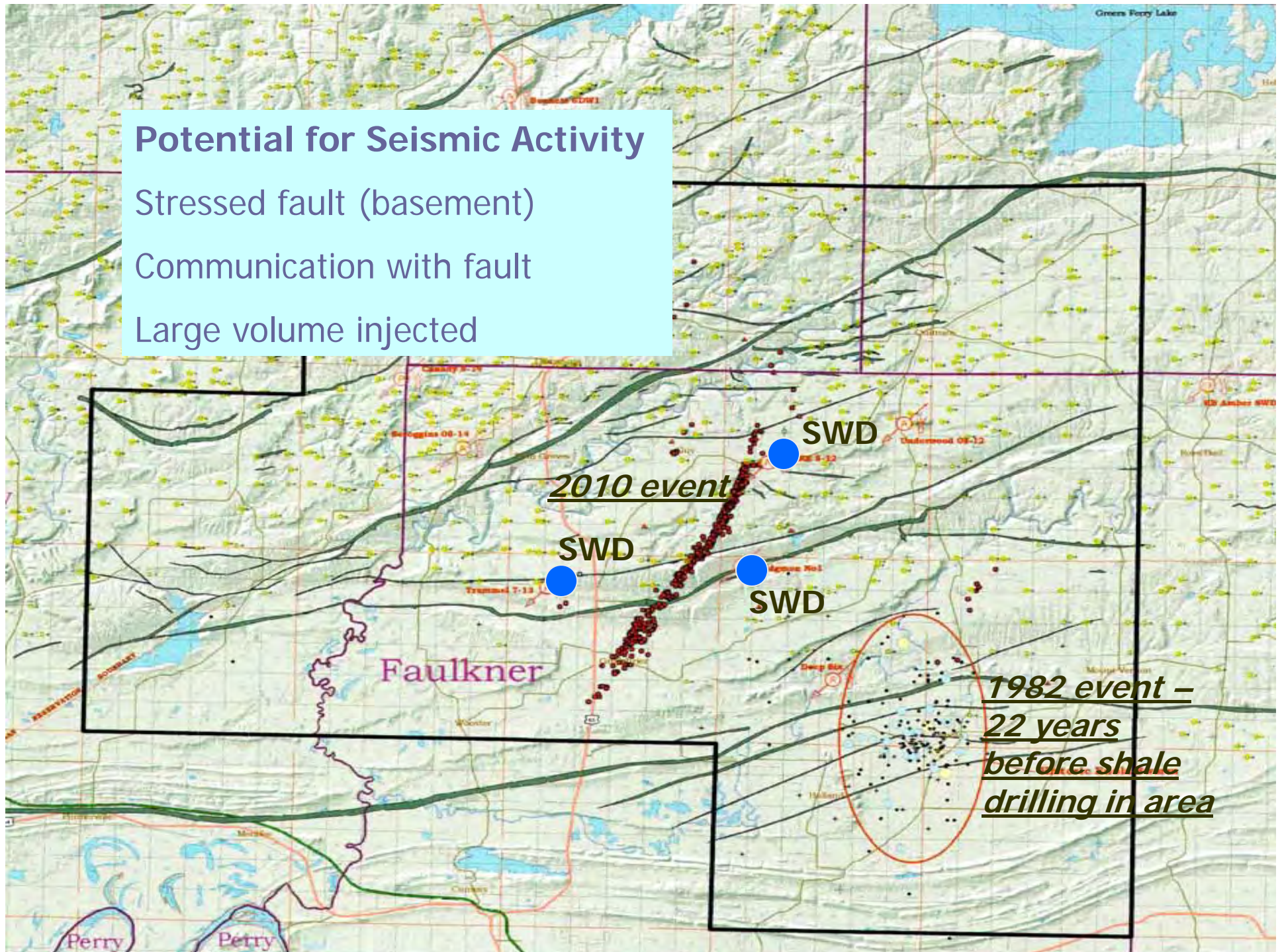


## Potential for Seismic Activity

Stressed fault (basement)

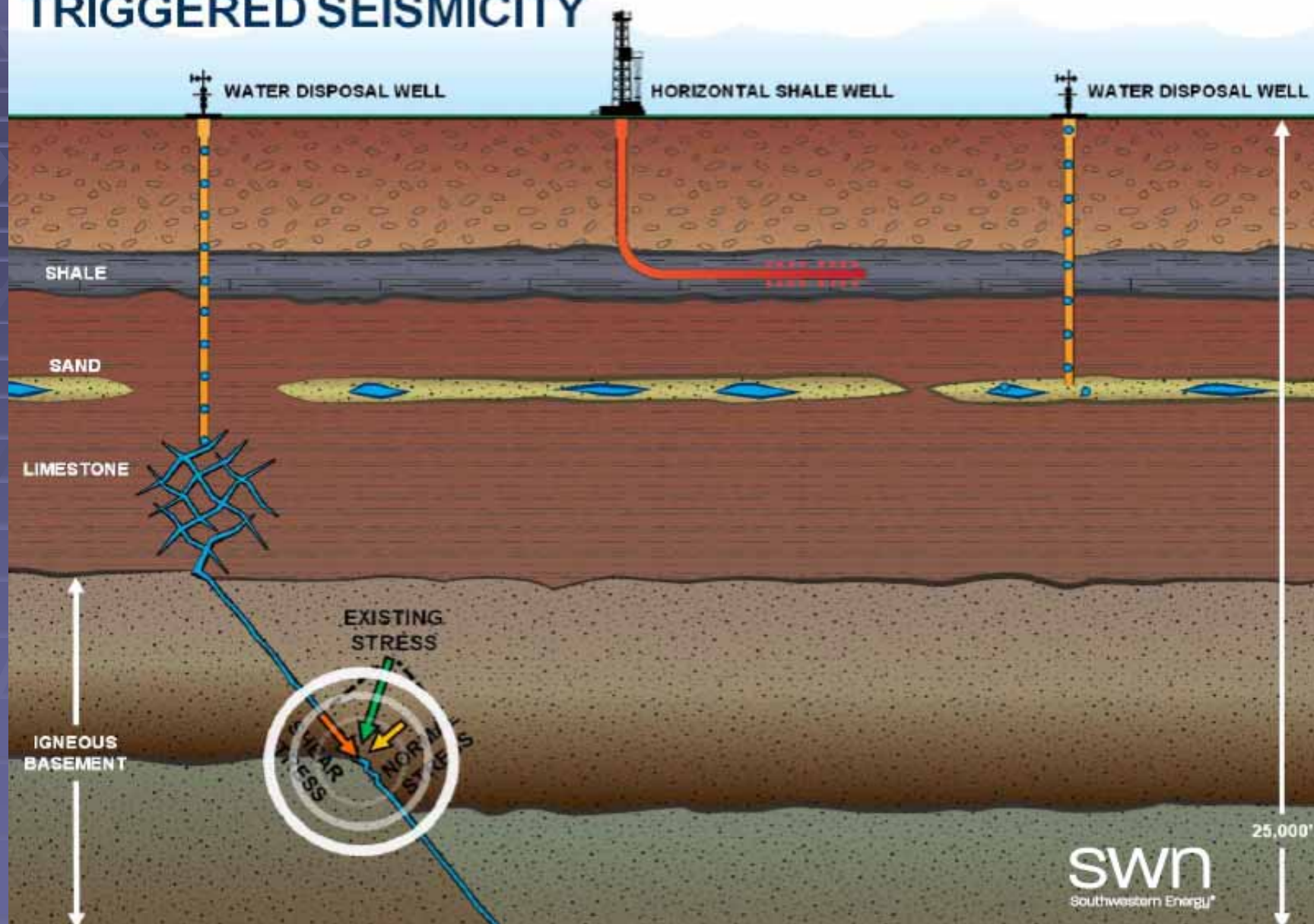
Communication with fault

Large volume injected





# TRIGGERED SEISMICITY



# Arkansas Hydraulic Fracturing State Review

February, 2012



## Report concluded:

**“regulatory program well managed and professional”**  
**with rule amendments, water well complaint protocol and AOGC web page cited as program strengths.**

## Two primary recommendations:

- **Conduct inspections during active hydraulic fracturing operations - Implemented**
- **Increase staffing to provide additional field inspection capability – Requested in FY 14 Budget**

QUESTIONS ?