Natural Gas Drilling Activities - A State Perspective

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Fayetteville Shale Outcrop
South Arkansas Oil Production

Oil field workers following the discovery of the Richardson No. 1 well at the Smackover Pool in Union County, July 1922.

Courtesy of the Southwest Arkansas Regional Archives
Process Overview

- Site Selection and construction
- Drilling
- Hydraulic fracturing
- Completion
- Production
- Transmission
Significant Challenges

- Drill Pad Construction and Operation
- Lack of Federal Regulation/Federal Exemptions
- Location of Fayetteville Shale Play
- Shared Regulatory Authority within the State
- Established Practices in South Arkansas
- Waste Disposal Needs/Quantity
- Available Raw Materials
- Lack of Available State Oversight Personnel
Reserve Pit Activity

As of May 4th, 2011
Problems at Drilling Sites

- Reserve pit leaks and overflows
- Fluids runoff from the drilling pad
- Sediment runoff
- Physical stream alteration
- Unauthorized retention ponds
- Uncontained chemical storage areas
Sediment
Fluids Runoff
Stormwater Runoff
Federal Regulatory Exemptions

- Safe Drinking Water Act – Hydraulic Fracing
- NPDES Industrial Stormwater Discharge Permits
- NPDES Construction Stormwater Discharge Permits
- RCRA Hazardous Waste Designation Exemption
- CERCLA Liability Exemptions
- Additional Exemptions
Arkansas Law

• Arkansas Code Annotated 8-4-203
• The Arkansas Department of Environmental Quality or its successor is given and charged with the power and duty to issue, continue in effect, revoke, modify, or deny permits, under such conditions as it may prescribe:

  (1) To prevent, control, or abate pollution;

  (2) For the discharge of sewage, industrial waste, or other wastes into the waters of the state, including the disposal of pollutants into wells; and

  (3) For the installation, modification, or operation of disposal systems or any part of them.
Drilling Fluids

- Water-Based Drilling Fluids (aka “Drilling Mud”)
- Drilling fluids (or drilling muds) are comprised largely of water/diesel and bentonite (clay).
- Additives
Other Fluids

• **Produced Water**
  ✓ Flows out of well with the natural gas
  ✓ High chloride concentration (20,000+ ppm)
  ✓ General Disposed Class II UIC injection well.

• **Shallow Groundwater**

• **Flowback Water, (includes frac water)**
  ✓ Chlorides >3,000 ppm
  ✓ Generally not allowed in Reserve Pits
  ✓ General Disposed Class II UIC injection well.
Water-Based Drilling Fluids

• ADEQ defines Water-based drilling fluids as muds and fluids with a chloride concentration less than 3,000 ppm

• Regulated disposal methods
  ✓ Transport to landfarm
  ✓ Land apply to adjacent land on site (One time)
  ✓ Reuse with another well
Reserve Pit Construction

- Pit to for the temporary storage of water based drilling fluids, cuttings and encountered water

- Location Restrictions
  - Wetlands
  - Floodplain
  - Water Table Separation Distances

- Construction Requirements
  - Two Feet of Freeboard, 10 year, 24-hour Storm Event
  - 2 TO 1 Side slopes and 2 foot wide Berms
  - Liner Systems Clay or 20 mil Synthetic Liner or Approved Equivalent

- Stormwater BMPs for the Entire Drill Site
Operation and Closure of Reserve Pits

- No Discharge of Fluids Allowed
- Operator reports releases or spills
- Water and the drilling muds are hauled off site within 90 days.
- The remaining contents are mixed with stabilizing material and closed on site.
- Closure completed 180 days after the drilling rig leaves the site.
- Closure requires cover material and vegetation and returning the site to original grade.
- Special Provisions for the Recycling of Fluids
Closed reserve pit
General Permit for One-Time Land Application of Drilling Fluids

- 00000-WG-LA
- Requirements
  - One time application from one well’s reserve pit on one site
  - Application rate will be based on analysis of drill fluids and site soils
  - Post application testing
  - Submit NOI for coverage
  - Submit NOT to terminate coverage
Land Application (Landfarms)

- Receives water-based drilling fluids only
- No oil-based muds, completion fluids or frac water
- Fluids are hauled from the reserve pits and into a holding pit and are then pumped from the holding pit and onto the fields.
Landfarms – Land Application Sites

• 2009 Study
• Soil investigated by professional before permit issuance
• Check of each truckload for hydrocarbons and onsite analysis of each truckload for restricted fluids
• Analysis and approval by ADEQ required before land application
• Vegetation on site
• No Land Application during rainfall or when rain is imminent
• Groundwater Monitoring
• Financial Assurance
Stream Crossing

- Facility must obtain an authorization from ADEQ

- In 2010, ADEQ authorized some 1,400 stream crossing activities associated with the Fayetteville Shale.
Mining Program

• Quarries
  ✓ Construction of roads and drilling pads
  ✓ Frac Sand

• Open-cut mines
  ✓ Frac sand

Break News: ADEQ seeks injunction, $250,000 fine against Bluebird Sand

December 14, 2010

Melbourne — The Arkansas Department of Environmental Quality has filed a complaint against Bluebird Sand, LLC of Izard County for violations of the Arkansas Pollution Control Act. The complaint was filed after the ADEQ found the company polluted a tributary to the White River that resulted in a fish kill.
Active Quarries
Pre-2005: Blue
Post-2005: Green
Active Frac Sand Mines

Red: Open-Cut Mines
Green: Quarries

Pulaski
Faulkner
Van Buren
Cleburne
Stone
Izard
Independence
White
Jackson
Solid Waste Division

- Landfill odor complaints
- Alternate Daily Cover Materials
- Consumption of landfill space
- Beneficial fill/recovered material requests
- Liquid bulking operations

Landfill operator responds

Posted by Max Brantley on Mon, Apr 27, 2009 at 1:25 PM

Allied Waste Industries, which operates the BFI landfill on Mabelvale Pike, agrees that there have been odor problems at the landfill and it pinpoints waste from shale drilling. Here's the company release on what it is doing about it.
• Drilling Waste Disposal
Public Concern

Looking for gas under Greers Ferry
Concern grows over seismic testing.
by Gerard Matthews

In October last year, the U.S. Army Corps of Engineers issued a license to Chesapeake Energy that allows the natural gas exploration company to begin seismic testing on Greers Ferry Lake. That was news to some local residents as the license was issued without a public hearing or notice in the newspaper. Now that testing has begun, the possibility of future gas drilling has some of the locals concerned.

Natural gas violations

The Arkansas Public Policy Panel has released an analysis of state inspection records of natural gas drilling and production sites compiled by the Arkansas Department of Environmental Quality showing frequent violations of state environmental regulations, that companies operating in the Fayetteville Shale are not following their own best management practices and that ADEQ is doing little to make sure corrective actions are taken by the violators.

Shale shock
Drillers' rights top landowners.
by Gerard Matthews

Problems related to natural gas drilling are well known here in Arkansas. Ever since companies moved in to exploit the Fayetteville Shale several years ago, residents have complained about dirty water, the number of semi trucks running up and down their small country roads, the methods used to dispose of drilling waste and the noise created by drills and compressor stations. All bad stuff for sure, but all in the name of job creation and royalty payments.
Increased Oversight

- Complaints
  - 2006 – 2010: 347
  - 2011: 62

- Inspections
  - 2006 – 2010: 382
  - 2011: 990

- 4 New Inspectors, 1 Inspector Supervisor, 2 Enforcement Analysts
Current Challenges

- Game and Fish Property
  - Ambient Water Quality
  - Weekly Inspections
- Inspector Funding
- Earthquakes
- Recycling of Frac and Other Fluids
Fluid Recycling
QUESTIONS?