

Evolving Environmental and Social Issues

Protecting Water Sheds

Atlantic Council Conference

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Washington D.C.

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Ground Water Protection Council

Mission: “...*Promote the protection and conservation of ground water resources for all beneficial uses, recognizing ground water as a critical component of the ecosystem.*”

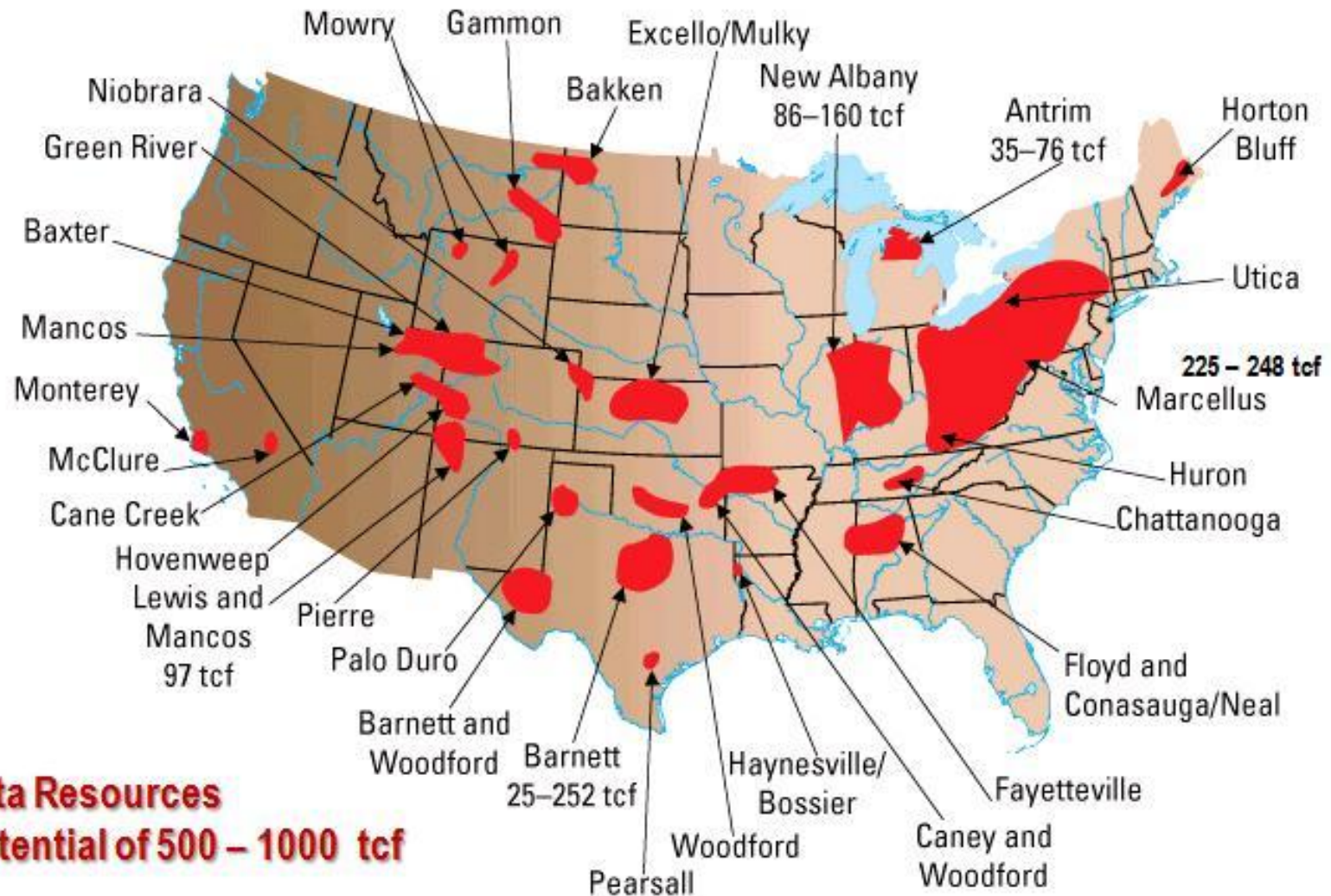


GWPC Activities

- Symposia
- Resolutions
- Surveys/Research
- Education and outreach
- Data management assistance

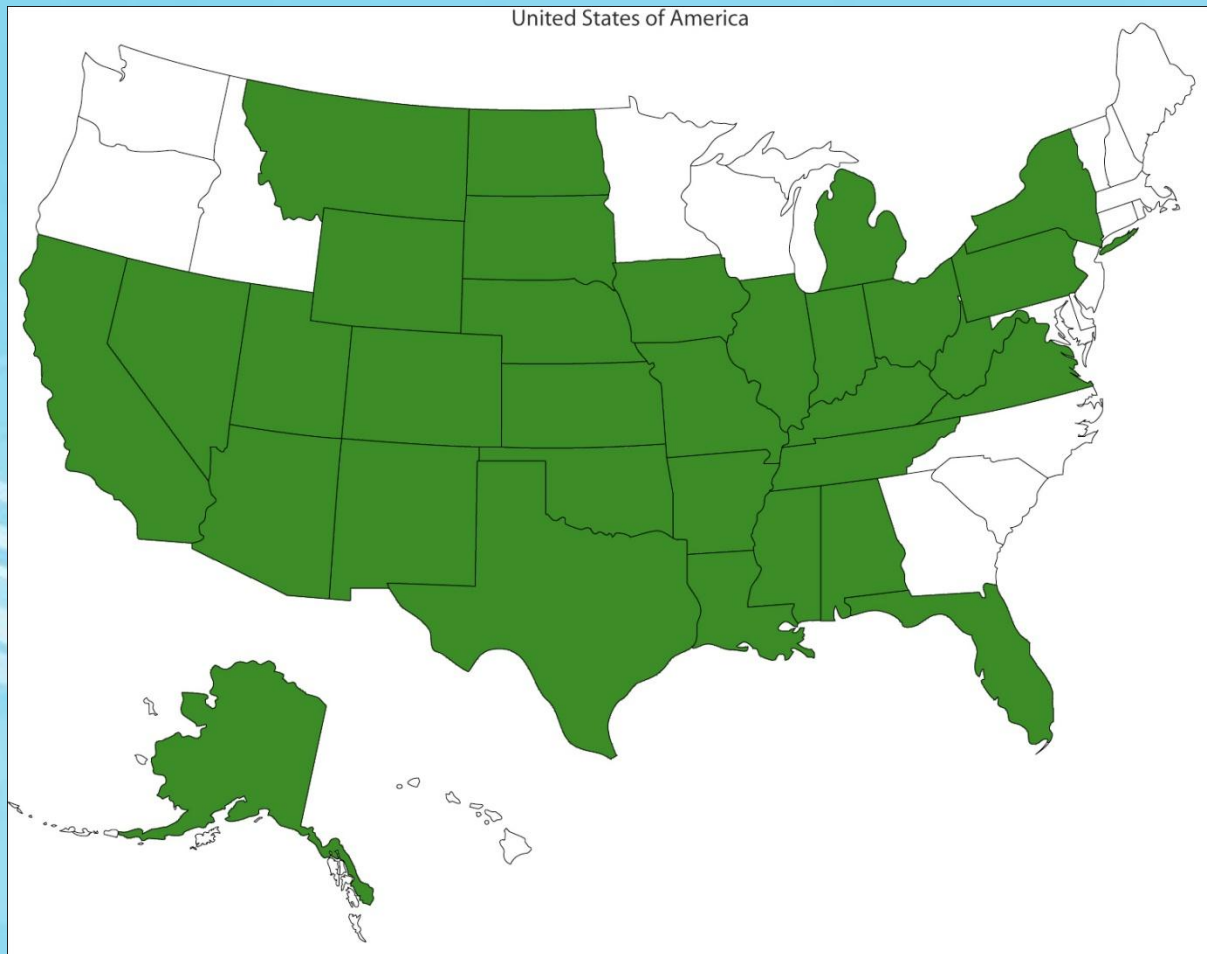


Shale Gas Basins In The United States

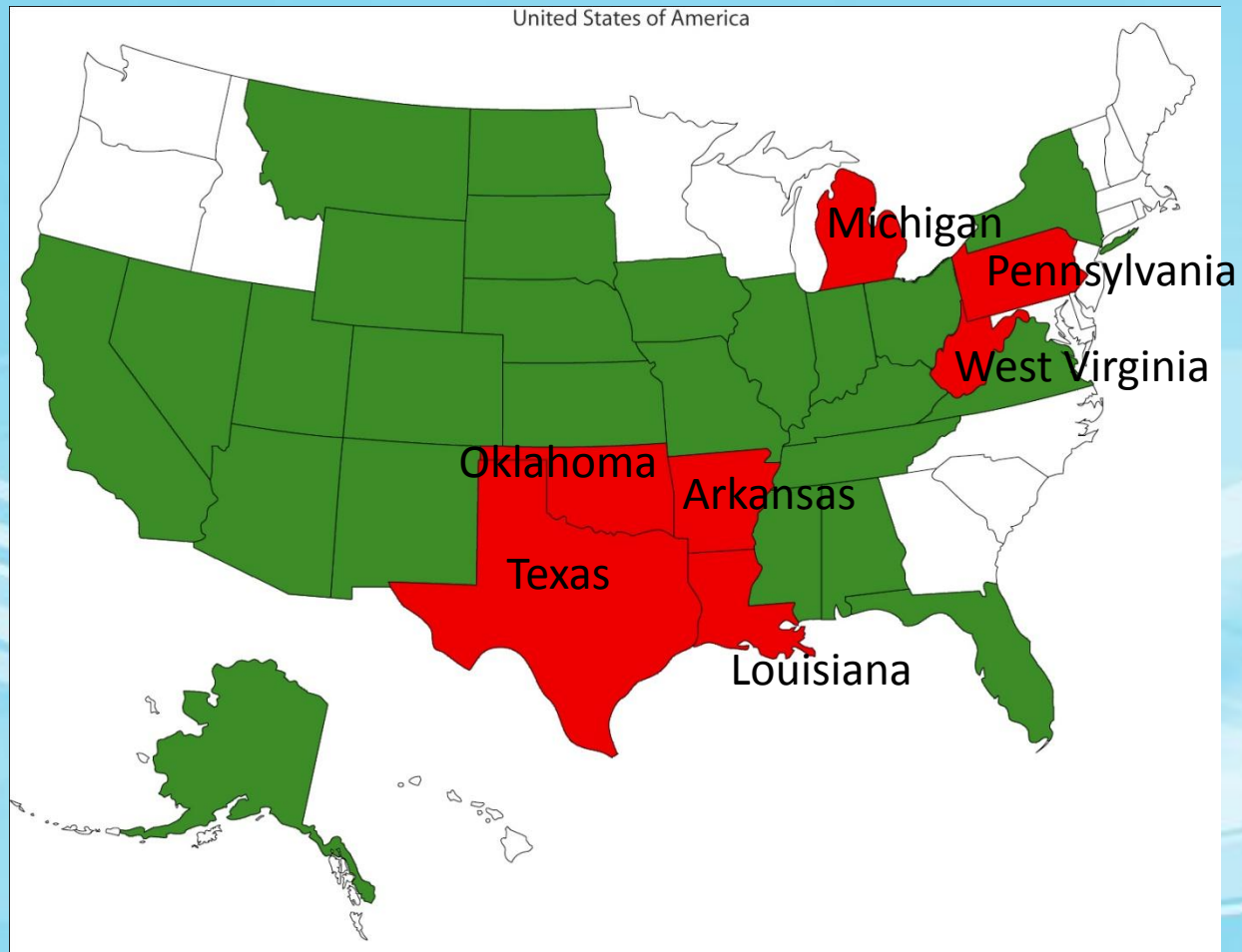


Total Resources
Potential of 500 - 1000 tcf

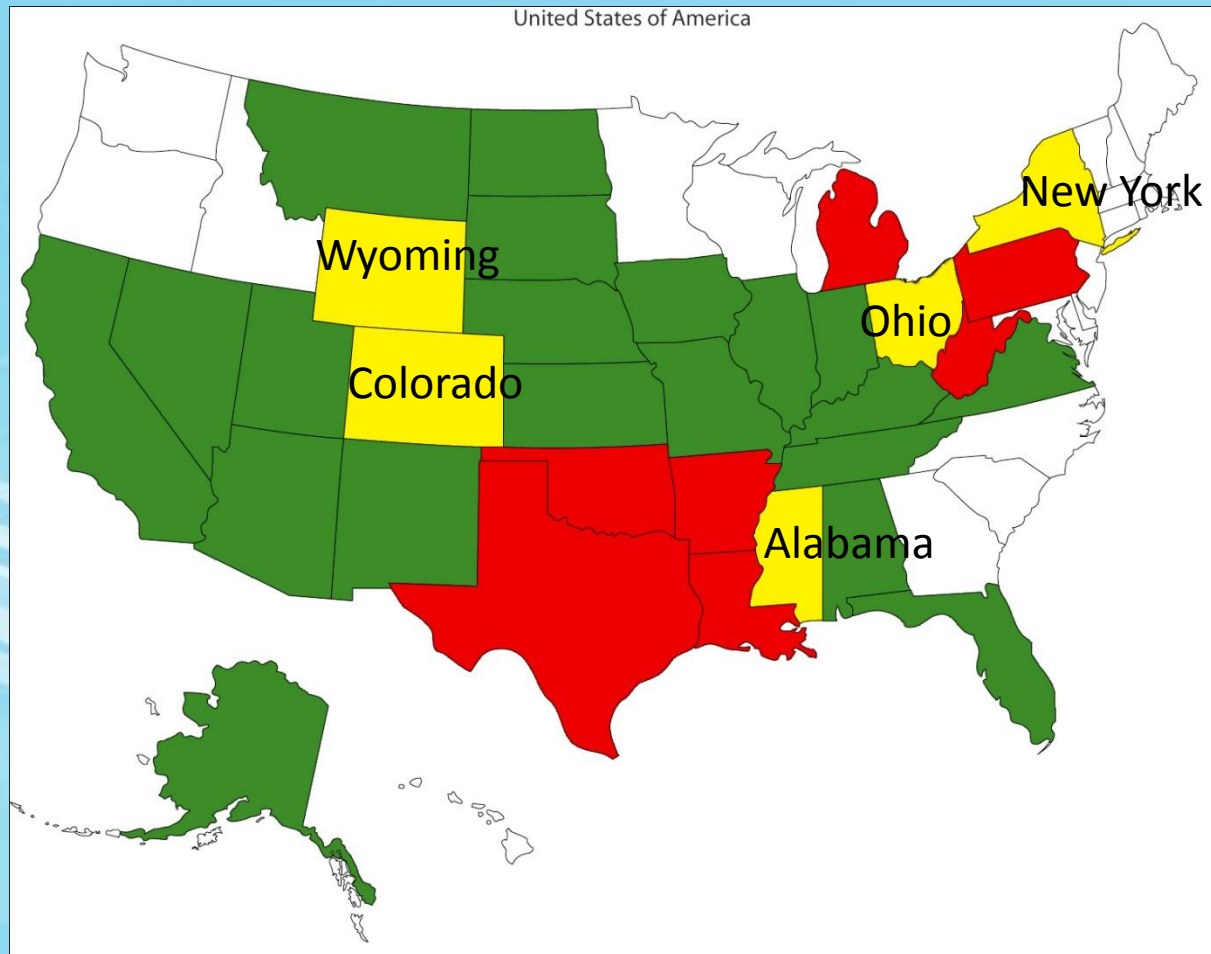
Oil & Gas Producing States



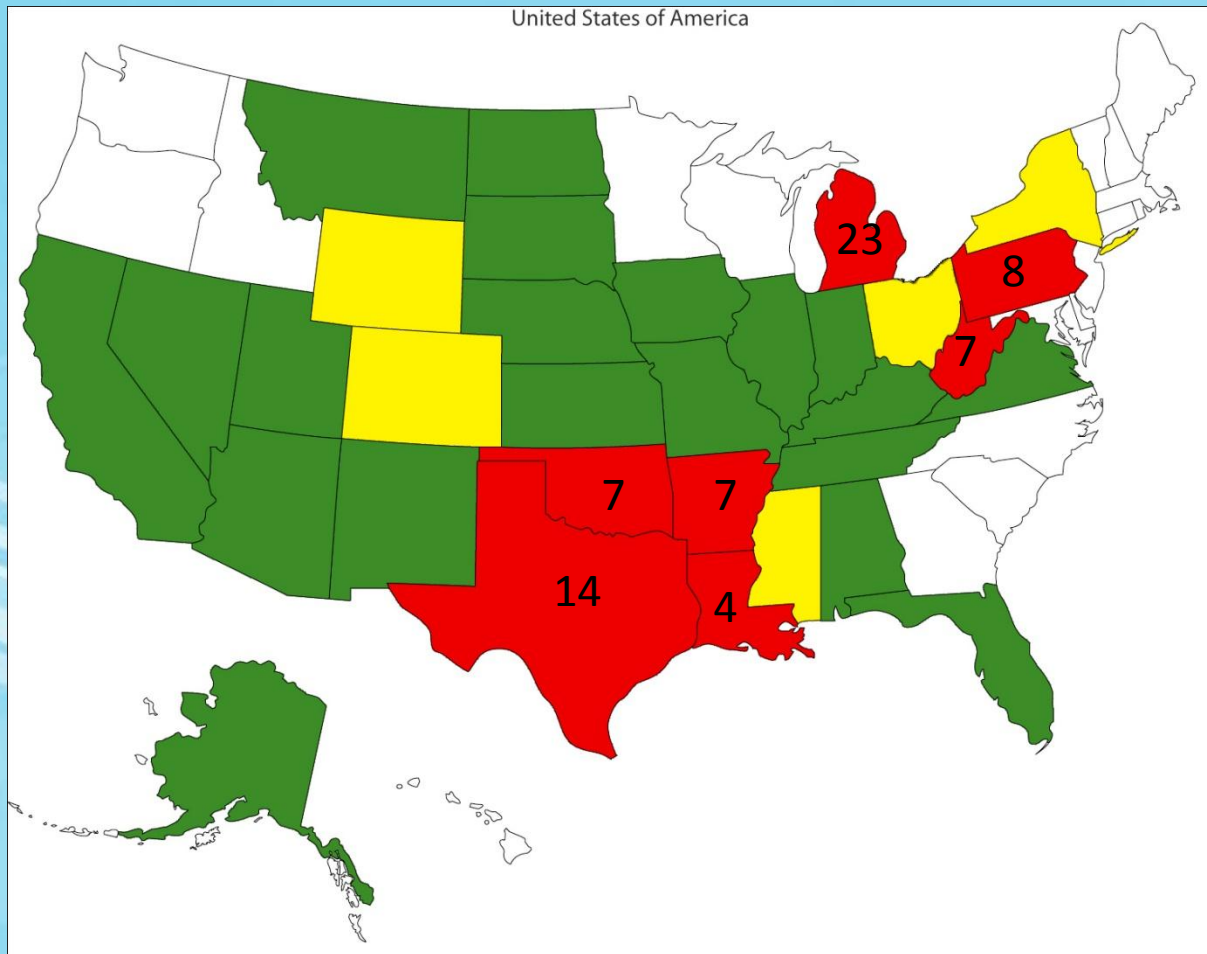
Shale Gas States



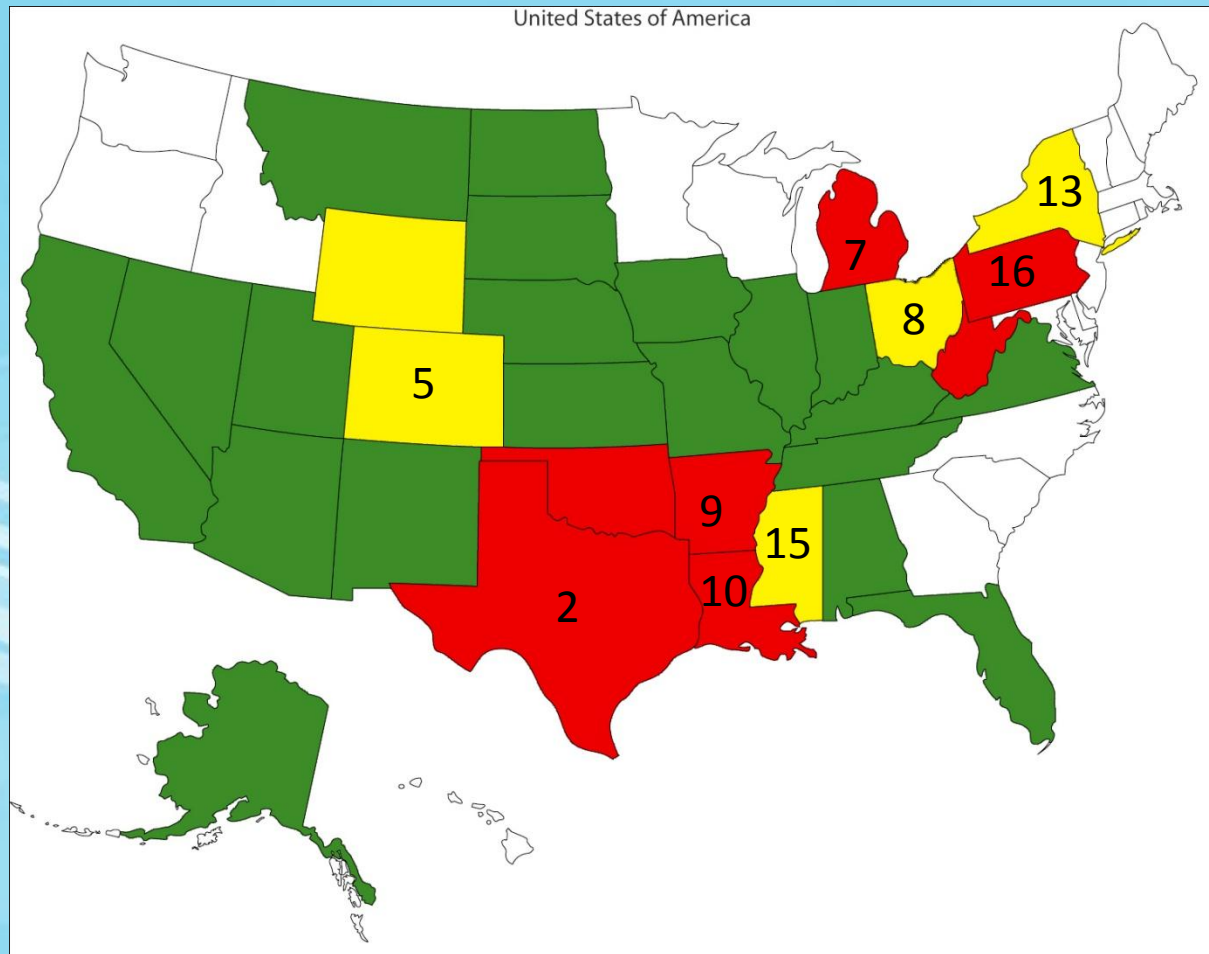
Emerging Shale Gas Development



Development Years



Rank: Total Ground Water Withdrawal (USGS, 2005)

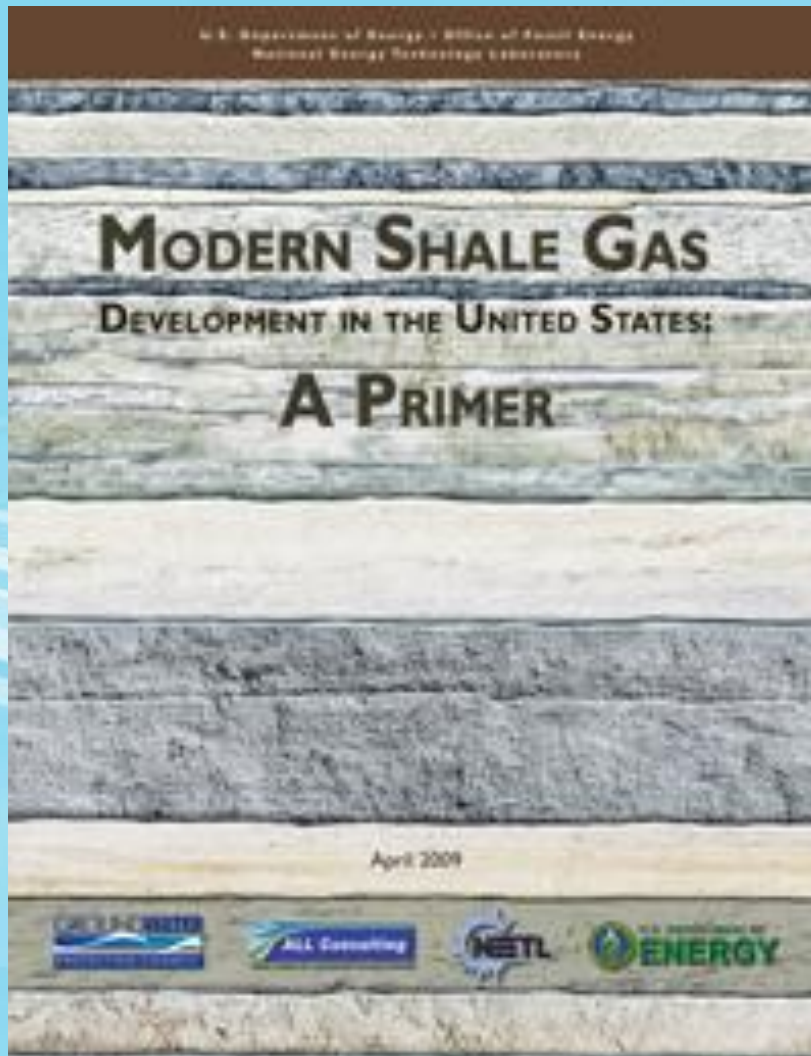


Regulatory Framework

- Federal
- Regional
- State
- Local



Reference



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Issues of Scale

- Storm water management
- Water withdrawals
- Surface management of fluids/ additives
- Large volume hydraulic fracturing stimulations
- Management/ disposal of produced water returns

Storm Water Management



The federal CWA prohibits discharges of contaminated storm water into “Navigable Waters”

States manage by;

- Requiring site development plans,
- Storm water and erosion control BMPs, and
- Enforcing surface water quality standards

Water Withdrawals



2-6 million gallons per treatment

< 1.0% total usage

Regional, State and Local
Agencies regulate by:

- Registration
- Reporting
- Impact analysis



Surface Storage



Large Volume Stimulations

Traditional Ohio stimulation:
100,000 gallons



Large volume stimulation



Protections:

- Multiple layers of cemented casing
- Pre-stimulation equipment tests
- Pre-stimulation casing integrity test
- Annular pressure monitoring

Produced Water Management

Methods:

- Class II injection (SDWA)
- Treatment and surface discharge (CWA)
- Re-use



Class II Injection wells

170,000 nationwide

30 years: 720 billion barrels disposed

Risk Based Data Management System

Hydraulic Fracturing Module

- Water sources
- Water volumes
- Chemical additives by purpose, trade name, ingredients, CAS #, concentration
- Stimulations pressures and rates
- Produced water volume and fate
- Mechanical integrity assessment

FracFocus

Hydraulic Fracturing Chemical Registry:

**A Single Website with Multiple
Areas Designed to Provide
Information to the Public**

Project Objectives

► Industry Transparency/ Public Education via:

- Web interface where operators voluntarily post hydraulic fracturing chemicals;
- Web interface where public finds more information on hydraulic fracturing process:
 - Public education component
 - Fact based, layman's terms
 - FAQ's to explain the process/protections
- Well site search tool

Hydraulic Fracturing Fluid Product Component Information Disclosure

| | |
|----------------------------|--------------|
| Fracture Date: | 1/2/2010 |
| State: | Montana |
| County: | Petroleum |
| API Number: | 25-069-05420 |
| Operator Name: | Test Me Out |
| Well Name: | Well Name 1 |
| Longitude: | -123.333344 |
| Latitude: | 18.333444 |
| Long/Lat Projection: | WG84 |
| True Vertical Depth (TVD): | 12,333 |
| Total Water Volume (gal): | 5,000,000 |
| Production Type: | Oil |

Hydraulic Fracturing Fluid Composition:

| Trade Name | Supplier | Purpose | Ingredients | Chemical Abstract Service Number (CAS #) | Ingredient Concentration in Additive (% by mass)* | Ingredient Concentration in HF Fluid (% by mass)* | Comments |
|-----------------|----------|--------------------|--|--|---|---|----------|
| Water | | Carrier/Base Fluid | | | | | |
| Sand (Proppant) | | Proppant | | | | | |
| | | Surfactant | Ethanol | 64-17-5 | 45-60% | 0.0222 - 0.02939% | |
| | | | Heavy aromatic petroleum naphtha | 64742-94-5 | 25-30% | 0.012 - 0.01469% | |
| | | | Naphthalene | 91-20-3 | 0.05 | 2.45E-05 | |
| | | | 1,2,4 Trimethylbenzene | 95-63-6 | 0.01 | 4.9E-06 | |
| | | | Poly(oxo-1,2-ethanediyl), alpha-(4-nonylphenyl)-omega-hydroxy-, branched | 127087-87-0 | 0.05 | 2.45E-05 | |
| | | Friction Reducer | Hydrotreated light petroleum distillate | 64742-47-8 | 0.3 | 3.53E-05 | |
| | | Biocide | | | | | |
| | | | Proprietary | | Proprietary | Proprietary | |
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* Information is based on the maximum potential for concentration and thus the total may be over 100%

Project Status

- Operator upload site is being populated
- Public access/education component in development

Stay tuned: gwpc.org