Regulatory Framework for Shale Development in Ohio

Division of Oil & Gas Resources Management, ODNR

Licking County Energy Summit 03-22-12





On Behalf of ODNR

Director: James Zehringer

Assistant Director: Fred Shimp

Chief: Richard Simmers

Presenter: Mike McCormac





Today's Presentation

- Brief history of oil and natural gas development in Ohio
- Shale development to date
- Regulatory Framework
- Differences bet. Vertical &

Horizontal Wells

Hydraulic fracturing



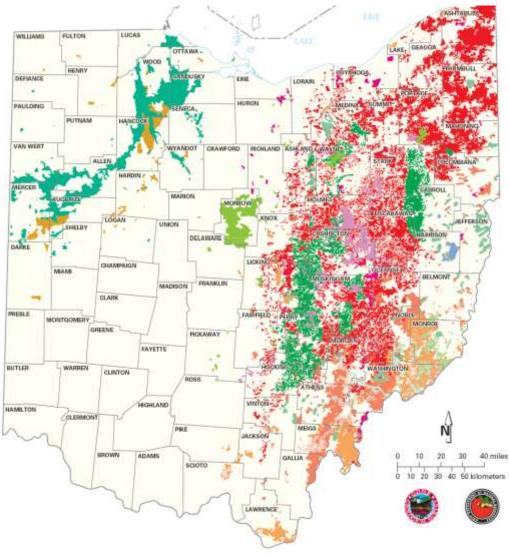
ODNR Organization Changes

Oil & Gas program became a stand alone division Oct. 1, 2011

Acknowledgement of the importance for a direct focus on oil and natural gas development, in particular, shale development



Oil and Gas Fields in Ohio



275,000 + wells drilled



Ohio's Historical Drilling Activity

Year	Wells Drilled		
1895	6,147		
1930	2,134		
1980-82	5,167 (avg)		
2008	1,087		
2010	431		
2011	460		

64,000 Well Exist in Ohio Today

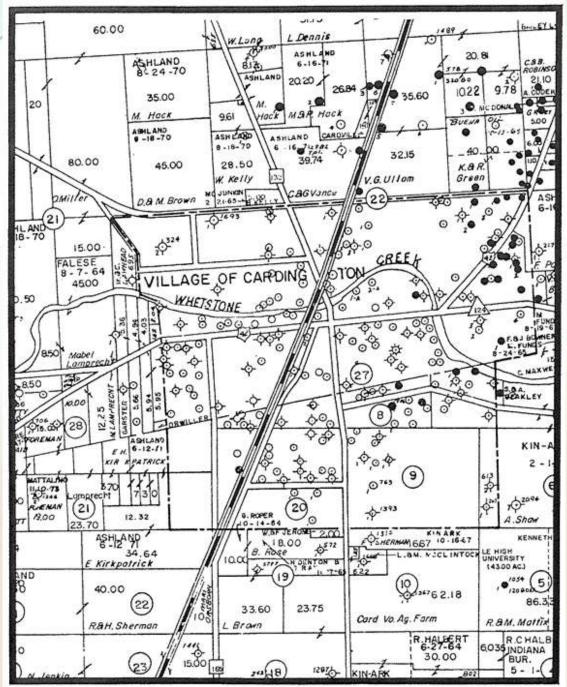


Legal Authority For The Regulation of Oil and Natural Gas Development

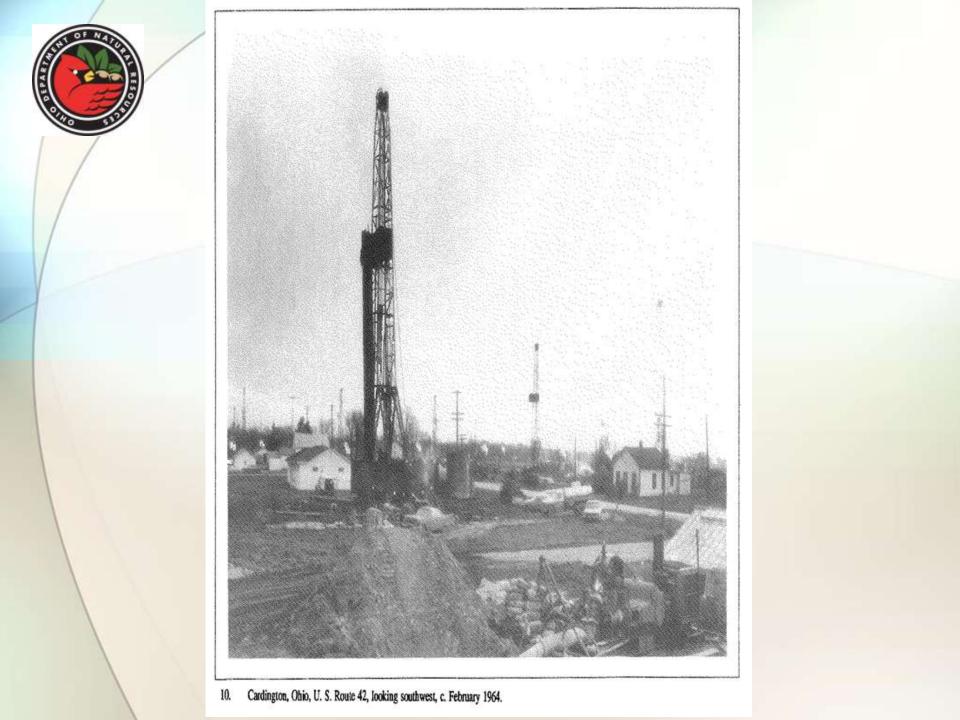
- Ohio Revised Code 1509
- Ohio Administrative Code 1501
- ORC 1509 effective in 1965:
- Major changes in 1985, 2004 and 2010

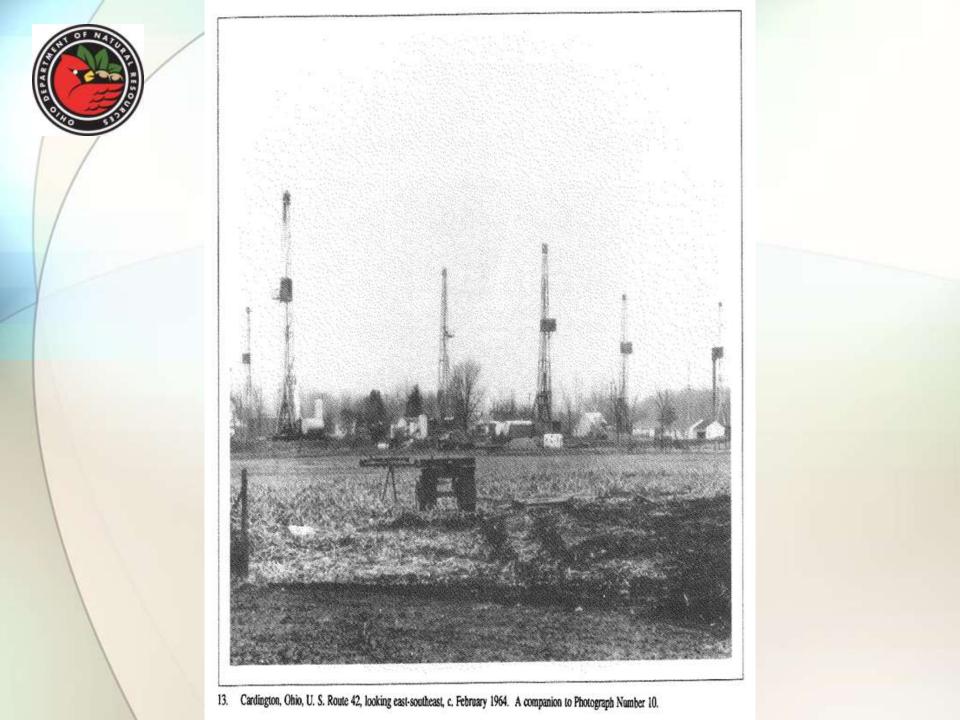
The Division has sole authority over the permitting, location and production of oil and natural gas in Ohio.





Cardington Township, Scale: 1 Inch = 1,320 Feet, Secs. 22 & 27, Lots 8, 9 & 20, The Village Of Cardington; Example Of Map Detail At Working Scale; Midcontinent-Wood, Inc., c. 1967; Courtesy Of Exhibit Pro, Columbus, Ohio.







Basis for Oil & Gas Laws and Rules

Protection of the environment

- Conservation
- Public health & safety





Permit Conditions -Examples

- Pre-site review
- As drilled surveys



Shale Development in the United States and Ohio

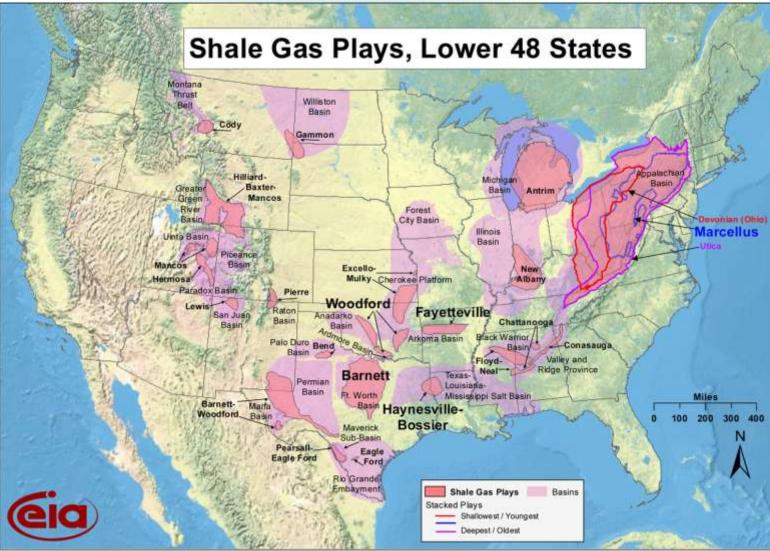


Application of Two Established Technologies

- Directional Drilling
- Hydraulic Fracturing

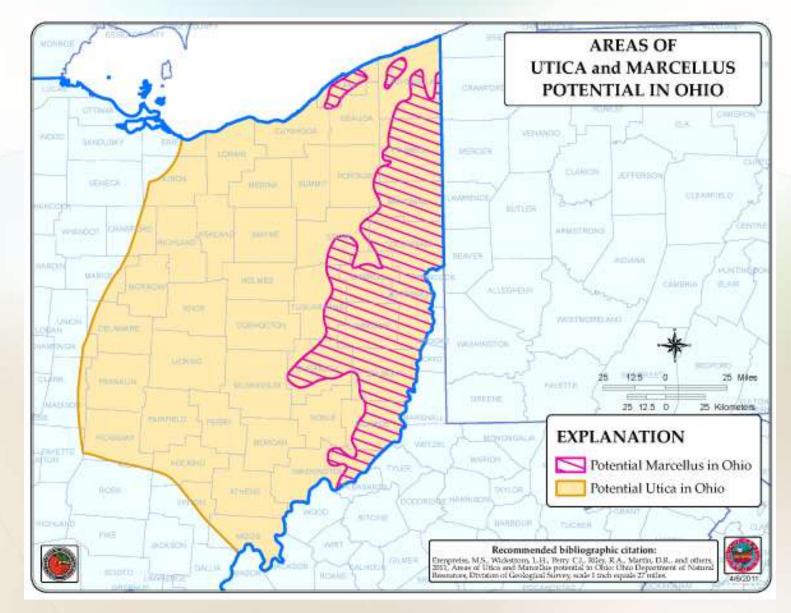


Location of Shale Development





Utica and Marcellus Shale





The Game Changer

 The Utica Shale may contain significant quantities of natural gas liquids

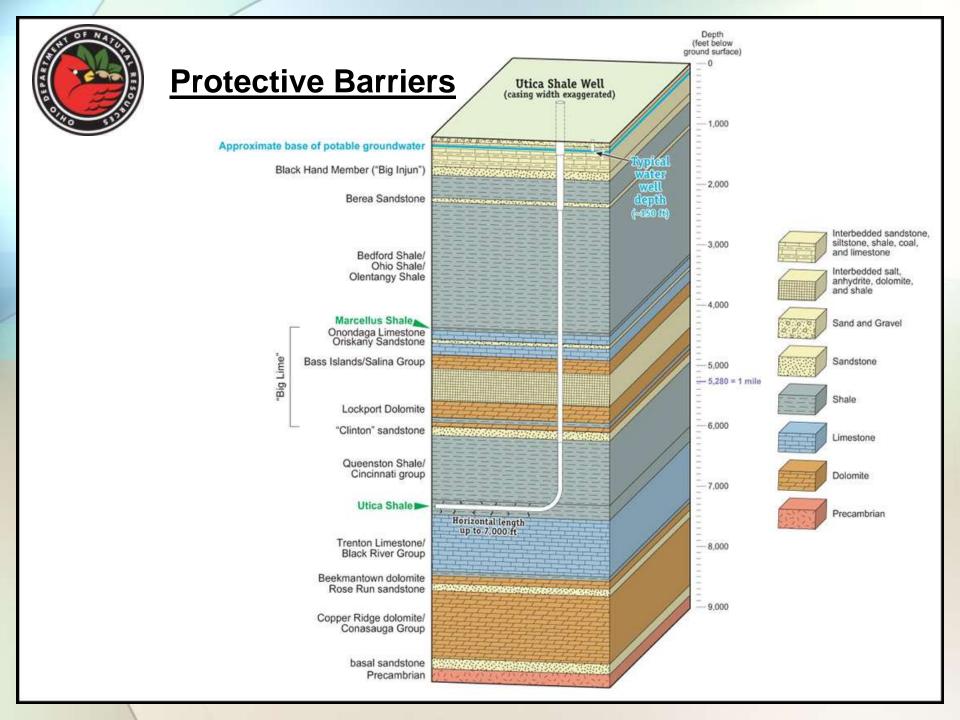
 It appears the liquids potential increases as you move westward toward central Ohio



Shale – Possible Productive Extent

- Geologically: 40 + counties
- 10,000,000 + acres
- 14,000 + sq mi

Productive areas - still being defined





Marcellus Shale Drilling in Ohio through 03/04/12

- Horizontal Permits
 Issued: 13
- Horizontal Wells
 Drilled: 7

No Change for weeks





Utica Shale Drilling in Ohio through 03/11/12

- Horizontal permits
 issued: 159
- Horizontal wells
 drilled: 50
- Producing wells: 7





ODNR Division of Oil and Gas Resources Management - Oil and Gas

Oil & Gas

Shale Development

Coal Mining

Industrial Minerals

Mine Safety

Abandoned Mine Land

FAQs

- About Oil and Gas

- Leasing and Drilling

Public Information

- Shale Development Activity

& Web Resources - Shale Development Fact

Sheets

- Best Management Practices for Pre-Drilling Water Sampling

- Protecting Groundwater

- Senate Bill 165 Updates

- Material Safety Data Sheets (MSDS)

Oil and Natural Gas Well and Shale Development Resources

Effective immediately, the vertical permits (stratigraphic test well permits) have been removed from this listing. In the initial phases of both Marcellus and Utica exploration, they were listed to reflect exploratory activity. They are no longer necessary with the increase of horizontal permitting activity. As always, they are available through the Oil & Gas On-line Well Search.

The following table reflects the shale activity to date.

Marcellus Shale - Weekly Permitting Activity

Marcellus Shale - Ohio Activity (for week of 3/4/2012) View Spreadsheet View PDF

Horizontal Permits: 13

Horizontal Wells Drilled: 7

Recent* Utica Shale - Ohio Activity (for week of 3/4/2012) View Spreadsheet View PDF

Horizontal Permits: 150 Horizontal Wells Drilled: 50 * permits issued since December 2009

Recent* Utica Shale - Weekly Permitting Activity (for week of 3/4/2012) View PDF

The following link provides a listing of web resources (with hyperlinks) that explain or depict the process receiving attention in Ohio, Pennsylvania, New York, West Virginia and in the other shale development regions across the United States.

Public Web Resources

(for week of 3/4/2012)

View PDF

Click Here To Enter Your Content

Ohio Department of Natural Resources - Division of Oil and Gas Resources Management

UTICA/POINT PLEASANT SHALE WELLS - WEEK OF 3/11/2012

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Where in Ohio - Now

Carroll	Noble
Columbiana	Ashland
Guernsey	Stark
Jefferson	Knox
Mahoning	Tuscarawas
Belmont	Medina
Harrison	Geauga
Monroe	Portage
Muskingum	



Shale Companies Currently in Ohio

- Chesapeake
- Devon Energy
- Enervest
- Anadarko E&P
- Gulfport Energy
- CNX Gas

- Hess Ohio Resources
- HG Energy
- Eclipse Resources
- > XTO Energy Inc.
- ≻R E Gas Dev.



What to Expect

2012 - steady drilling growth & infrastructure building:
 200 Shale wells will be drilled

2013 - exponential drilling growth

2014 - drilling at maximum until...?



Differences Between a Horizontal Well and Traditional Vertical Well

- Everything is bigger It takes longer
 - Well site 3-5 acres vs. 1-2 acres
 - Shale rig is much larger
 - Associated equipment more of it



Carroll County - Utica Shale Horizontal Drilling



Differences Between a Horizontal Well and Traditional Vertical Well

- One month/well to drill vs. one week
- 6 or more wells can be drilled from one well site pad
- \$5 million (and higher) vs. \$400,000

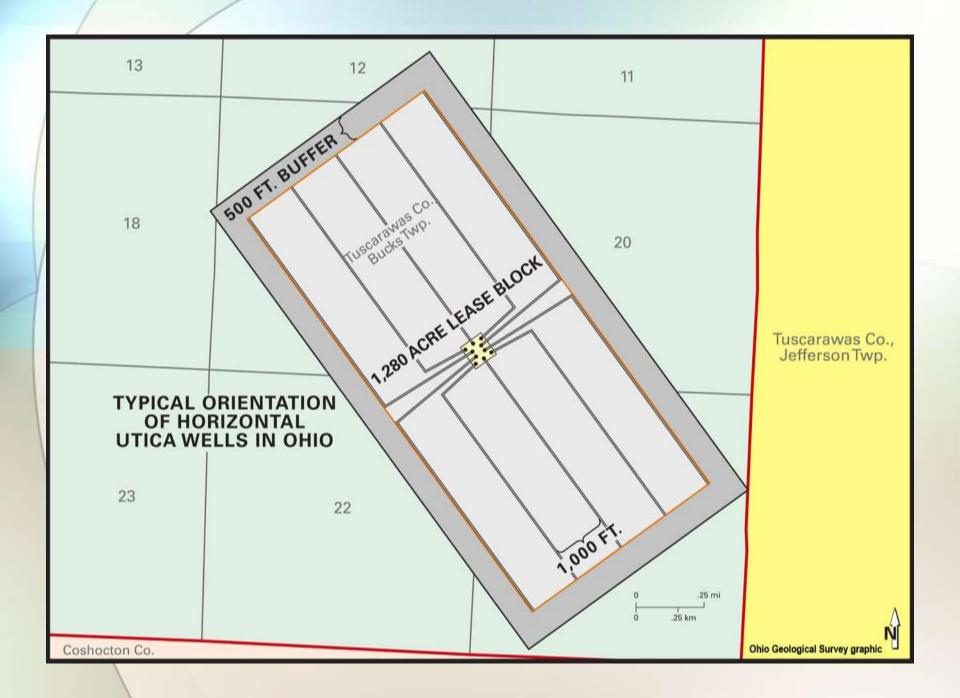
	Spacing	Categories	
Depth	Acres	Unit Lines	Distance Bet. Wells
0 to 1,000'	1	100'	200 '
1 to 2K	10	230'	460'
2 to 4K	20	300'	600'
4,000 +	40	500'	1,000'



Minimum Acreage Needed for a One Mile Horizontal Well



6,280' * 1,000'/43,560 = 144.16 acres





Positive Change: Increased Staffing Ability to Oversee the Coming Shale Activity

Current FTE: 53 Within 16 Months: **150 FTE** Focus of expansion: Field staff **Boots-on-the-ground**





Positive Change Cont.:

Enhancement of current regulations

- > Well construction rules
- Injection Well
- Coordination between state agencies – unlike any time over the last 30+ years (OEPA, Dept. Health PUCO, Commerce, Ohio EMA, Dept. Pub Safety.....)



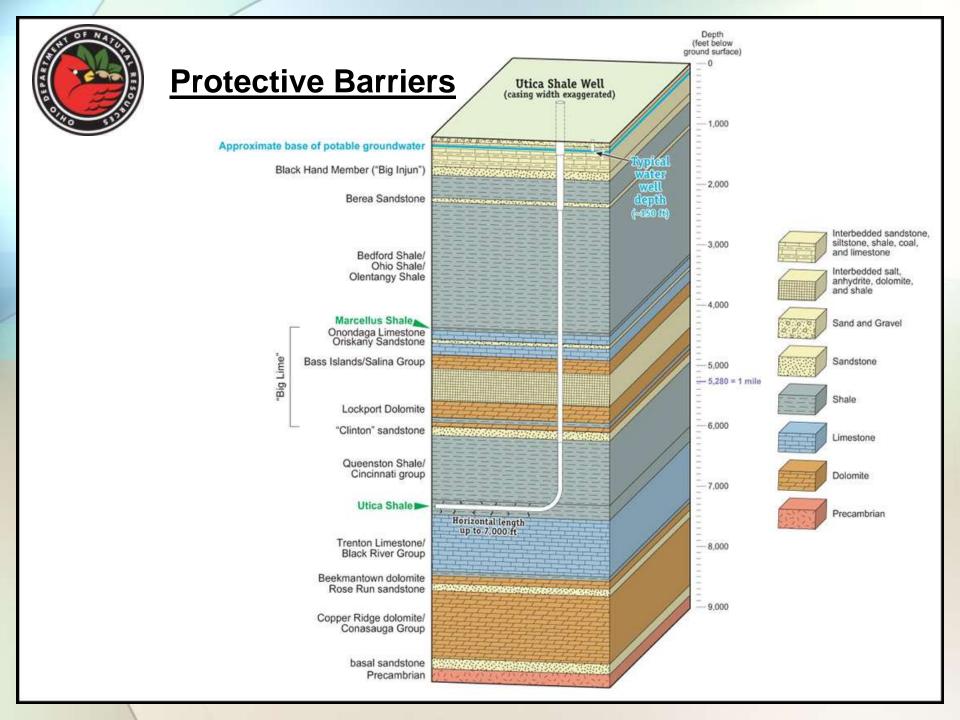
Positive Change Cont.:

Enhancement of current regulations

- Spill Prevention (SPCC) Rules
- > Pipeline development close coordination with PUCO
- Coordination between other ODNR Divisions (Geo. Survey. Wildlife, Soil and Water, Engineering)



Positive Change Cont.: Coordination with other states active with shale development across the nation – lessons learned We are ahead of the coming increased shale drilling activity





Proper Well Construction

Well construction rules

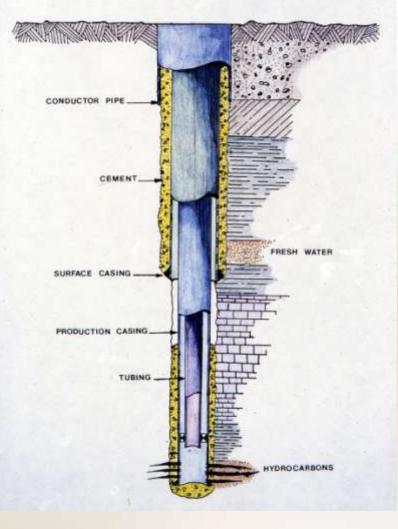
- Requires operators to set and cement surface casing to isolate and protect all Underground Sources of drinking Water
- Fresh water based drilling system



GROUNDWATER PROTECTION WELL CONSTRUCTION

WELL CASING

Surface casing set at least 50 feet below the USDW
Protect up to 10,000 ppm TDS





Proper Well Construction

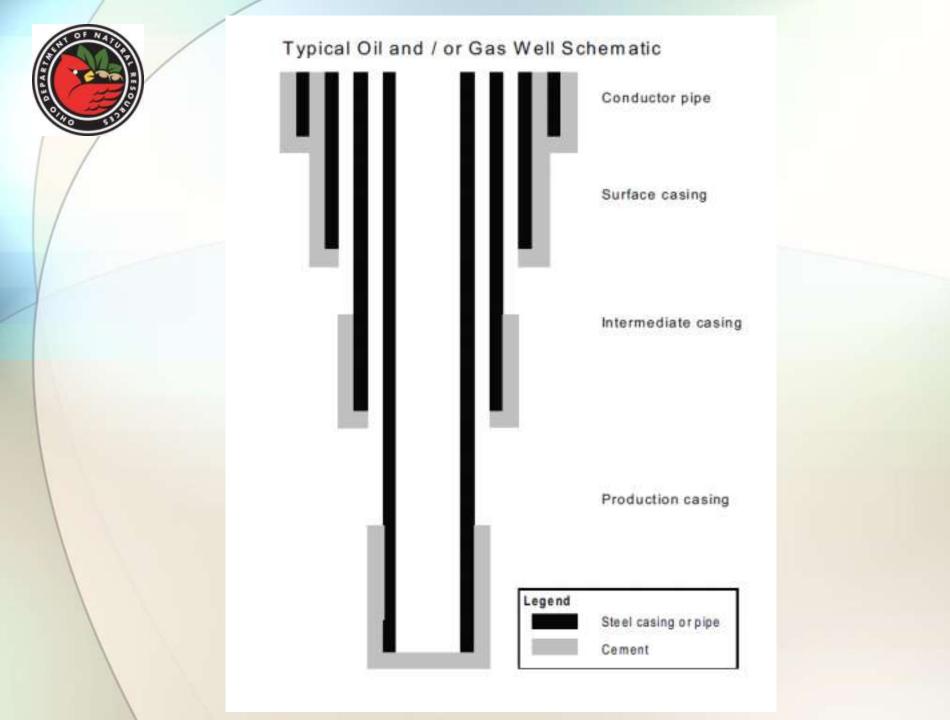
Requires operators notify the O & G inspector at least 24 hours prior to every cement job



Proper Well Construction

Casing

- Multiple cemented casing strings to protect groundwater
- Conductor, Surface, Intermediate, Production







"Fracking"

"Fracing"

"Hydrofracing"



"Well Stimulation"

"Frac Wells" [no such thing]



A process of using water, sand and chemicals under pressure to fracture a geologic formation to create pathways for oil and natural gas to migrate back to the wellbore

 Without hydraulic fracturing, few oil/gas producing reservoirs in Ohio would be economically viable



Is this a new process ?

- No
- Developed in Texas oilfields in the 1940's
- Used in Ohio since the 1950's
- 80,000 + wells in Ohio have been hydraulically fractured
 - 1,000,000+ across the nation



"Hydraulic Process Used In **Developing New Oil Well On Rohrer Farm**"

September 3, 1954

East Sparta July 1952



ped by the Standard OH Com-

pumping of oil, in which is mixed

sure produces cracks in the under-

oil mixture flows into these open-

cracks expanded thus allowing the

ground rocks and the sand and the sand and another fed the sand

Later the oil in removed led by the Halliburton company,

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Following the fracturing and 1,200 barrels of oil were used. cass of last Thursday the well. pany of Indiana, involves the This required days of preparation Can in hauling in the oil, erecting the was closed, until Monday of this finit coarse sand, into the well under tanks for storage, etc. Three week at which time it was onen-Mun a terrific pressure. This pree-large trucks pumped oil during ed. laice the operation, two others handled

Bray It was reported that there was Taw into the oil. This work was handa flow of oil but recordings are kept over a period of time and Hast leaving the sand to keep the working out of Zanesville, Ohio, until the oil is returned which DAT whose equipment specializes in was pumped into the well no deand natoral of supply to flow to the this process the world over. The finite indication as to the natural well. In some instances it is pos- equipment involved in the process flow will be available. sible to extend these cracks a dis- at this one well was valued in ex-M:



MYTHS ABOUT HYDRAULIC FRACTURING

- There is a lot of misinformation regarding hydraulic fracturing
- You cannot propagate fractures back to the surface or to aquifers
- 700 + Chemicals used on each hydraulic fracture





Chemicals Used in Hydraulic Fracturing

Product

Purpose

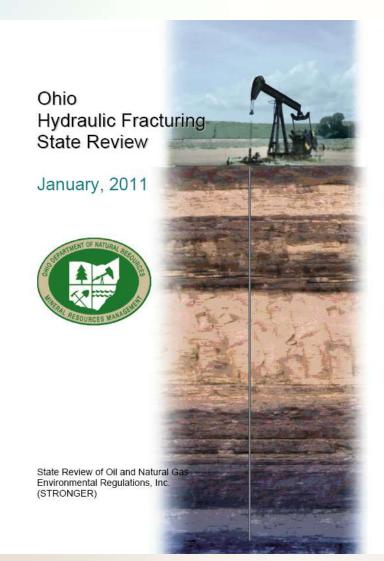
Acids	Dissolve minerals and initiate cracks
Friction reducers	Minimize friction
Scale inhibitors	Prevents scale deposits
Surfactants	Increase viscosity
Biocides	Eliminates bacteria
Clay stabilizers	Prevents swelling
Breakers	Delays breakdown of gel
Crosslinker	Viscosity control

Jefferson County Hydraulic Fracture 12-19-11

	Water	85.99% (4.04 mill gal)
	Sand	12.91% sand
	Acid	0.4% HCL
	Friction Reducer	0.109%
	Scale inhibitor	0.001%
	Gelling+Ph agent	0.3295%
products and 32 sub-products including sand and water, <i>not</i>	Biocides	0.01%
	Clay stabilizers	0.10%
	Breakers	0.0045%
	Crosslinkers	0.058%



January 2011 the "Ohio Hydraulic Fracturing State Review" report was released by State Review of Oil and Natural Gas Regulations, Inc. (STRONGER)



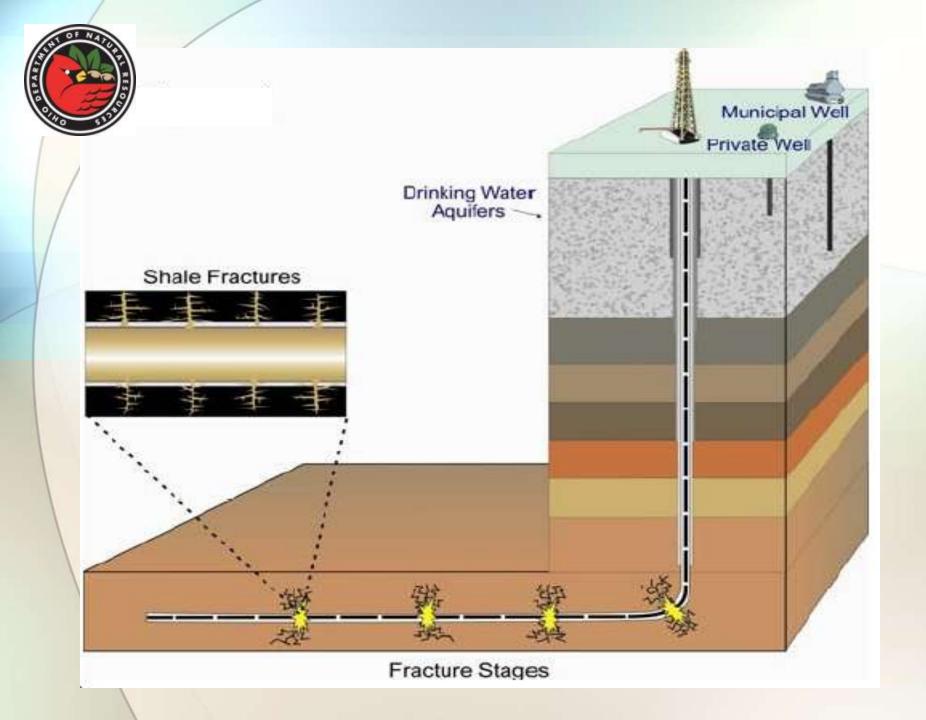


 Eight industry, regulatory, and environmental officials reviewed
 Ohio's hydraulic fracturing
 regulatory program and found:



"Ohio's program is overall:

- well-managed
- professional and;
- is meeting it's program objectives."







Other Important Considerations

- Proper Fluid Containment
- Proper Fluid Disposal



Disposal of Waste

- Brine
- Flow-back Fluids



Disposal of Oil-Field Wastes by Class II Injection

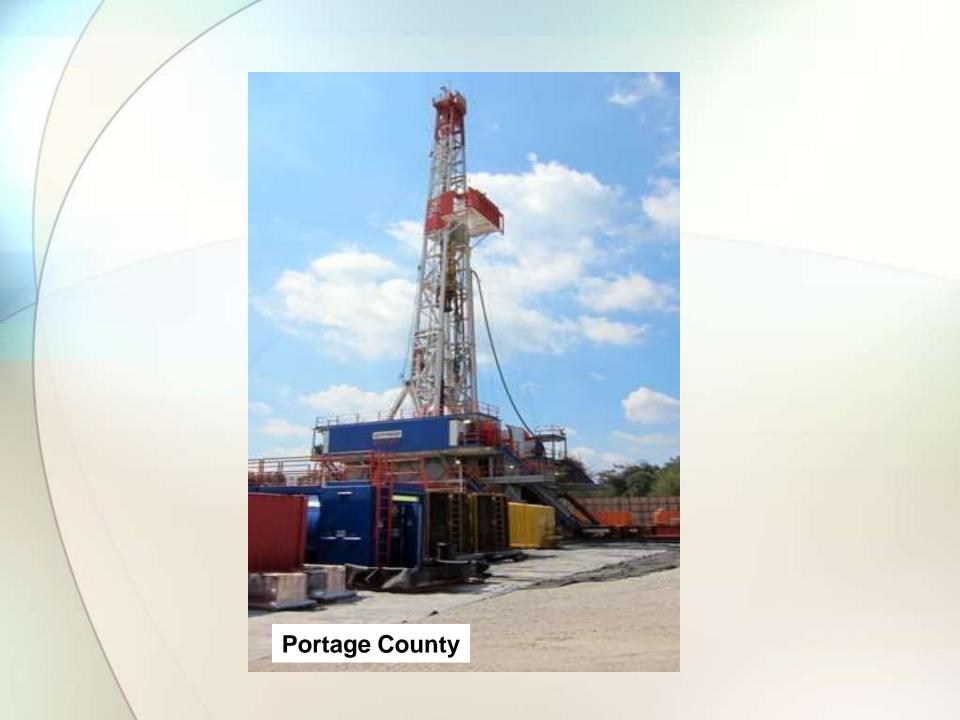
- Under a primacy agreement with
 USEPA Since the early 1980's
- Ohio's laws and rules for underground injection are as stringent or more so than the USEPA



What to Expect – A Visual Depiction



02/13/2012 16:23







Harrison County – First Productive Utica Shale Well

Section 2



Spill Prevention Controls Harrison County

RB31162ML

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Guernsey County Pad Development



