# 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



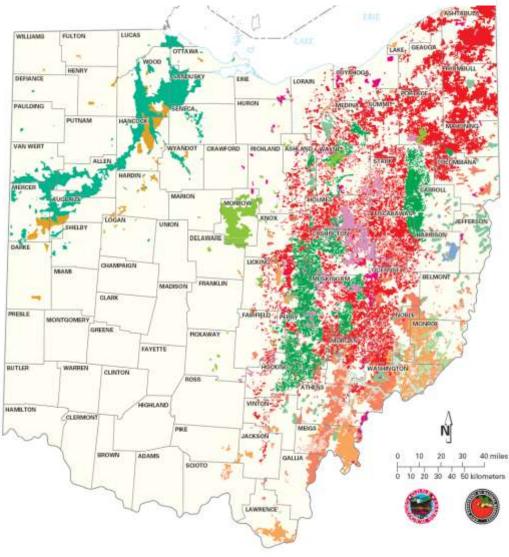
# ODNR Organization Changes

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

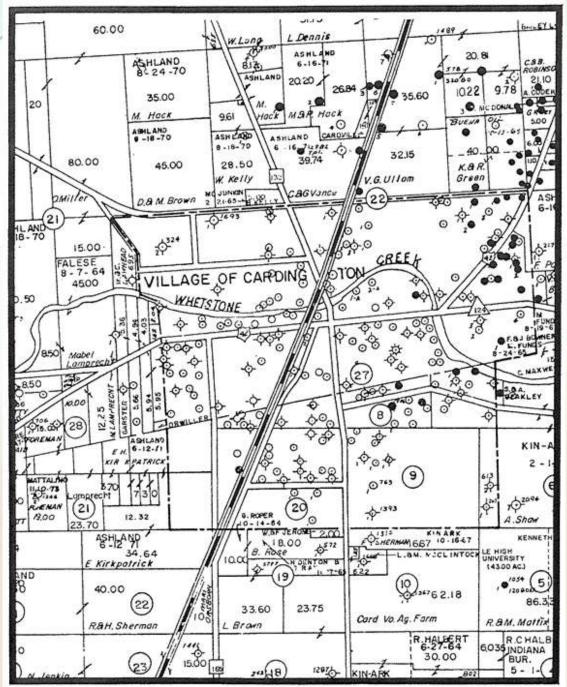


Legal Authority For The Regulation of Oil and Natural Gas Development

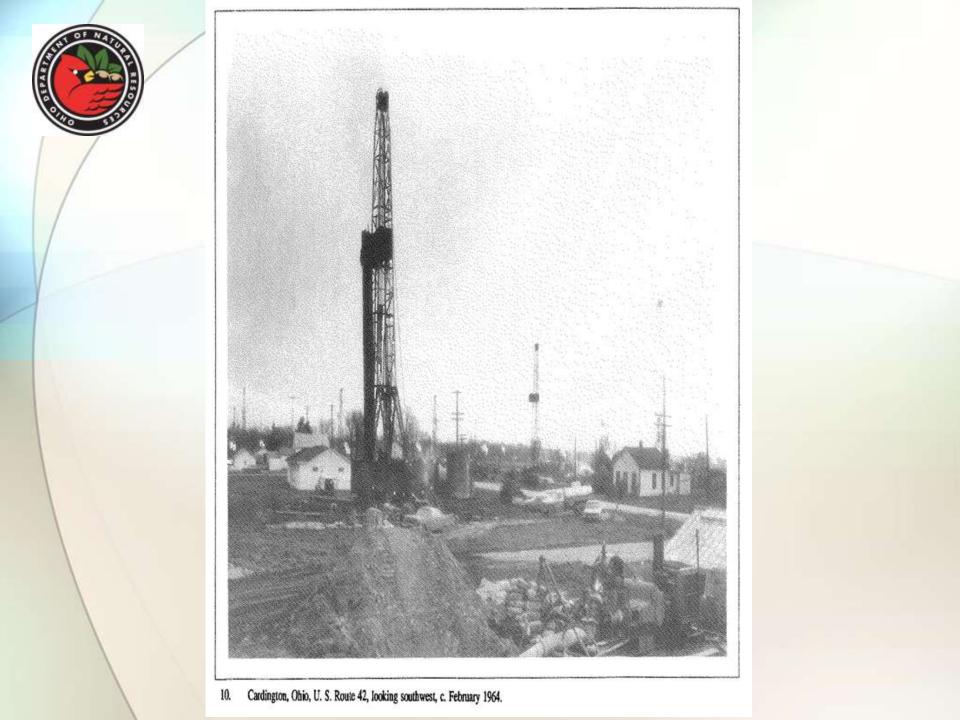
- Ohio Revised Code 1509
- Ohio Administrative Code 1501
- ORC 1509 effective in 1965:
- Major changes in 1985, 2004 and 2010

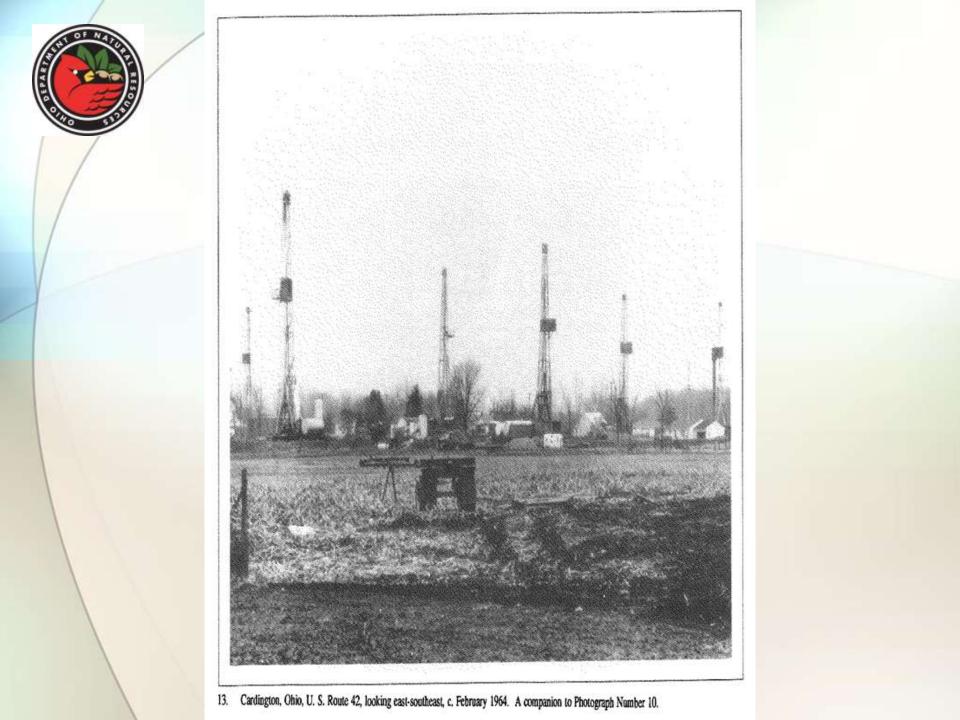
The Division has sole authority over the permitting, location and production of oil and natural gas in Ohio.





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

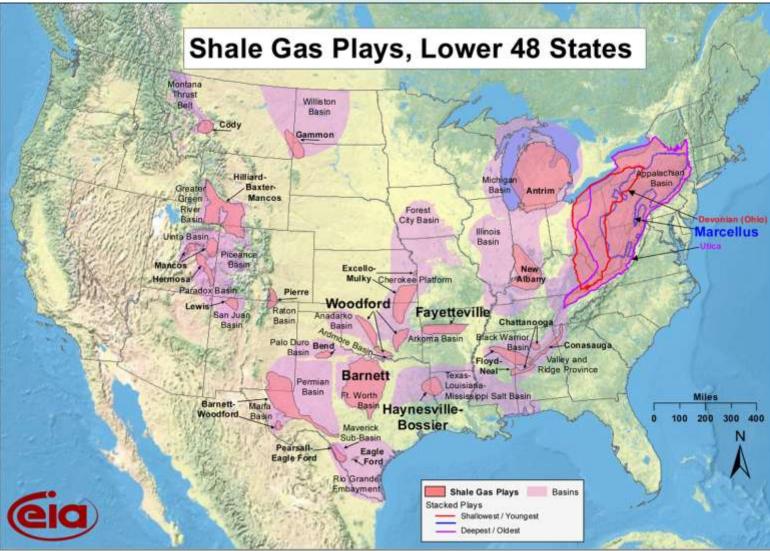


# Application of Two Established Technologies

- Directional Drilling
- Hydraulic Fracturing

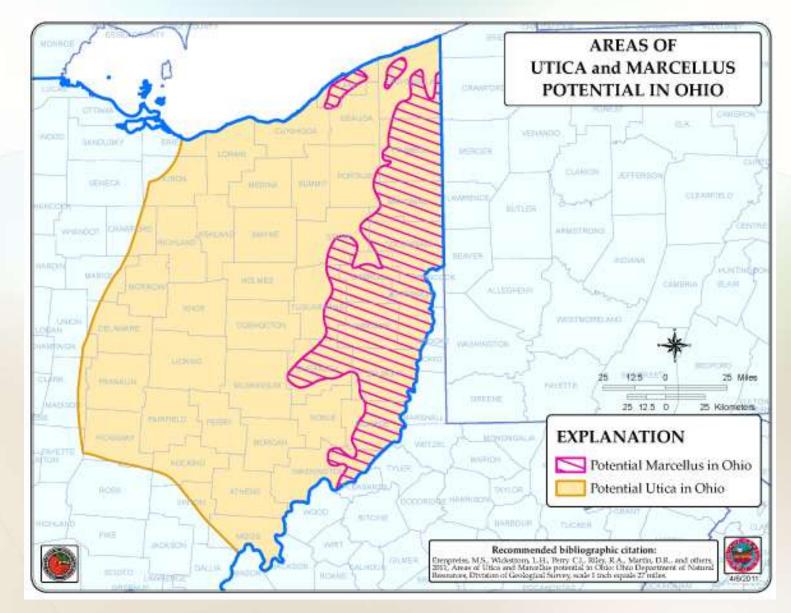


#### **Location of Shale Development**





#### **Utica and Marcellus Shale**





# **The Game Changer**

 The Utica Shale may contain significant quantities of natural gas liquids

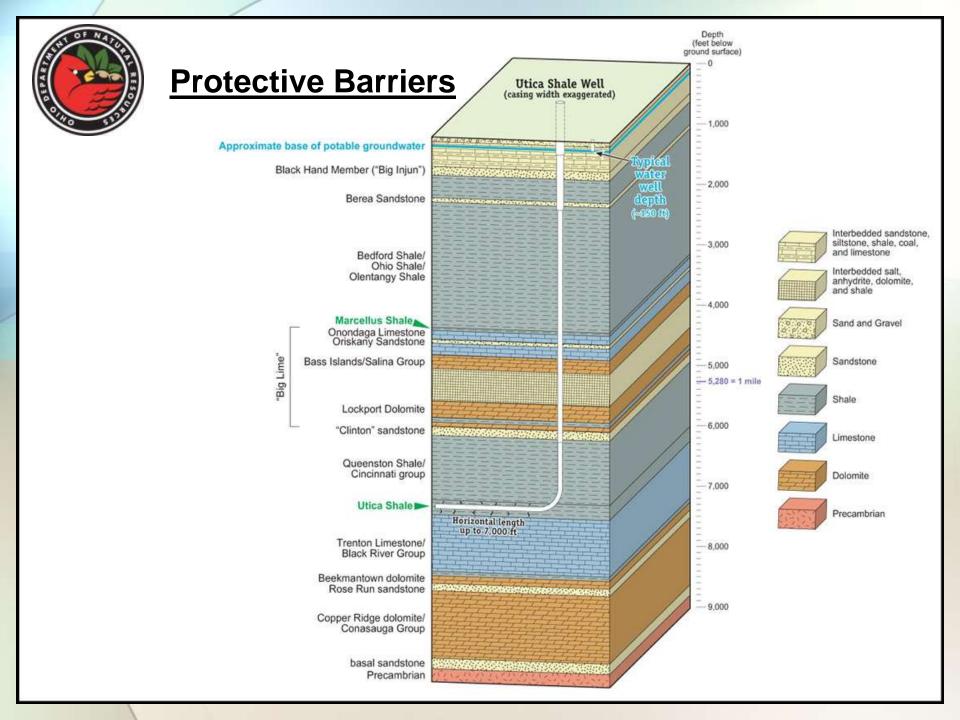
 It appears the liquids potential increases as you move westward toward central Ohio



# 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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In Transit       2       0         Total       13       8         252011       Carroll       Perry       34019221050000       Driling       Horizontal       Onesapeake Exploration LLC       Sootdy 11:3-5.6H       Intermediate string set.         252012       Carroll       Perry       3401922109000       Driling       Horizontal       Onesapeake Exploration LLC       Sootdy 11:3-5.6H       Intermediate string set.         252012       Carroll       Lee       34019220970000       Drilled       Horizontal       Onesapeake Exploration LLC       Sootdy 11:3-5.7H       Wating to frax well.         1742011       Carroll       Lee       3401922080000       Drilled       Horizontal       Onesapeake Exploration LLC       Snoddy 11:3-5.7H       Wating to frax well.         1742011       Carroll       Lee       3401922080000       Drilled       Horizontal       Onesapeake Exploration LLC       Houyouse 15:13-5 8H       Wating to frax well.         1742011       Carroll       Lee       34019221000000       Drilled       Horizontal       Onesapeake Exploration LLC       Houyouse 15:13-5 8H       Wating to frax well.         282011       Carroll       Lee       34019221000000       Drilled       Horizontal       Onesapeake Exploration LLC       Houyouse 15:13-5 8H	In Transit       2       0         Total       13       8         2011       Carrol       Lee       34018221050000       Driling       Horizontal       Chesapeake Exploration LLC       Stodty 11-35-6H       Intermediate string set.         20211       Carrol       Lee       34018221190100       Driling       Horizontal       Chesapeake Exploration LLC       Stodty 11-35-6H       Intermediate string set.         20212       Carrol       Lee       34018221190100       Driling       Horizontal       Chesapeake Exploration LLC       Stodty 11-35-5H       Wating to frac well.         20211       Carrol       Lee       34018220870000       Drilled       Horizontal       Chesapeake Exploration LLC       Stoddy 11-13-5 5H       Wating to frac well.         20211       Carrol       Lee       34018220880000       Drilled       Horizontal       Chesapeake Exploration LLC       Horizontal       Chesapeake Exploration LLC       Horizontal       Chesapeake Exploration LLC       Horizontal       Newalesee         20211       Carrol       Lee       34018220880000       Drilled       Horizontal       Chesapeake Exploration LLC       Horizontal       Nesapeake Exploration LLC       Horizontal       Nesapeake Exploration LLC       Horizontal       Nesapeake Exploration LLC       Hor		_							izontal permits issued this week
Total       13       8         V152011       Caroli       Lee       34019221050000       Driling       Horizontal       Chesapeake Exploration LLC       Soddy 11-3-5.6H       Intermediate string set.         25/2012       Caroli       Perry       3401922109000       Driling       Horizontal       Chesapeake Exploration LLC       Soddy 11-3-5.6H       Intermediate string set.         131/2011       Caroli       Lee       3401922090000       Drilled       Horizontal       Chesapeake Exploration LLC       Soddy 11-3-5.6H       Waiting to frac well.         131/2011       Caroli       Lee       34019220900000       Drilled       Horizontal       Chesapeake Exploration LLC       Snoddy 11-3-5.6H       Waiting to frac well.         131/2011       Caroli       Lee       34019220900000       Drilled       Horizontal       Chesapeake Exploration LLC       Snoddy 11-3-5.6H       Waiting to frac well.         128/2011       Caroli       Lee       34019220900000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5.0H       Waiting to frac well.         128/2011       Caroli       Lee       34019221000000       Drilled       Horizontal       Chesapeake Exploration LLC       Blouyouse 15-13-5.0H       Waiting to frac well.         1302011	Total       13       8         2011       Carroll       Lee       34019221050000       Drilling       Horizontal       Chesapeake Exploration LLC       Stoody 11-35 6H       Intermediate string set.         2012       Carroll       Perry       34019221050000       Drilling       Horizontal       Chesapeake Exploration LLC       Stoody 11-35 6H       Intermediate string set.         2011       Carroll       Lee       34019220870000       Drilled       Horizontal       Chesapeake Exploration LLC       Stoody 11-135 5H       Wating to frac well.         2011       Carroll       Lee       34018220870000       Drilled       Horizontal       Chesapeake Exploration LLC       Stoody 11-135 5H       Wating to frac well.         2011       Carroll       Lee       34018220890000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 0H       Wating to frac well.         2011       Carroll       Lee       34018221000000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 0H       Wating to fac well.         2011       Carroll       Lee       34018221000000       Drilled       Horizontal       Chesapeake Exploration LLC       Baley 35-1254 1H       On site to fac.         2011       Carroll       <	_	Dr							
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25/2012       Carroll       Perry       34019221190100       Drilling       Horizontal       Chesapeake Exploration LLC       Socit 24-12-15 3H       Drilling lateral.         131/2011       Carroll       Lee       34019220970000       Drilled       Horizontal       Chesapeake Exploration LLC       Snoddy 11-13-5 5H       Waiting to frac well.         131/2011       Carroll       Lee       34019220980000       Drilled       Horizontal       Chesapeake Exploration LLC       Snoddy 11-13-5 1H       Waiting to frac well.         1/24/2011       Carroll       Lee       3401922080000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 1H       Drillegiateral.         1/26/2011       Carroll       Lee       3401922080000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 0H       Waiting to frac well.         1/26/2011       Carroll       Lee       34019221000000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 0H       Waiting to frac well.         1/30/2011       Carroll       Lee       34019221000000       Drilled       Horizontal       Chesapeake Exploration LLC       Bailey 35-1254 3H       On site to frac.         1/30/2011       Carroll       Lee       34019221030000	2012       Carroll       Perry       34019221190100       Drilling       Horizontal       Chesapeake Exploration LLC       Scott 24-12-15 3H       Drilling lateral.         //2011       Carroll       Lee       34019220970000       Drilled       Horizontal       Chesapeake Exploration LLC       Snoddy 11-13-5 5H       Waiting to frac well.         //2011       Carroll       Lee       34019220980000       Drilled       Horizontal       Chesapeake Exploration LLC       Snoddy 11-13-5 5H       Waiting to frac well.         //2011       Carroll       Lee       34019220980000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 8H       Waiting to frac well.         //2011       Carroll       Lee       3401922100000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 8H       Waiting to frac well.         //2011       Carroll       Lee       3401922100000       Drilled       Horizontal       Chesapeake Exploration LLC       Bailey 35-1254 3H       On site to frac.         //2011       Carroll       Lee       3401922100000       Drilled       Horizontal       Chesapeake Exploration LLC       Bailey 35-1254 3H       On site to frac.         //2011       Carroll       Lee       34019221040000       Drilled	-								
25/2012       Carroll       Perry       34019221190100       Drilling       Horizontal       Chesapeake Exploration LLC       Socit 24-12-15 3H       Drilling lateral.         131/2011       Carroll       Lee       34019220970000       Drilled       Horizontal       Chesapeake Exploration LLC       Snoddy 11-13-5 5H       Waiting to frac well.         131/2011       Carroll       Lee       34019220980000       Drilled       Horizontal       Chesapeake Exploration LLC       Snoddy 11-13-5 1H       Waiting to frac well.         1/24/2011       Carroll       Lee       3401922080000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 1H       Drillegiateral.         1/26/2011       Carroll       Lee       3401922080000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 0H       Waiting to frac well.         1/26/2011       Carroll       Lee       34019221000000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 0H       Waiting to frac well.         1/30/2011       Carroll       Lee       34019221000000       Drilled       Horizontal       Chesapeake Exploration LLC       Bailey 35-1254 3H       On site to frac.         1/30/2011       Carroll       Lee       34019221030000	2012       Carroll       Perry       34019221190100       Drilling       Horizontal       Chesapeake Exploration LLC       Scott 24-12-15 3H       Drilling lateral.         //2011       Carroll       Lee       34019220970000       Drilled       Horizontal       Chesapeake Exploration LLC       Snoddy 11-13-5 5H       Waiting to frac well.         //2011       Carroll       Lee       34019220980000       Drilled       Horizontal       Chesapeake Exploration LLC       Snoddy 11-13-5 5H       Waiting to frac well.         //2011       Carroll       Lee       34019220980000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 8H       Waiting to frac well.         //2011       Carroll       Lee       3401922100000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 8H       Waiting to frac well.         //2011       Carroll       Lee       3401922100000       Drilled       Horizontal       Chesapeake Exploration LLC       Bailey 35-1254 3H       On site to frac.         //2011       Carroll       Lee       3401922100000       Drilled       Horizontal       Chesapeake Exploration LLC       Bailey 35-1254 3H       On site to frac.         //2011       Carroll       Lee       34019221040000       Drilled	-								
25/2012       Carroll       Perry       34019221190100       Drilling       Horizontal       Chesapeake Exploration LLC       Socit 24-12-15 3H       Drilling lateral.         131/2011       Carroll       Lee       34019220970000       Drilled       Horizontal       Chesapeake Exploration LLC       Snoddy 11-13-5 5H       Waiting to frac well.         131/2011       Carroll       Lee       34019220980000       Drilled       Horizontal       Chesapeake Exploration LLC       Snoddy 11-13-5 1H       Waiting to frac well.         1/24/2011       Carroll       Lee       3401922080000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 1H       Drillegiateral.         1/26/2011       Carroll       Lee       3401922080000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 0H       Waiting to frac well.         1/26/2011       Carroll       Lee       34019221000000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 0H       Waiting to frac well.         1/30/2011       Carroll       Lee       34019221000000       Drilled       Horizontal       Chesapeake Exploration LLC       Bailey 35-1254 3H       On site to frac.         1/30/2011       Carroll       Lee       34019221030000	2012       Carroll       Perry       34019221190100       Drilling       Horizontal       Chesapeake Exploration LLC       Scott 24-12-15 3H       Drilling lateral.         //2011       Carroll       Lee       34019220970000       Drilled       Horizontal       Chesapeake Exploration LLC       Snoddy 11-13-5 5H       Waiting to frac well.         //2011       Carroll       Lee       34019220980000       Drilled       Horizontal       Chesapeake Exploration LLC       Snoddy 11-13-5 5H       Waiting to frac well.         //2011       Carroll       Lee       34019220980000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 8H       Waiting to frac well.         //2011       Carroll       Lee       3401922100000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 8H       Waiting to frac well.         //2011       Carroll       Lee       3401922100000       Drilled       Horizontal       Chesapeake Exploration LLC       Bailey 35-1254 3H       On site to frac.         //2011       Carroll       Lee       3401922100000       Drilled       Horizontal       Chesapeake Exploration LLC       Bailey 35-1254 3H       On site to frac.         //2011       Carroll       Lee       34019221040000       Drilled	-								
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V31/2011       Carroll       Lee       34019220980000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 1H       Drilling lateral.         V26/2011       Carroll       Lee       34019220980000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 1H       Drilling lateral.         V26/2011       Carroll       Lee       34019220980000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 8H       Waiting to frac well.         V25/2011       Carroll       Lee       34019221020000       Drilled       Horizontal       Chesapeake Exploration LLC       Houyouse 15-13-5 6H       Waiting to frac well.         /30/2011       Carroll       Lee       34019221020000       Drilled       Horizontal       Chesapeake Exploration LLC       Bailey 35-1254 1H       On site to frac.         /30/2011       Carroll       Lee       34019221030000       Drilled       Horizontal       Chesapeake Exploration LLC       Bailey 35-1254 3H       On site to frac.         /30/2011       Carroll       East       34019221030000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 6H       Waiting to frac well.         20/2011       Carroll       Lee       3401922090000 <td< td=""><td>V2011CarrollLee34019220980000DrilledHorizontalChesapeake Exploration LLCSnoddy 11-13-5 1HWaiting to frac well.V2011CarrollLee34019220980000DrilledHorizontalChesapeake Exploration LLCHouyouse 15-13-5 1HDrilling lateral.V2011CarrollLee34019220980000DrilledHorizontalChesapeake Exploration LLCHouyouse 15-13-5 8HWaiting to frac well.V2011CarrollLee34019221020000DrilledHorizontalChesapeake Exploration LLCHouyouse 15-13-5 8HWaiting to frac well.V2011CarrollLee34019221020000DrilledHorizontalChesapeake Exploration LLCBailey 35-1254 1HOn site to frac.V2011CarrollLee34019221030000DrilledHorizontalChesapeake Exploration LLCBailey 35-1254 3HOn site to frac.V2011CarrollEast34019221030000DrilledHorizontalChesapeake Exploration LLCBuoey 21-14-4 6HWaiting to frac well.V2011CarrollEast3401922090000DrilledHorizontalChesapeake Exploration LLCBuoey 21-14-4 6HWaiting to frac well.V2011CarrollLee3401922090000DrilledHorizontalChesapeake Exploration LLCBuoey 21-14-4 6HWaiting to frac well.V2011CarrollLee3401922090000DrilledHorizontalChesapeake Exploration LLCWhite 17-13-5 3HWaiting to frac well.V2011CarrollLee3</td><td>/15/2011</td><td></td><td>Lee</td><td>13</td><td>¥</td><td></td><td>8 Chesapeake Exploration LLC</td><td></td><td></td></td<>	V2011CarrollLee34019220980000DrilledHorizontalChesapeake Exploration LLCSnoddy 11-13-5 1HWaiting to frac well.V2011CarrollLee34019220980000DrilledHorizontalChesapeake Exploration LLCHouyouse 15-13-5 1HDrilling lateral.V2011CarrollLee34019220980000DrilledHorizontalChesapeake Exploration LLCHouyouse 15-13-5 8HWaiting to frac well.V2011CarrollLee34019221020000DrilledHorizontalChesapeake Exploration LLCHouyouse 15-13-5 8HWaiting to frac well.V2011CarrollLee34019221020000DrilledHorizontalChesapeake Exploration LLCBailey 35-1254 1HOn site to frac.V2011CarrollLee34019221030000DrilledHorizontalChesapeake Exploration LLCBailey 35-1254 3HOn site to frac.V2011CarrollEast34019221030000DrilledHorizontalChesapeake Exploration LLCBuoey 21-14-4 6HWaiting to frac well.V2011CarrollEast3401922090000DrilledHorizontalChesapeake Exploration LLCBuoey 21-14-4 6HWaiting to frac well.V2011CarrollLee3401922090000DrilledHorizontalChesapeake Exploration LLCBuoey 21-14-4 6HWaiting to frac well.V2011CarrollLee3401922090000DrilledHorizontalChesapeake Exploration LLCWhite 17-13-5 3HWaiting to frac well.V2011CarrollLee3	/15/2011		Lee	13	¥		8 Chesapeake Exploration LLC		
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/30/2011       Carroll       Lee       34019221020000       Drilled       Horizontal       Chesapeake Exploration LLC       Bailey 35-1254 1H       On site to frac.         /30/2011       Carroll       Lee       34019221030000       Drilled       Horizontal       Chesapeake Exploration LLC       Bailey 35-1254 3H       On site to frac.         /8/2011       Carroll       East       34019221030000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 5H       On site to frac.         /8/2011       Carroll       East       34019221040000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 6H       Waiting to frac well.         /8/2011       Carroll       Lee       34019220900100       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 6H       Waiting to frac well.         //4/2011       Carroll       Lee       34019220900100       Drilled       Horizontal       Chesapeake Exploration LLC       Tarner 24-124-10H       Waiting to frac well.         //14/2011       Carroll       Lee       34019220920000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 3H       Waiting to frac well.         20/2011       Carroll       Lee       34019220820000       Drilled	Vi2011       Carroll       Lee       34019221020000       Drilled       Horizontal       Chesapeake Exploration LLC       Bailey 35-1254 1H       On site to frac.         Vi2011       Carroll       Lee       34019221010000       Drilled       Horizontal       Chesapeake Exploration LLC       Bailey 35-1254 3H       On site to frac.         2011       Carroll       East       34019221030000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 5H       On site to frac.         2011       Carroll       East       34019221040000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 6H       Waiting to frac.         2011       Carroll       Lee       3401922090000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 6H       Waiting to frac.         2011       Carroll       Lee       3401922090000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 6H       Waiting to frac.         2011       Carroll       Lee       3401922090000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 3H       Waiting to frac.         2011       Carroll       Lee       34019220820000       Drilled       Horizontal       Chesape	/15/2011	Carroll Carroll Carroll Carroll Carroll	Lee Perry Lee Lee	<b>13</b> 34019221050000 34019221190100 34019220970000 34019220980000	Drilling Drilled Drilled	Horizontal Horizontal Horizontal	Chesapeake Exploration LLC Chesapeake Exploration LLC Chesapeake Exploration LLC Chesapeake Exploration LLC	Scott 24-12-15 3H Snoddy 11-13-5 5H Snoddy 11-13-5 1H	Drilling lateral. Waiting to frac well. Waiting to frac well.
30/2011       Carroll       Lee       34/019221010000       Drilled       Horizontal       Chesapeake Exploration LLC       Bailey 35-1254 3H       On site to frac.         //6/2011       Carroll       East       34/019221030000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 5H       On site to frac.         //6/2011       Carroll       East       34/019221040000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 6H       Waiting to frac well.         20/2011       Carroll       Lee       34/019220900100       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 6H       Waiting to frac well.         20/2011       Carroll       Lee       34/019220900100       Drilled       Horizontal       Chesapeake Exploration LLC       Tanner 24-12-4-10H       Waiting to frac well.         20/2011       Carroll       Lee       34/019220920000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 3H       Waiting to frac well.         20/2011       Carroll       Lee       34/019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 10H       Waiting to frac well.         20/2011       Carroll       Lee       34/019220820000	V2011       Carroll       Lee       34019221010000       Drilled       Horizontal       Chesapeake Exploration LLC       Bailey 35-1254 3H       On site to frac.         2011       Carroll       East       34019221030000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 5H       On site to frac.         2011       Carroll       East       34019221040000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 6H       Waiting to frac well.         2011       Carroll       Lee       3401922090000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 6H       Waiting to frac well.         2011       Carroll       Lee       3401922090000       Drilled       Horizontal       Chesapeake Exploration LLC       Tarner 24-124-10H       Waiting to frac well.         2011       Carroll       Lee       34019220920000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 3H       Waiting to frac well.         2011       Carroll       Lee       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 1H       Well completed.         2011       Carroll       Lee       34019220820000       Drilled       Horizontal	2/15/2011 25/2012 231/2011 231/2011	Carroll Carroll Carroll Carroll Carroll Carroll	Lee Perry Lee Lee Lee	<b>13</b> 34019221050000 34019221190100 34019220970000 34019220980000 34019220990000	Drilling Drilled Drilled Drilled	Horizontal Horizontal Horizontal Horizontal	Chesapeake Exploration LLC Chesapeake Exploration LLC Chesapeake Exploration LLC Chesapeake Exploration LLC Chesapeake Exploration LLC	Scott 24-12-15 3H Snoddy 11-13-5 5H Snoddy 11-13-5 1H Houyouse 15-13-5 1H	Drilling lateral. Waiting to frac well. Waiting to frac well. Drilling lateral.
V8/2011       Carroll       East       34019221030000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 5H       On site to frac.         V8/2011       Carroll       East       34019221040000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 6H       Waiting to frac well.         20/2011       Carroll       Lee       34019220900100       Drilled       Horizontal       Chesapeake Exploration LLC       Tanner 24-124-10H       Waiting to frac well.         20/2011       Carroll       Lee       3401922090000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 3H       Waiting to frac well.         27/2011       Carroll       Lee       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 10H       Well completed.         20/2011       Carroll       Lee       34019220880100       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 8H       Drilling lateral.         20/2011       Carroll       Lee       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       West 4-15-5 3H       Drilling lateral.         2/2012       Columbiana       Washington       34029217060100       Drilling <td>2011       Carroll       East       34019221030000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 5H       On site to frac.         2011       Carroll       East       34019221040000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 6H       Waiting to frac well.         2011       Carroll       Lee       34019220900100       Drilled       Horizontal       Chesapeake Exploration LLC       Tanner 24-12-4-10H       Waiting to frac well.         72011       Carroll       Lee       34019220950000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 3H       Waiting to frac well.         72011       Carroll       Lee       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 3H       Waiting to frac well.         72011       Carroll       Lee       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 3H       Waiting to frac well.         7011       Carroll       Lee       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5-8H       Drillig lateral.         7011       Carroll       Lee       34019220820000       Drilled       Horizo</td> <td>2/15/2011 25/2012 231/2011 231/2011 231/2011 231/2011</td> <td>Carroll Carroll Carroll Carroll Carroll Carroll Carroll</td> <td>Lee Perry Lee Lee Lee</td> <td>34019221050000 34019221190100 34019220970000 34019220980000 34019220980000 34019220980000</td> <td>Drilling Drilled Drilled Drilled Drilled</td> <td>Horizontal Horizontal Horizontal Horizontal Horizontal</td> <td>8 Chesapeake Exploration LLC Chesapeake Exploration LLC Chesapeake Exploration LLC Chesapeake Exploration LLC Chesapeake Exploration LLC</td> <td>Scott 24-12-15 3H Snoddy 11-13-5 5H Snoddy 11-13-5 1H Houyouse 15-13-5 1H Houyouse 15-13-5 8H</td> <td>Drilling lateral. Waiting to frac well. Waiting to frac well. Drilling lateral. Waiting to frac well.</td>	2011       Carroll       East       34019221030000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 5H       On site to frac.         2011       Carroll       East       34019221040000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 6H       Waiting to frac well.         2011       Carroll       Lee       34019220900100       Drilled       Horizontal       Chesapeake Exploration LLC       Tanner 24-12-4-10H       Waiting to frac well.         72011       Carroll       Lee       34019220950000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 3H       Waiting to frac well.         72011       Carroll       Lee       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 3H       Waiting to frac well.         72011       Carroll       Lee       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 3H       Waiting to frac well.         7011       Carroll       Lee       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5-8H       Drillig lateral.         7011       Carroll       Lee       34019220820000       Drilled       Horizo	2/15/2011 25/2012 231/2011 231/2011 231/2011 231/2011	Carroll Carroll Carroll Carroll Carroll Carroll Carroll	Lee Perry Lee Lee Lee	34019221050000 34019221190100 34019220970000 34019220980000 34019220980000 34019220980000	Drilling Drilled Drilled Drilled Drilled	Horizontal Horizontal Horizontal Horizontal Horizontal	8 Chesapeake Exploration LLC Chesapeake Exploration LLC Chesapeake Exploration LLC Chesapeake Exploration LLC Chesapeake Exploration LLC	Scott 24-12-15 3H Snoddy 11-13-5 5H Snoddy 11-13-5 1H Houyouse 15-13-5 1H Houyouse 15-13-5 8H	Drilling lateral. Waiting to frac well. Waiting to frac well. Drilling lateral. Waiting to frac well.
V8/2011       Carroll       East       34019221040000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 6H       Waiting to frac well.         20/2011       Carroll       Lee       34019220900100       Drilled       Horizontal       Chesapeake Exploration LLC       Tanner 24-124-10H       Waiting to frac well.         20/2011       Carroll       Lee       3401922090000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 3H       Waiting to frac well.         27/2011       Carroll       Lee       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 10H       Well completed.         20/2011       Carroll       Lee       34019220880100       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 8H       Drilling lateral.         20/2011       Carroll       Augusta       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       Weit 17-13-5 8H       Drilling lateral.         20/2011       Carroll       Augusta       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       West 4-15-5 3H       Drilling lateral.         2/2012       Columbiana       Washington       34029217060100       Dril	2011       Carroll       East       34019221040000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 6H       Waiting to frac well.         2011       Carroll       Lee       34019220900100       Drilled       Horizontal       Chesapeake Exploration LLC       Tanner 24-124-10H       Waiting to frac well.         //2011       Carroll       Lee       34019220950000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 3H       Waiting to frac well.         //2011       Carroll       Lee       34019220850000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 3H       Waiting to frac well.         2011       Carroll       Lee       34019220880100       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 8H       Drilling lateral.         2011       Carroll       Lee       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 8H       Drilling lateral.         2011       Carroll       Lee       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       West 4-15-5 3H       Drilling lateral.         2012       Columbiana       Washington       34029217060100       Drilling	2/15/2011 25/2012 1/31/2011 1/31/2011 1/14/2011 1/14/2011	Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll	Lee Perry Lee Lee Lee Lee	34019221050000 34019221190100 34019220970000 34019220980000 34019220980000 34019220980000 34019220980000 34019220980000	Drilling Drilled Drilled Drilled Drilled Drilled	Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal	Chesapeake Exploration LLC	Scott 24-12-15 3H Snoddy 11-13-5 5H Snoddy 11-13-5 1H Houyouse 15-13-5 1H Houyouse 15-13-5 8H Houyouse 15-13-5 8H	Drilling lateral. Waiting to frac well. Waiting to frac well. Drilling lateral. Waiting to frac well. Waiting to frac well.
V8/2011       Carroll       East       34019221040000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 6H       Waiting to frac well.         20/2011       Carroll       Lee       34019220900100       Drilled       Horizontal       Chesapeake Exploration LLC       Tanner 24-124-10H       Waiting to frac well.         20/2011       Carroll       Lee       3401922090000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 3H       Waiting to frac well.         27/2011       Carroll       Lee       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 10H       Well completed.         20/2011       Carroll       Lee       34019220880100       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 8H       Drilling lateral.         20/2011       Carroll       Augusta       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       Weit 17-13-5 8H       Drilling lateral.         20/2011       Carroll       Augusta       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       West 4-15-5 3H       Drilling lateral.         2/2012       Columbiana       Washington       34029217060100       Dril	2011       Carroll       East       34019221040000       Drilled       Horizontal       Chesapeake Exploration LLC       Bucey 21-14-4 6H       Waiting to frac well.         2011       Carroll       Lee       34019220900100       Drilled       Horizontal       Chesapeake Exploration LLC       Tanner 24-124-10H       Waiting to frac well.         //2011       Carroll       Lee       34019220950000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 3H       Waiting to frac well.         //2011       Carroll       Lee       34019220850000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 3H       Waiting to frac well.         2011       Carroll       Lee       34019220880100       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 8H       Drilling lateral.         2011       Carroll       Lee       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       White 17-13-5 8H       Drilling lateral.         2011       Carroll       Lee       34019220820000       Drilled       Horizontal       Chesapeake Exploration LLC       West 4-15-5 3H       Drilling lateral.         2012       Columbiana       Washington       34029217060100       Drilling	2/15/2011 25/2012 1/31/2011 1/31/2011 1/14/2011 1/26/2011 1/25/2011 1/30/2011	Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll	Lee Perry Lee Lee Lee Lee Lee	<b>13</b> 34019221050000 34019221190100 34019220970000 34019220980000 34019220980000 34019220980000 34019221000000 34019221000000	Drilling Drilled Drilled Drilled Drilled Drilled Drilled	Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal	Chesapeake Exploration LLC Chesapeake Exploration LLC	Scott 24-12-15 3H Snoddy 11-13-5 5H Snoddy 11-13-5 5H Houyouse 15-13-5 1H Houyouse 15-13-5 8H Houyouse 15-13-5 6H Bailey 35-1254 1H	Drilling lateral. Waiting to frac well. Waiting to frac well. Drilling lateral. Waiting to frac well. Waiting to frac well. On site to frac.
V14/2011         Carroll         Lee         34019220950000         Drilled         Horizontal         Chesapeake Exploration LLC         White 17-13-5 3H         Waiting to frac well.           27/2011         Carroll         Lee         34019220920000         Drilled         Horizontal         Chesapeake Exploration LLC         White 17-3-5 10H         Well completed.           20/2011         Carroll         Lee         34019220820000         Drilled         Horizontal         Chesapeake Exploration LLC         White 17-13-5-8H         Drilling lateral.           20/2011         Carroll         Augusta         34019220820000         Drilled         Horizontal         Chesapeake Exploration LLC         White 17-13-5-8H         Drilling lateral.           3/2011         Carroll         Augusta         34019220820000         Drilled         Horizontal         Chesapeake Exploration LLC         West 4-15-5 3H         Drilling lateral.           2/2012         Columbiana         Washington         34029217080100         Drilling         Horizontal         Chesapeake Exploration LLC         Janie Trust 5-12-3 1H         Surface casing set.           6/2012         Columbiana         Madison         34029217100000         Drilling         Horizontal         Chesapeake Exploration LLC         Rosebud 16-10-2 8H         Conductor casing set.	V2011         Carroll         Lee         34019220950000         Drilled         Horizontal         Chesapeake Exploration LLC         White 17-13-5 3H         Waiting to frac well.           2011         Carroll         Lee         34019220920000         Drilled         Horizontal         Chesapeake Exploration LLC         White 17-13-5 3H         Waiting to frac well.           2011         Carroll         Lee         34019220920000         Drilled         Horizontal         Chesapeake Exploration LLC         White 17-13-5 10H         Well completed.           2011         Carroll         Lee         34019220820000         Drilled         Horizontal         Chesapeake Exploration LLC         White 17-13-5-8H         Drilling lateral.           011         Carroll         Augusta         34019220820000         Drilled         Horizontal         Chesapeake Exploration LLC         Weit 4-15-5 3H         Drilling lateral.           012         Columbiana         Madison         34029217060100         Drilling         Horizontal         Chesapeake Exploration LLC         Janie Trust 5-12-3 1H         Surface casing set.           012         Columbiana         Madison         34029217180000         Drilling         Horizontal         Chesapeake Exploration LLC         Rosebud 16-10-2 8H         Conductor casing set.	215/2011 25/2012 331/2011 331/2011 331/2011 331/2011 326/2011 25/2011 1/30/2011	Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll	Lee Perry Lee Lee Lee Lee Lee Lee	<b>13</b> 34019221050000           34019221190100           34019220970000           34019220970000           34019220980000           34019220980000           34019220980000           3401922090000           3401922090000           3401922090000           3401922090000           3401922090000           34019221000000           3401922100000           3401922100000	Drilling Drilled Drilled Drilled Drilled Drilled Drilled Drilled	Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal	Chesapeake Exploration LLC Chesapeake Exploration LLC	Scott 24-12-15 3H Snoddy 11-13-5 5H Snoddy 11-13-5 5H Houyouse 15-13-5 1H Houyouse 15-13-5 1H Houyouse 15-13-5 6H Bailey 35-1254 1H Bailey 35-1254 3H	Drilling lateral. Waiting to frac well. Waiting to frac well. Drilling lateral. Waiting to frac well. On site to frac. On site to frac.
Carroll         Lee         34019220920000         Drilled         Horizontal         Chesapeake Exploration LLC         White 17-3-5 10H         Well completed.           20/2011         Carroll         Lee         34019220880100         Drilled         Horizontal         Chesapeake Exploration LLC         White 17-3-5 10H         Well completed.           20/2011         Carroll         Lee         34019220820000         Drilled         Horizontal         Chesapeake Exploration LLC         White 17-13-5-8H         Drilling lateral.           3/2011         Carroll         Augusta         34019220820000         Drilled         Horizontal         Chesapeake Exploration LLC         West 4-15-5 3H         Drilling         Horizontal         Chesapeake Exploration LLC         Janie Trust 5-12-3 1H         Surface casing set.           0/2012         Columbiana         Madison         34029217100000         Drilling         Horizontal         Chesapeake Exploration LLC         Rosebud 18-10-2 8H         Conductor casing set.           0/2012         Columbiana         Washington         34029217160000         Drilling         Horizontal         Chesapeake Exploration LLC         Rosebud 18-10-2 8H         Conductor casing set.           0/2012         Columbiana         Washington         340292171600000         Drilling         Horizontal	2011         Carroll         Lee         34019220920000         Drilled         Horizontal         Chesapeake Exploration LLC         White 17-35 10H         Well completed.           2011         Carroll         Lee         34019220880100         Drilled         Horizontal         Chesapeake Exploration LLC         White 17-35-8H         Drilling lateral.           011         Carroll         Augusta         34019220820000         Drilled         Horizontal         Chesapeake Exploration LLC         West 4-15-5 3H         Drilling lateral.           012         Columbiana         Washington         34029217060100         Drilling         Horizontal         Chesapeake Exploration LLC         Janie Trust 5-12-3 1H         Surface casing set.           012         Columbiana         Madison         34029217130000         Drilling         Horizontal         Chesapeake Exploration LLC         Rosebud 18-10-2 8H         Conductor casing set.           012         Columbiana         Washington         34029217160000         Drilling         Horizontal         Chesapeake Exploration LLC         Rosebud 18-10-2 8H         Conductor casing set.           012         Columbiana         Washington         34029217160000         Drilling         Horizontal         Chesapeake Exploration LLC         Janie Trust 5-12-3 10H         Waiting to frac well. <td>2/15/2011 25/2012 3/31/2011 3/31/2011 3/31/2011 3/26/2011 1/25/2011 1/30/2011 1/30/2011 2/6/2011</td> <td>Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll</td> <td>Lee Perry Lee Lee Lee Lee Lee Lee Lee East</td> <td><b>13</b>           34019221050000           34019221190100           34019220970000           34019220970000           34019220980000           34019220980000           34019220980000           3401922090000           3401922090000           3401922090000           3401922090000           3401922100000           3401922100000           34019221020000           34019221020000           34019221020000</td> <td>Drilling Drilled Drilled Drilled Drilled Drilled Drilled Drilled Drilled</td> <td>Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal</td> <td>Chesapeake Exploration LLC     Chesapeake Exploration LLC</td> <td>Scott 24-12-15 3H Snoddy 11-13-5 5H Snoddy 11-13-5 5H Houyouse 15-13-5 1H Houyouse 15-13-5 8H Houyouse 15-13-5 8H Bailey 35-1254 1H Bailey 35-1254 3H Bucey 21-14-4 5H</td> <td>Drilling lateral. Waiting to frac well. Waiting to frac well. Drilling lateral. Waiting to frac well. Waiting to frac well. On site to frac. On site to frac. On site to frac.</td>	2/15/2011 25/2012 3/31/2011 3/31/2011 3/31/2011 3/26/2011 1/25/2011 1/30/2011 1/30/2011 2/6/2011	Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll	Lee Perry Lee Lee Lee Lee Lee Lee Lee East	<b>13</b> 34019221050000           34019221190100           34019220970000           34019220970000           34019220980000           34019220980000           34019220980000           3401922090000           3401922090000           3401922090000           3401922090000           3401922100000           3401922100000           34019221020000           34019221020000           34019221020000	Drilling Drilled Drilled Drilled Drilled Drilled Drilled Drilled Drilled	Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal	Chesapeake Exploration LLC	Scott 24-12-15 3H Snoddy 11-13-5 5H Snoddy 11-13-5 5H Houyouse 15-13-5 1H Houyouse 15-13-5 8H Houyouse 15-13-5 8H Bailey 35-1254 1H Bailey 35-1254 3H Bucey 21-14-4 5H	Drilling lateral. Waiting to frac well. Waiting to frac well. Drilling lateral. Waiting to frac well. Waiting to frac well. On site to frac. On site to frac. On site to frac.
20/2011         Carroll         Lee         34/019220880100         Drilled         Horizontal         Chesapeake Exploration LLC         White 17-13-5-8H         Drilling lateral.           3/2011         Carroll         Augusta         34/019220820000         Drilled         Horizontal         Chesapeake Exploration LLC         West 4-15-5 3H         Drilling lateral.           2/2012         Columbiana         Washington         34/029217060100         Drilling         Horizontal         Chesapeake Exploration LLC         Janie Trust 5-12-3 1H         Surface casing set.           16/2012         Columbiana         Madison         34/029217130000         Drilling         Horizontal         Chesapeake Exploration LLC         Rosebud 16-10-2 8H         Conductor casing set.           3/2012         Columbiana         Washington         34/029217160000         Drilling         Horizontal         Chesapeake Exploration LLC         Rosebud 16-10-2 8H         Conductor casing set.           3/2012         Columbiana         Washington         34/029217160000         Drilling         Horizontal         Chesapeake Exploration LLC         Janie Trust 5-12-3 10H         Waiting to frac well.	2011         Carroll         Lee         34019220880100         Drilled         Horizontal         Chesapeake Exploration LLC         White 17-13-5-8H         Drilling lateral.           011         Carroll         Augusta         34019220820000         Drilled         Horizontal         Chesapeake Exploration LLC         West 4-15-5 3H         Drilling lateral.           012         Columbiana         Washington         34029217060100         Drilling         Horizontal         Chesapeake Exploration LLC         Janie Trust 5-12-3 1H         Surface casing set.           2012         Columbiana         Madison         34029217130000         Drilling         Horizontal         Chesapeake Exploration LLC         Janie Trust 5-12-3 1H         Surface casing set.           2012         Columbiana         Madison         34029217130000         Drilling         Horizontal         Chesapeake Exploration LLC         Rosebud 16-10-2 8H         Conductor casing set.           012         Columbiana         Washington         34029217160000         Drilling         Horizontal         Chesapeake Exploration LLC         Janie Trust 5-12-3 10H         Waiting to frac well.	2/15/2011 25/2012 3/31/2011 3/31/2011 3/31/2011 1/14/2011 1/26/2011 1/25/2011	Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll Carroll	Lee Perry Lee Lee Lee Lee Lee Lee East East East	<b>13</b> 34019221050000           34019221190100           34019220970000           34019220970000           34019220980000           34019220980000           34019220980000           34019220980000           3401922090000           3401922090000           34019220000           3401922100000           3401922100000           3401922100000           3401922100000           3401922100000           3401922100000	Drilling Drilled Drilled Drilled Drilled Drilled Drilled Drilled Drilled	Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal Horizontal	8 Chesapeake Exploration LLC Chesapeake Exploration LLC	Scott 24-12-15 3H Snoddy 11-13-5 5H Snoddy 11-13-5 5H Houyouse 15-13-5 1H Houyouse 15-13-5 8H Houyouse 15-13-5 8H Bailey 35-1254 1H Bailey 35-1254 3H Bucey 21-14-4 5H Bucey 21-14-4 6H	Drilling lateral. Waiting to frac well. Waiting to frac well. Drilling lateral. Waiting to frac well. Waiting to frac well. On site to frac. On site to frac. On site to frac. Waiting to frac well.
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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



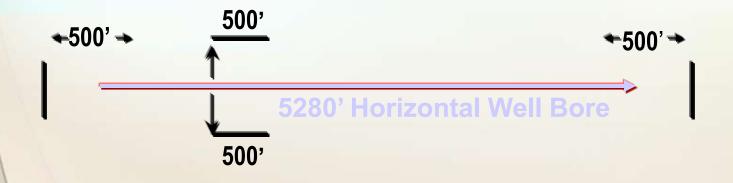
# Differences Between a Horizontal Well and Traditional Vertical Well

- 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

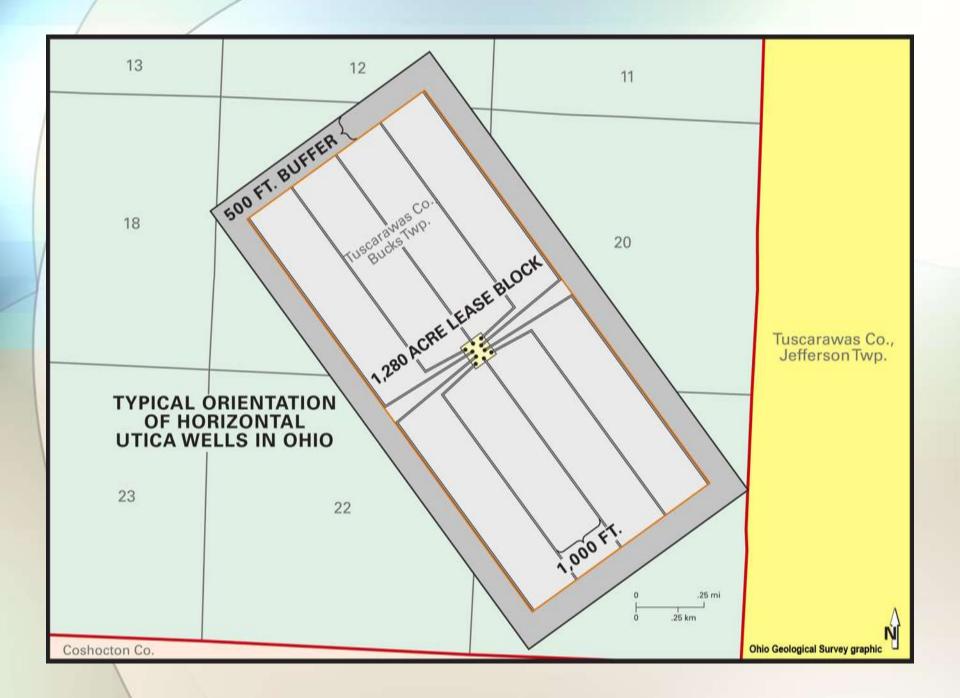
	Spacing	Categories	
Depth	Acres	Unit Lines	Distance Bet. Wells
0 to 1,000'	1	100'	<b>200</b> '
1 to 2K	10	230'	460'
2 to 4K	20	300'	600'
4,000 +	40	<b>500'</b>	1,000'



### 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.....)



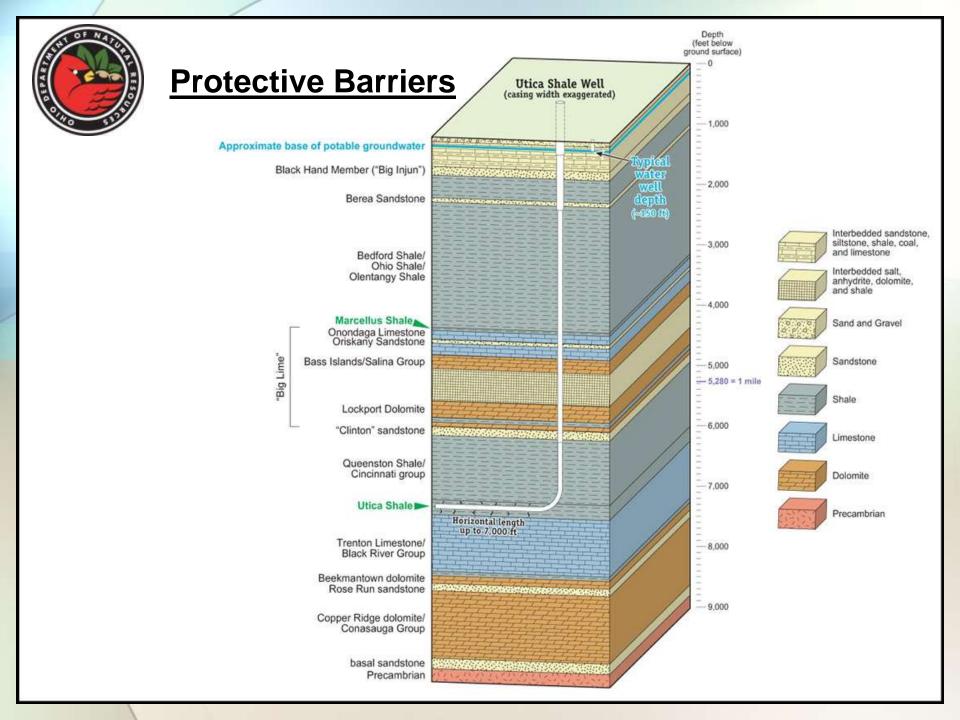
# **Positive Change Cont.:**

**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

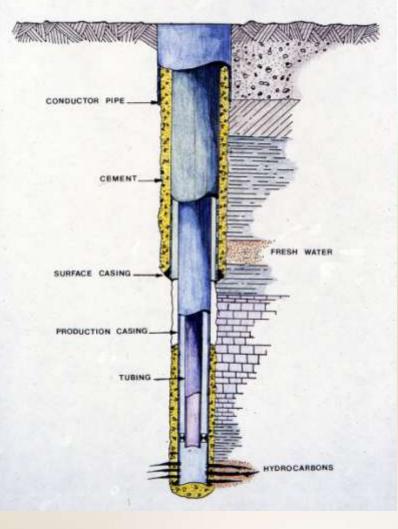
- Requires operators to set and cement surface casing to isolate and protect all Underground Sources of drinking Water
- Fresh water based drilling system



### 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**

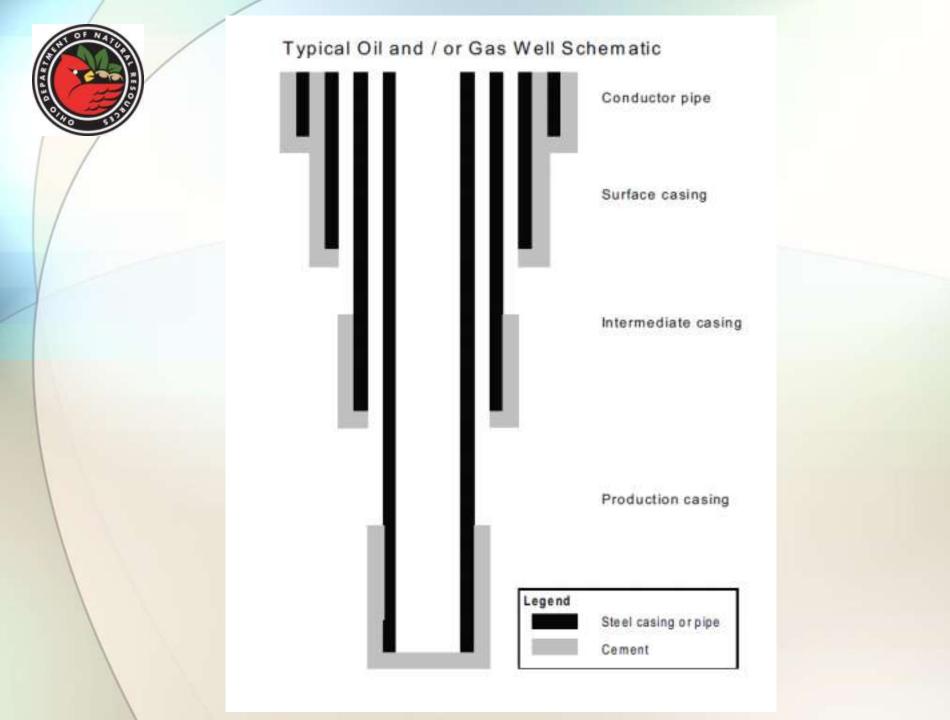
Requires operators notify the O & G inspector at least 24 hours prior to every cement job



# **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,

Ham-

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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

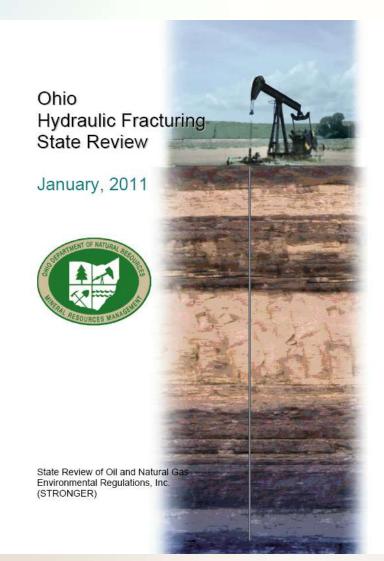
Acids	Dissolve minerals and initiate cracks
Friction reducers	Minimize friction
Scale inhibitors	Prevents scale deposits
Surfactants	Increase viscosity
Biocides	Eliminates bacteria
Clay stabilizers	Prevents swelling
Breakers	Delays breakdown of gel
Crosslinker	Viscosity control

#### **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>	<b>Biocides</b>	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)



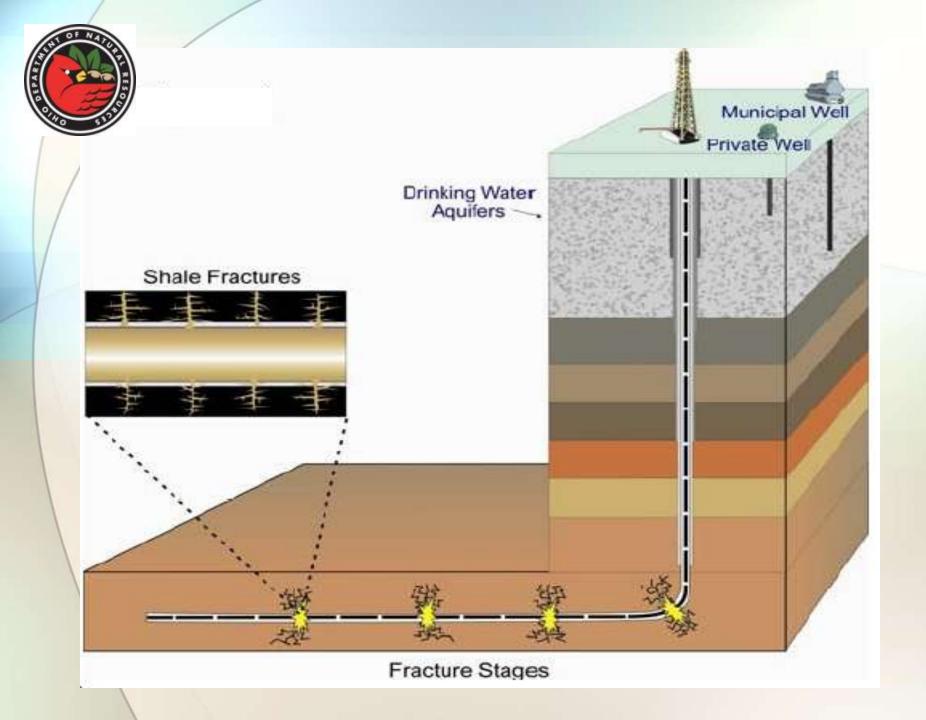


 Eight industry, regulatory, and environmental officials reviewed
 Ohio's hydraulic fracturing
 regulatory program and found:



### "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

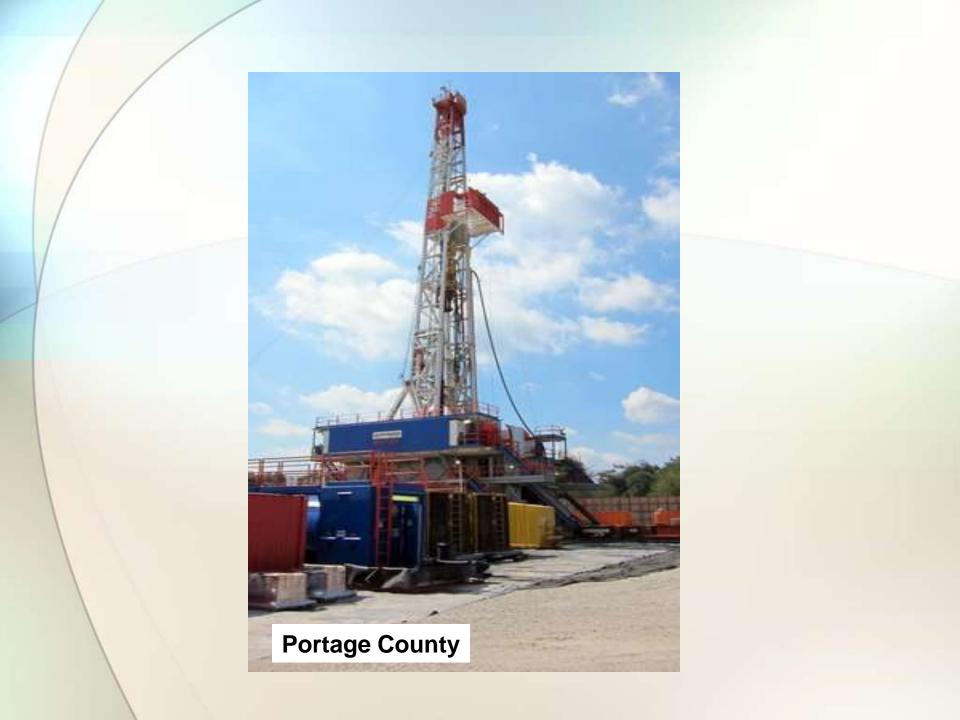
- Under a primacy agreement with
   USEPA Since the early 1980's
- Ohio's laws and rules for underground injection are as stringent or more so than the USEPA



## 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

i



#### **Guernsey County Pad Development**



