



# Regulation of the Oil and Gas Exploration & Production Industry in Pennsylvania

## A Short Course on Requirements for Oil and Gas Wells

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PA Department of Environmental Protection  
Bureau of Oil & Gas Management

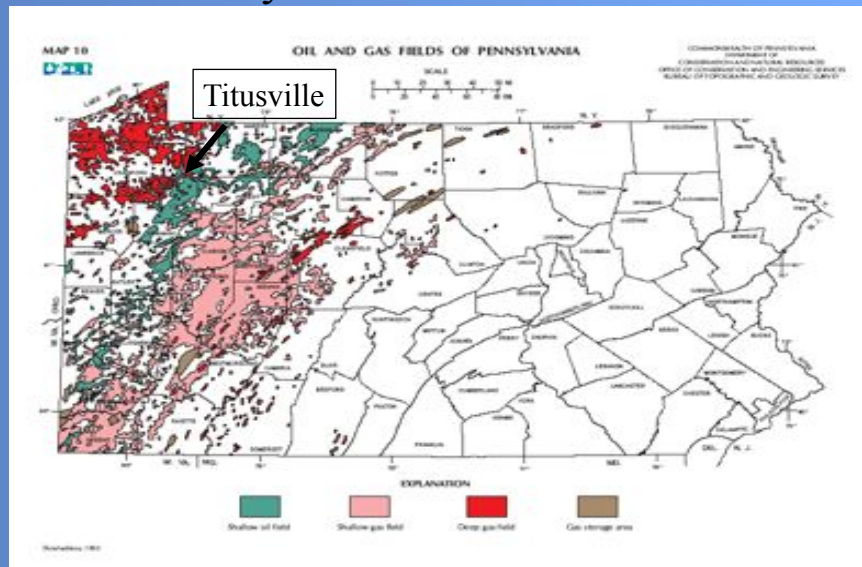


## History of Oil & Gas in Pennsylvania

- Birthplace of the commercial  
Oil Industry  
1859  
Titusville, PA
- Colonel Edwin L. Drake



## Pennsylvania Oil & Gas Patch



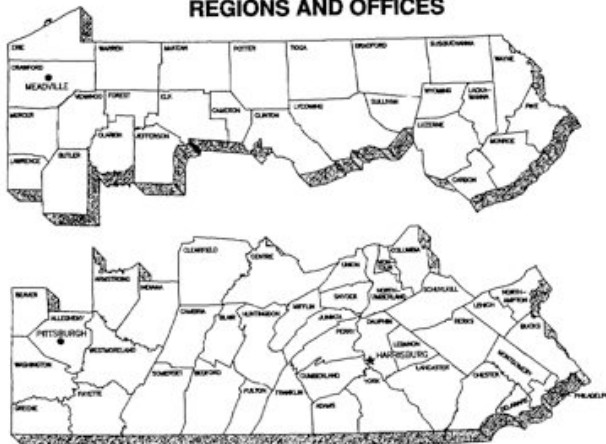
Pennsylvania produces 3.6 million barrels of oil and 163 BCF of natural gas (2004 est.)

## About the Bureau

5500-FM-000015



### COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION OIL & GAS MANAGEMENT PROGRAM REGIONS AND OFFICES



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Recycled Paper

The Bureau of Oil and Gas Management was formed in response to requests from the public and industry for a single focal point within the Department for oil and gas exploration and production issues. The Bureau conducts its activities under the authority of the following statutes:

Oil and Gas Act;  
Coal and Gas Resource Coordination Act;  
Oil and Gas Conservation Law;  
Clean Streams Law;  
Solid Waste Management Act;  
Dam Safety and Encroachments Act; and  
Administrative Code.

### General Program Areas

- Permitting oil and gas related activities
  - Drilling
  - Waste Disposal
  - Storage in underground formations
  - Coordination with coal resources
- Inspection of oil and gas related activities
- Enforcement of requirements
- Orphan and abandoned well plugging program

# OIL & GAS WELL PERMITS ISSUED

## 1990 - 2005

The chart displays the total number of oil and gas well permits issued annually from 1990 to 2005. The y-axis represents the total number of permits, ranging from 0 to 6030. The x-axis represents the year. The bars are stacked, with green representing permits issued by DOW and red representing permits issued by DOWR. The total permits issued show a steady increase over the period, with a notable acceleration in growth starting around 2001.

Year	Total
1990	1909
1991	2010
1992	1809
1993	1407
1994	1608
1995	1407
1996	1909
1997	2010
1998	2010
1999	2010
2000	2211
2001	2814
2002	3015
2003	3216
2004	3618
2005	4221

## **Program Authority**

### **Oil and Gas Act**

- 25 Pa Code Chapter 78 – Oil and Gas Wells

### **Oil and Gas Conservation Law**

- 25 Pa Code Chapter 79 – Oil and Gas Conservation

### **Coal and Gas Coordination Act**

## **Program Authority**

### **Dam Safety and Encroachment Act**

- 25 Pa Code 105 – Dams and Waterways Management
- 25 Pa Code 106 – Flood Management

### **Solid Waste Management Act**

## **Program Authority**

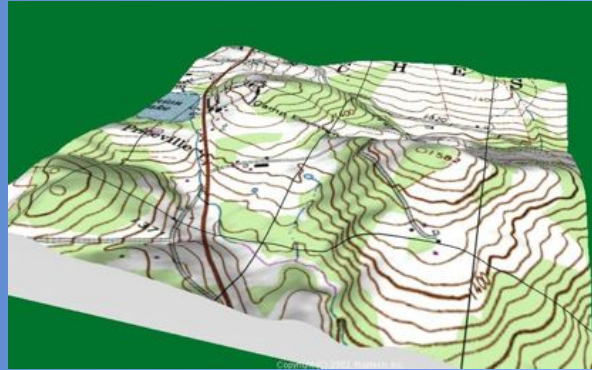
### **Clean Streams Law**

- 25 Pa Code 102 – Erosion and Sediment Control
- 25 Pa Code 91 – General Provisions
- 25 Pa Code 92 – NPDES Permits, Monitoring and Compliance
- 25 Pa Code 93 – Water Quality Standards
- 25 Pa Code 95 – Wastewater Treatment Requirements
- 25 Pa Code 96 – Water Quality Standards Implementation

## **General Overview Of Developing a Well**

## Locating A Well Site

- Geology – drill where the gas is






## To obtain a permit to drill a new well an operator must:

- Register with Dept of State (Corp/Fictitious Names)
- Have a bond – conditioned on drilling, water supply replacement, restoration, and plugging.
  - Single \$2,500
  - Blanket Bond \$25,000
- Complete application/fee – must be acted on in 30 days.
- Proof of proper notices – surface owner/water supplies w/ in 1000'/coal owner/storage operator.

(Permit is valid for 1 year to 'spud' the well.)



 <p><b>PA's Game Commission</b></p> <p>Responsibility: The Commission is responsible for managing all of Pennsylvania's wild birds and mammals, especially the endangered ones.</p> 	<h1>Threatened &amp; Endangered Species</h1>	 <p><b>PA's Fish &amp; Boat Commission</b></p> <p>Responsibility: Threatened and endangered fish, reptiles and amphibians.</p>
 <p><b>U.S. Fish &amp; Wildlife Service</b></p> <p>Responsibility: Responsible for managing &amp; protecting the threatened and endangered species of Pennsylvania, and the rest of the United States. In particular the endangered species.</p>		 <p>Osprey</p> <p>USFWS Photo: A. Blake</p>

<h2>Protection of Streams and Wetlands</h2> <p>25 Pa. Code Chapter 105</p> <p>Oil and Gas Act</p>	
	 



## *Public Lands*

- *Public parks*
- *State Forest*
- *State Gamelands*
- *Federal parks*
- *Federal Forests*

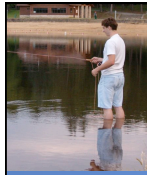
Coordination of a Well Location with Public Resources

Form **5500-PM-OG0076**

## *Erosion and Sediment Control Stormwater Management*

- *Must implement BMPs*
- *Must prepare and implement Erosion and Sediment Control/Stormwater Management Plan*
- *Must obtain ESCGP approval if trigger the 5-Acre rule*
- *Must use anti-degradation BMPs and meet anti-degradation criterion in Special Protection watersheds.*





## Recreational Opportunities Abound



## Protection of Water Resources

- 83,100 miles of streams

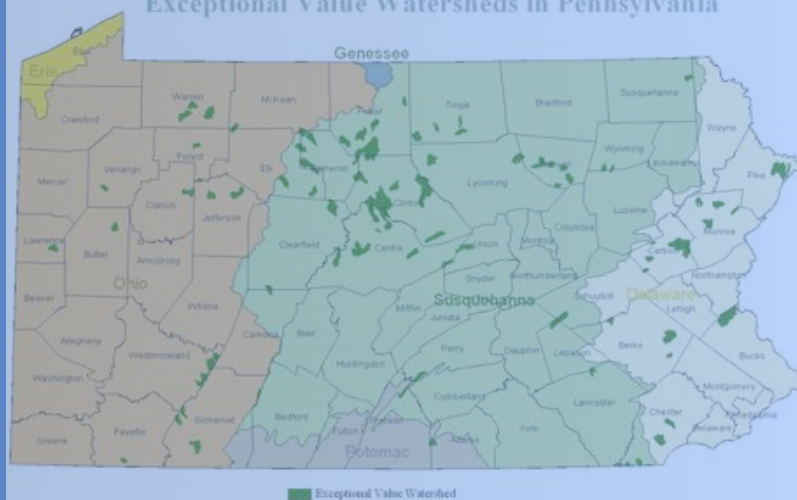


### High Quality Watersheds in Pennsylvania



22,267 miles of stream – protected water use - High Quality (HQ)

### Exceptional Value Watersheds in Pennsylvania



1,700 miles of streams - protected water use Exceptional Value (EV)

## *Water Withdrawals and Water Management Plans*

- *SRBC and DRBC approvals*
- *Act 220 registration*
- *Protection of existing and designated uses*

## *Preparedness, Prevention and Contingency Plans*

- *Description of Operation*
- *Pollution Prevention Measures*
- *Chemicals and additives used - waste generated and characteristics*
- *Waste Disposal Methods*
- *Incidents Response Plans and Corrective Actions*
- *Central Storage Impoundments (including structural stability)*

## *Centralized Impoundments and Dams*

- *Centralized fresh-water storage impoundments*
- *Structurally sound*
- *Dam Permit for Jurisdictional Dams*

## *Pits and Impoundments at Well Location*

- *Oil and Gas Regulations*
- *Structurally sound*
- *Impermeable*
- *Protected from unauthorized acts of third parties*

## *Site Restoration*

- *9 months after completion of the well*
- *Site Restoration Report*
- *9 months after plugging the well*
- *Well Plugging Certificate*

***Additional permits and/or approvals may be needed***

- ***PennDOT highway occupancy permit***
- ***Local use requirements/road bond***



## *Application Addendum for Marcellus Shale Wells*

5500-PM-OG0083

- *For all new well permit application*
- *Well Type*
- *Earth Disturbance*
- *Preparedness, Prevention and Contingency (PPC) Plan*
- *Water Withdrawals*
- *Water Treatment, Reuse and Disposal*
- *Pits Impoundments and Dams*
- *Encroachment Permits*

Well Site BMP – Minimize size of well site, **while maintaining safe well drilling and completion practices**



**Minimize the Disturbance**

## Build the Site



## Drill the well



## Drilling the Well



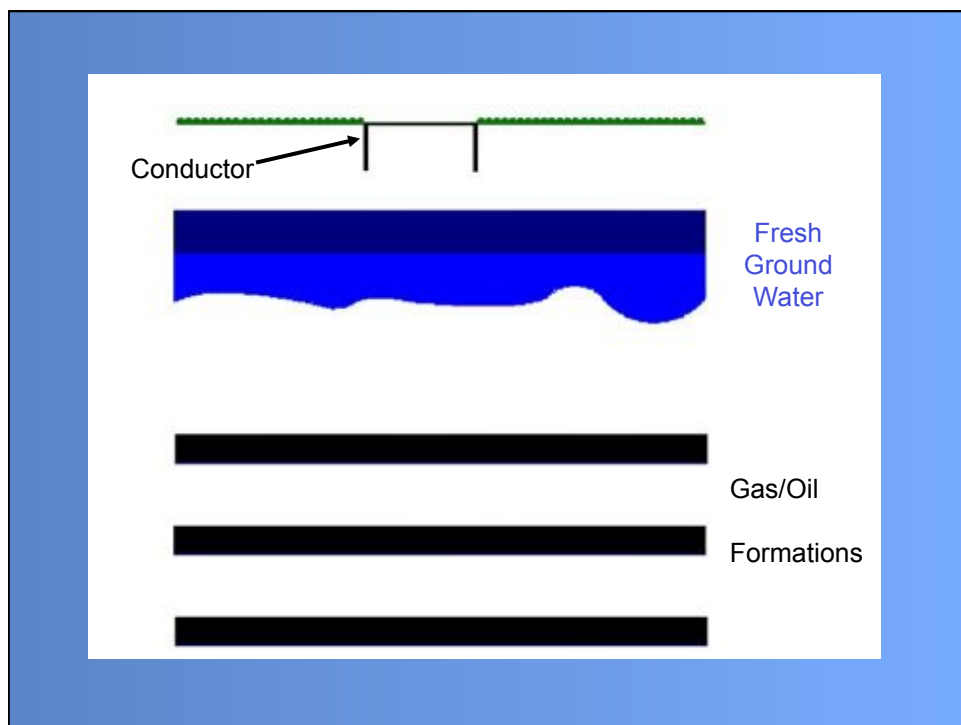
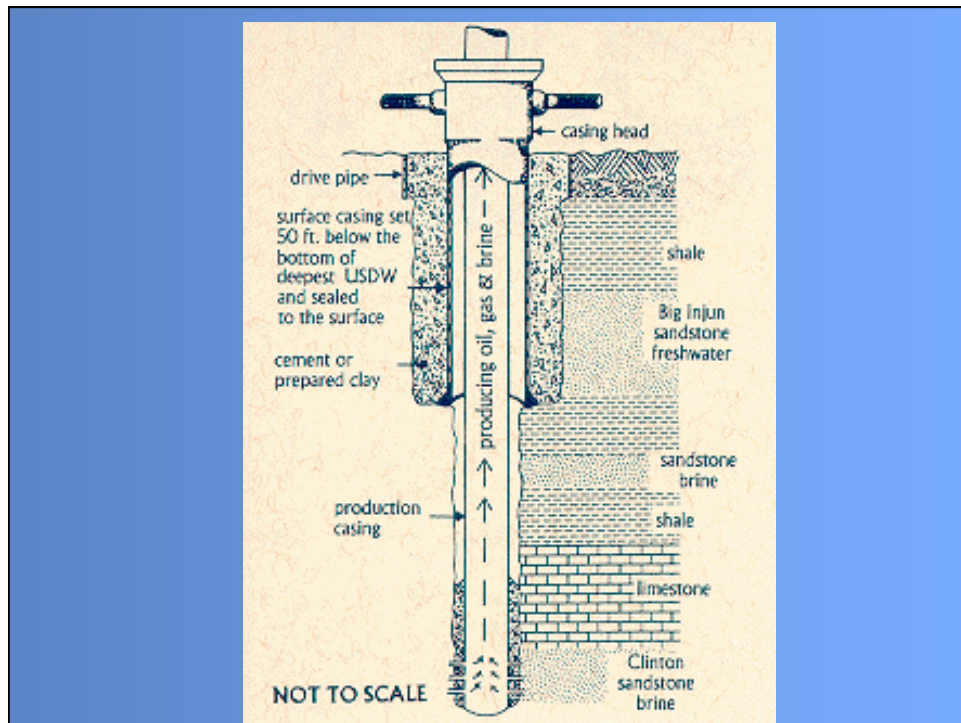
## Protection of Ground Water

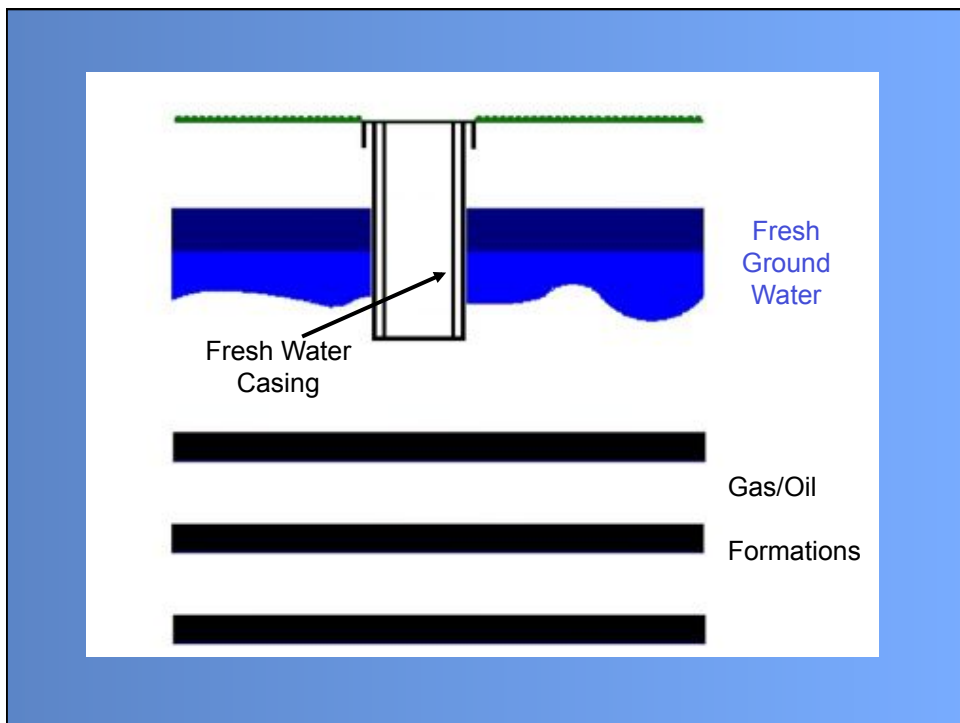
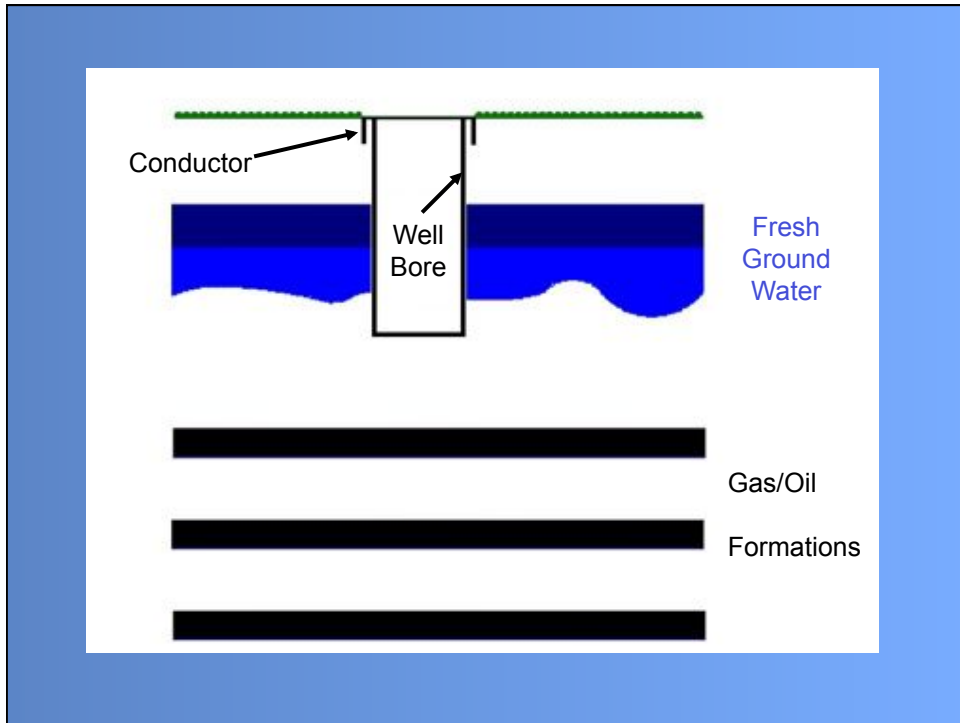
- Steel casing is placed in the borehole to the depth of fresh ground water and cemented to surface to protect GW.
- Activities on the surface must be contained so that there is no discharge of pollutional substances to GW.

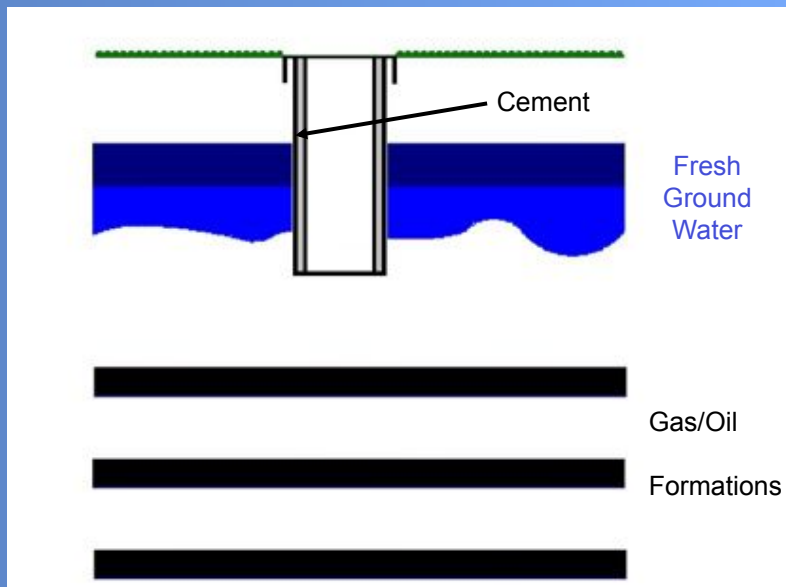


## *Protection of Ground Water*

- *Steel casing is placed in the borehole to the depth of fresh ground water and cemented to surface to protect groundwater.*
- *Activities on the surface must be contained so that there is no discharge of pollutional substances to groundwater.*



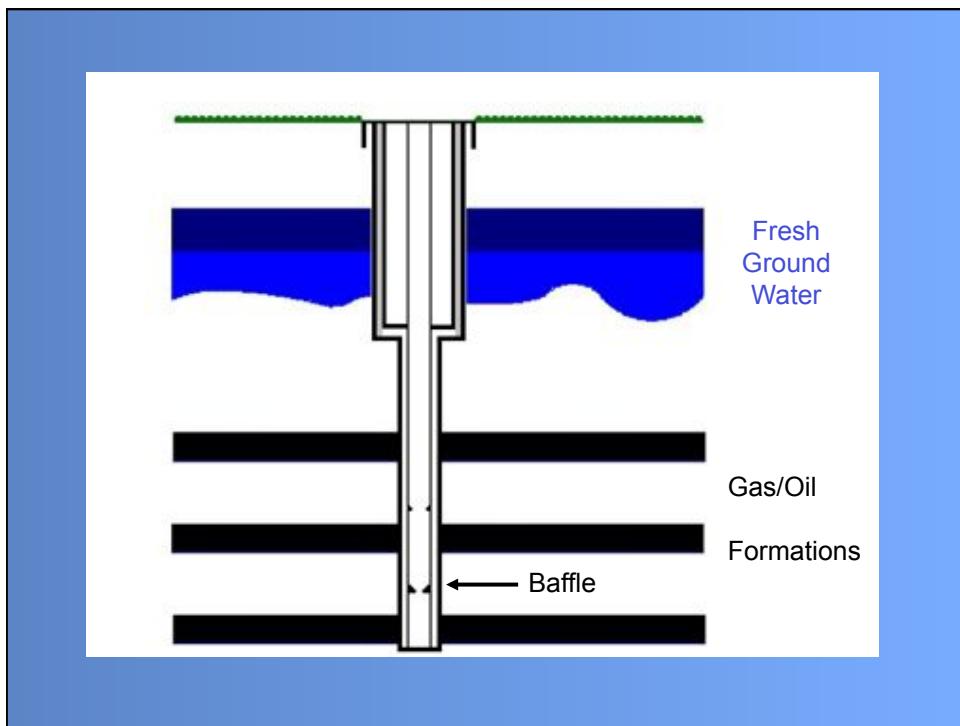
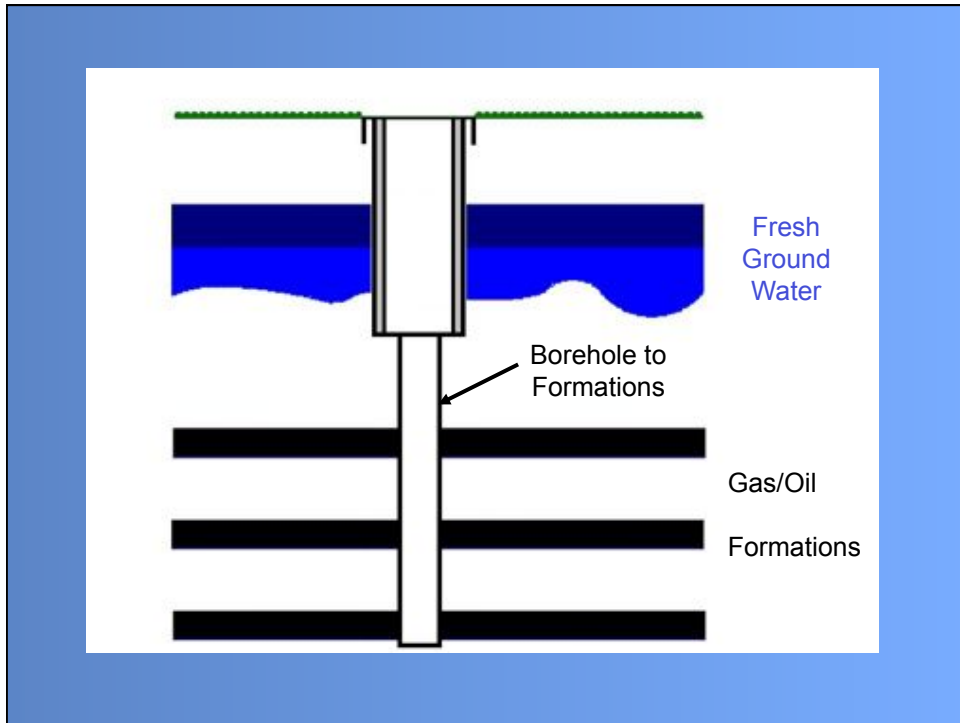


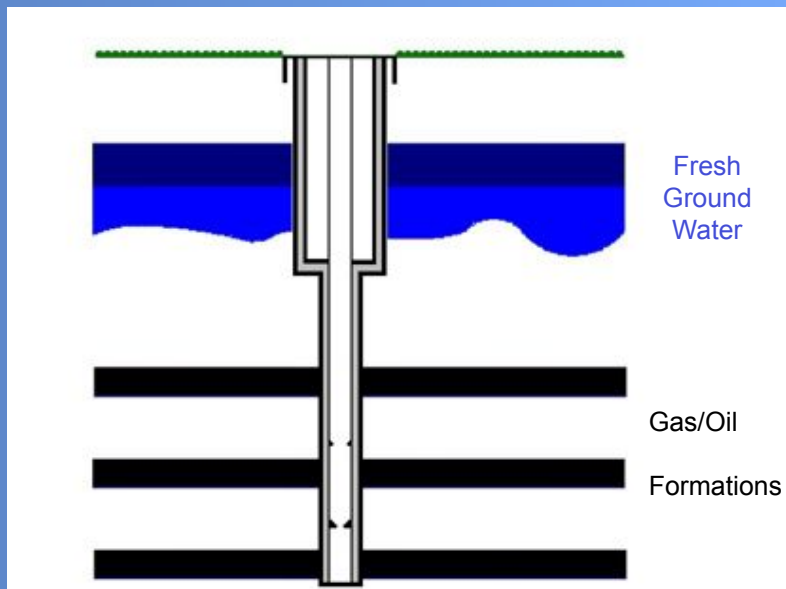


## Cement Returns from the annular space









## Fracing the Well



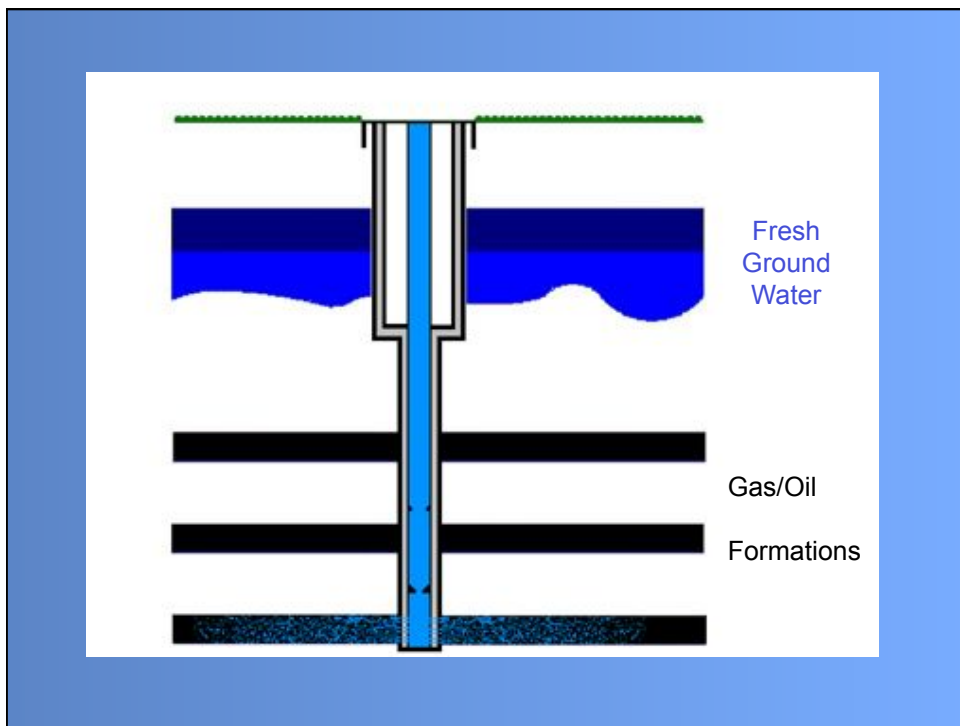
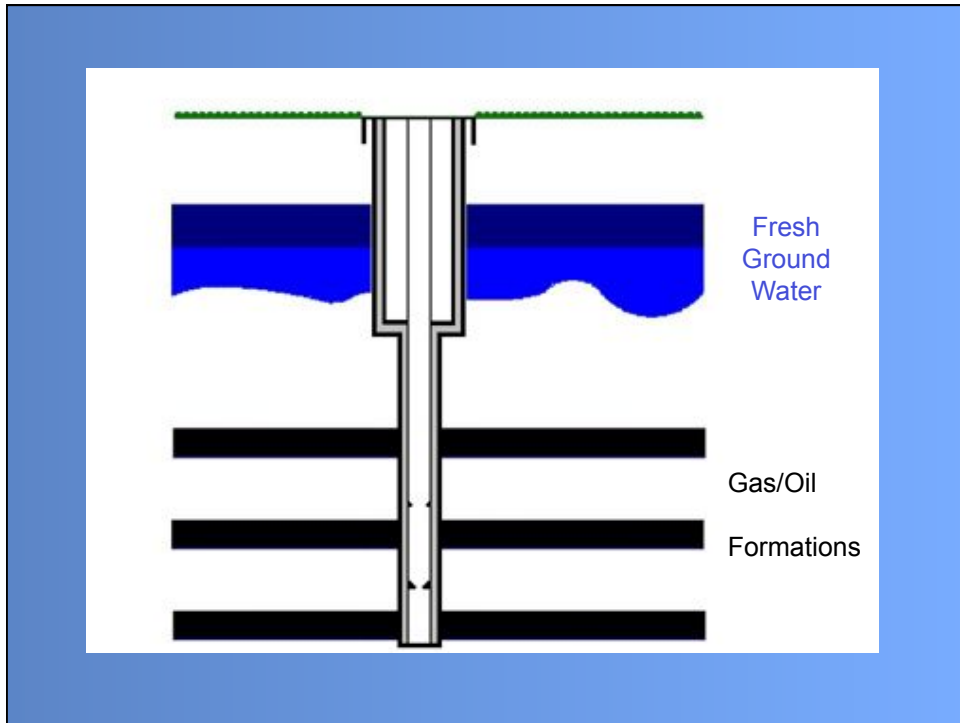
## What is Fracing?

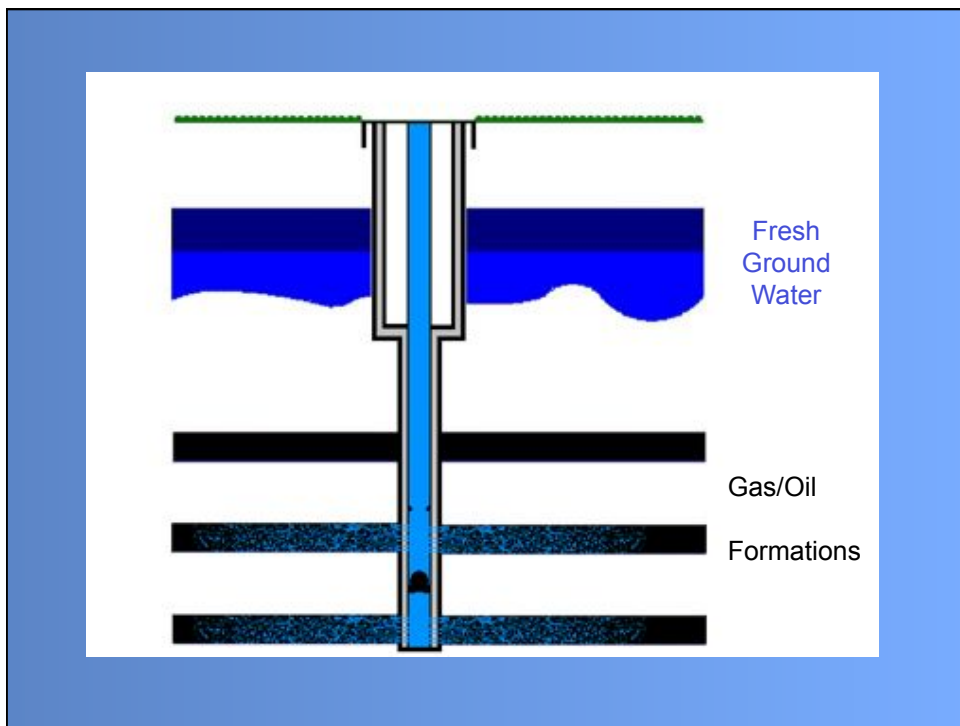
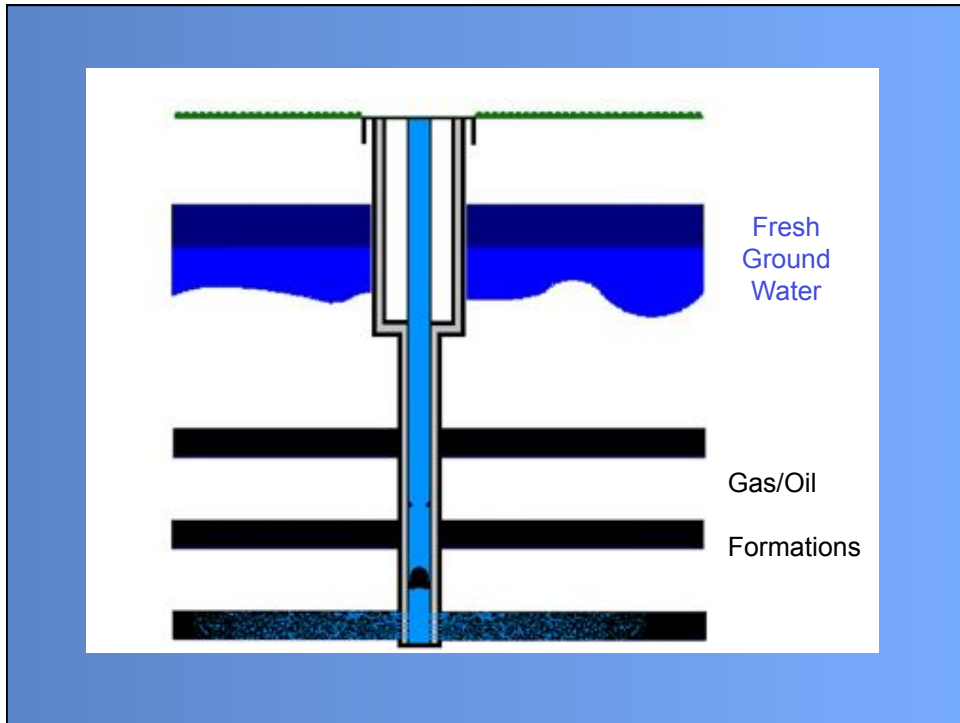
Hydraulic fracturing is the process in which fluid is pumped down a well and into a formation under pressure high enough to cause the formation to crack, or fracture, forming passages through which gas can flow into the well bore.

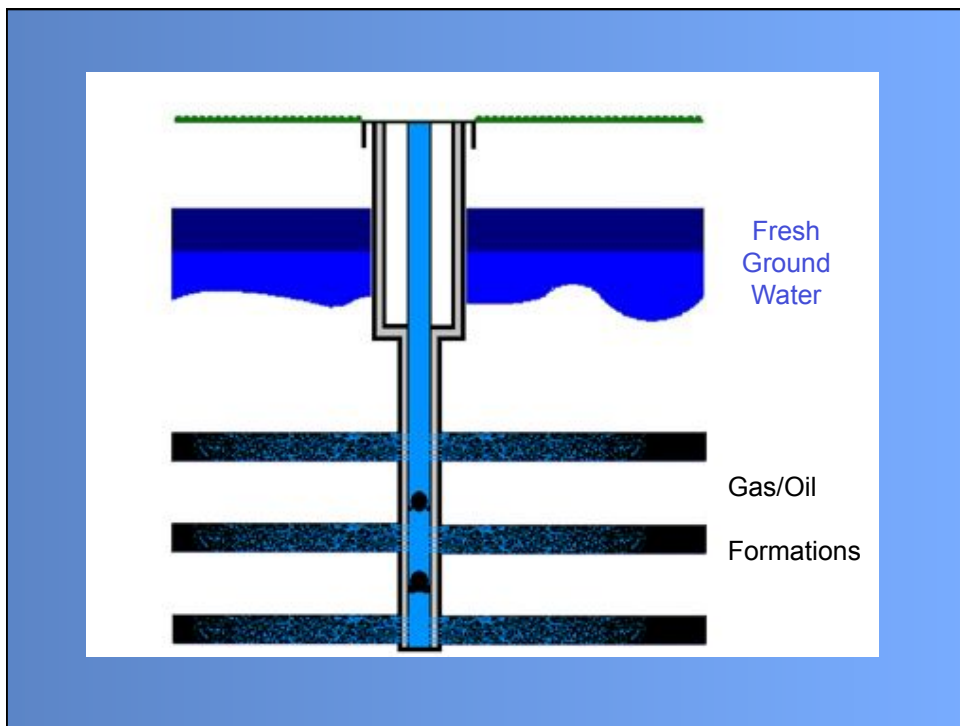
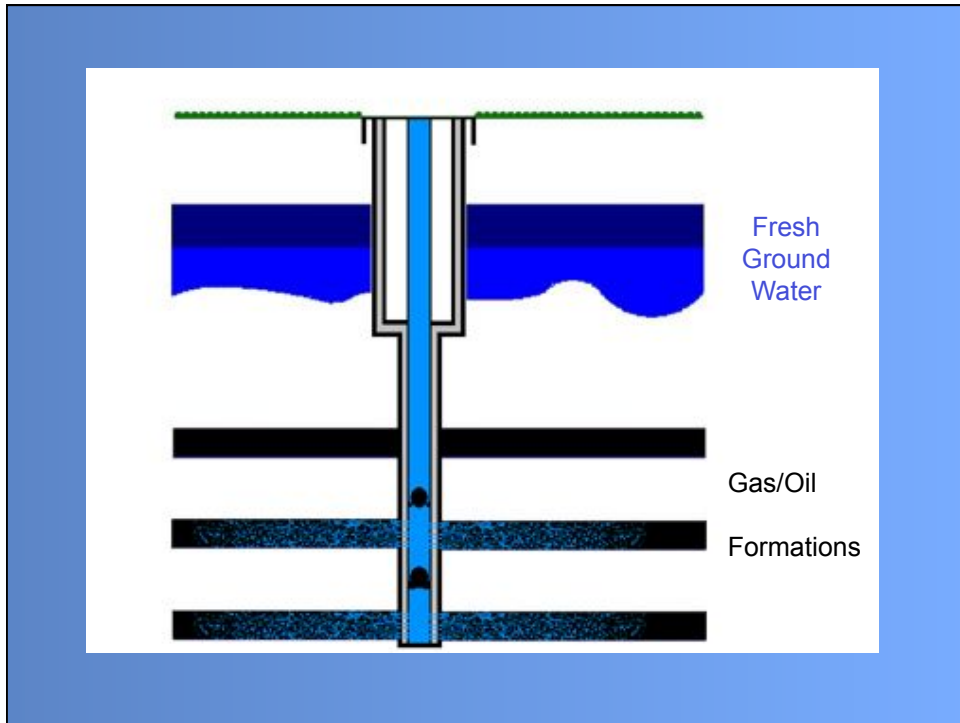
Upon completion of the frac this fluid is pumped from the formation into a lined sump and trucked to a permitted treatment facility.

## Using Frac Tanks

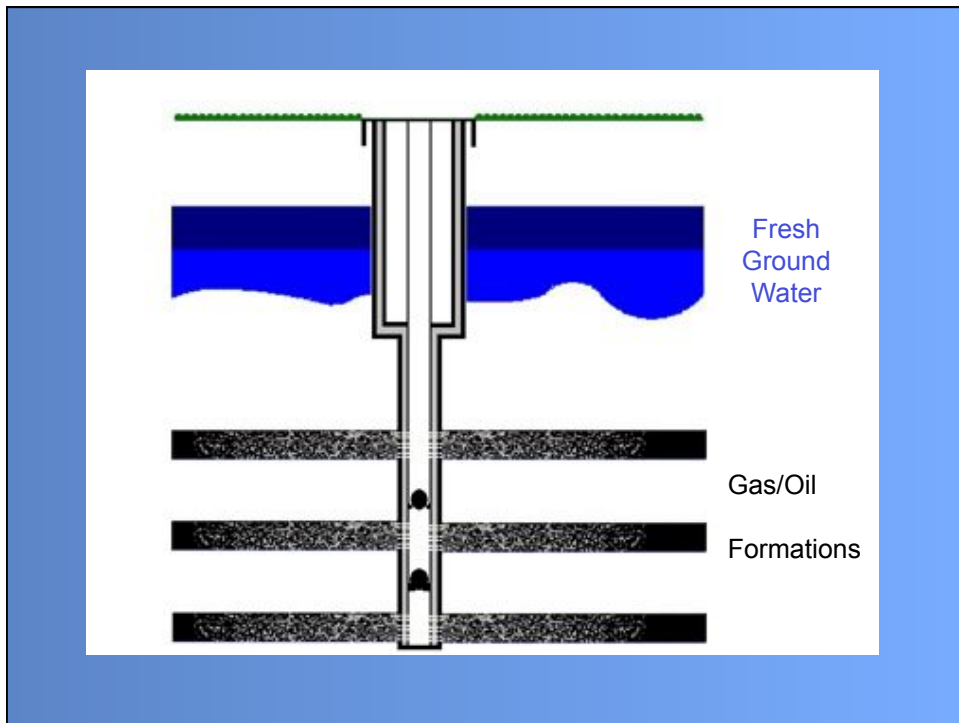












## Water Supply Replacement

- Operator responsible for replacing water supply if quality or quantity affected
- Complaint – DEP has 10 days to investigate and 45 days to make a determination
- Issue orders as appropriate



### **What protections are available to water supply owners?**

The Oil and Gas Act includes a “responsibility” section (208) which requires an operator to restore or replace any supply determined by DEP to be affected by pollution or diminution as a result of their oil and gas operations with an adequate replacement supply.

The operator is presumed responsible for pollution of a water supply within 1000 ft of a well if it occurs within six months of the completion of the well - unless the operator can prove otherwise.

Whenever a water loss or degradation occurs that may be related to an oil or gas well, it should be reported to the Oil & Gas regional office for further investigation. (10/45 days).

### **How close can they drill a well to my home?**

Wells cannot be drilled within 200 ft of an existing building or water well without written consent of the owner.



There is, however, no DEP restriction on how close you can build a house to a well.



### **How close to my property line can a well be drilled?**

The boundary considered for oil and gas issues is the actual mineral ownership or “lease line” which may or may not correspond to the surface property line.

There are no distance limitations between wells and surface property lines.

Conservation wells penetrate the Onondaga formation or are 3800’ deep where formation is shallower or non-existent. A conservation well must be 330’ from lease lines.

### **How close to a stream or wetland can a gas well be drilled?**

The Oil and Gas Act (Act 223) requires an operator to stay 100 ft. from any stream, spring or body of water identified on the most current 7 ½ minute USGS topographic map. In addition a distance of 100 ft. must be maintained to any wetland greater than one acre in size. The department may grant a waiver to the distance restriction upon submission of a plan that identifies additional measures and practices to protect the waters of the Commonwealth.





Chapter 105 regulates encroachments to the waters of the Commonwealth. This includes stream crossings and wetlands.



- Operators must have a site specific E & S plan in compliance with Chapter 102;
- keep controls in place and functional;
- and permanently restore the site after the well is completed.

Operators are encouraged to use the Dept's Oil & Gas Operator's Manual as well as the Statewide E & S Manual in preparing and implementing their E & S plans.



### Typical E & S controls include:

- Filter fence
- Vegetation
- Sediment traps
- Hay bales
- Culverts with Energy Dissipaters
- Rocked road entrance





# Water Treatment



## **What happens with the water removed from the well?**

- **Reuse in drilling/fracing**
- **Treatment and Discharge**
- **Disposal Wells**
- **Municipal/industrial treatment plants**
- **Beneficial Reuse for road stabilization/dust/deicing**

The water, from below the fresh water casing, also known as “brine”, can only be discharged after treatment to limits established by an NPDES permit issued by the Department. Treatment usually consists of equalization, skimming, aeration, settling and then discharging.

Discharge limits usually include iron, oil & grease, TSS (Total Suspended Solids) and PH. In addition, Alkalinity, Acidity, TDS (Total Dissolved Solids), and Chlorides are monitored.

The water encountered when drilling through the fresh water zones is commonly referred to as “top hole water”. If this water meets specific criteria for pH, conductivity and is not contaminated with any other substance it may be land applied and allowed to infiltrate back into the ground.



All other drilling, fracing and production fluid is hauled to a permitted treatment facility



Treatment would occur at a plant that has an NPDES permit that has specific discharge limits. An NPDES Permit issued by DEP satisfies state as well as USEPA requirements.



## Pipeline Trenching







## Pipeline Stream Crossings



## Site Restoration

Well Site must be restored within 9 months  
of well plugging.



You might see this...

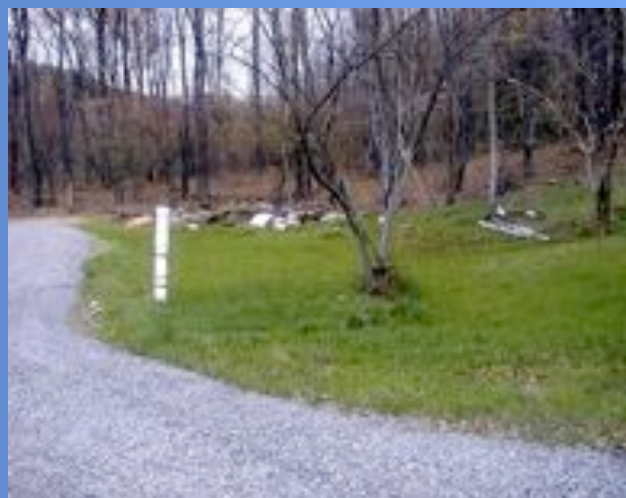




## The End Result







**Bioretention / Infiltration Area**





**Stabilized road surface**



**Slope Stabilization**

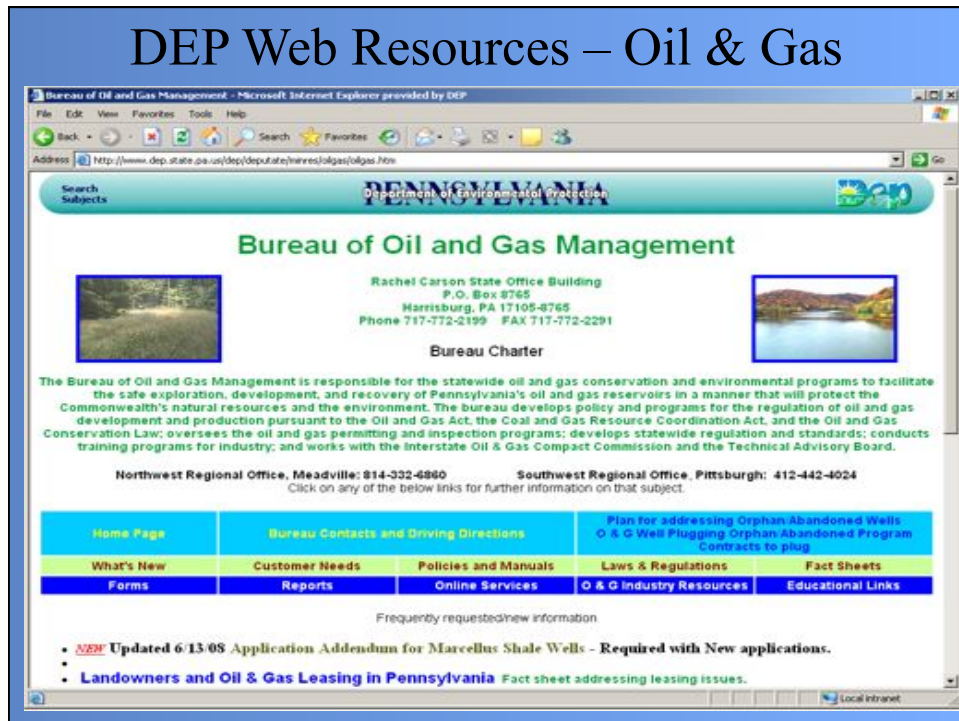
## Pipeline Right-of-Way



## *Ongoing Issues*

- *Air Quality Emissions*
- *Waste Characteristics Evaluation*
  - *Solids, Liquids,*
  - *NORM and TNORM*
- *Supporting Infrastructure*
- *Treatment Capacity*
- *Oil and Gas Technical Advisory Board*
- *Regulations Update*

## DEP Web Resources – Oil & Gas



## Contact Information

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 and Well Plugging  
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## QUESTIONS ?