

Real Estate Department

**POSSIBLE LEASE
TO EXPLORE AND DRILL
FOR NATURAL GAS ON
CORNELL PROPERTY**



Lessee: Anschutz Exploration Corporation

- A privately held enterprise that has 75 years in oil and gas exploration and production operations in the US and overseas
- Founded by Fred B. Anschutz in the 1930's
- Headquarters in Denver, Colorado
- Current operations in central New York, Ohio, Pennsylvania, North Dakota's Williston Basin, western Montana, Wyoming and central Utah
- Thirty employees supplemented with field operations personnel and third party consultants or contractors

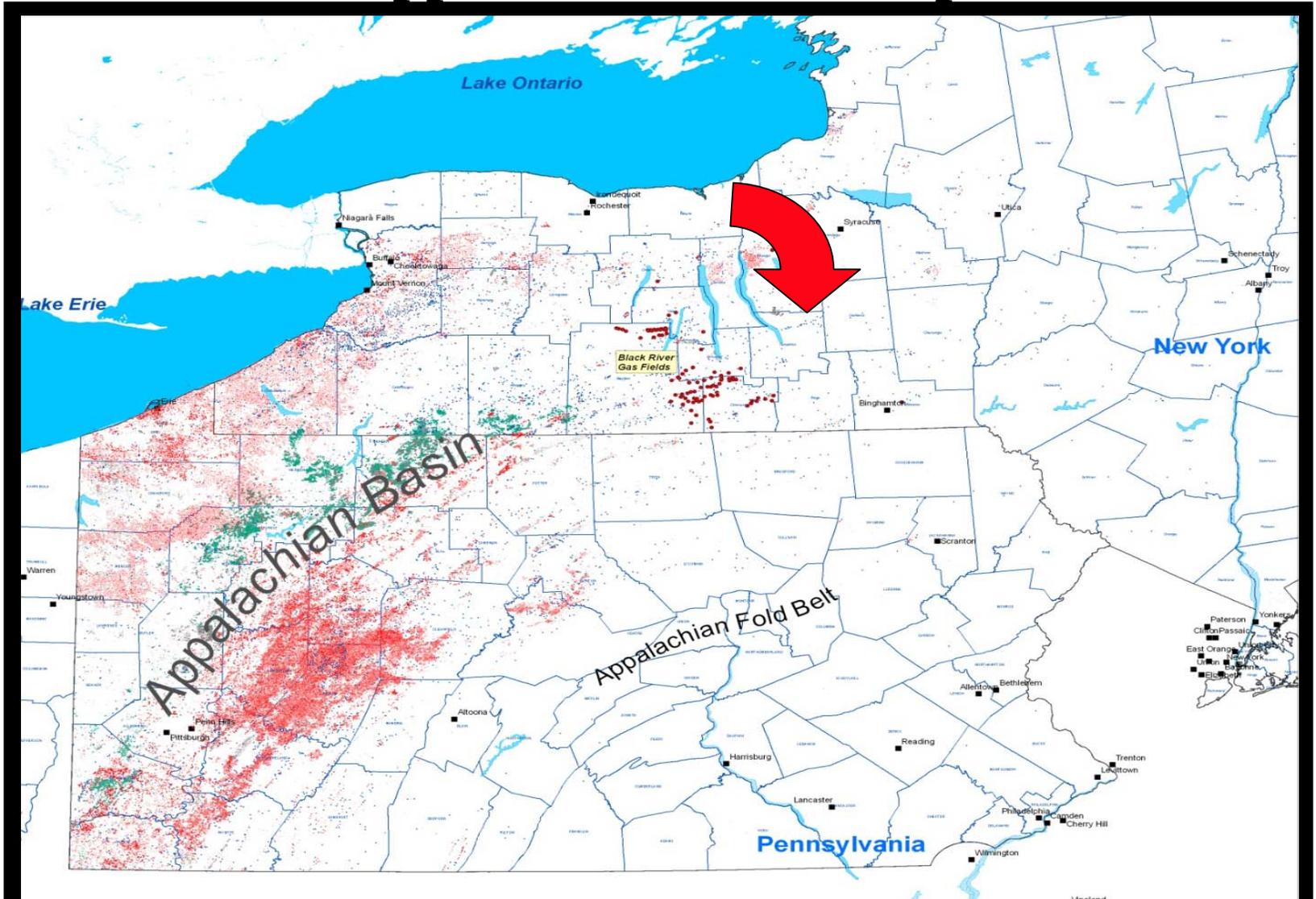


Anschutz Operations

- To bring new reserves of gas or oil to market in a safe and environmentally conscientious manner.
- Mineral leasing, contracts, lease and joint venture negotiations, geology, geophysics, drilling operations, economic analysis, wellbore evaluation, reservoir engineering, production operations and optimization, transportation and sales, accounting – and planning.
- Anschutz's New York program is focused on leasing and preparation to drill exploratory wells in Tompkins, Cayuga, Tioga and Cortland Counties.
- Two wells have been drilled by Anschutz in Cayuga County.

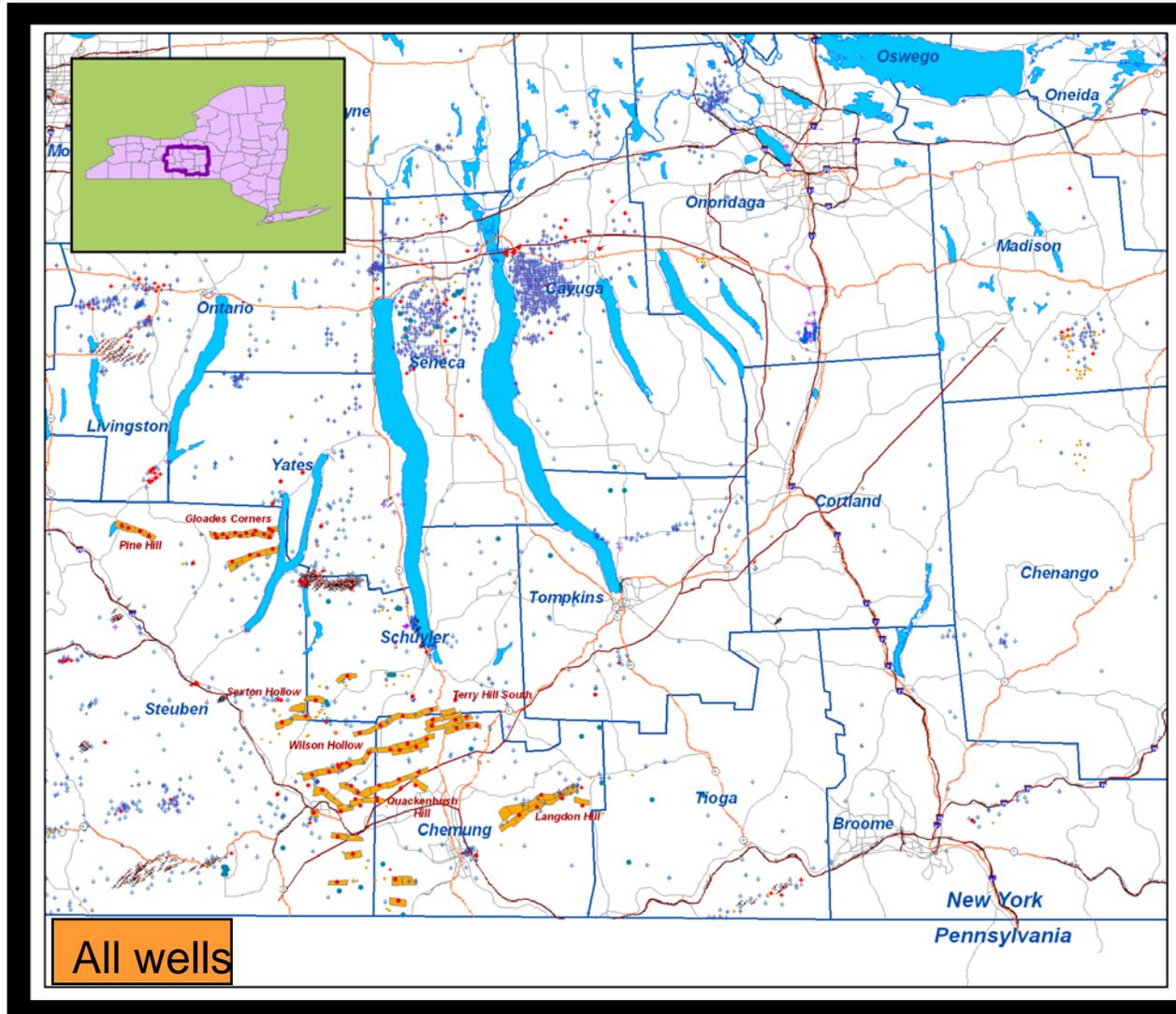


Appalachian Basin Map



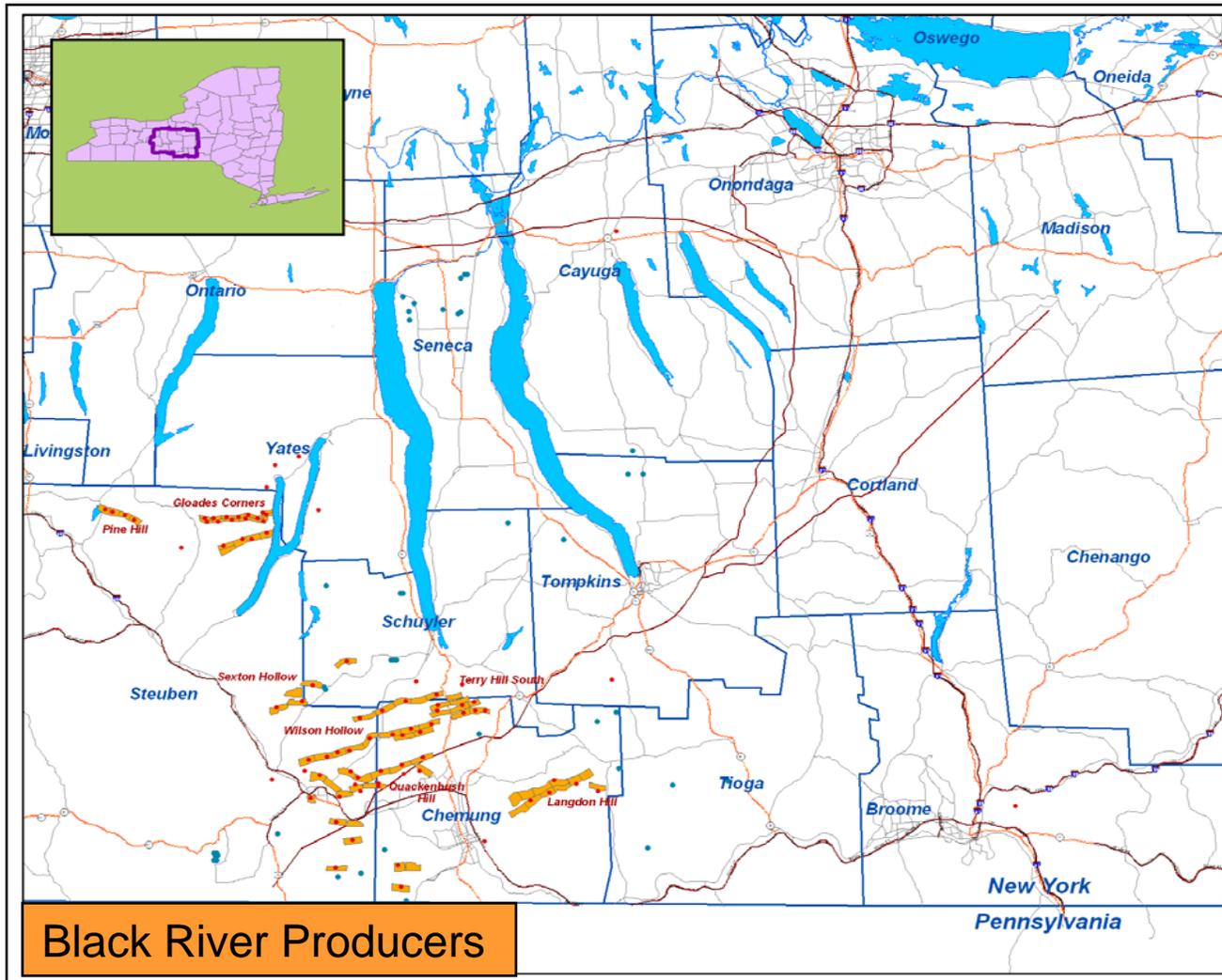


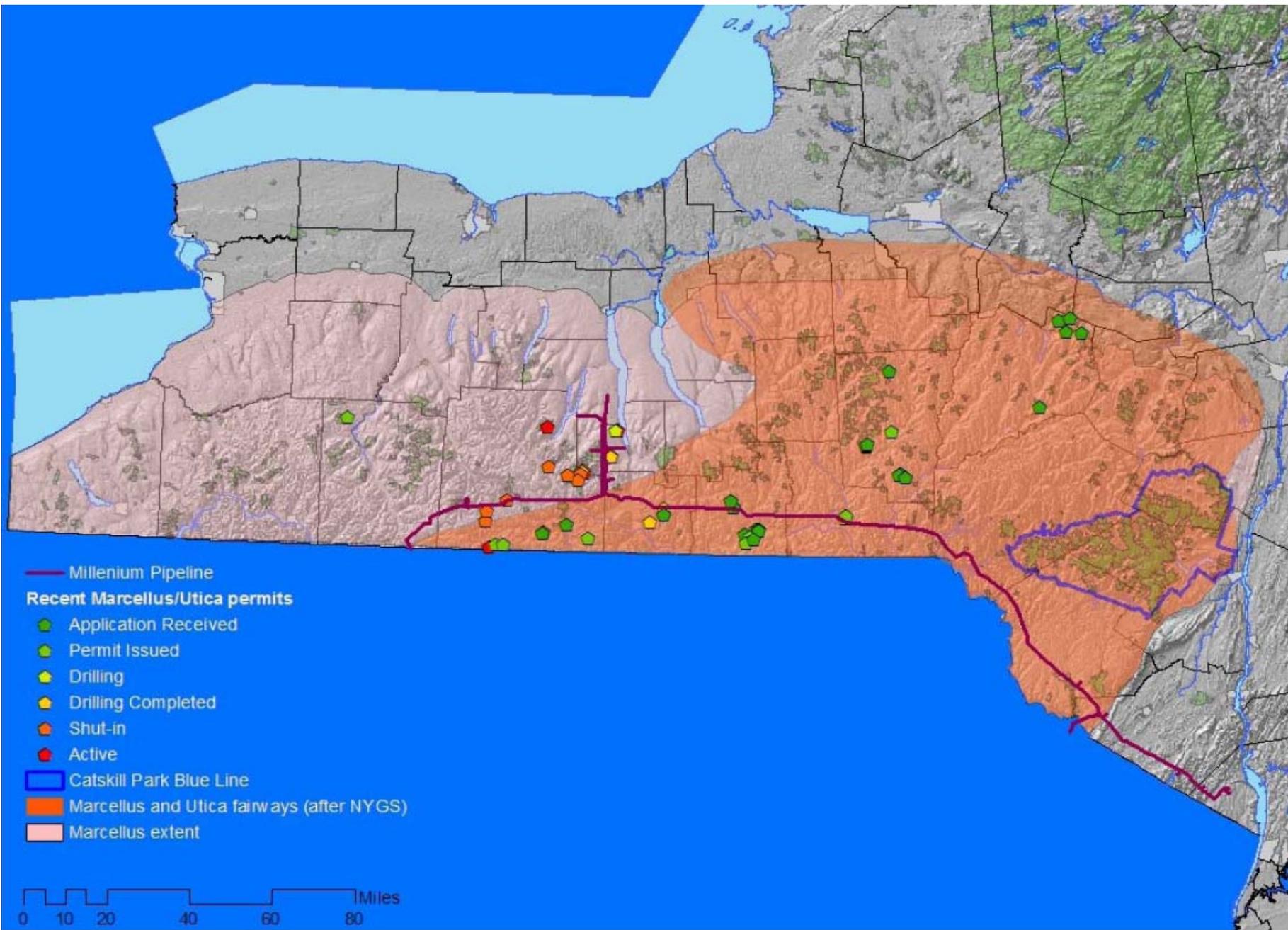
New York Regional Map





New York Regional Map





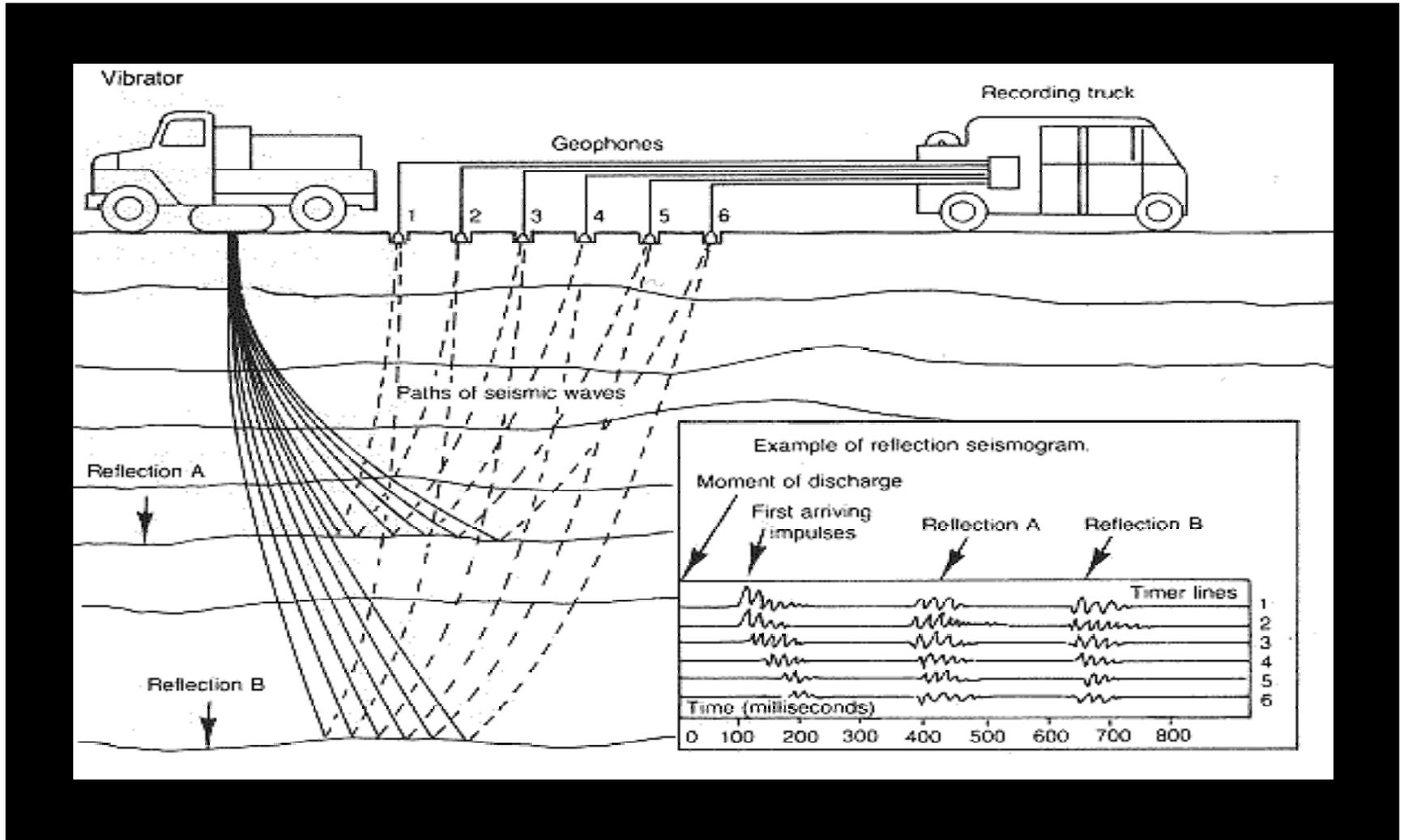


Exploration Process

- An idea about the presence of hydrocarbons in the subsurface
- Leasing of mineral rights
- Geological investigation
- Geophysics and Seismic
- Drilling (An exploration or production well)
 - **Oil and Gas exploration in New York is regulated by the NYDEC. Regulations and penalties are in place to protect groundwater, prevent pollution, protect the environment, prevent waste of energy resources and protect mineral and surface owners' rights.**
- Natural Gas or Oil Production and Sales



Seismic Imaging of the Subsurface





Appalachian Seismic Crew



Vibroseis Trucks



Geophone Crew



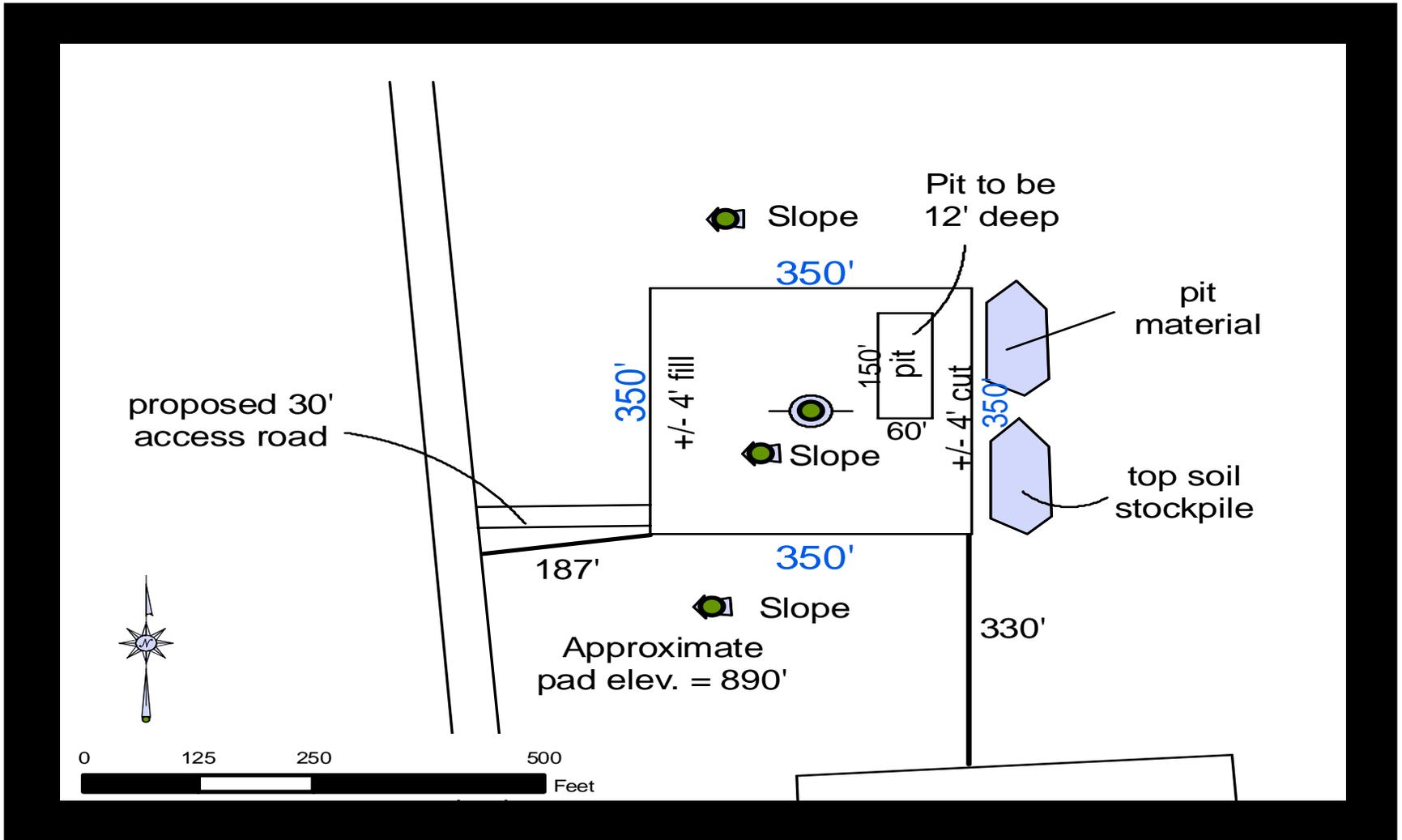
Geophone Cable



Geophone



Example Drill Site Plan



Example AEC-operated Drill Site



July 2007

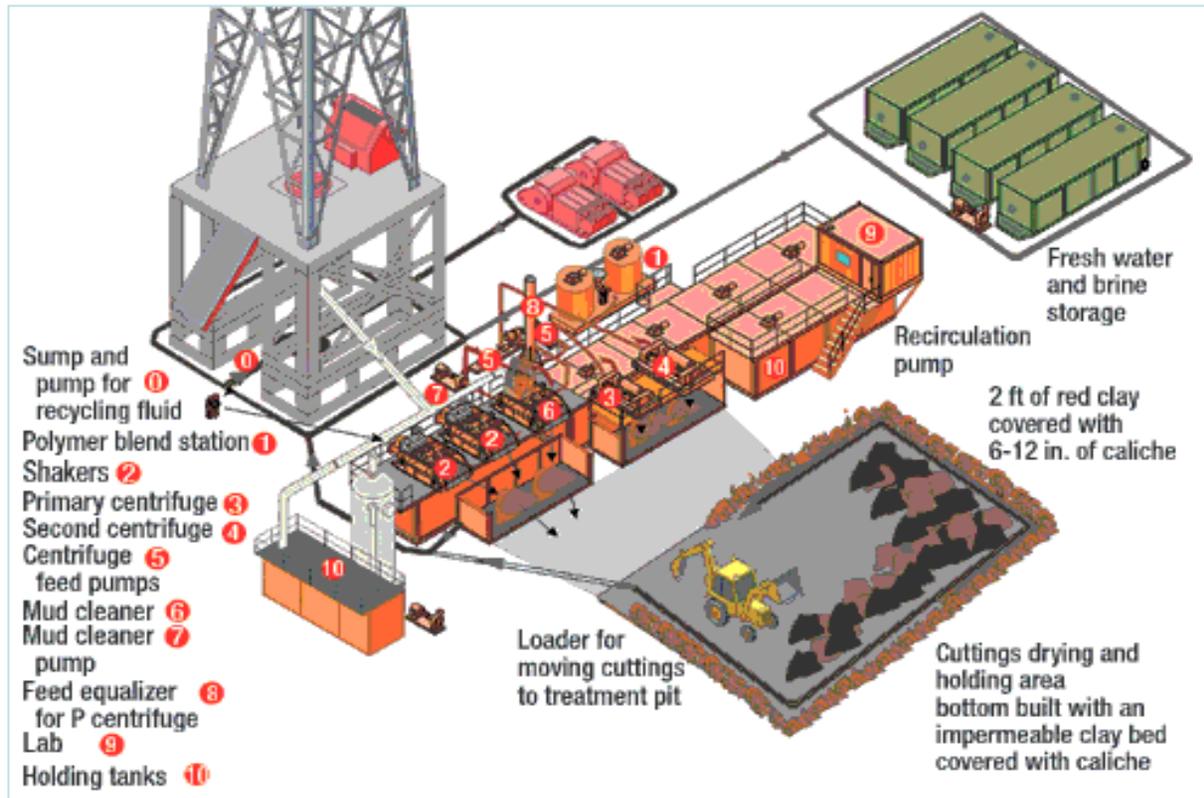


Field Photos





Closed Loop Drilling



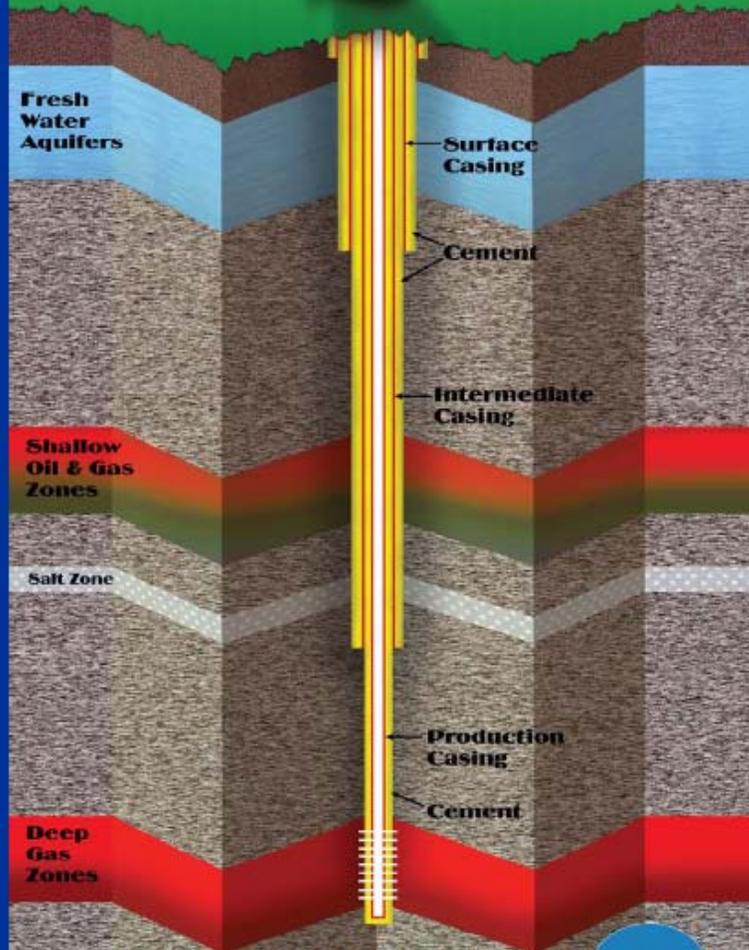
Schematic of the closed loop dewatering layout used in New Mexico. The key components are the pad, frac tanks for reserve and recycled fluids, cement handling, and the solids control and dewatering equipment.

Groundwater Protection

Well Casing and Cementing Program

The Division of Mineral Resources' well casing and cementing regulations provide for the protection of the State's fresh water aquifers

Regulations require that wells be constructed and operated to prevent the movement of oil, gas or water from one zone to another





Production Locations





Production Facilities





Principal Parts of an Oil and Gas Lease

- **Grants the exclusive right to explore**
- **Bonus (\$/acre) (paid regardless of drilling activity)**
- **Term (years) and renewal option**
- **Rental (“paid up” or in periodic payments)**
- **Landowner royalty percentage**
- **May or may not grant surface access**



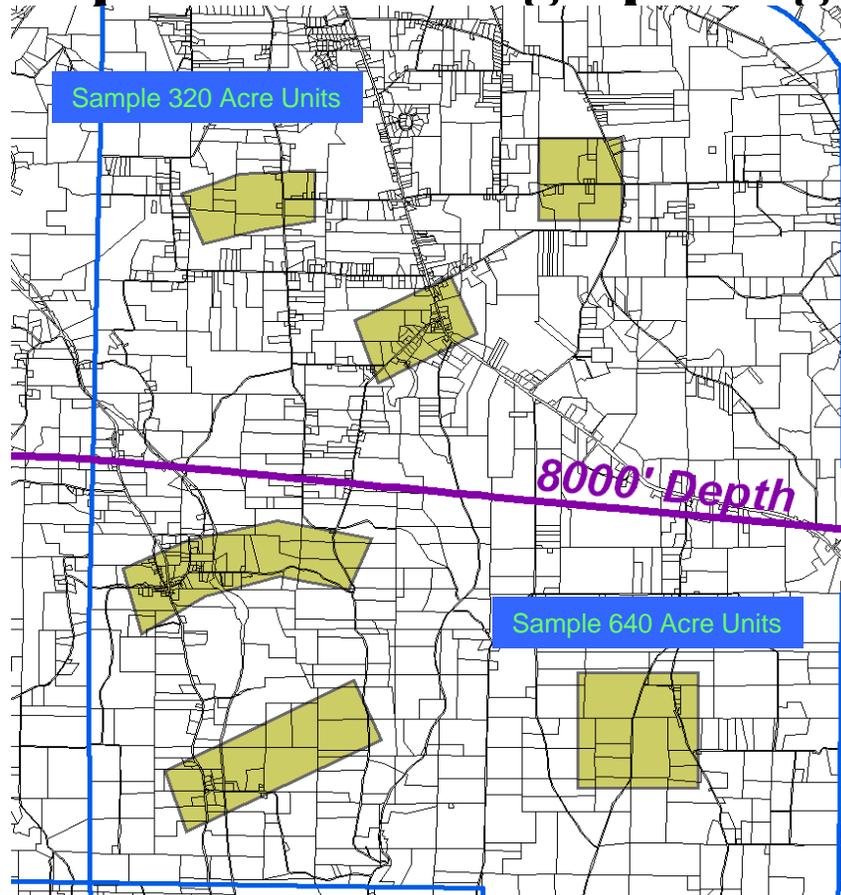
What is a Drilling Spacing Unit or “Unit”?

A “Unit” for the drilling of a Black River horizontal well is a DEC and operator- defined area of

- **320 acres (when the Black River top is shallower than 8,000’)**
- **640 acres (when the Black River top is deeper than 8,000’)**



Examples of Drilling Spacing Units



New York State Department of Environmental Conservation rules:

- If well depth is less than 8000', then the drilling unit must be 320 acres
- If well depth is greater than 8000', then the drilling unit must be 640 acres



Example: Landowner Share of Sales

- The landowner (LO) share of gas sales at the wellhead from a unit well's production is calculated according to the Landowner's share of the unit.
- The landowner does not share in the costs of exploration, production, development nor operating expense.
- $(\text{Landowner Royalty \%}) \times (\text{LO Net Acres within unit} / \text{Total Unit Acres})$

320 Acre Unit:

	<u>Part</u>	<u>Full</u>
	<u>Ownership</u>	<u>Ownership</u>
Landowner royalty	12.5%	12.5%
Landowner net acres in unit	64	320
Total unit acres	320	320
Landowner share of unit	20%	100%
Landowner share of sales	2.5%	12.5%



Well Production

Assumptions:

- Gas Price: \$8/MCF
- Production: 2,000 MCF/day, minimum daily production

Part Ownership :

- $2,000 \text{ MCF} \times \$8/\text{MCF} \times 365 \text{ days} \times 2.5\% = \$146,000/\text{year}$

Full Ownership:

- $2,000 \text{ MCF} \times \$8/\text{MCF} \times 365 \text{ days} \times 12.5\% = \$730,000/\text{year}$

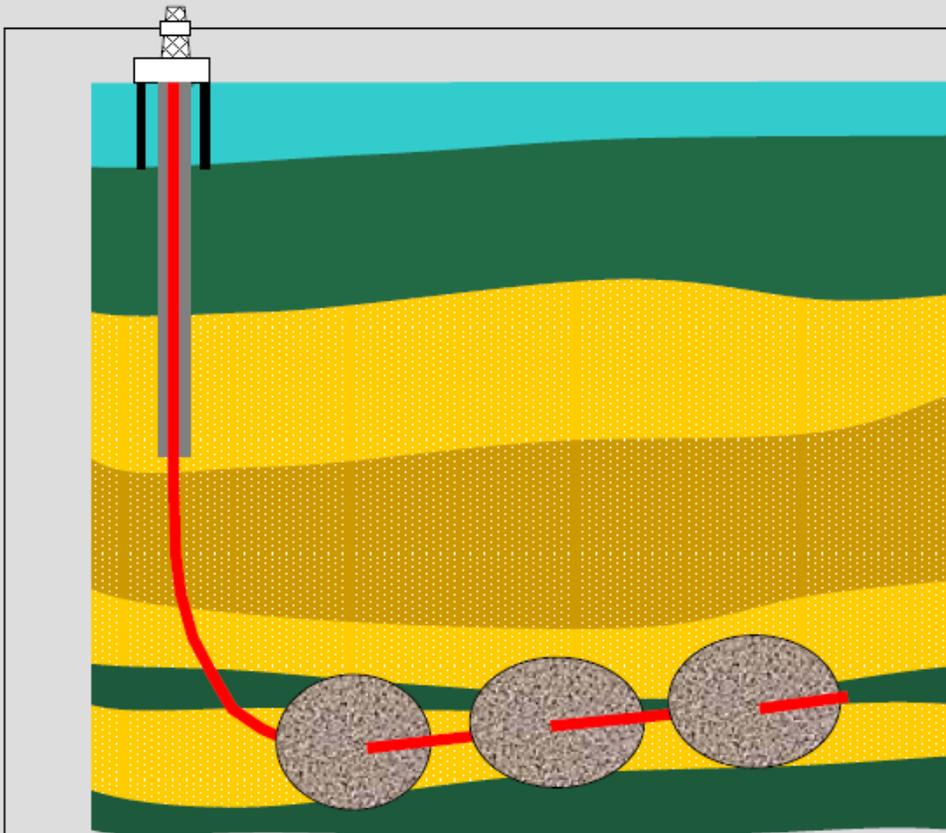
$$20,000 \text{ MCF} \times \$8/\text{MCF} \times 365 \text{ days} \times 12.5\% = \$7,300,000/\text{year}$$



Marcellus Shale

- Cannot drill for production in Marcellus Shale or any other Shale until DEC establishes firm regulations

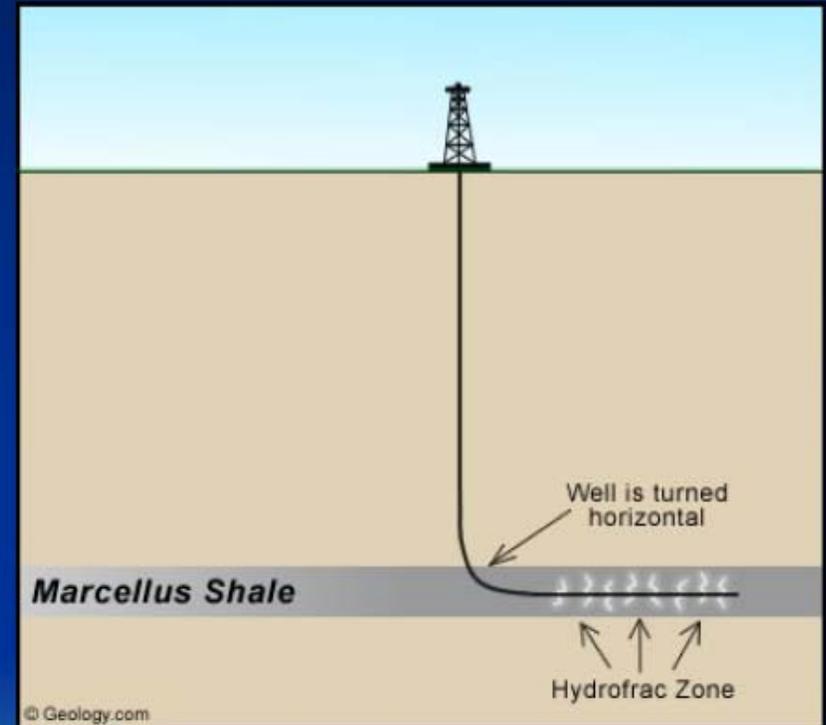
Why Fracture Horizontal Wells?



- Advantages
 - Increase productivity
 - Reduce surface footprint (replacing multiple vertical wells)
 - Achieve maximum surface area of gas-bearing rock to the wellbore

Horizontal Drilling in New York

- First horizontal well in New York – 1989
- 69 of 665 applications in 2007 were for horizontal or directional drilling



Primary Regulatory Issue Unique to Marcellus Development

- “Size” of hydro-fracturing operation
 - Water source
 - Frac fluid handling and storage
 - Flowback fluid storage and disposal



Hydraulic Fracturing (“Fracking”)

- Used for decades in New York State
- Target formations are thousands of feet below surface and ground water
- Does not occur until after the ground water zones are sealed and drilling is completed
- Fracturing is limited to completion interval



Water Use, Storage and Disposal

- Water withdrawals require Basin approvals (SRBC, DRBC)
- Hydraulic fracturing and frac water volumes
 - 1 million gallons or more per well
 - Fluid handling and disposal
 - Frac fluid composition requested as part of DEC's drilling application
 - Fluid stored in lined pits or tanks
 - Pits and tanks inspected by DEC
 - Fluid removed from site by Part 364 waste hauler





Why are we doing this?

- Stewardship
- Sustainability
- Research



Links

- DEC Marcellus Shale Exploration:
[http://gasleasing.cce.cornell.edu/Marcellus%20Shale_locgovt_Webinar\(NYSDEC_7-15-2008_21slides\).pdf](http://gasleasing.cce.cornell.edu/Marcellus%20Shale_locgovt_Webinar(NYSDEC_7-15-2008_21slides).pdf)
- Cornell Cooperative Extension Gas Leasing:
<http://gasleasing.cce.cornell.edu/>
- Tioga County Landowners Group:
<http://www.tiogagaslease.org/home.html>
- CNY Landowners: <http://www.cnylandcoalition.org/>
- Geology.com: <http://geology.com/articles/marcellus-shale.shtml>