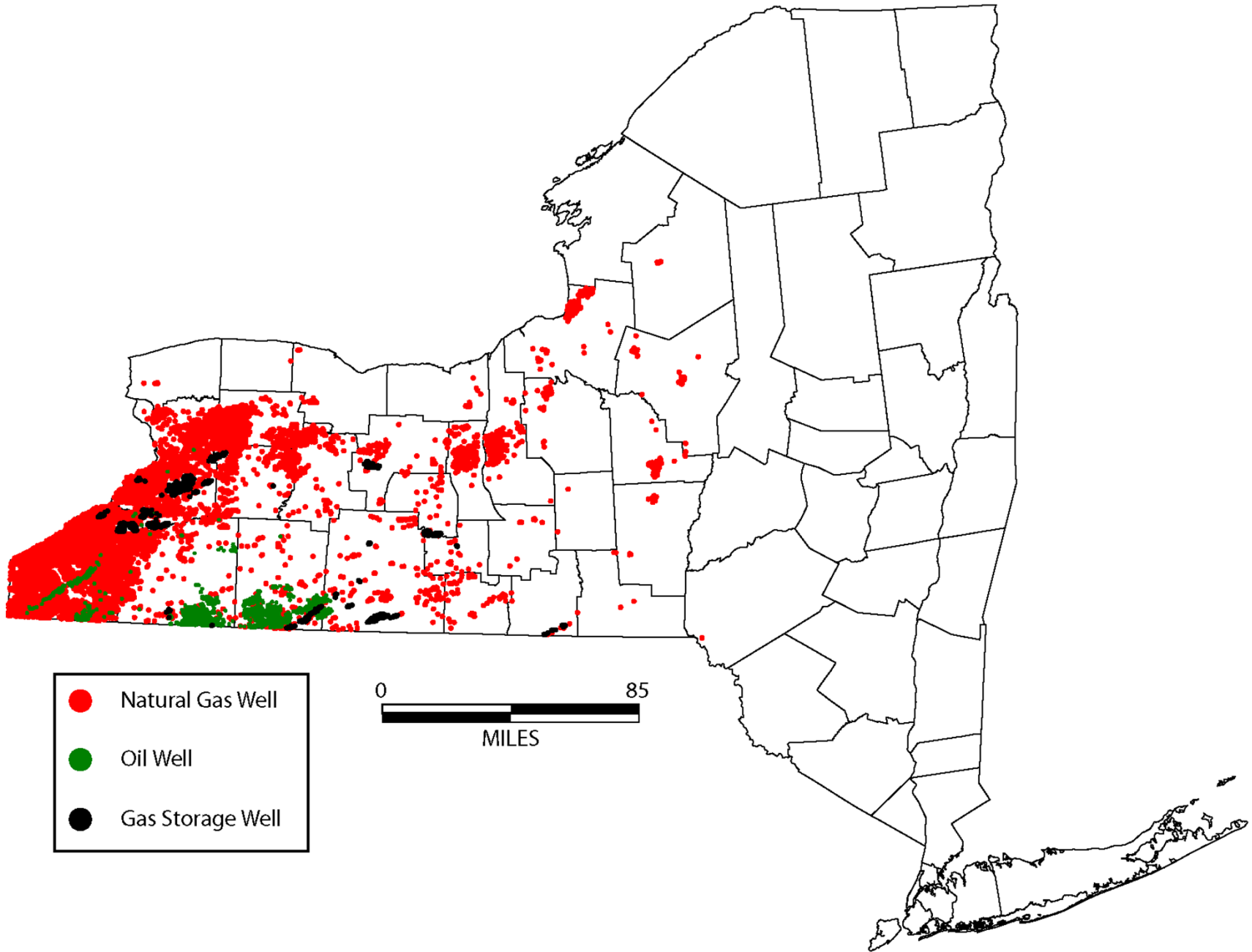


Oil and Gas Plays of New York State

Brian Slater, Langhorne Smith, Richard Nyahay



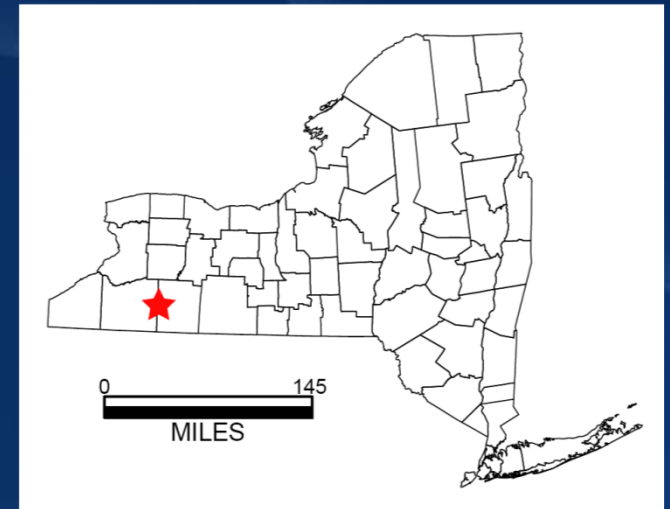


Period		Group	Formation	Lithology
Devonian	Upper	Genesee	Genesee Shale	
			Tully Limestone	
	Middle	Hamilton	Marcellus Shale	
			Onondaga Lst	
	Lower	TriStates	Oriskany Sst	
Manlius Lst				
Silurian	Upper	Helderberg	Rondout Dol	
			Akron Dol	
			Bertie Shale	
			Syracuse Salt Vernon Dol	
	Lower	Clinton	Lockport Dol	
			Rochester Sh	
			Irondequoit Lst	
			Sodus Shale	
Ordovician	Upper	Trenton/ Black River	Queenston Sst	
			Lorraine Slst	
			Utica Shale	
	Lower	Beekman- town	Trenton Lst	
			Black River Lst	
			Tribes Hill Lst	
Cambrian	Upper	Beekman- town	Little Falls Dol	
			Galway Sst	
			Potsdam Sst	
Precambrian Basement				

Oil / Gas Plays of NY

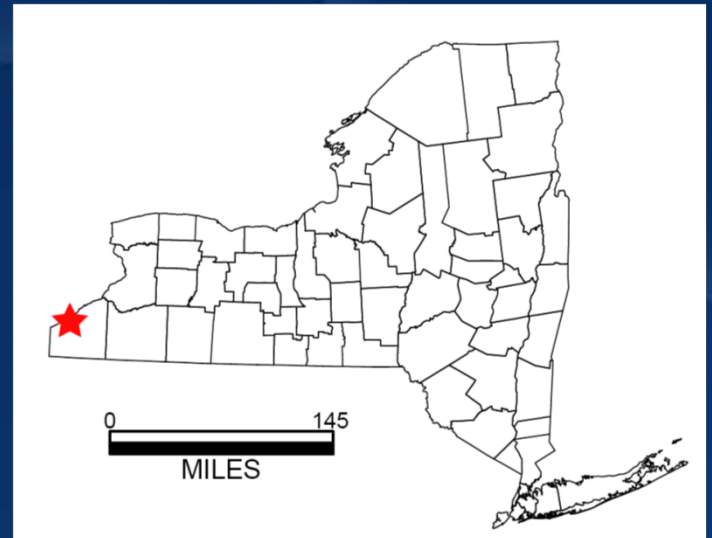
- Canadaway Group (Devonian Sands)
- Onondaga Reef
- Oriskany Sandstone
- Bass Islands Trend
- Medina Sandstone
- Herkimer-Oneida-Oswego Sandstone
- Queenston Sandstone
- Utica Shale
- Trenton Limestone
- Trenton / Black River Hydrothermal Dolomite
- Theresa / Rose Run Sandstone

Cuba, NY



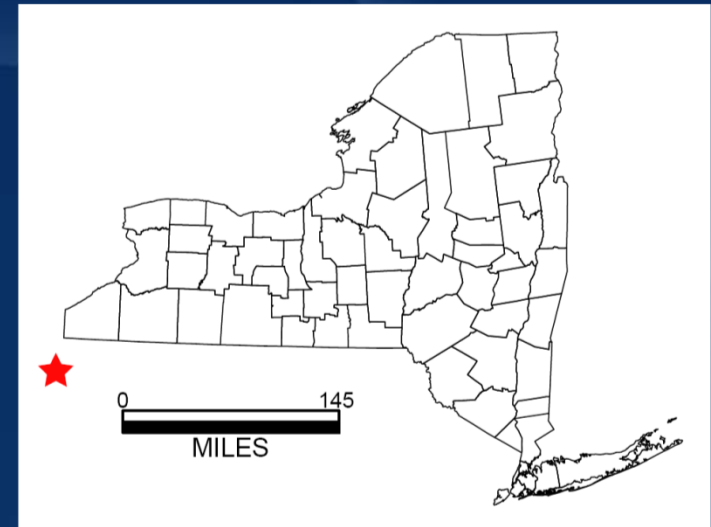
- In 1627 missionaries reported a natural seepage of oil contaminating the water on what is now called Oil Springs Reservation
- The native Seneca Indians believed the water had healing qualities and was used for its medicinal purposes

Fredonia & Barcelona, NY



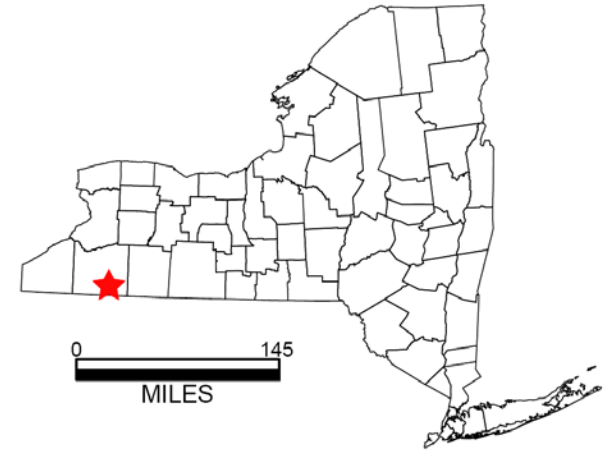
- In 1821 William Hart dug the first natural gas well in Fredonia, NY.
- In 1830 this lighthouse in Barcelona, NY became the first to be lit by natural gas.
- By the 1880's hollow logs were being used to pipe the gas into towns where it was used for lighting and heating purposes.

Titusville, PA



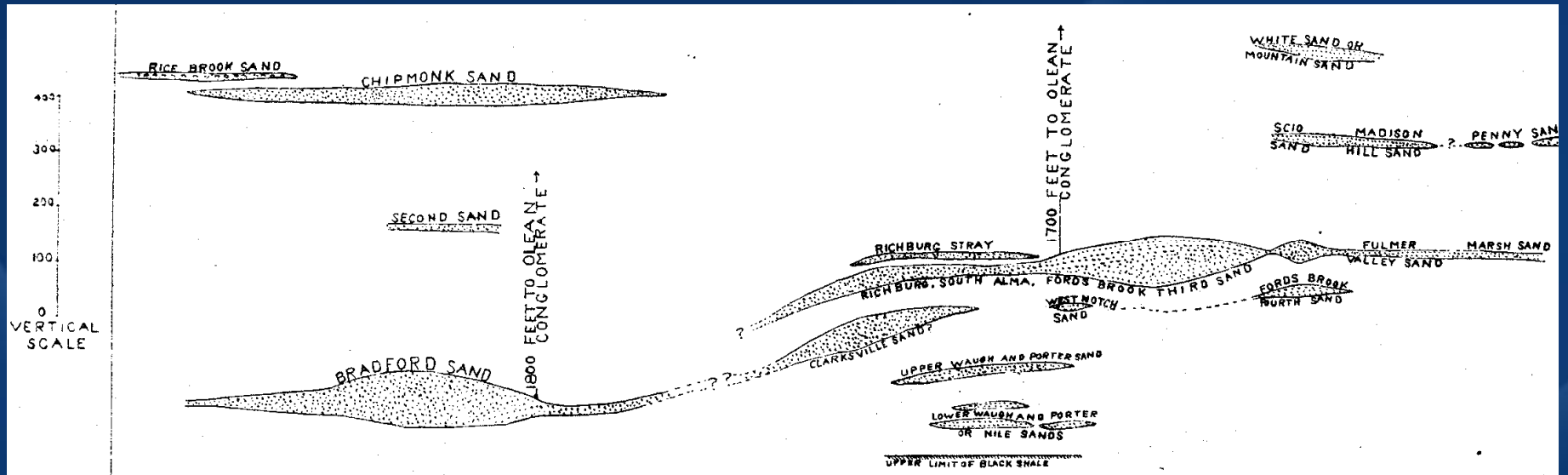
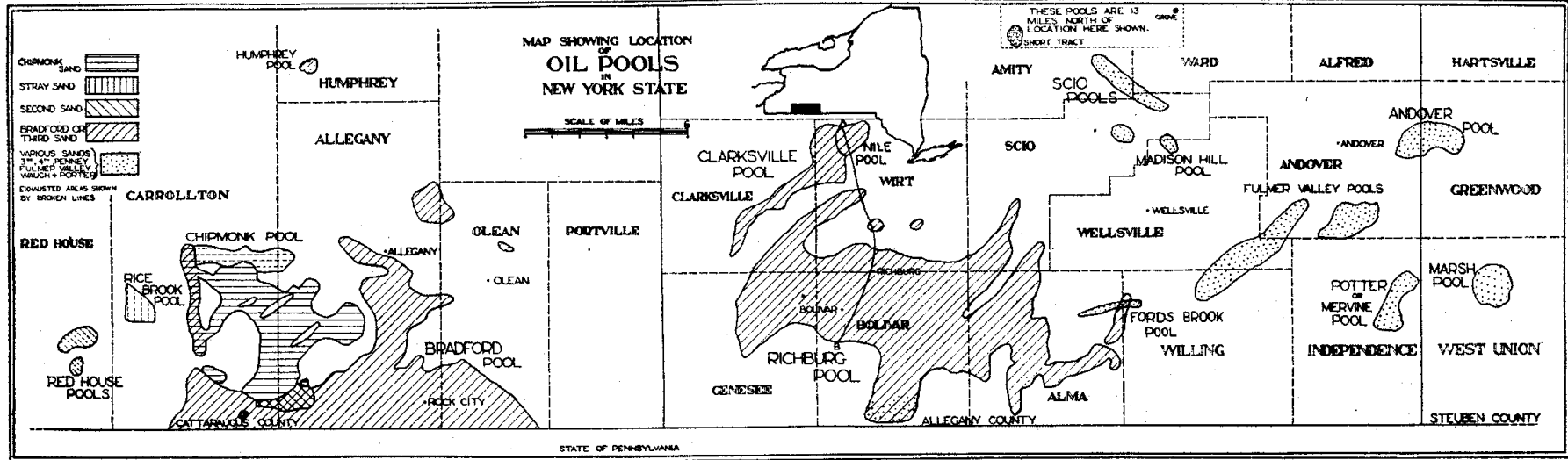
- In 1859 Edwin Drake drilled the first commercial oil well in Titusville, PA
- This well produced oil from a small sandstone lens in the Upper Devonian Riceville Shales
- The success of the Drake well and his drilling methods lead to increased exploration in NY

Limestone, NY



- In 1865 Job Moses drilled the first commercial oil well in New York State
- Producing formation was the Bradford Sandstone
- Although this well only produced about 7 barrels per day, it led to further exploration and the drilling of additional wells

Bradford & Richburg Oil Fields



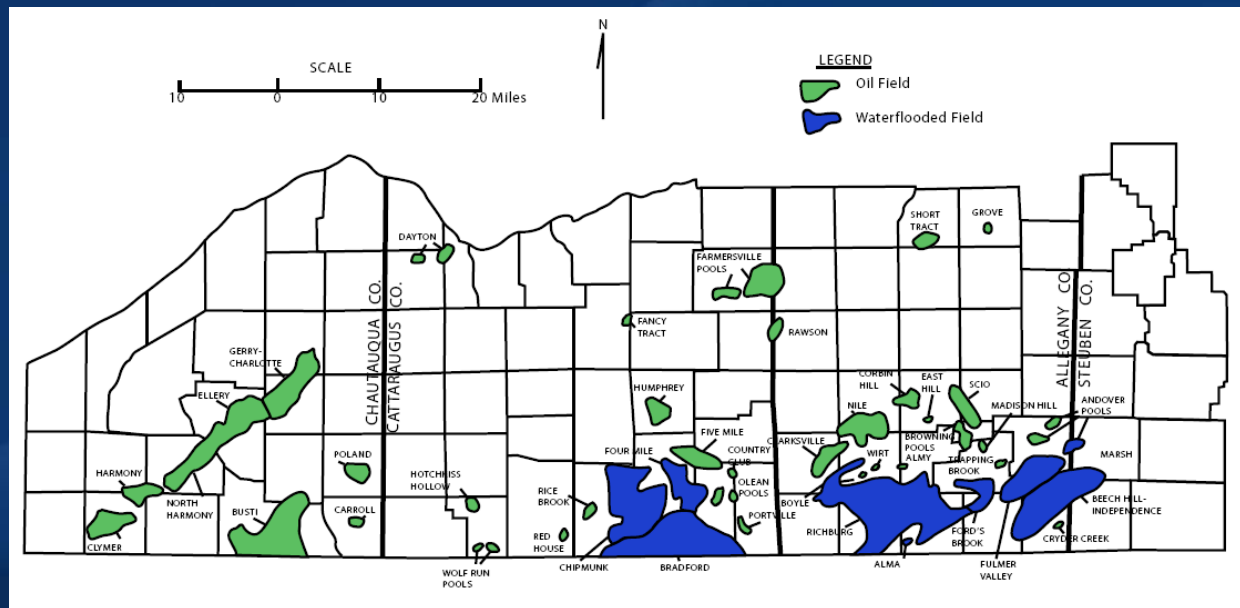
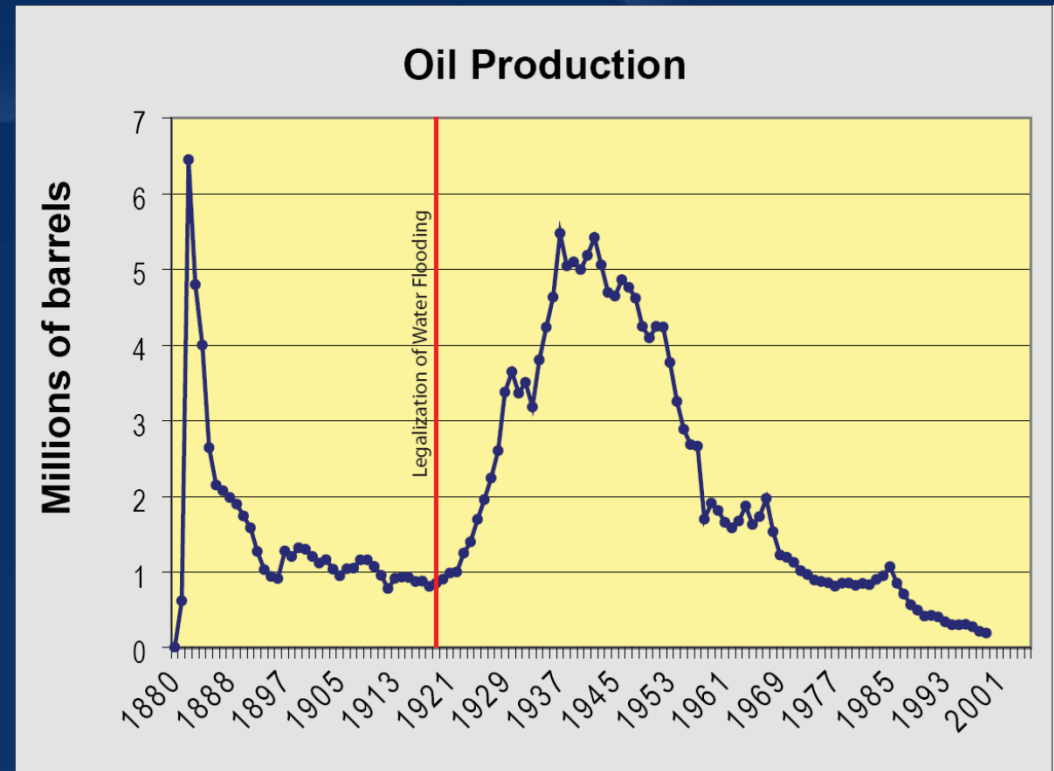
Hartnagle and Russell, 1929



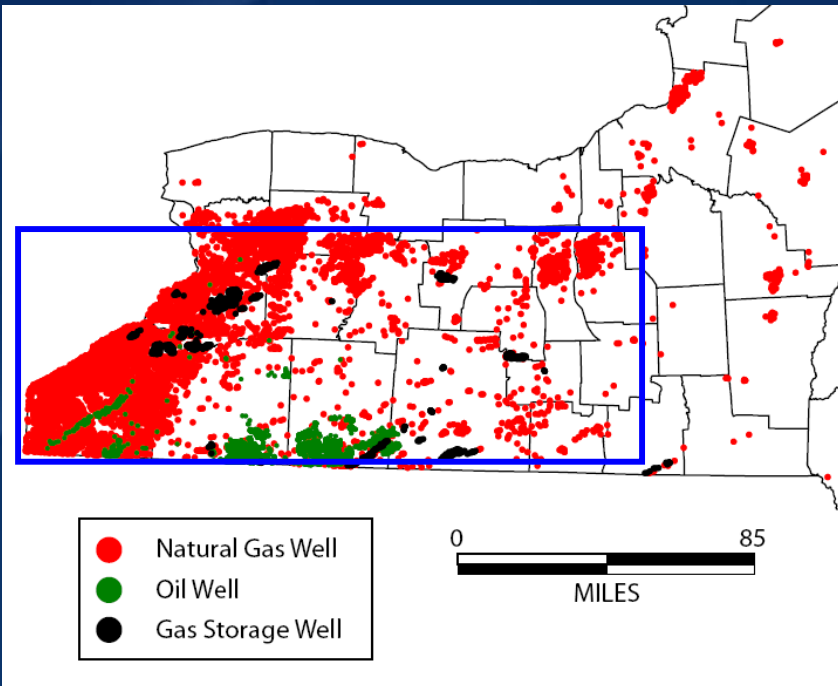
Richburg, 1882

Secondary Recovery

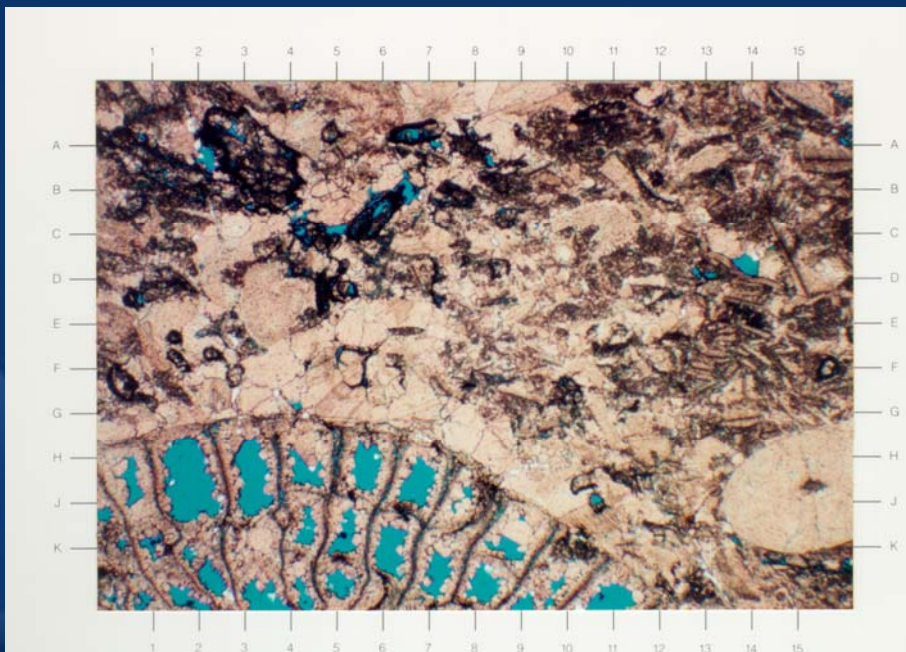
- Concept of waterflooding was first discovered ~1865 when it was realized that a sudden increase in production related to faulty casing in a nearby well had caused water to leak into the producing formation.
- Legalization of waterflooding in 1919 led to a second oil boom in the Upper Devonian Sands
- By 1928 hydraulic presses were being used to inject water at pressures >1000psi
- Secondary recovery led to the production of over 100 million additional barrels of oil over the next 40 years.
- Current production from the Devonian sands is ~292 Mbbbl of oil and 355 Mmcf of gas per year



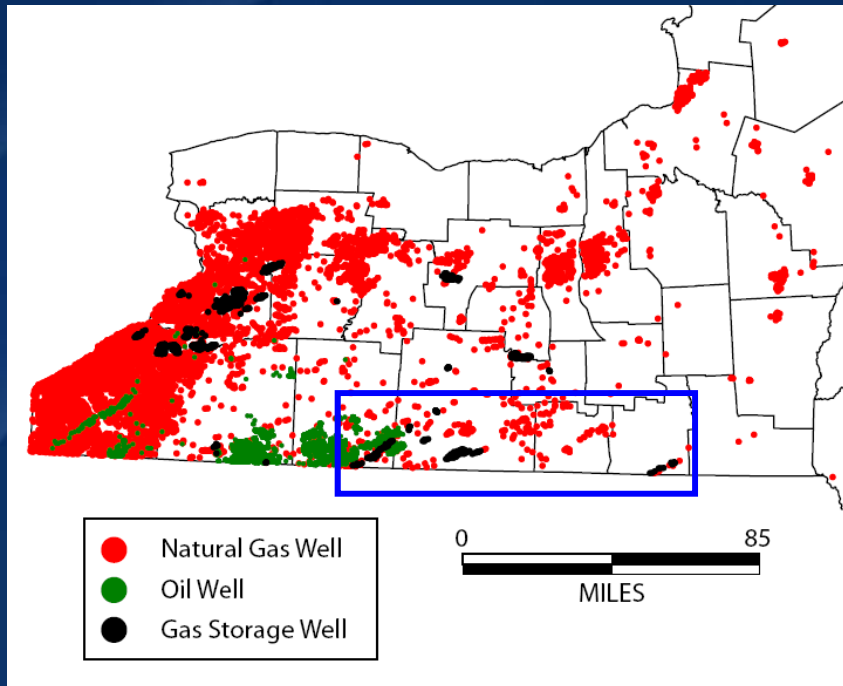
Onondaga Reefs



- Discovered by seismic prospecting in late 1960's
- Currently 179 wells with Onondaga listed as the producing formation
- Geographically widespread with wells in 12 different counties
- Reefs are made up of rugose corals.
- Today several fields have been converted to gas storage facilities



Oriskany Sandstone



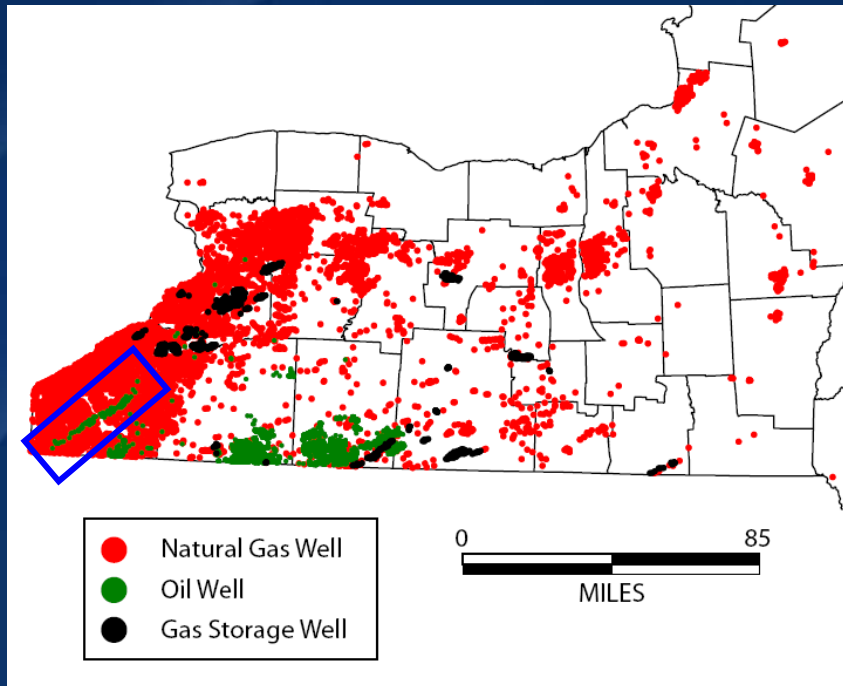
- Discovered in the 1930's as the decline in shallower wells led to deeper exploration.
- Conventional trapping mechanisms
- Currently 573 wells with the Oriskany listed as the producing formation.
- Like the Onondaga Reefs, many depleted Oriskany have been converted to gas storage

Stagecoach Field

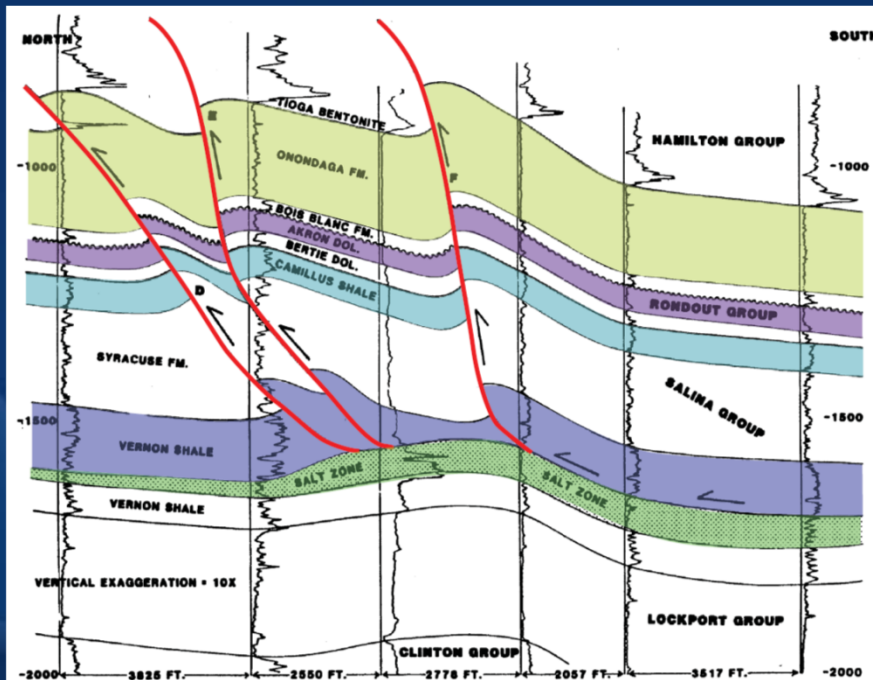
- Discovered in 1987
- Produced 7.88 bcf of gas from 12 wells.
- Currently the easternmost underground natural gas storage facility in the US
- 500 MMcf/day withdrawal capacity



Bass Islands Trend

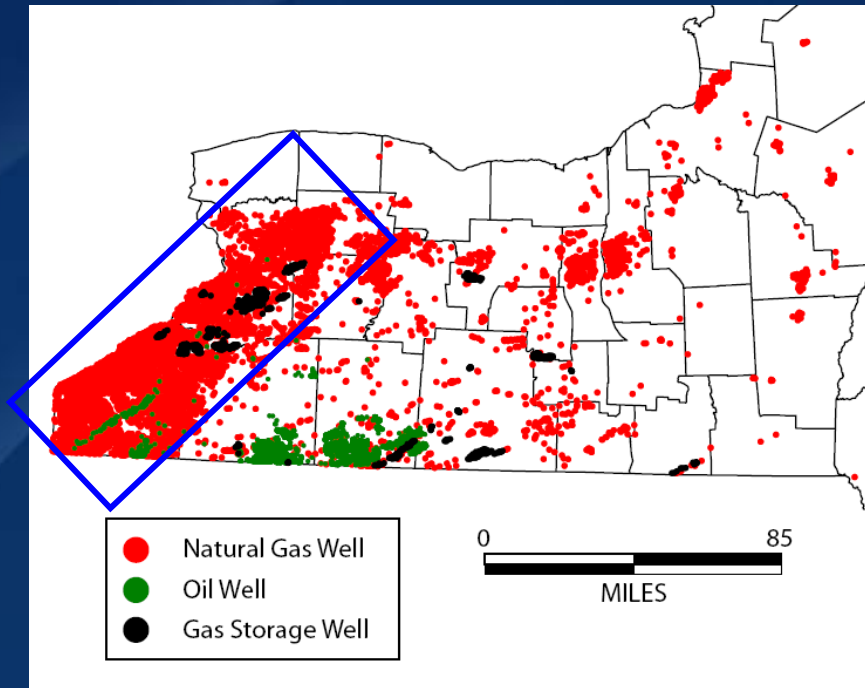


- Northernmost extension of the Silurian / Devonian Carbonate Thrust belt
- Produces oil and gas from the Onondaga (limestone) – Bertie (dolomite) stratigraphic section
- Trapping mechanism is a linear trend of heavily fractured anticlines associated with high angle reverse faults
- Discovered in 1981 with seismic data, it was NY's first flowing oil well in 40 years
- In 2008 this play produced 13,614 bbl of oil and 136,516 mcf of gas from 82 for NY

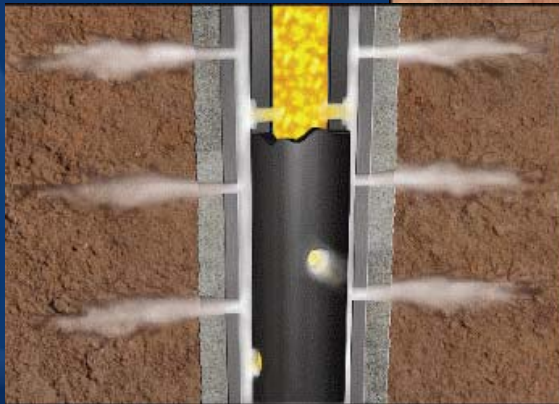
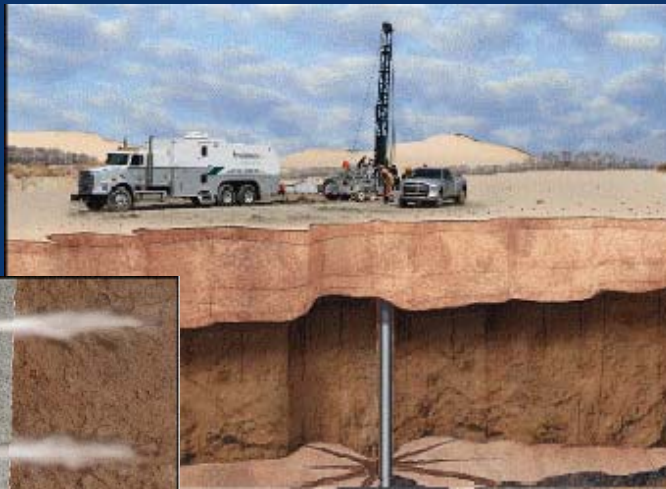


From Beinkaffner, 1983

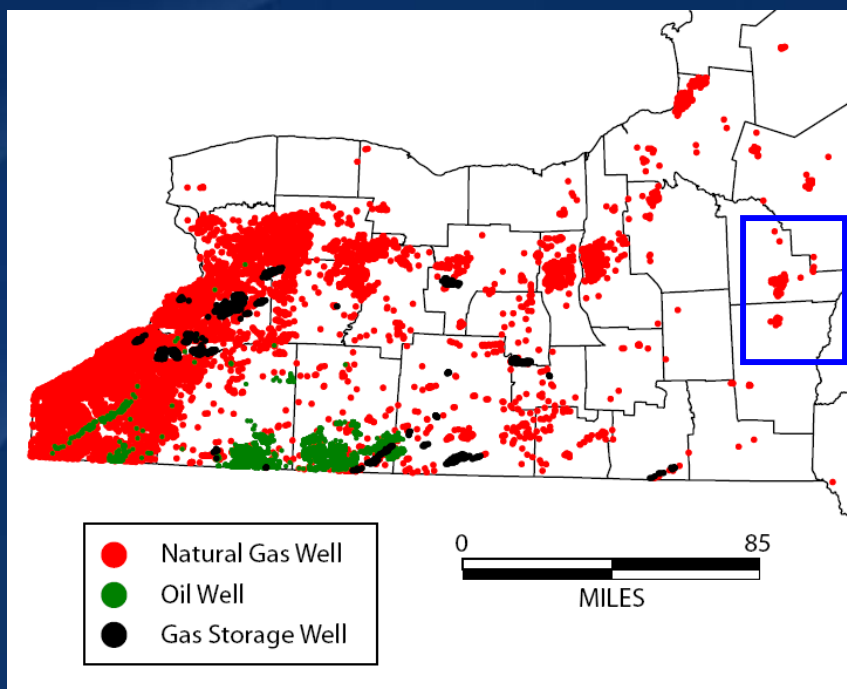
Medina Sandstone



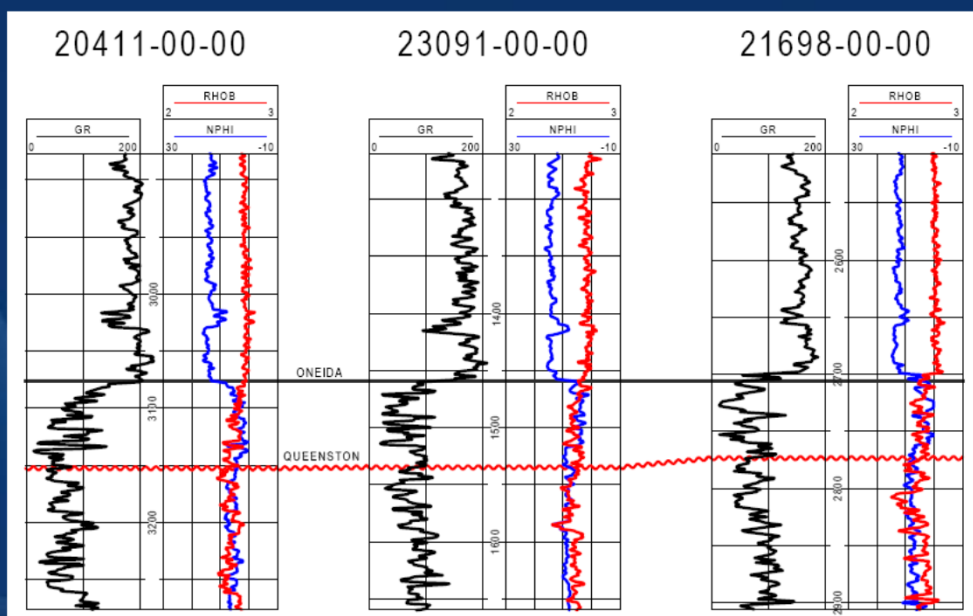
- Lower Silurian sandstones in western NY, mostly Chautauqua and Erie Counties
- Low porosities and permeabilities require hydraulic fracturing to produce at economic rates
- Second largest gas producer in the state. (Over 10.3 BCF from 6,551 wells in 2008)
- Characterized as continuous - type accumulations based on coalesced fields and production in a majority of holes drilled
- Estimated 4Tcf of undiscovered gas



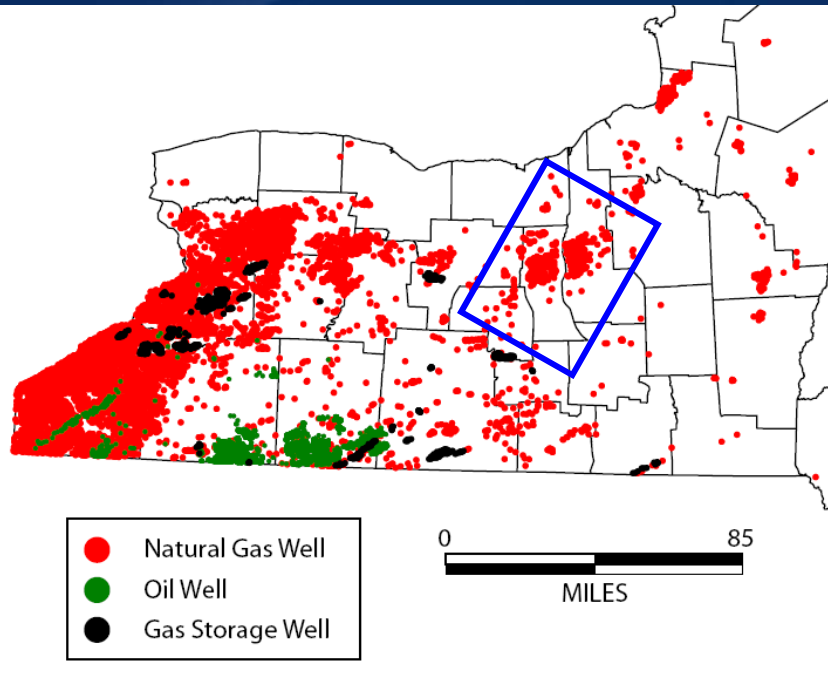
Herkimer-Oneida-Oswego Sandstones



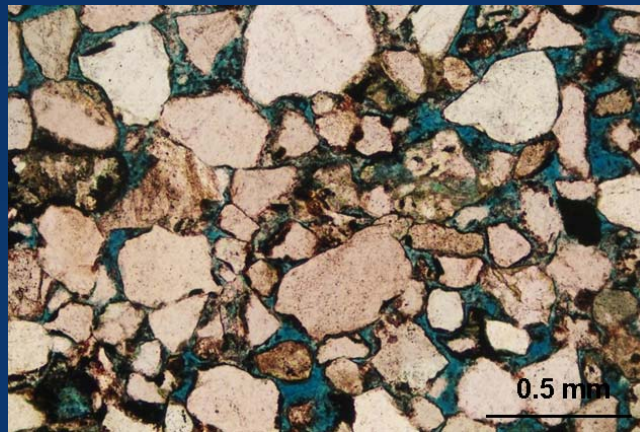
- Relatively new play, only ~10 of the 79 producing wells were drilled before 1997
- Fractured Sandstone Play
- Fourth largest gas producer in the state. (935 MMcf in 2008)
- Nornew Inc. has had much success with horizontal wells targeting fracture zones visible on seismic
- Gastem well targeting the Utica tested 2 mmcf/day from the Oneida
- Good potential for continued exploration and possible 2-for-1 with the Marcellus



Queenston Sandstone



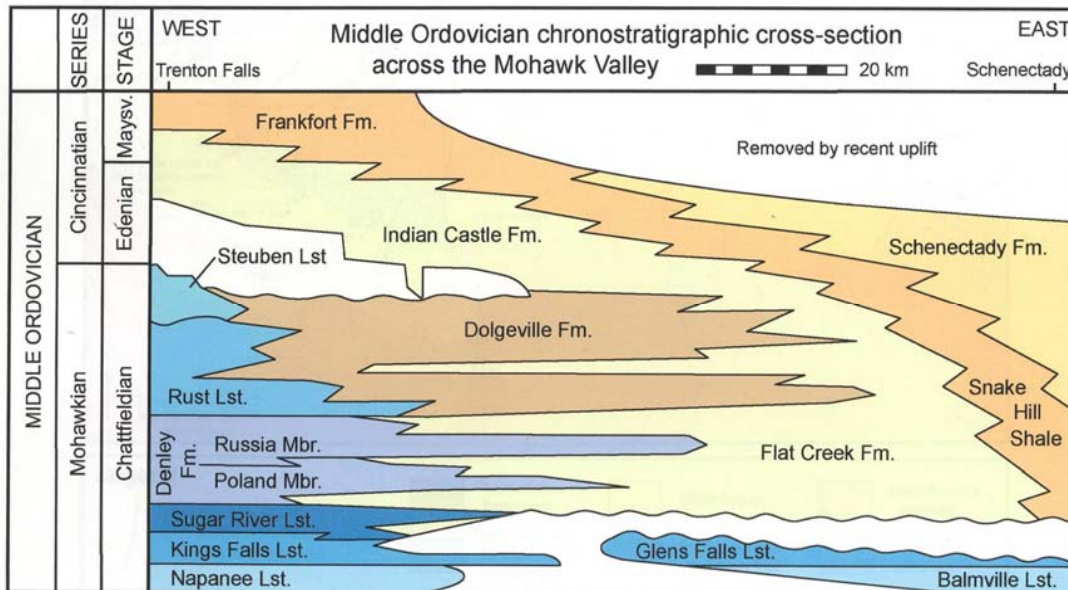
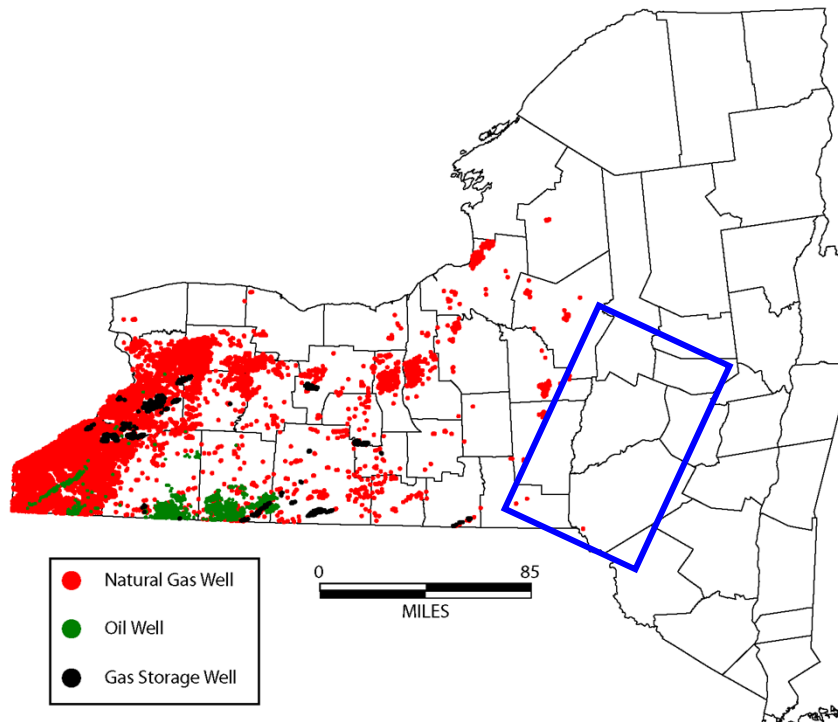
- Upper Ordovician sandstones in central NY, mostly Seneca and Cayuga Counties.
- Fluvial sandstone with frequent cross-bedding likely deposited in a braided stream (distributary) system
- Facies change trap as the Queenston sandstone grades into shale to the east and west.
- Natural fractures may increase permeability and explain the difference between productive and dry wells
- Produced 2.46MMCF from 589 wells in 2008. (a 49% increase from 2007)



1634.5'

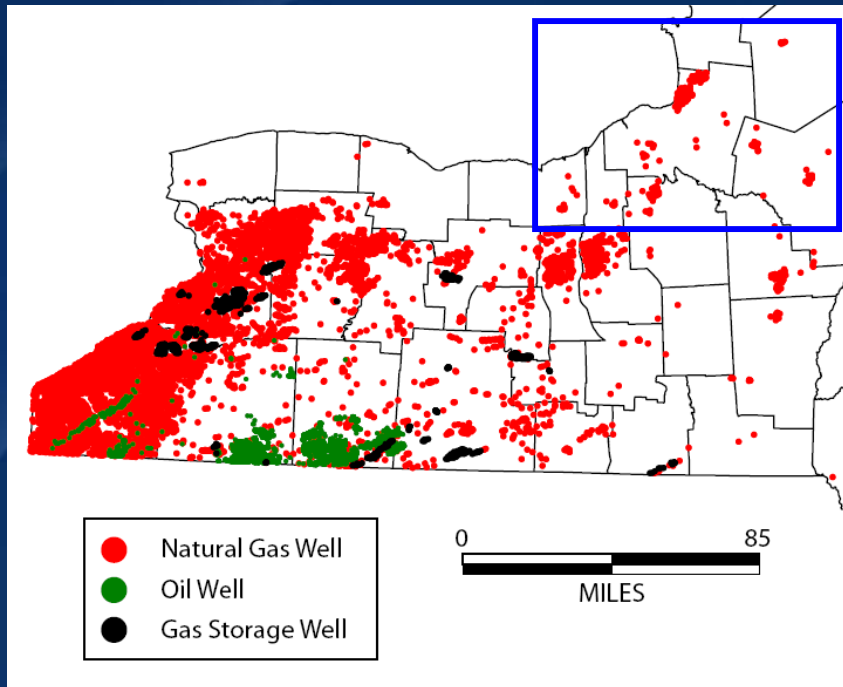
Utica Shale

- Upper Ordovician organic rich, often calcareous shale
- Deposition during the Taconic Orogeny, active faulting makes correlation very complicated
- Organic-rich zones often have TOC values as high as 3.5%
- Gastem has had some recent success drilling vertical Utica wells in Otsego County
- Considered to be the source rock for several gas plays such as the Trenton, Black River, and Queenston
- The overlap of Utica and Marcellus fairways create a potential two-for-one opportunity for drilling shale gas



(Goldman, et al 1994)

Trenton Limestone



- First drilled in 1888 (Sandy Creek Field)
- Produces from Upper Ordovician limestones with interbedded shales east / south east of Lake Ontario
- Typical well has several high pressure gas shows that usually drop to ~10 mcf/day after a few hours
- Mud weights as high as 19 pounds have been used to handle high pressures
- It is believed that gas is contained in open bedding planes, shale partings, and horizontal fractures capped by tight limestones beds
- All wells occur where Trenton is less than 3000' deep (transition to vertical fracture stress regime)
- Currently there are 13 active wells that produced almost 42 MMcf in 2008

CAMDEN ADVANCE-JOURNAL

CAMDEN, N. Y., THURSDAY, OCTOBER 4, 1934

No. 14

Bender Gas Well Contacted Powerful Gas Pocket at One O'clock This Morning

Explosion Skyrockets Two Ton Drill, Disrupts Cable and Fires Rock to Top of Derrick-Work Proceeds for a Main Vein.

The Bender gas well, which is being drilled on the Harvey Dunn farm near this village, struck a pocket of gas this morning at 1 o'clock that hoisted the 3,800 pound cable and sent a volume of rock and water into the air to an altitude about the height of the towering derrick.

This is the fourth time within the week that pockets of gas have been struck. Yesterday morning a pocket, capable of flowing 50,000 cubic feet of gas daily, blew in at 8:45 o'clock. Each succeeding strike comes with greater force and the explosions increase in noise. Excitement this morning is running high at the well. Engineer Cady is supervising the two shifts of workmen who have resumed operations to drill on until the main vein is hit. The well is now down 980 feet.

The young gusher that came to light at 1 a. m. today has permeated the air about the premises with a strong odor—sample of the real stuff. The gas is strong enough that some of the workmen complain of making their heads ache. The flow of gas, from the six inch hole, can be felt on the hand when held six to eight feet above the platform, visitors report.

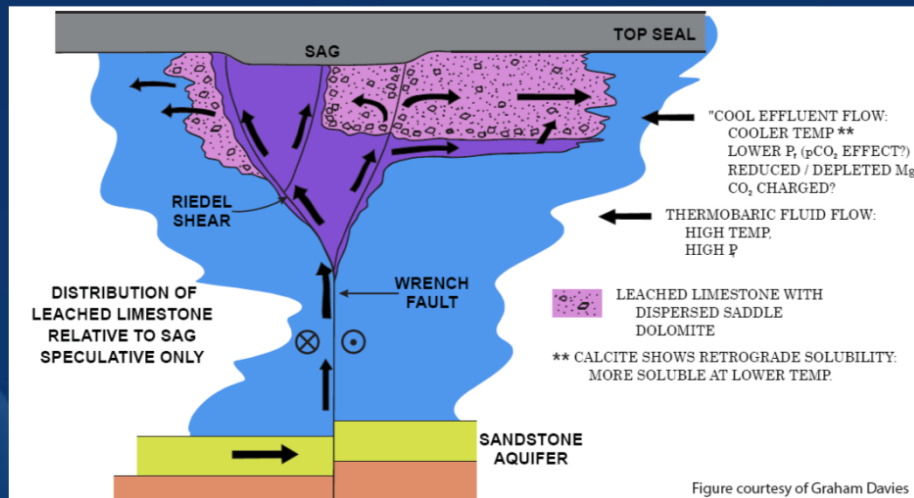
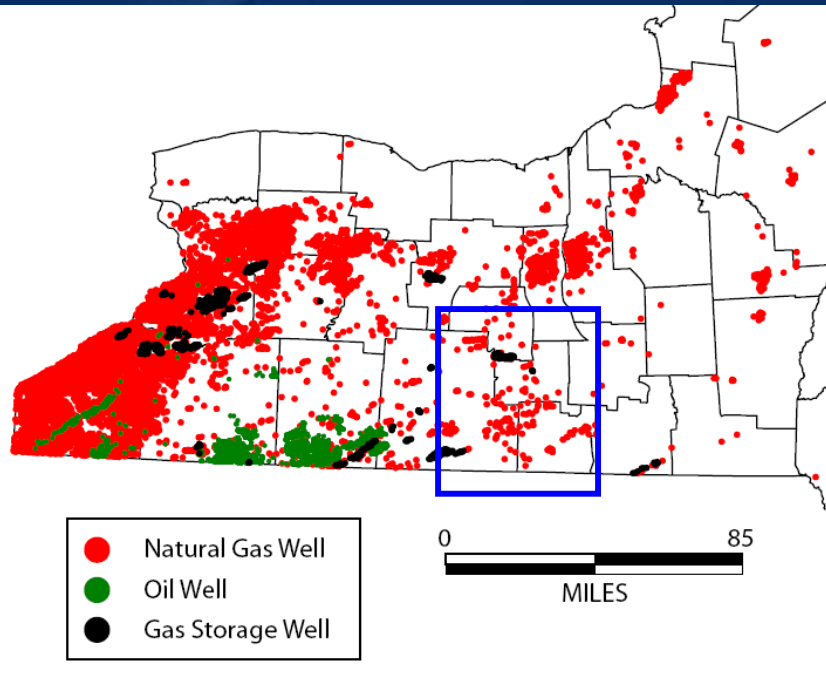
The monotony of just drilling has reached a different stage—for the workmen stand ready to hustle for their lives with each re-curring explosion. Engineer Cady is highly jubilant over the prospects of the well to date and ventures his belief that within a week they will tap a major vein.

Warning is given to any visitor to the premises that smoking is absolutely forbidden.

“When shut in, pressure lifted 633' of casing and drive pipe out of the hole and scattered it about the land. One 80' length was thrown 600' from the well.”

– Scout Card from the Polaski Field

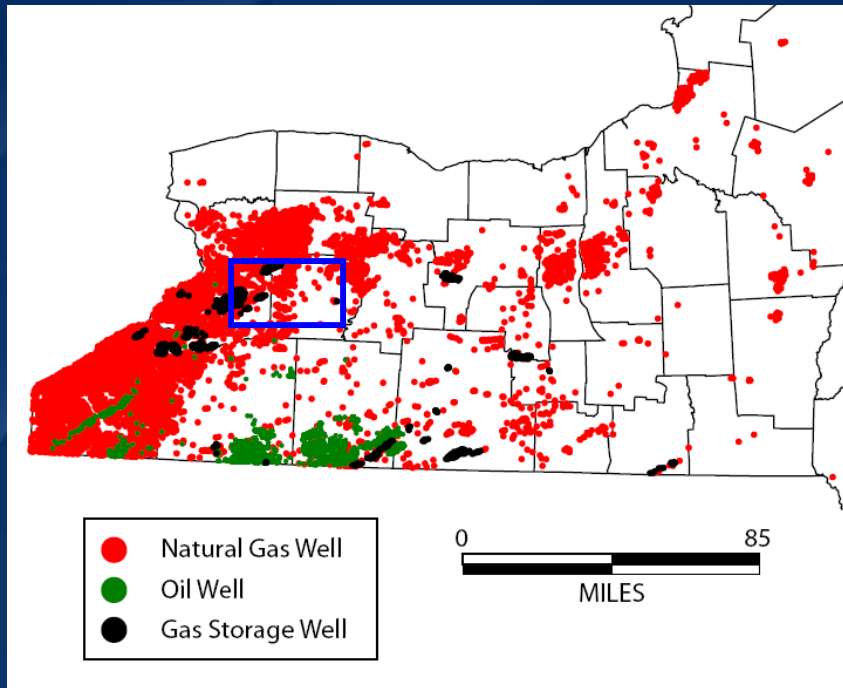
Trenton – Black River Hydrothermal Dolomite



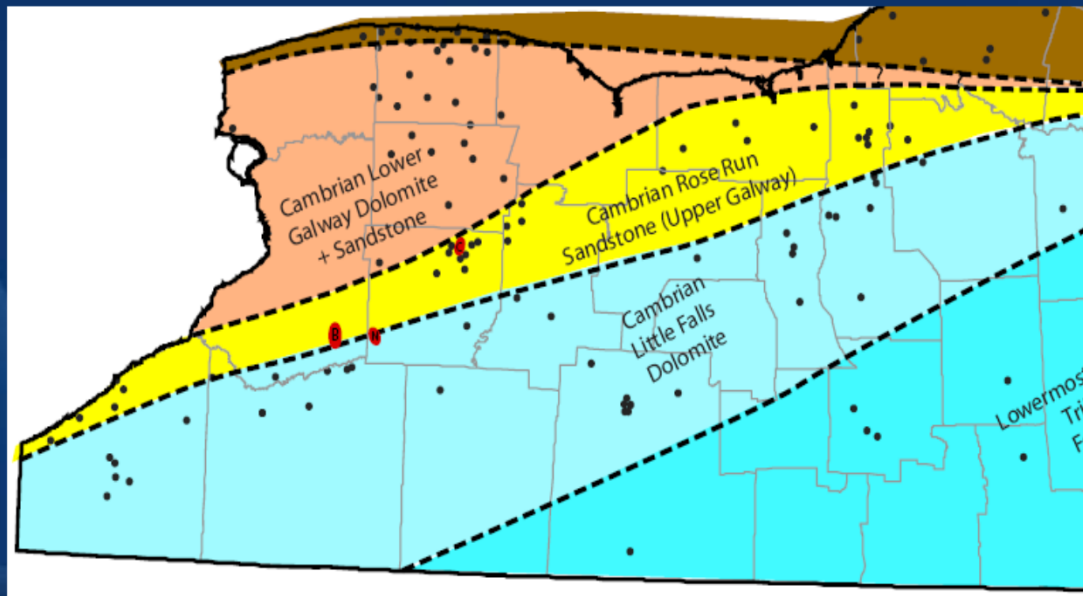
- Production from linear bodies of dolomitized Trenton / Black River Limestone
- Associated with fluid flow along oblique strike-slip faults during the Taconic Orogeny
- Vuggy porosity with permeability >10 darcies in some whole core samples
- Reservoirs appear as long, linear lows on seismic and are best targeted with horizontal wells
- Largest gas producer in NY: over 34 bcf from 138 wells in 2008



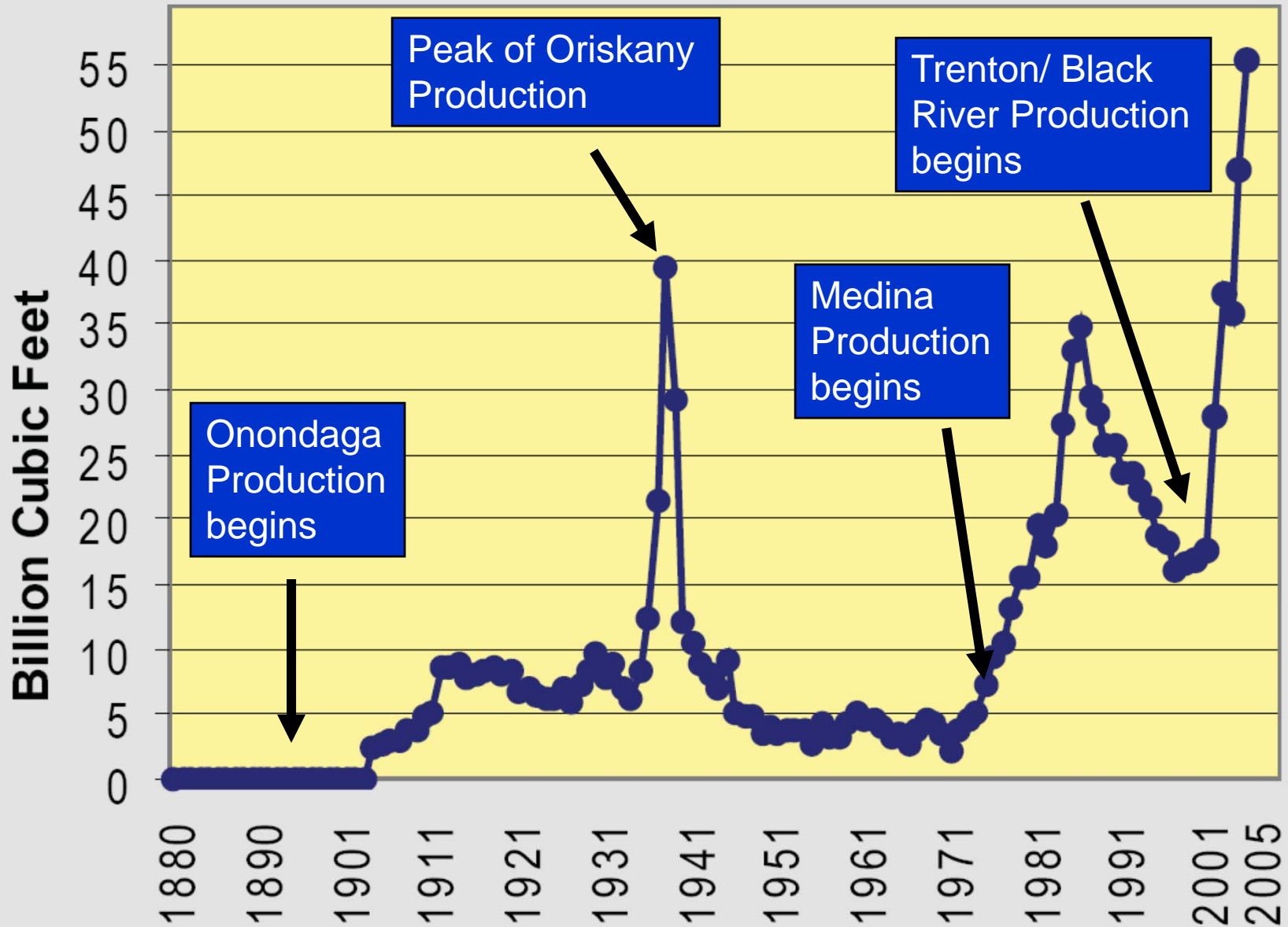
Theresa / Galway (Rose Run) Sandstone



- Upper Cambrian sandstone, once thought to be the Theresa, but is actually upper Galway Fm. (Rose Run eq.)
- Sub-crop play occurring where the Rose Run directly underlies
- Secondary porosity: leached feldspar, dolomite, and quartz
- Traps appear to be fault controlled 4-way closures detectable on seismic
- Produced over half a bcf from 25 wells in 2008
- Large unexplored areas that appear to have good potential
- Carbon Sequestration Potential



Natural Gas Production



Noteworthy Production

- A vast majority of the oil produced in NY is comes from new wells drilled in the same Devonian Sands as the some of the first wells in the state
- The Black River HTD play is by far the largest gas producer in the state
- Exploration of the Medina tight sandstone continues to yield increased production
- Very little information regarding the Herkimer-Oneida-Oswego Play, but it appears to have great potential and impressive production thus far

Table 4 - Production by Geologic Formation, 2008

Formation	Wells ¹	Gas (mcf)	Oil (bbl)
Devonian Shale	28	24,523	0
Undifferentiated Canadaway Group ²	4,441	355,612	292,553
Perrysburg	1,069	297,751	68,140
Tully	11	16,958	1,058
Hamilton	3	0	0
Marcellus	28	64,063	0
Onondaga	76	48,537	1,528
Oriskany	40	190,854	0
Helderberg	1	0	0
Akron	29	13,708	0
Herkimer-Oneida-Oswego	79	935,557	0
Medina	6,551	10,302,222	1,412
Bass Island	82	136,516	13,614
Queenston	589	2,460,968	0
Trenton	13	41,872	0
Black River	138	34,768,042	0
Little Falls	1	10,674	0
Theresa	25	534,866	0
Other	478	117,160	5,500

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Welcome to ESOGIS

You can explore over 34,000 of New York's oil and gas wells from our Well Database.

[What's New](#)

The Empire State Oil and Gas Information System is your complete resource for oil and gas data in the state of New York. In addition to allowing you to query and view data for all of New York's 34,000+ wells, we will be providing online access to maps, papers and other information important to New York's oil and gas industry. Whether you have been involved in New York's oil and gas industry for many years or you are just beginning to explore here in New York, the ESOGIS will provide you with a wealth of information delivered to your desktop.

Currently you are able to run a number of different queries and download the results to a delimited text file (.csv, opened with a spreadsheet). **General Well data** and **production data** are available to the public while **formation tops** (11,000+ wells), **paper files** (completion reports), **raster and digital logs** (deep wells only) are available for download by ESOGIS members. You can also create your own personalized projects containing wells returned from any of the queries. To do this you must create an account, login and then follow the directions on the 'My Wells Projects' page for creating a project.

Currently we have paper files for 26,000 wells, formation tops for 11,000 wells, raster logs for 13,000 wells and complete digital log suites for 400 wells. We hope to complete the digital logs for the deep set by the end of 2008. We are currently developing a mapping module that will allow you to map, view, and interact with wells that satisfy your queries. Use the [Help](#) to find out how you can map wells with this version of the ESOGIS.

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*Please Note: We are in the process of updating our databases and you are likely to find occasional discrepancies in our data. Problem areas may be with confidential status, location data or field information. Please e-mail any problems that you find with the data to [Adam Wilson](#) and we will rectify the problem. Thank you for your help.

References

- New York's Natural gas and Oil Resource Endowment: Past, Present and Potential – NYSERDA
- New York State Oil, Gas, and Mineral Resources 2008 – DEC
- Appalachian Basin Province (067) – R.T. Ryder, USGS

