New York State
Oil, Gas
and
Mineral Resources
2007

New York State
Department of Environmental Conservation
Division of Mineral Resources
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www.dec.ny.gov

Division Mission Statement

The Division of Mineral Resources is responsible for ensuring the environmentally sound, economic development of New York's non-renewable energy and mineral resources for the benefit of current and future generations.

This report was produced by the
NYS Department of Environmental Conservation

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Executive Summary

Mining occurs in every region of the State except the New York City area. Oil and gas development has historically occurred in the western half of the State, but the Finger Lakes region has been experiencing heavy activity for several years. Due to differences in legal reporting requirements, the types of statistics presented for the two programs are not identical.

Oil, Gas and Solution Mining

Inspections - Staff traveled 103,363 miles and performed 2,481 oil and gas inspections.

Permits and Completions

Gas:	Permits	386	Completions	271
Oil:	Permits	142	Completions	198
Other:	Permits	49	Completions	65
Total:	Permits	577	Completions	534

Wells Reported (All Types) 2007 - 13,913

Wells To Date (All Types) - 75,000, majority pre-regulation (most plugging status unknown).

Production & Market Value

Gas	54.916 bcf	Value Up	25%
Oil	386,887 bbl	Value Up	53%
Total O&G Mkt Value	$516 million		

State Leasing - 106 leases were in effect covering 83,021 acres, 221 producing wells.

Revenues from Oil and Gas

State Revenues	$11.8 million
Local Govt. Taxes (est.)	$15.5 million
Landowner Royalties (est.)	$64.6 million

Underground Natural Gas Storage - 24 facilities were 81% full at year-end.

Total Storage Capacity	223 bcf
Working Gas Capacity	112 bcf
Max. Daily Deliverability	2.127 bcf/day

Solution Mining - 5 facilities produced 1.97 billion gallons of brine equal to 2.29 million metric tons of salt.

Financial Security - In 2007 New York held $23.1 million to guarantee well plugging and site reclamation.

Mined Land Reclamation

Inspections – Staff traveled 172,719 miles to perform 2,507 mine inspections.

Permits Issued		**Fees Annual**
Total Permits	372	**Regulatory**
New Permits	46	$2.9 Million
Renewal & Mod.	326	

Active Mines 2,203

Estimated Market Value $1.3 Billion

US Production Rank by Quantity

Wollastonite	1st	Salt	3rd
Garnet	1st	Talc	4th

NY Rank by Value

Crushed Stone	1st	Sand & Gravel	4th
Salt	2nd	Wollastonite	5th
Cement	3rd		

Common Mine Types

Sand & Gravel	1,810
Limestone	85
Bluestone	85

Owner Type

Industry	1,742
County	49
Town	396

Net Affected Acreage	48,551
Life-of-Mine Acreage	115,618
Reclaimed Acreage, 2006	1,073
Reclaimed Since 1975	26,688

Financial Security – In 2007 New York required $139.1 million to guarantee mine site reclamation.

Division of Mineral Resources Program Highlights

New York State gas production in 2007 was 54.916 billion cubic feet (bcf), just a little lower than the previous year's record total of 55.342 bcf. Trenton-Black River production declined slightly, but accounted for 75% (41.29 bcf) of 2007 production. Oil production jumped 21% to 386,887 barrels in 2007 and the State's oil reserves more than doubled from 2005.

The number of wells completed rose 18% overall from 2006; gas wells led the way with a 42% increase. Five new Trenton-Black River gas fields started production in 2007: John Hill, Forest Hill and Beans Station in Steuben County, and Brickhouse and Steege Hill in Chemung County.

In 2007 drilling permits were at levels similar to 1984, a period of high activity. Total drilled depth of the wells for the year was over 1.44 million feet (more than the distance from Schenectady to Buffalo). Drilling rig availability continued to be a significant concern for New York's oil and gas operators.

By year-end 2007 a total of 19 deep wells had been drilled on or adjacent to State land. In 2007 New York collected $2.5 million in royalties from the wells draining State land and $11.8 million in total leasing revenues. Steuben County had the most State acreage under lease.

In 2007 the Division of Mineral Resources conducted 38 compulsory integration hearings and finalized 29 orders. The 9 orders which remained pending were referred to the Office of Hearings and Mediation Services for adjudication on issues including data and site access, assessment of rig penalties, and pipeline costs.

The Division received a total of 19 Marcellus permit applications (18 vertical, 1 directional) in 2007. Eight vertical Marcellus wells were spud in 2007 in Broome, Chemung, Schuyler and Steuben counties. The 2007 activity brought the State's total number of Marcellus producing wells to 11.

In 2007 there were 2,203 active DEC-regulated mines in New York State, a drop of 12 mines from 2006 and the ninth straight year of decline. Increasingly, mine operators are choosing to replace production by expanding current mines, rather than opening new ones. This trend holds true for both sand and gravel mines and hardrock quarries. Only 46 of the 372 mining permits issued in 2007 were for new facilities.

Nevertheless, production of the State's major mined commodities remains relatively level from year to year. The U.S. Geological Survey estimates the annual value of New York's mineral production at roughly $1.3 billion. Mining is spread fairly evenly across the State due to the need to reduce the cost of transporting heavy materials. Sand and gravel mines account for over 80% of DEC-regulated mines and 36 of the new permits issued in 2007, or 78%, were for sand and gravel.

One (1) new bluestone mine was permitted and 10 Exploration Authorizations were issued to mine operators allowing them to evaluate potential bluestone sites for a limited period of time (one year with possible one-year renewal).

A total of 48,551 acres were affected by mining in 2007 out of a total life-of-mine approved acreage of 115,618 acres. The Division continued to have success promoting concurrent reclamation with 405 acres reclaimed at 41 operating mines. Final reclamation of 669 acres occurred at 67 closed mines bringing the 2007 total to 1,073 acres. Roughly 25,688 acres of land affected by mining have been reclaimed since 1975.

In 2007 the Division held over $139.1 million in financial security to guarantee mine reclamation. The increase of $17 million from the previous year was due, in part, to a new method for calculating financial security introduced in 2006. The improved method brings financial security requirements more in line with modern-day reclamation costs.

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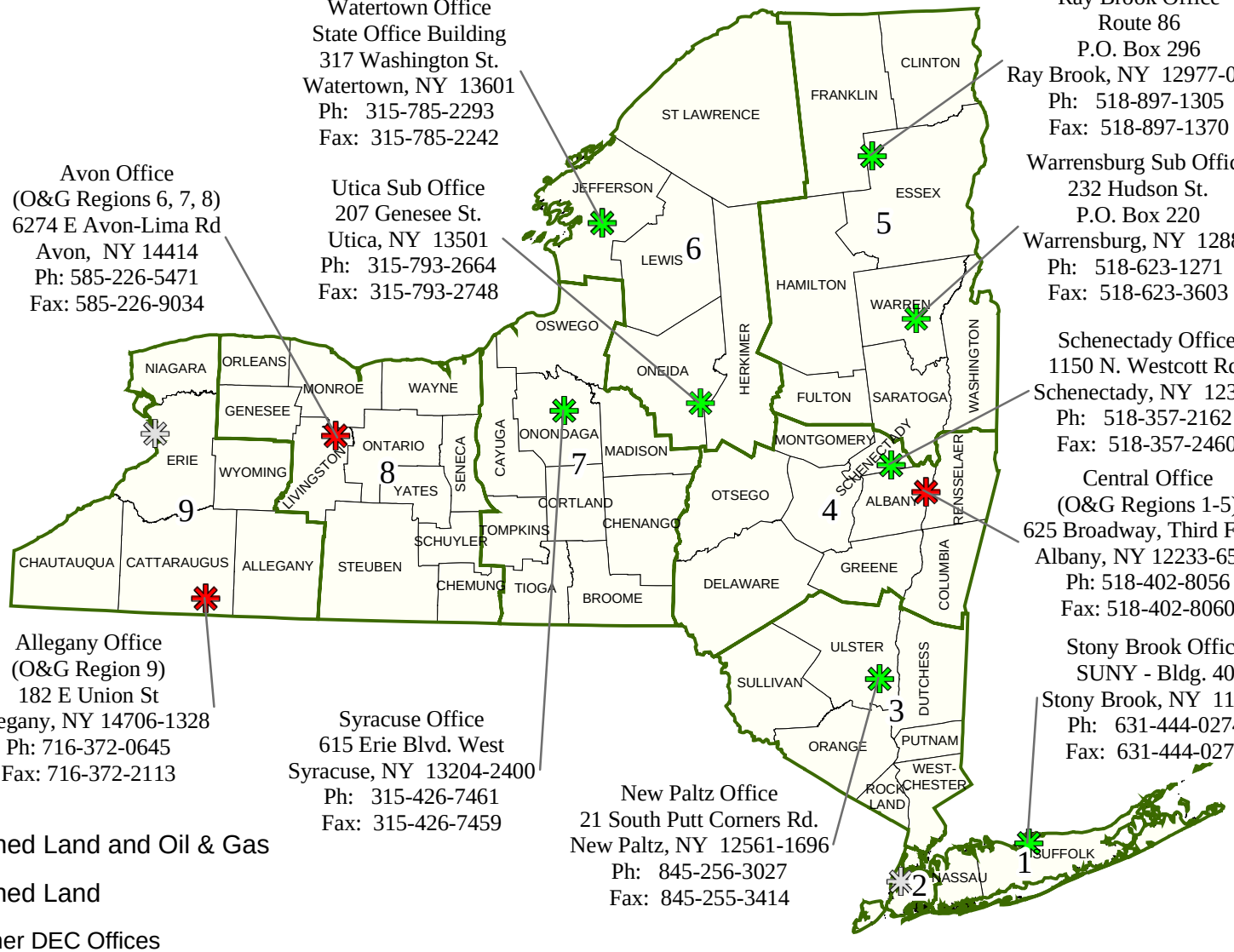
Appendix 2 - Mined Land Data

Map 1 - Division of Mineral Resources Regional Service Areas



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Mined Land and Oil & Gas

Mined Land

Other DEC Offices

2007 New York Oil & Gas Industry At a Glance

Production and Market Value

Gas	54.916 bcf	Value Up 25%
Oil	386,887 bbl	Value Up 53%
Total Market Value		$516 Million

Revenues In Millions

State Leasing	$11.8 Million
Local Govt. (est.)	$15.5 Million
Landowner Royalties (est.)	$64.6 Million

Financial Security

Plugging & Reclamation

$23,135,553

State Leasing

106 leases covered 83,021 acres and 221 productive wells

All Reported Wells	13,913
Active Wells	
Natural Gas	6,683
Oil	3,559
Gas Storage	945
Solution Salt	123

Underground Gas Storage

24 facilities, 81% full at year-end

Total Storage Capacity	223 bcf
Working Gas Capacity	112 bcf
Max. Deliverability	2.127 bcf/day

Solution Mining

5 facilities produced 1.97 billion gallons of brine (2.29 million metric tons salt)

Natural Gas & Oil Abbreviations

Abbreviations for natural gas volume measurements:

mcf	**thousand cubic feet**
mmcf	**million cubic feet**
bcf	**billion cubic feet**

Crude oil is also measured by volume. One barrel equals 42 gallons.

bbl barrel

What's an MCF Do ?

Roughly 4.2 million households in New York use natural gas for home heat, cooking and heating water. It takes just 69 mcf* per year to heat the average New York home. The State's 2007 production of 54.9 bcf was enough to heat 795,886 homes.

* 2005 NYS Energy Fast Facts, NYSERDA

Market Value and Economic Benefits

Market Value

New York's estimated total market value for oil and gas increased 25% to $516.4 million in 2007. Breaking down the figures in more detail, the value of natural gas increased from $394.6 million in 2006 to $486.0 million in 2007. New York produces much less oil than gas, but oil's market value rose 53%, from $19.9 million in 2006 to $30.4 million in 2007.

Tax Revenues to Local Governments

Communities in oil and gas producing areas also benefit from the industry's activity. The Division estimates that real property taxes on 2007 production totaled roughly $15.5 million, a 25% increase from the previous year.

To dampen the impact of fluctuating oil and gas prices, local governments assess their taxes on a unit of production value determined by the NY State Division of Equalization and Assessment using a five-year average.

State Lease Oil and Gas Prices

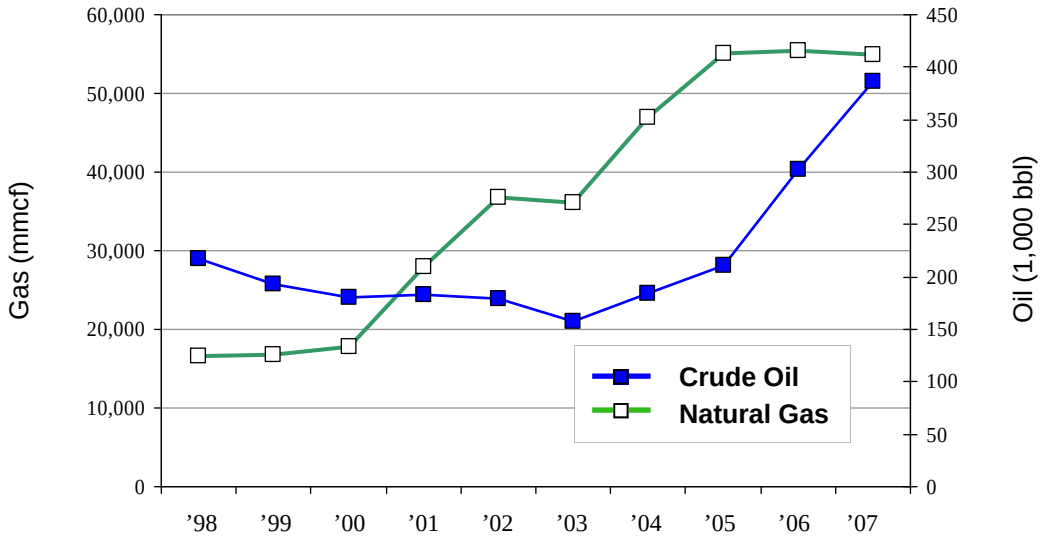
The average wellhead natural gas price of $8.85 per mcf in 2007 was up 24% from $7.13 in 2006. The average 2007 oil price of $78.59 per bbl was up 26% from $62.38 in 2006. These average prices were obtained from royalty payments made to New York for leases on State lands.

Landowner Royalties and Landowner Wells

The majority of landowners with producing oil and gas leases receive a royalty from the well operator. Based on an average royalty of one-eighth of the production value, the Division estimates that landowners in New York received roughly $64.6 million in royalties in 2007.

In addition, roughly 500 of New York's gas well operators (mostly landowners) own just one well. Typically, the wells are no longer considered commercially productive, but can provide enough gas to help reduce or eliminate the landowner's home heating costs.

Chart 1 - New York State Oil and Gas Production, 1998 - 2007



Production of Oil and Gas

Natural Gas Production

New York's reported natural gas production for 2007 was 54.916 bcf, down just slightly from 55.342 bcf in 2006. Roughly 41.29 bcf of gas came from just 92 producing Trenton-Black River wells, with one well alone producing 3.97 bcf. Production from other formations rose 8.7% as a group, with notable increases from the Marcellus (229%) and Herkimer-Oneida-Oswego (64%).

Oil Production

In 2007 New York's oil production rose 21% to 386,887 barrels, the highest since 1992. From 2005 to 2007 oil reserves more than doubled.

Top Producers

In 2007 Chemung County continued as the top gas-producing county. Chemung and Steuben counties accounted for 72% of New York's 2007 production. Chautauqua County continued in third place (see Table 1).

In 2007 the top gas producer was Fortuna Energy Inc. at 39.19 bcf of gas and the top oil producer was East Resources at 185,430 bbl of oil. Tables 2 and 3 on page 12 show the top 10 oil and gas producers. Tables 5 and 6 on page 16 show the top 10 Trenton-Black River wells and fields.

Table 1 - Top 10 Gas Counties, 2007

County	Gas (mcf)	Active Gas Wells	Average mcf/Well
Chemung	20,947,565	38	551,252
Steuben	18,577,681	61	304,552
Chautauqua	6,564,517	3,354	1,957
Schuyler	1,841,202	16	115,075
Cattaraugus	1,640,581	581	2,824
Erie	1,590,478	1,072	1,484
Seneca	846,066	181	4,674
Genesee	713,697	526	1,357
Cayuga	756,066	304	2,487
Wyoming	397,873	282	1,411

For Further Details

Map 2 on page 13 gives production information by town. Table 4 on page 14 gives production by geologic formation. For further production details, please visit our website at **www.dec.ny.gov/energy/1601.html** .

Chart 2 - Producing Formation for NY Natural Gas, 2003 - 2007

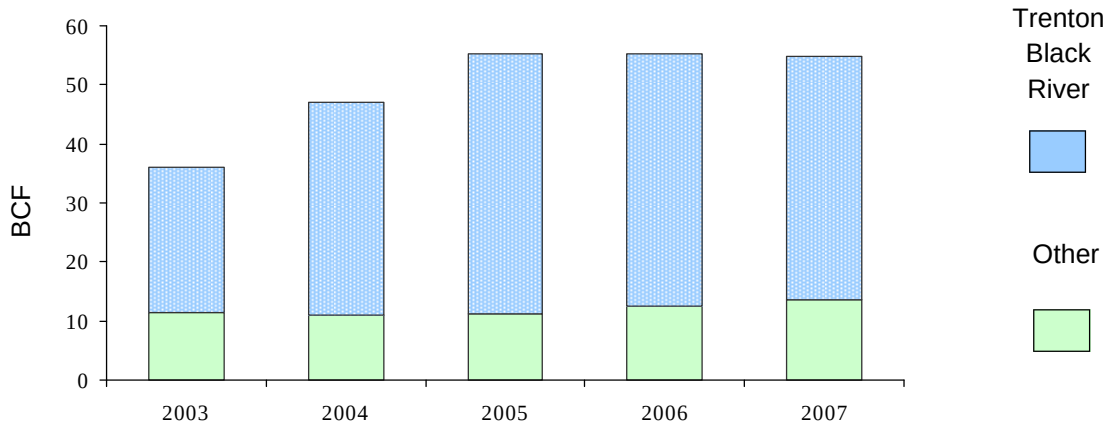


Table 2 - Top 10 Gas Producing Companies, 2007

Company	2007 Mcf Gas	2006 Rank	2007 Change
1. Fortuna Energy Inc.	39,193,003	1	-2%
2. Chesapeake Appalachia, LLC	3,422,056	2	-15%
3. Great Lakes Energy Partners	2,527,981	3	-4%
4. Nornew, Inc.	1,938,389	4	+33%
5. US Energy Development Corp.	961,835	8	+105%
6. United States Gypsum Co.	563,857	7	+9%
7. Seneca Resources Corp.	474,833	6	-10%
8. Ardent Resources, Inc.	454,882	5	-23%
9. Universal Resources Holdings, Inc.	445,222	>10	-2%
10. Kastle Resources Enterprises, Inc.	425,862	10	+3%

Table 3 - Top 10 Oil Producing Companies, 2007

Company	2007 Barrels	2006 Rank	2007 Change
1. East Resources, Inc.	185,430	1	+32%
2. McCracken, Carl A. III	24,637	3	+7%
3. Case Brothers, Inc.	14,774	4	+9%
4. Nathan Petroleum, Corp.	12,961	>10*	N/A
5. Otis Eastern Service, Inc.	11,627	6	+53%
6. Dallas Energy, LLC	9,534	new company	N/A
7. Plants & Goodwin, Inc.	8,256	7	+31%
8. Johnson, Mark & Troy	7,505	8	+31%
9. Bouquin, Fred C. & Fred L.	7,487	5	-21%
10. Copper Ridge Oil, Inc.	7,465	10	+49%

***** Transfer from Richardson Petroleum

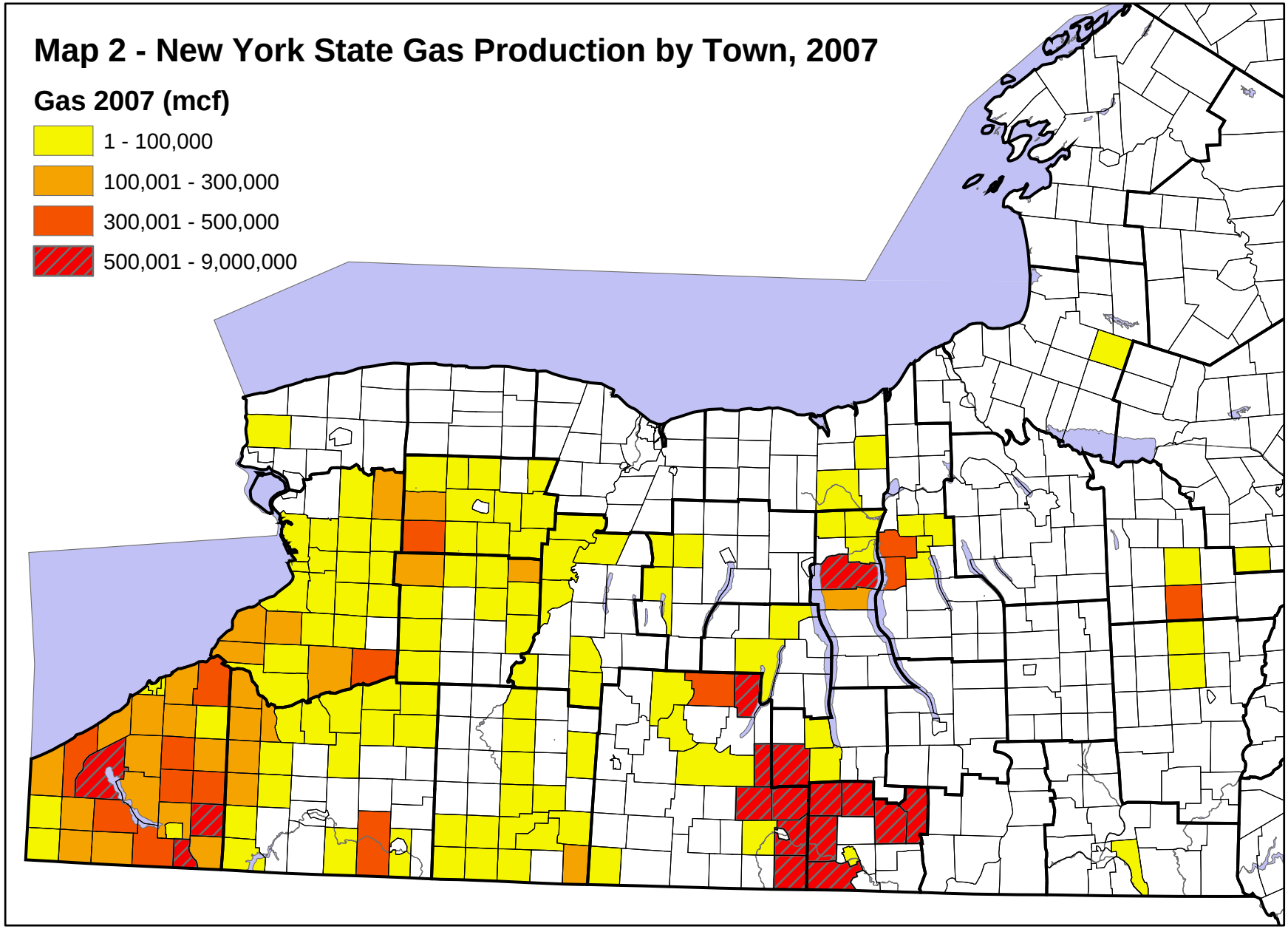

Map 2 - New York State Gas Production by Town, 2007
Gas 2007 (mcf)
1 - 100,000
100,001 - 300,000
300,001 - 500,000
500,001 - 9,000,000

Table 4 - Production by Geologic Formation, 2007

Formation	Wells	Gas (mcf)	Oil (bbl)
Devonian Shale	30	21,621	0
Undifferentiated Canadaway Group	4,290	383,435	296,134
Perrysburg	957	270,621	62,601
Tully	10	16,881	0
Hamilton	3	0	0
Marcellus	19	28,200	0
Onondaga	78	72,962	2,778
Oriskany	40	197,209	0
Helderberg	2	0	0
Akron	24	12,866	0
Herkimer-Oneida-Oswego	52	397,078	0
Medina	6,324	9,853,361	915
Bass Island	81	96,993	10,918
Queenston	561	1,648,131	0
Trenton	14	81,133	0
Black River	127	41,290,040	0
Little Falls	1	6,893	0
Theresa	19	456,741	0
Other	363	81,964	108

* Undifferentiated Canadaway Group includes Glade, Richburg, Bradford and other well-known oil producing formations

To see a stratigraphic column of New York's geologic formations go to http://www.dec.ny.gov/energy/33893.html

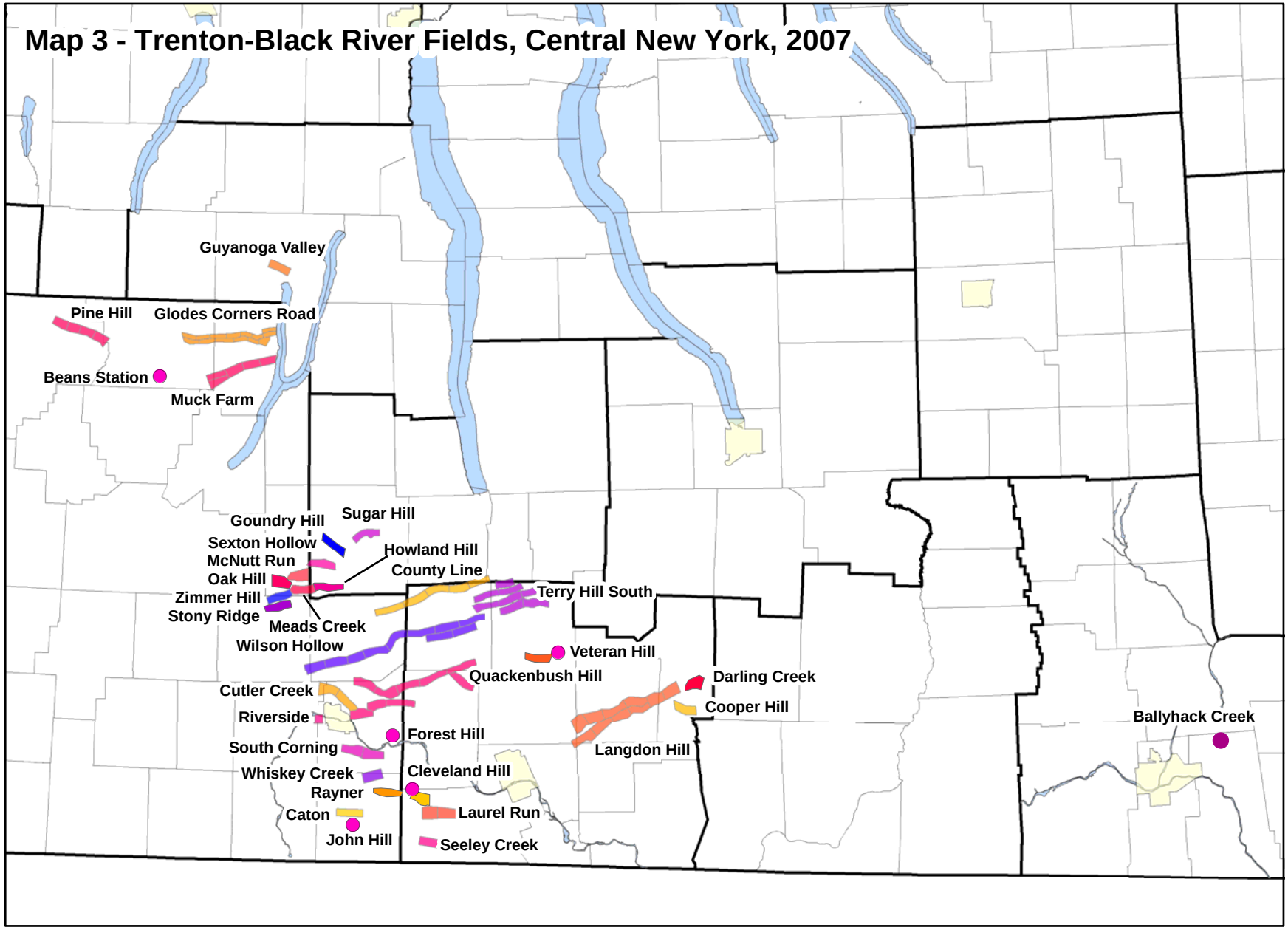

Map 3 - Trenton-Black River Fields, Central New York, 2007
Guyanoga Valley
Pine Hill
Glodes Corners Road
Beans Station
Muck Farm
Goundry Hill
Sugar Hill
Sexton Hollow
McNutt Run
Howland Hill
County Line
Oak Hill
Zimmer Hill
Stony Ridge
Meads Creek
Wilson Hollow
Terry Hill South
Veteran Hill
Quackenbush Hill
Darling Creek
Cooper Hill
Cutler Creek
Riverside
Forest Hill
South Corning
Langdon Hill
Whiskey Creek
Cleveland Hill
Rayner
Caton
Laurel Run
John Hill
Seeley Creek
Ballyhack Creek

Table 5 - Top 10 Wells, Trenton-Black River Production, 2007			
Well Name	**API Identification Number**	**2007 Production (bcf)**	**County/ Field**
Stoscheck 1	31015238140000	3,973,466	Chemung/ Darling Creek
Hulett 1	31015238270000	3,009,710	Chemung/ Brick House
Hartman, BJ 1	31101232270000	2,585,740	Steuben/ Rayner
Lovell 1323	31015228310000	1,893,799	Chemung/ Quakenbush Hill
Michaloski 1	31101239210000	1,845,421	Steuben/ Caton
Gross D1	31101239020000	1,473,106	Steuben/ Quackenbush Hill
Gillis 1	31101231100000	1,392,274	Steuben/ Rayner
Schwingel 2	31015238200000	1,249,136	Chemung/ Quakenbush Hill
MacNaughton 1	31101239510000	1,214,153	Steuben/ John Hill
Henkel 1359-A	31101228710100	1,161,960	Steuben/ Quakenbush Hill

Table 6 - Top 10 Fields, Trenton-Black River Production, 2007				
Field Name	**2007 Production (bcf)**	**2006 Production (bcf)**	**Cumulative Production Year-End 2007**	**First Year of Production**
Quackenbush Hill	9,555,996	13,583,105	87,928,175	2000
Rayner	3,978,014	3,999,267	9,717,276	2005
Darling Creek	3,973,466	3,939,874	7,913,340	2006
Wilson Hollow	3,291,519	3,573,885	42,051,650	1999
Langdon Hill	1,437,763	2,665,612	8,942,170	2001
Veteran Hill	762,610	2,109,663	2,872,273	2006
Howland Hill	430,770	1,399,236	1,830,006	2006
Whiskey Creek	952,809	1,281,411	4,808,492	2003
Cleveland Hill	977,966	1,253,032	2,359,634	2005
Seeley Creek	860,920	900,613	5,466,066	2004

Drilling Permits and Well Completions

Drilling Permits

DEC issued 577 drilling permits in 2007, a 7% decrease from the previous year. DEC issued 386 natural gas, 142 oil, 14 brine, 31 geothermal, and 4 underground gas storage permits. While a small part of the total, the 31 geothermal permits represent the second highest total for that category.

In 2007 DEC issued permits for wells in 22 counties; the top 3 were Chautauqua County (130), Cattaraugus County (125) and Erie County (79). Most of the oil drilling permits were issued for Cattaraugus (69) and Allegany (45) counties. Chautauqua (127) and Erie (78) counties had the highest number of gas permits.

Wildcats and Extensions

Operators drilled 60 gas wildcat wells, 0 oil wildcat wells, and 13 gas extension wells in 2007.

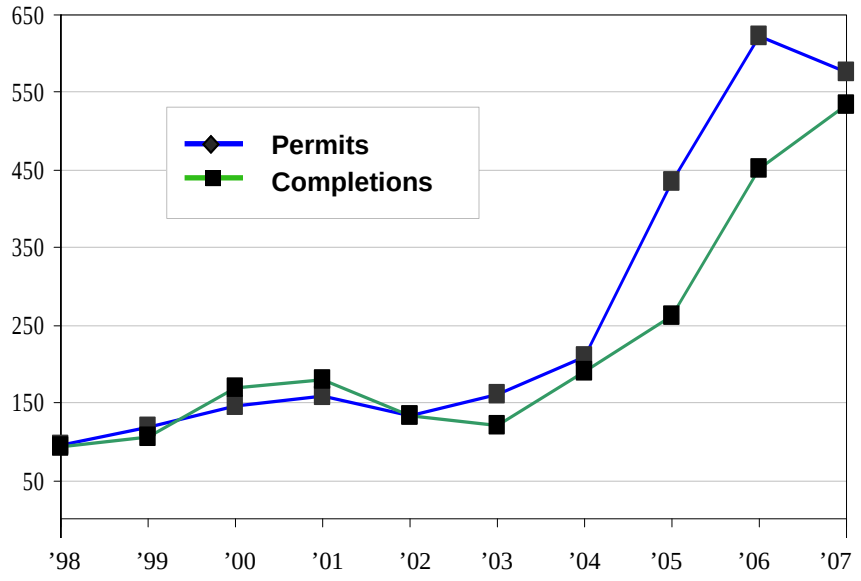
Well Spuds and Completions

The number of wells spud (started) in 2007 was 517. While the number of permits issued in 2007 was down 8% from the previous year, the number of completions rose 18%. Gas wells led the way with a 42% increase in completions over 2006.

Formations Permitted

Industry interest in the Black River and Trenton formations remained strong, with 49 permits issued in 2007. Other primary gas targets included the Medina and Queenston for a total of 292 permits. The Division issued 136 permits for the State's main oil-producing formations (Perrysburg and Undifferentiated Canadaway Group). Fifteen permits for vertical Marcellus Shale wells were issued in 2007 and just 8 vertical Marcellus wells were drilled in Broome, Chenango, Schuyler and Steuben counties.

Chart 3 - Drilling Permits and Completions, 1998 - 2007



Drilling Permits, 2007

Gas	386
Oil	142
Other	49
Total	577

Well Completions, 2007

Gas	271
Oil	198
Other	65
Total	534

Compliance and Enforcement

Inspections

In 2007 Oil and Gas staff traveled 103,363 miles to perform 2,481well site inspections. Staff inspect well sites:

- during permit application review to check environmental and public safety issues;
- during drilling to check on well site construction and drilling permit compliance;
- during the operating phase to check for leaks, spills or other potential problems; and
- to ensure that well plugging and site reclamation meet requirements.

DEC staff perform follow-up inspections to ensure any violations are properly remediated.

Compliance Enforcement

Violations are handled with a mixture of enforcement tools, remediation requirements and penalties. In 2007 the Oil and Gas Program assessed $19,000 in fines and penalties from 10 administrative cases and collected $75,000 in environmental benefit project funds. Another $6,719 was received as a settlement from a case referred to the Attorney General's Office.

Permit Fees

Total oil and gas permit fees collected by the Division equaled $781,490 in 2007, of which $65,500 was deposited in the Oil and Gas Account.

DEC Oil and Gas staff perform over 2,000 inspections per year to make sure wells are in compliance. Here the inspector is checking the condition of a newly completed well. The wellhead was in good condition and grass had started to grow on the recently reclaimed well site.

State Land Leasing

At the end of 2007 the Division managed 106 leases covering roughly 83,021 acres of State land, an increase from the previous year's 63,558 acres.

Steuben County had the most State acreage under lease due to the continued high level of drilling activity associated with the Trenton-Black River.

At year-end 2007 the State was earning royalties from 108 productive oil and gas wells physically located on State lands and another 113 producing wells on adjacent and/or unitized lands. These wells are associated with 61 State leases.

New York collected royalties from these 221 wells which produced 23.7 bcf of natural gas and 1,372 bbl of oil. The average prices paid were $8.85 per mcf for gas and $78.59 per barrel of oil.

In 2007 the State received total leasing revenues of $11.8 million:

- **Delay Rentals** - Operators submitted a total of $166,868 in delay rentals, up 122% from 2006, due to increased delay rentals from the 2006 lease sale.
- **Royalties** - The State received $2,472,424 in royalty revenue from oil and gas production on 61 leases in nine counties (32,452 acres).
- **Storage Leases** - Fourteen storage leases added $133,298, up 6.6% from 2006. The majority of New York's storage lease acreage is in Cattaraugus County.
- **Bonus Bids** - The Division held a major oil and gas lease sale on August 23, 2006, for 19,277 acres of State land and received high bonus bids totaling $8,995,223. The contracts, which were finalized in 2007, count as 2007 revenue.
- **Lease Sale Revenue** - The State received $10,720 from four non-competitive leases of New York State Department of Transportation acreage in preexisting production units and an amendment to a contract.

DEC Managed Oil and Gas Leases

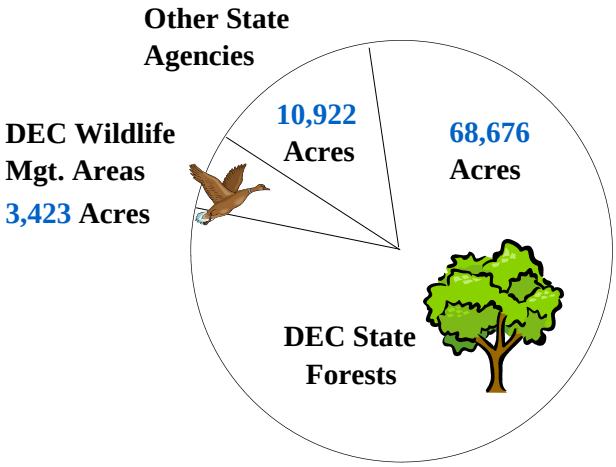


Table 7 - Total Leasing Revenues, 2003 - 2007	
2003	$5,326,927
2004	$765,782
2005	$3,439,670
2006	$3,296,932
2007	$11,767,813

For more information, see the 2007 Oil & Gas Leasing Report at **http://www.dec.ny.gov/energy/1579.html**

Plugging Permits and Bonds

2007 Plugged Wells and Bonds

At the end of production the well must be plugged with cement at the proper intervals, the equipment must be removed, and all disturbed land, including the access road, must be reclaimed. In 2007 operators plugged 192 wells in accordance with requirements set by DEC in a plugging permit. At year-end DEC held $23.1 million in financial security to guarantee well plugging and well site reclamation.

A total of 192 wells were plugged in 2007. Much of the plugging activity was in the old oilfields of western New York. Almost 62% were oil wells, 22% gas wells, and the remaining 16% a mix of other regulated well types.

Plugging occurred in 15 counties, however, almost 50% of the plugging jobs were in Cattaraugus County and another 9% were in Allegany County. The vast majority involved old oil wells, particularly in the Bradford Field. Most of this plugging activity was aimed at bringing wells into compliance that were no longer producing. However, some of it was associated with redevelopment activity spurred by higher oil prices.

Financial Security, 2007

$23.1 Million

Table 8 Plugged Wells, 2007	
Oil	119
Gas	42
Other	31
Total	192

The amount of Financial Security that the Division has on-hand to guarantee well plugging typically increases between $100,000 and $1.2 million per year. However, it rose 55% from $14.9 million in 2006 to $23.1 million in 2007. This was due largely to a significant increase in bonding requirements for deeper wells.

Abandoned and Orphaned Wells

2007 Status Report

Abandoned, unreported and inactive wells continue to be a problem despite high oil and gas prices. In 2007 a total of 221 operators reported 2,460 wells with zero production. Another 822 unreported wells are considered abandoned. This is in addition to over 4,500 orphan wells in the Department's records.

Enforcement actions have reduced the number of unreported wells, but their numbers remain significant.

Old Historic Well Problems

Abandoned wells can leak oil, gas and/or brine; underground leaks may go undiscovered for years. These fluids can contaminate ground and surface water, kill vegetation and cause public safety and health problems.

Historically, abandoned wells have been discovered in the woods, along roadsides, and in residential yards, playgrounds and parking lots. They've even been discovered inside buildings, and underwater in wetlands, streams and ponds.

DEC has at least partial records on 35,000 wells, but estimates that over 75,000 oil and gas wells have been drilled in the State since the 1820s. Most of the wells date before New York established a regulatory program. Many of these old wells were never properly plugged or were plugged using older techniques that weren't as reliable and long-lasting as modern methods.

Every year while conducting scheduled inspections or investigating complaints, DEC staff discover more abandoned wells. Extensive courthouse research is often required to identify the well's previous owners. Many of these cases take several years to resolve as DEC pursues legal action against the responsible parties.

Why Do We Keep Finding "New" Abandoned Wells

Most abandoned wells were drilled many decades ago so:

- they were not registered with the State and there are often no maps available.
- surface equipment may be gone that would make them easier to spot.
- they may be hidden by thick underbrush, standing water, or other subsequent uses of the land.

Oil & Gas Account

New York has an Oil and Gas Account that was created to plug problem abandoned wells. It is funded by a $100 per well permit fee; at the end of 2007 the balance was $441,963. DEC has over 600 wells on its priority plugging list, in addition to the thousands of abandoned and unreported wells cited above. Since the funds are insufficient to cover the scope of the problem, DEC has been working to find other mechanisms to plug abandoned wells.

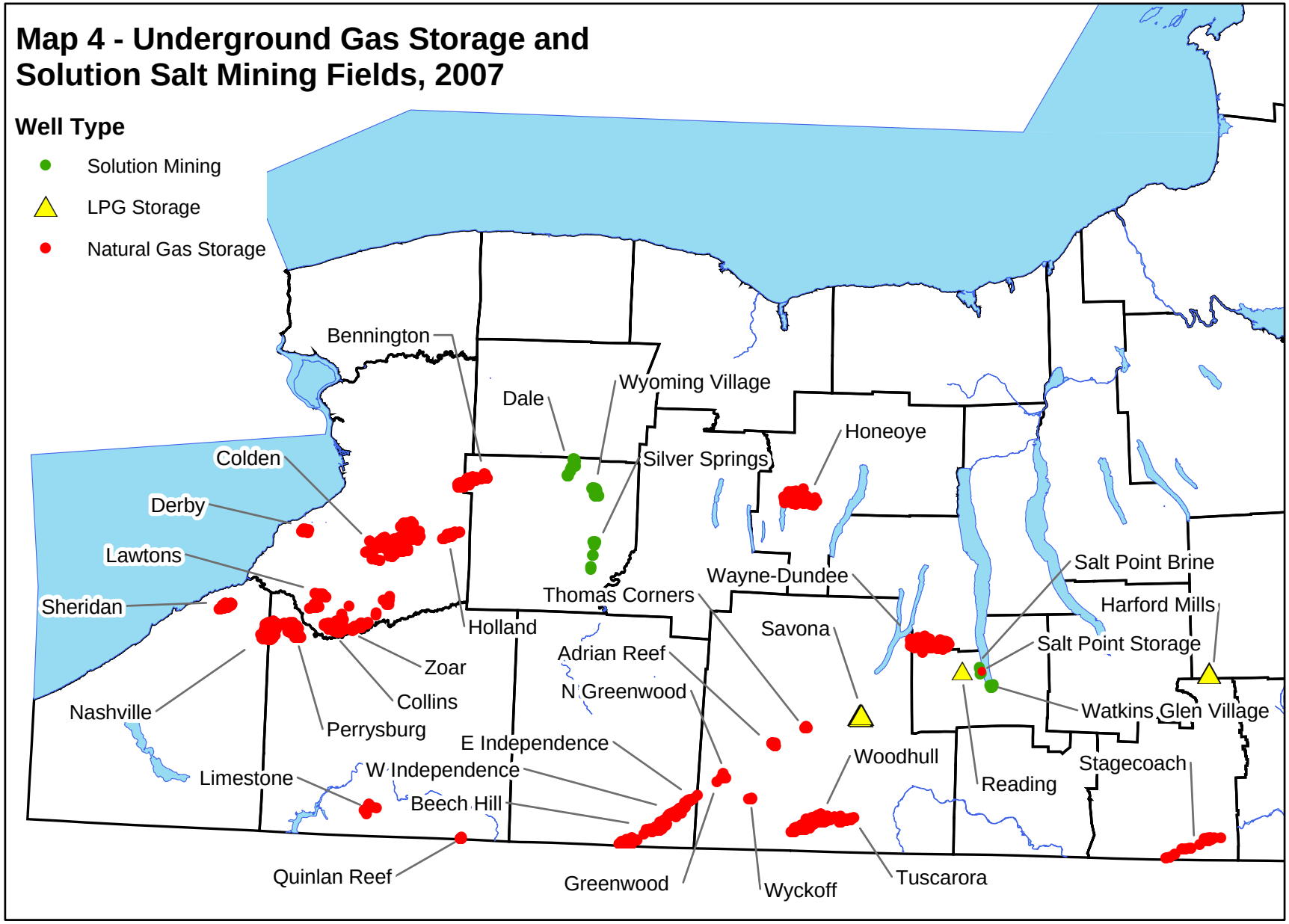
DEC-Coordinated Plugging Efforts

In 2007 Division staff, the U.S. Environmental Protection Agency (EPA) and the U.S. Coast Guard completed a multi-year, multi-million dollar project using federal Oil Pollution Act funds to plug a total of 86 abandoned oil wells in the Town of Bolivar, Allegany County. The abandoned and leaking oil wells on this lease had been the subject of DEC enforcement actions for decades and staff efforts were directly responsible for EPA's agreement to plug the problem wells.

In 2007 Division staff also worked on Oil and Gas Account contracts required to undertake two more major plugging projects involving abandoned oil wells. One was a $190,000 contract to plug 45 wells on the Thorton-Bradley and Warfield leases in the Town of Alma, Allegany County, and the other was a $150,000 contract to plug 25 wells on the Knox Lease in Cattaraugus County. Wells on the Knox Lease were causing water supply contamination problems and the Thorton-Bradley/Warfield wells were in an advanced state of disrepair and posed a threat to the environment.

Division staff were also involved in plugging 3 old abandoned gas wells at Deer Creek Park Wildlife Management Area, in Oswego County and plugging a leaking gas well in the front yard of a residence in the Village of Fredonia, Chau–tauqua County. In addition, staff discovered many other old abandoned wells over the course of the year, researched the identity of the responsible parties, and required them to plug the wells.

Abandoned wells, like this one (photo center) are sometimes very hard to find.


Map 4 - Underground Gas Storage and Solution Salt Mining Fields, 2007
Well Type
Solution Mining
LPG Storage
Natural Gas Storage
Bennington
Dale
Wyoming Village
Honeoye
Silver Springs
Colden
Derby
Lawtons
Sheridan
Wayne-Dundee
Thomas Corners
Salt Point Brine
Harford Mills
Salt Point Storage
Holland
Savona
Adrian Reef
N Greenwood
Zoar
Collins
Perrysburg
Nashville
Watkins Glen Village
E Independence
W Independence
Beech Hill
Limestone
Woodhull
Reading
Stagecoach
Quinlan Reef
Greenwood
Wyckoff
Tuscarora

Underground Gas Storage

In 2007 there were 24 natural gas and 3 liquefied petroleum gas underground storage facilities operating in 10 counties in the western and central parts of New York State.

Natural Gas Storage

At year-end 2007 the combined total capacity of all the underground natural gas storage fields in New York State was 223.3 bcf and the maximum deliverability per day was 2.13 bcf. Working gas capacity was 112.2 bcf. Operators reported that these storage fields were 81% full at the end of the year, with 181.0 bcf in storage.

Seven different companies operate the 24 underground natural gas storage fields in New York State, with over half owned by National Fuel Gas Supply. Twenty-three of the facilities use depleted natural gas reservoirs in the Onondaga, Oriskany and Medina formations and the remaining one (1) uses a solution-mined cavern in the Syracuse salt formation. These formations range in depth from several thousand feet to five thousand feet below the earth's surface.

In 2007 Division staff approved two permit transfers for Thomas Corners storage field in Steuben County. The facility was originally permitted by the Department in 1996, but was never placed in service. The transfers were from Steuben Gas Storage Company to Arlington Storage Corporation and then on to the current owner, Arlington Storage Company, LLC. The Thomas Corners storage field is projected to be in service in 2008 or 2009, after additional state and federal review.

Liquefied Petroleum Gas Storage

New York's 3 liquefied petroleum gas (LPG) underground storage facilities are located in Cortland, Steuben and Schuyler counties. At year's end Department records showed Inergy Midstream, LLC (Inergy) as the owner of the facility in Steuben County and TE Products Pipeline Company, LLC (TEPPCO) as the owner of the facilities in Cortland and Schuyler counties. TEPPCO purchased the facility formerly owned by New York LP Gas Storage, Inc. (NYLPG) in Cortland County, and Division staff approved the transfer of the facility's underground storage permit in February 2007. At year-end 2007 total LPG capacity of the 3 facilities was 149.95 million gallons, while product in storage was 40.17 million gallons.

LPG is stored in underground caverns excavated in the shales of the Genesee Group at the TEPPCO facility in Schuyler County, and solution-mined out of the Salina Group salt formations at the other 2 facilities. The Salina Group salt formations are the same rock units used by New York's 5 solution mining facilities.

In 2005 the Department and Bath Petroleum Storage, Inc. (BPSI) executed an Order on Consent regarding the LPG facility in Steuben County. As the current owner, Inergy assumed responsibility for BPSI's legal obligations, including the requirement to fund an Environmental Benefit Project to plug orphaned wells. By the end of 2007 Inergy had paid $175,000 into a dedicated account, with the remainder of the $275,000 due by July 2008.

Permit Applications

In 2007 Division staff were engaged in reviewing four permit applications submitted during previous years. The applications included three from National Fuel Gas Supply Corp. (NFGSC) and one from Inergy (originally submitted by BPSI).

In addition to conducting its own review of the underground natural gas storage projects, the Department routinely participates as a cooperating agency in the Federal Energy Regulatory Commission's (FERC) permitting process. Division staff provide input to FERC for Environmental Assessments and accompany FERC reviewers on site visits. However, FERC's jurisdiction is limited to interstate natural gas facilities, so FERC was not involved in the above-mentioned permits for Inergy's LPG project.

Solution Salt, Geothermal and Stratigraphic Wells

While oil and gas wells are the best known part of the Division's regulatory program, there are several other important types of wells subject to permit requirements. Solution mining wells have been drilled into New York's underground salt beds since the 1800s. These wells and their facilities are subject to special drilling, operating and plugging requirements tailored to that industry. The Division also regulates geothermal and stratigraphic wells over 500 feet deep. Geothermal wells play an important role in energy conservation; stratigraphic wells provide essential information on underground rock formations and subsurface conditions.

Solution Salt

New York's five solution salt mining facilities, operated by U.S. Salt, Cargill, Morton, Texas Brine and Occidental Chemical, produced 1.97 billion gallons of brine in 2007, a decrease of 6 % from 2006. These solution mining facilities are located in Wyoming County (3) and Schuyler County (2).

In 2007 solution mining operators submitted 13 drilling permit applications, compared to 11 applications in 2006. Nine solution mining wells were plugged in 2007.

The value of New York's solution salt mining production is estimated at over $100 million. For years New York has ranked third nationally in total volume of salt production (combined brine and rock salt).

Geothermal

At year-end 2007 the State had 72 geothermal wells that required drilling permits from the Division of Mineral Resources because they were 500 feet or more in depth. While a few deep geothermal wells can be found scattered around the Capital District, central New York and the Adirondacks, the majority are in the New York City area. In 2007 the Division received 13 geothermal well drilling applications and issued 31 permits, all for the New York City and Westchester County area.

Also in 2007 the Division and the New York City Department of Environmental Protection (NYCDEP) agreed upon new more detailed permit application review procedures for wells in the vicinity of New York City's water tunnels. The new procedures provide a road map for staff from both agencies to efficiently and effectively screen proposed drilling locations to ensure the integrity of New York City's water supply infrastructure.

Stratigraphic

The Division did not receive any drilling applications or issue any permits for stratigraphic wells in 2007. Unlike many other wells regulated by the Division, stratigraphic wells tend to have a short lifespan. Once the rock cores and other geologic data has been collected, the well has served its purpose and is usually plugged soon thereafter; 22 stratigraphic wells were plugged in 2007. Most of them were wells drilled by NYCDEP in association with their water tunnel improvement projects.

Uses for Geothermal Wells

Geothermal/ geo-exchange wells regulated by DEC (500 feet or deeper) have been drilled to heat and cool a wide range of buildings:

- Residential and Commercial Projects
- Education Center
- Fashion Design Studio
- Historic Buildings
- Library
- Lion House at the Bronx Zoo
- Museum/ Research Facility
- Religious Retreat

Carbon Capture and Storage

The Division of Mineral Resources did not receive any applications for carbon capture and storage or geologic sequestration projects in 2007. In fact no such projects currently exist in New York State. However, there is much industry, government and public interest in this concept as one possible means to reduce global warming from CO_2 generation and release.

Important Terms

CO_2 is carbon dioxide.

Carbon Capture and Storage (CCS) means capturing CO_2 from large point sources, such as fossil fuel power plants, and storing it, primarily in geologic formations, instead of releasing it into the atmosphere.

Carbon Sequestration (CS) is the term for a broader class of techniques to capture and permanently sequester, or store, CO_2 through biological, chemical, or physical processes. It includes CCS defined above.

Regional Partnership

The diversity of carbon dioxide (CO_2) sources and storage options throughout the country demands region-specific strategies. The U.S. Department of Energy has created a network of seven Regional Carbon Sequestration Partnerships to help develop the infrastructure and knowledge base needed to jump-start commercialization of CS technologies.

New York State is a member of the Midwest Regional Carbon Sequestration Partnership (MRCSP) which is composed of state agencies, universities, private companies and non-governmental organizations. The region includes New York, Ohio, Indiana, Kentucky, West Virginia, Maryland, Pennsylvania and Michigan.

MRCSP is assessing carbon sequestration technologies suited to our region, identifying and evaluating appropriate storage locations and raising awareness of CSS issues. The group is also investigating the recovery efficiencies of various CO_2 extraction and sequestration methods in an effort to reduce fuel use and lower project costs.

Work done in 2007 by the Division of Mineral Resources supported the efforts of other New York State agency members, including the New York State Energy Research and Development Authority and the New York State Museum.

New York's Potential

Once the CO_2 has been captured at its source and transported by pipeline, it would then be injected and stored safely in deep underground geologic formations located more than a half mile below the earth's surface. In New York State saline (salt-water filled) formations show the greatest promise of providing suitable underground storage sites with the ability to adequately contain the CO_2. Not all reservoirs would be suitable, however. A formation's ability to accept the CO_2 at a sufficient injection rate is one of the primary considerations when siting a potential CCS project.

The wells needed to inject CO_2 into such reservoirs would be very similar to wells the Division of Mineral Resources already regulates at underground natural gas storage facilities. Environmental protection and public safety are the Division's focus in permitting the drilling, construction and operation of underground natural gas storage wells and facilities. The same in-depth review and oversight would be required for any proposed carbon sequestration project.