

Oil & Gas Well Permitting and the SGEIS



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ANNUAL MEETING

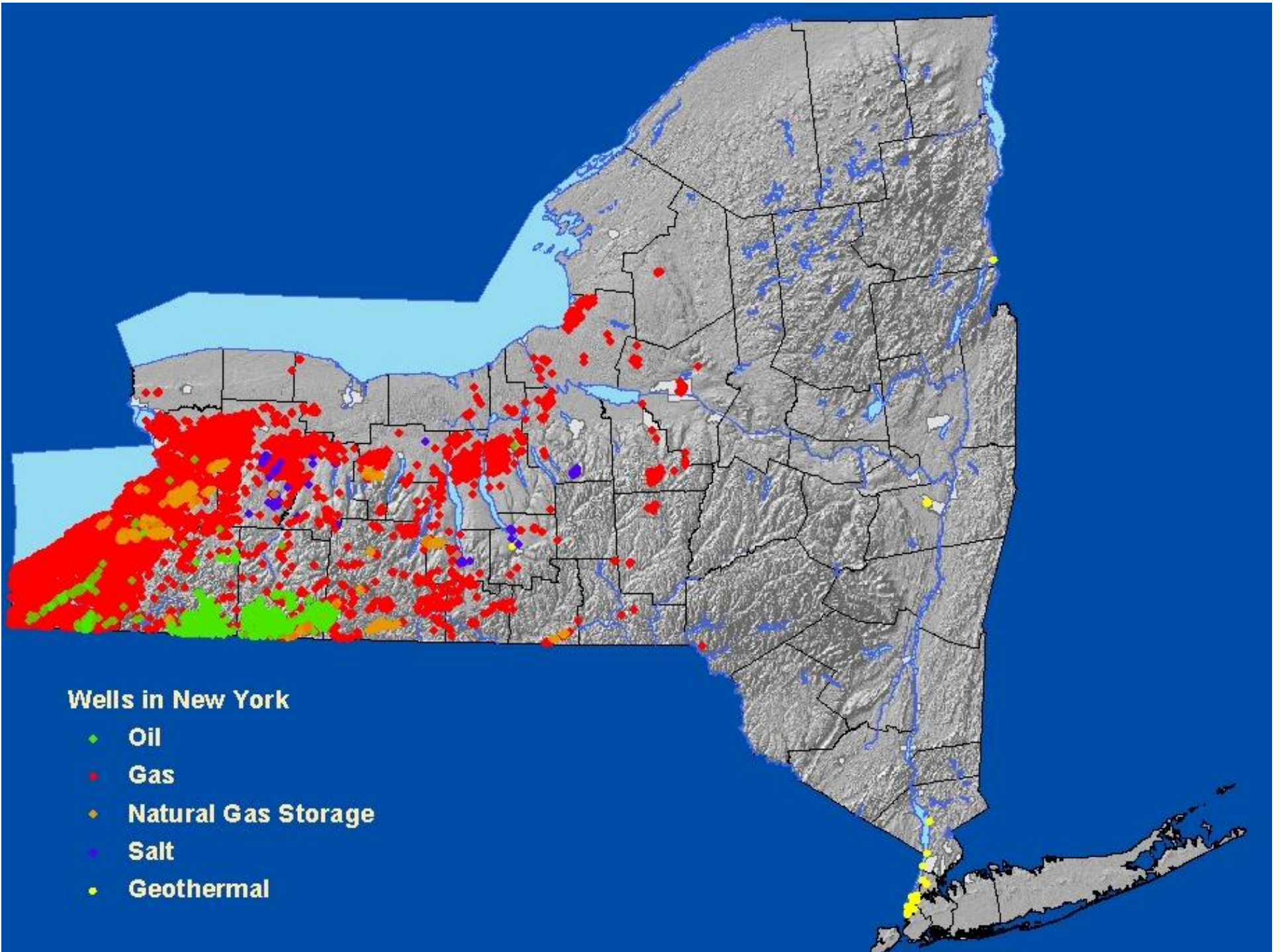
OCTOBER 2, 2010

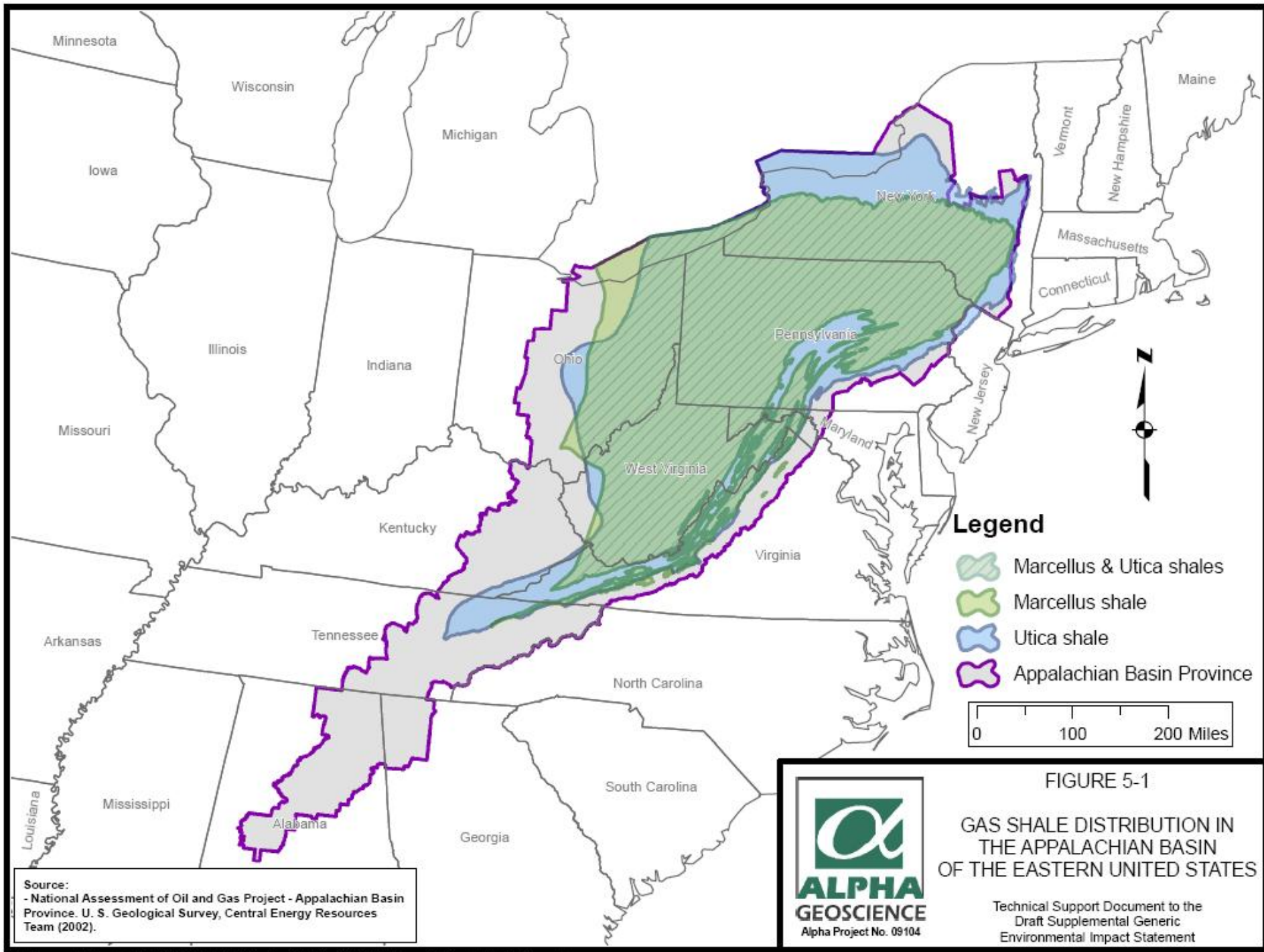
JENNIFER MAGLIENTI
ASSOCIATE ATTORNEY
OFFICE OF GENERAL COUNSEL
NYSDEC

Today's Presentation



- **New York's Oil & Gas Regulatory Framework**
- **SEQRA**
 - **Use of a Generic EIS to fulfill SEQRA**
- **Draft Supplemental GEIS Content & Update**
- **Next Steps**



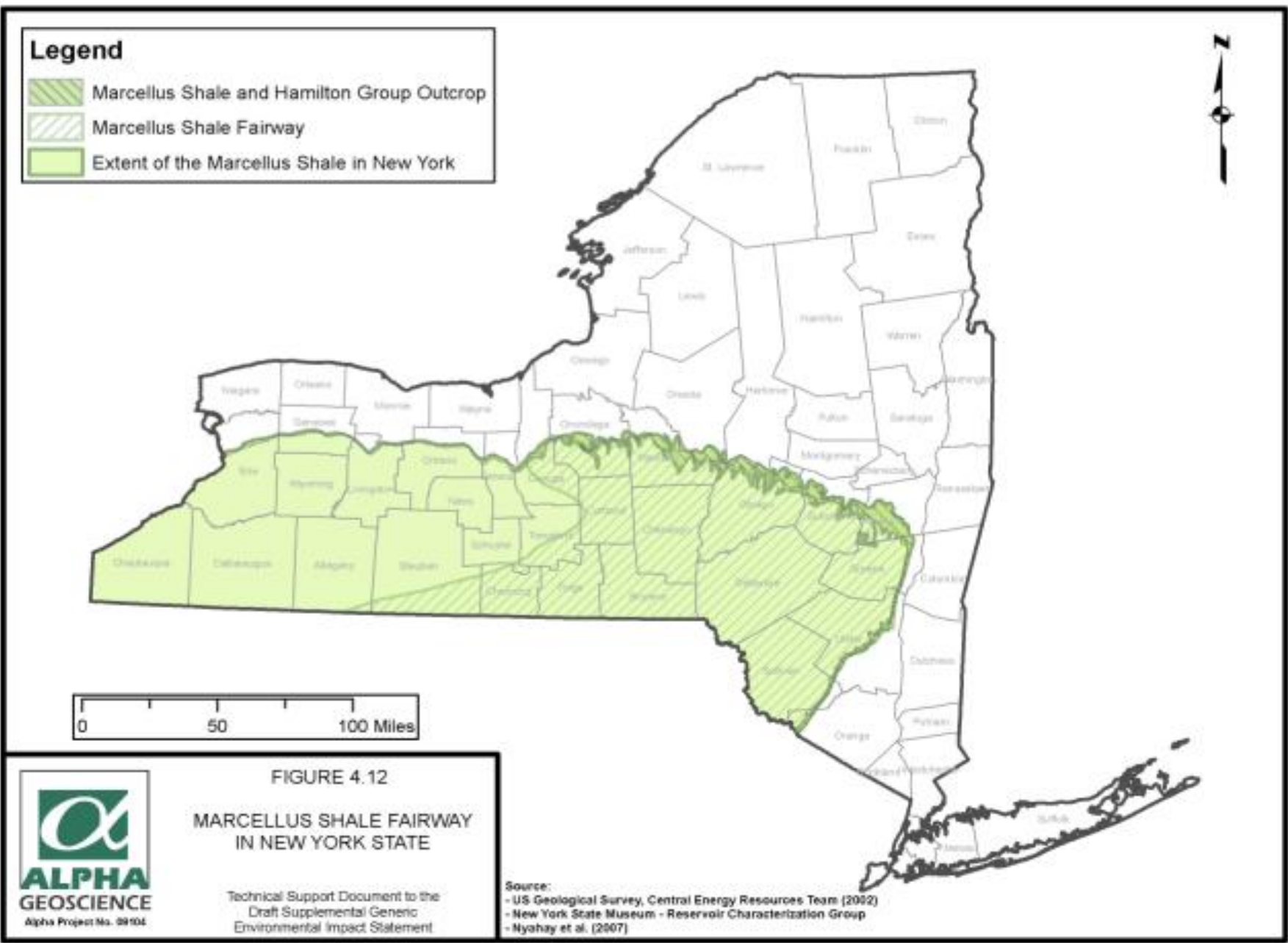


Source:
 - National Assessment of Oil and Gas Project - Appalachian Basin Province. U. S. Geological Survey, Central Energy Resources Team (2002).



FIGURE 5-1
 GAS SHALE DISTRIBUTION IN
 THE APPALACHIAN BASIN
 OF THE EASTERN UNITED STATES

Technical Support Document to the
 Draft Supplemental Generic
 Environmental Impact Statement



Legend

- Marcellus Shale and Hamilton Group Outcrop
- Marcellus Shale Fairway
- Extent of the Marcellus Shale in New York

0 50 100 Miles

FIGURE 4.12

**MARCELLUS SHALE FAIRWAY
IN NEW YORK STATE**



Technical Support Document to the
Draft Supplemental Generic
Environmental Impact Statement

Source:
 - US Geological Survey, Central Energy Resources Team (2002)
 - New York State Museum - Reservoir Characterization Group
 - Nyahay et al. (2007)

2009 Oil and Gas Activity in New York



- 44.9 bcf gas produced
- 323,536 bbl oil produced
- \$207.5 million wellhead market value
- \$25.9 million landowner royalties
- \$6.4 million in local taxes
- 13,200 wells
- 552 well permits issued in 2009
 - 737 well permits issued in 2008
- \$24.7 million in financial security held by DEC

Environmental Regulation



- **The Oil, Gas and Solution Mining Law (ECL Article 23)**
 - i Implementing Regulations at 6 NYCRR §550-559.
 - i Conveys authority to regulate oil, gas, solution mining, stratigraphic and geothermal wells.
 - i Contains requirements for financial security, permitting, spacing, compulsory integration, underground gas storage, & state land leasing.
- **Other DEC jurisdiction (Air, Water, Solid & Hazardous Waste regulation)**

Article 23 - Well Drilling Permits



- **Permit to drill, deepen, plug back or convert a well issued by Division of Mineral Resources (Bureau of Oil and Gas Regulation).**
- **To receive a permit, must control at least 60% of the mineral rights in the spacing unit at time of application.**
- **DEC publishes notice of intent in Minerals ENB – database updated every half hour.**
- **6 NYCRR Part 552 (Permit requirements); 6 NYCRR Part 554 (Drilling practices)**

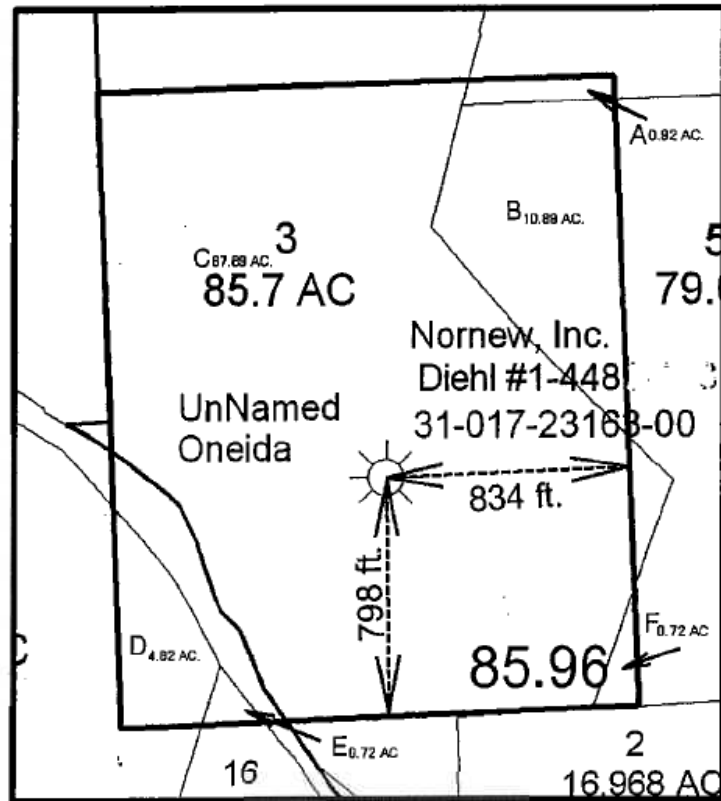
What is a spacing unit?



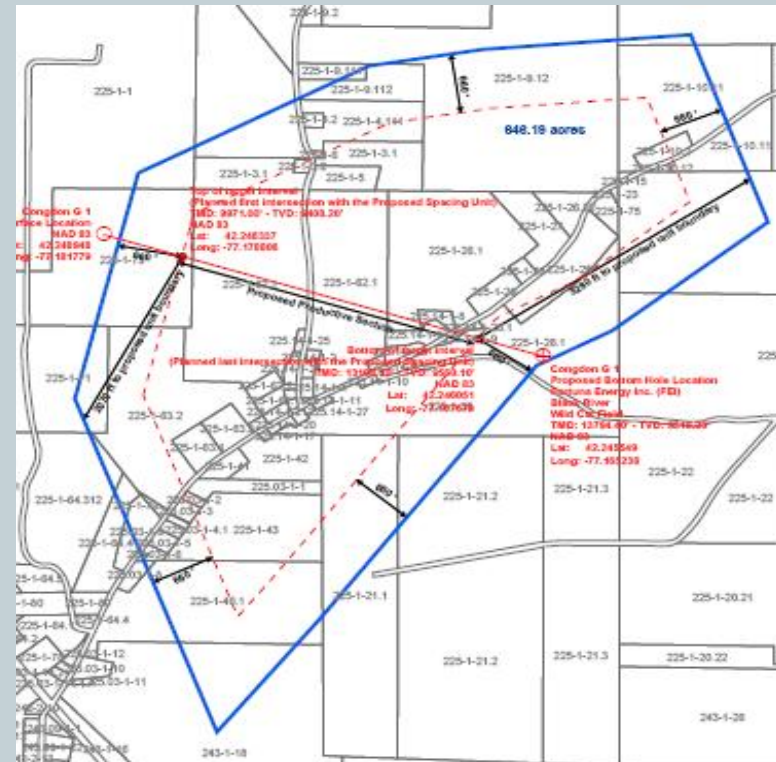
- **Area assigned to a permitted well.**
 - i • Spacing unit is established at time of permit issuance.
 - i • Default unit sizes and setbacks based on formation and/or depth of wellbore.
 - i • ECL 23-0503(3) provides a process to establish non-conforming unit, which includes a public comment period and opportunity to object to unit boundaries.

Examples of Conforming Units

Oneida – 85.7 acre unit, wellbore no less than 660 feet from unit boundary



Fault Bounded TBR hydrothermal dolomite – 648 acre unit, 1500 or 600 ft setback depending on whether there is a field bounding fault



Compulsory Integration



- **ECL 23-0901 – statutory process where unleased mineral interests in spacing unit are addressed.**
- **ECL Article 23 provides:**
 - i Right to make an election to participate in drilling
 - i Right to notice and hearing
 - i Opportunity to object to draft order prepared by DEC

Compulsory Integration



- Policy objective is to protect correlative rights (23-0301)
- Correlative rights defined as “a reasonable opportunity to each person entitled thereto to recover or receive the oil or gas beneath his tract or tracts or the equivalent thereof without being required to drill unnecessary wells or to incur unnecessary expense to recover or receive such oil or gas or its equivalent.” 6 NYCRR §550.3(ao)

Compulsory Integration



- **Purpose of the hearing is to:**
 - i Confirm elections
 - ⌘ Three options under the law: 1. participating owner, 2. non-participating owner, 3. royalty owner
 - i Hear objections
 - i Determine whether any issues raised by parties require adjudication. Requests for adjudication forwarded to the Office of Hearings & Mediation Services

- **DMN-1 Public Hearing Processes for Oil and Gas Well Spacing and Compulsory Integration**
- www.dec.ny.gov/energy/28013.html

SEQRA – ECL Article 8



“BASIC PURPOSE OF SEQRA IS TO INCORPORATE THE CONSIDERATION OF ENVIRONMENTAL FACTORS INTO THE EXISTING PLANNING, REVIEW AND DECISIONMAKING PROCESSES OF STATE, REGIONAL AND LOCAL GOVERNMENT AGENCIES AT THE EARLIEST POSSIBLE TIME.” 6 NYCRR §617.1

SEQRA REQUIRES THAT ALL AGENCIES DETERMINE WHETHER ACTIONS HAVE A SIGNIFICANT IMPACT ON THE ENVIRONMENT

Use of a GEIS to Fulfill SEQRA



- **Evaluates separate actions having common impacts**
- **Individual EIS not needed if GEIS adequately addresses all potential impacts**
- **Gas well drilling in NYS was reviewed in a 1992 GEIS**

i <http://www.dec.ny.gov/energy/45912.html>

1992 GEIS: Common Potential Impacts



- **Surface waters** - siltation and turbidity, spills
- **Ground water** - turbidity, methane release, spills
- **Agriculture** – land disturbance, topsoil, spills
- **Historical sites** – destruction, visual, noise
- **Archeological sites** - destruction
- **Significant habitats** – disturbance, species loss, habitat damage or loss
- **Floodplains** – floodway, erosion, spills
- **Freshwater wetlands** – physical damage, flow interruption, spills, access/overuse
- **State lands** – interference with designated use or damage
- **Coastal zone** – interference with use, damage to resources
- **Streams** – streambed/bank integrity, siltation, spills
- **General habitat loss** – topsoil loss, erosion and sedimentation, vegetation loss

GEIS: Common Mitigation Measures



- **Site review using plat, drilling EAF, GIS, inspections**
 - Environmental sensitivity of proposed location
 - Proximity to environmental and cultural features
 - Site-specific permit conditions
 - Other Department permits
- **Required casing and cementing practices**
 - Permit-specific review and approval
- **Supplementary permit conditions for wells in primary and principal aquifers**
 - Enhanced casing and cementing requirements
 - Rapid fluid removal requirements

1992 Findings on Gas Well Drilling



— **No Significant Impact:**

- Consistent with Final GEIS
- No other DEC permits needed
- Includes wells drilled in primary and principal aquifers

— **May be Significant:**

- In a State Parkland
- More than 2.5 acres in Agricultural District disturbed
- Less than 2,000 feet from a municipal water supply well

2008 Spacing Law



- **L. 2008, c. 376 – statewide spacing modified for shale units.**
 - i 40 acre spacing units for vertical wells, 460 ft setback
 - i 640 acre spacing units for horizontal wells, 330 ft setback (infills must be drilled within 3 years)
 - i 40 acre spacing units for horizontal wells, 330 ft setback (no requirement to infill)

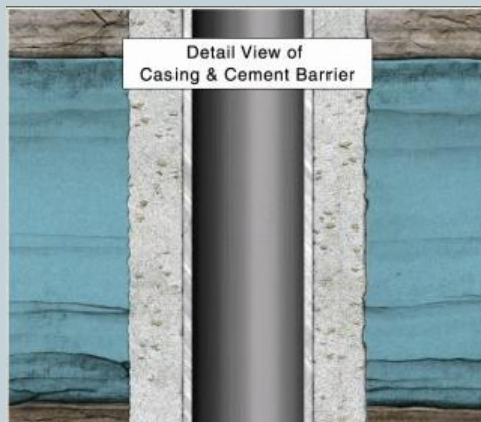
- **Governor’s approval memo directed DEC to supplement the 1992 GEIS to address high-volume hydraulic fracturing – July 23, 2008.**

High-Volume Hydraulic Fracturing

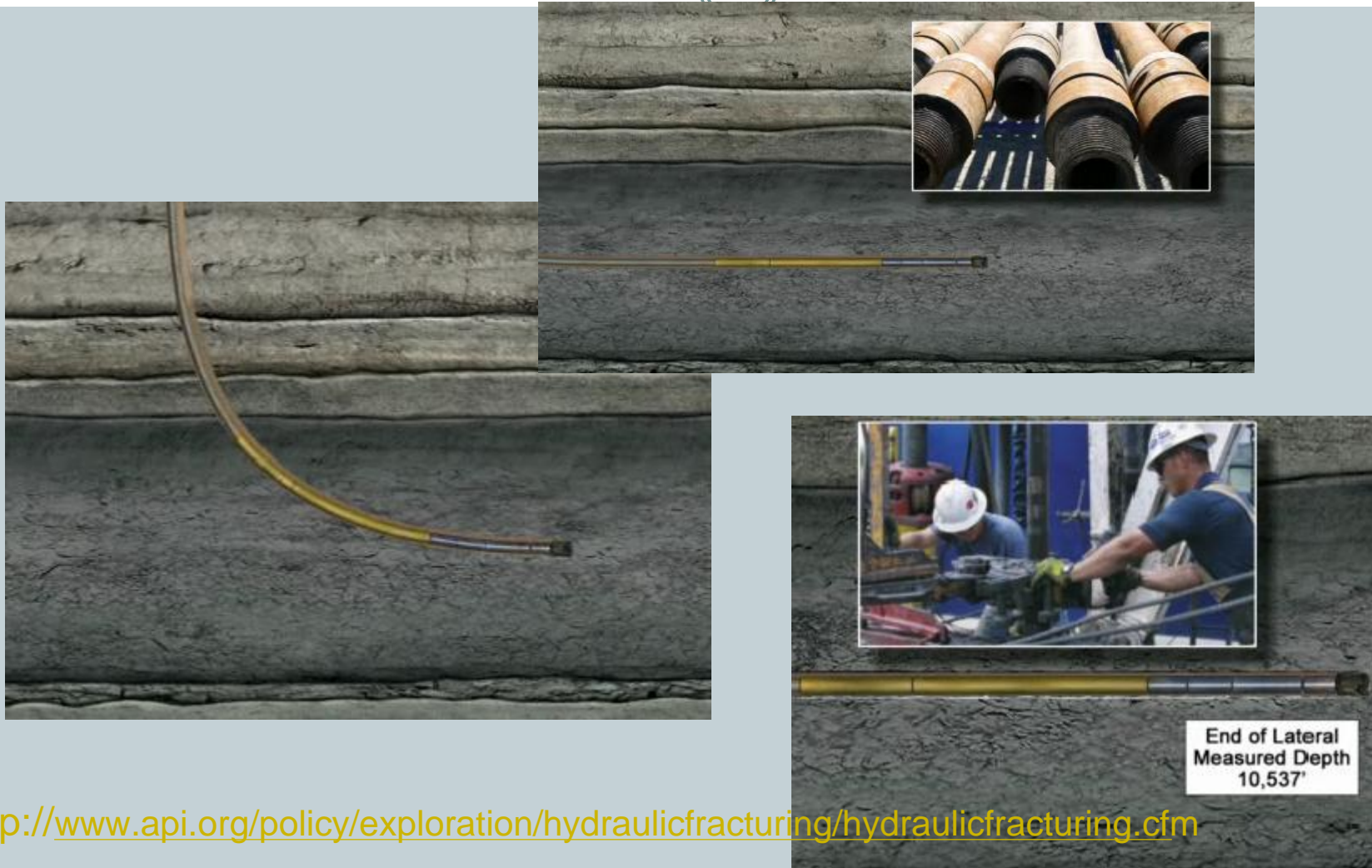


- **GEIS/Conventional drilling and stimulation:**
 - i up to 80,000 gallons of water
- **“Slick water” shale fracturing:**
 - i 2 to 8 million gallons of water
- **Both use proppant and additives**

Ground Water Protection



Horizontal Drilling



<http://www.api.org/policy/exploration/hydraulicfracturing/hydraulicfracturing.cfm>

Visualization

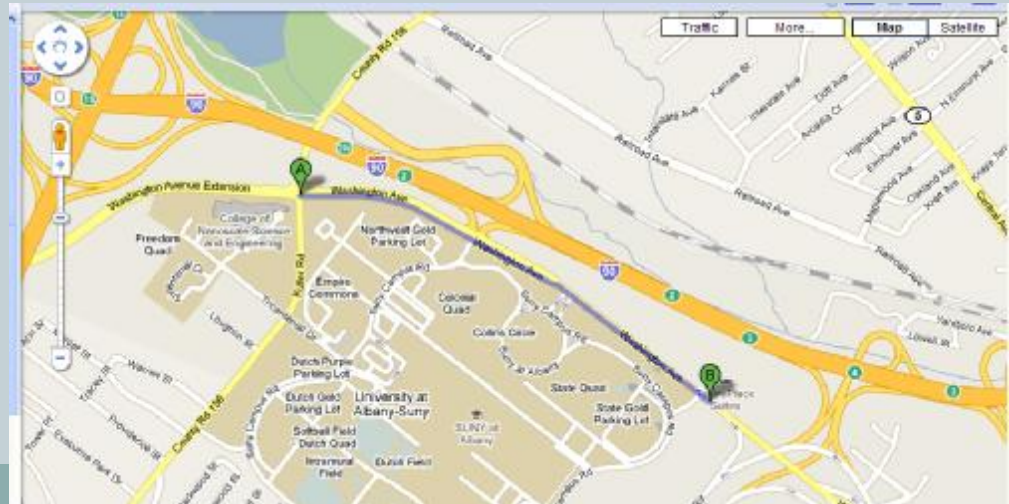
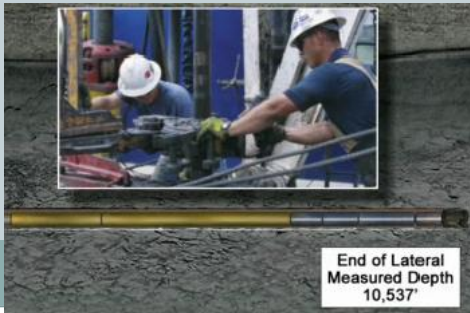


— SUNY “Quads”

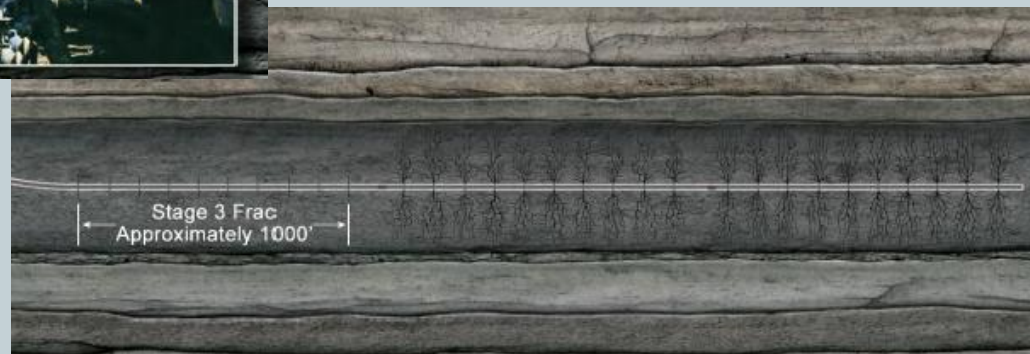
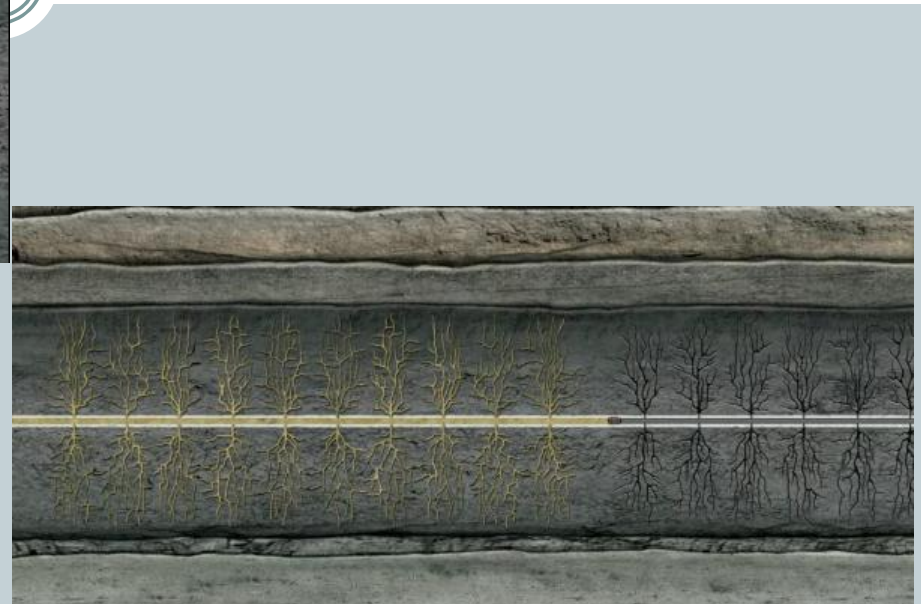
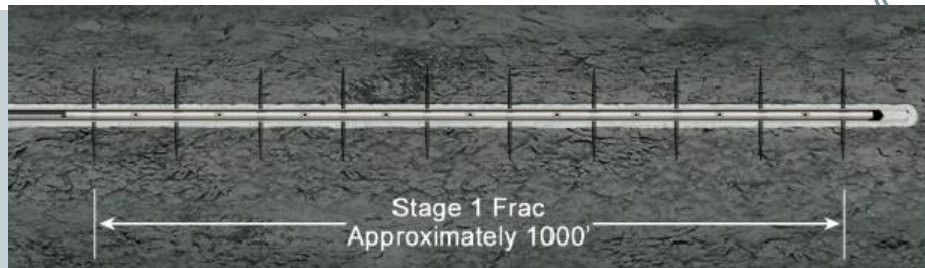
- ┆ Each tower = 286 feet tall
- ┆ 1,000 feet = 3.5 towers
- ┆ 2,000 feet = 7 towers
- ┆ 3,000 feet = 10.5 towers
- ┆ 4,000 feet = 14 towers

— One mile

- ┆ 18.5 towers
- ┆ Distance from Fuller & Washington to east end of uptown campus



Hydraulic Fracturing



<http://www.api.org/policy/exploration/hydraulicfracturing/hydraulicfracturing.cfm>

Potential impacts not addressed by GEIS



- **High-volume fluid management**
 - Water withdrawals and consumption
 - Transportation of water to the site
 - Additives
 - On-site facilities and handling
 - Flowback and ultimate disposition
- **Multiple wells at single site, longer duration of impacts**

Walk Through the Draft SGEIS



– Chapters

- i 1: Introduction
- i 2: Proposed action, public need and benefit, environmental setting
- i 3: SEQRA review process, proposed EAF addendum
- i 4: Geology – Marcellus & Utica Shales
- i 5: Natural gas development and high-volume hydraulic fracturing
 - ÷ Description of the activity
 - ÷ Composition of frac additives
 - ÷ Flowback water quality and treatment/disposal options
 - ÷ Description of existing regulatory programs for some ancillary activities, e.g., additive containers and transportation, pipelines
 - ÷ Review of other states' requirements and conclusions
- i 6: Potential impacts
- i 7: Mitigation
- i 8: Permit process and regulatory coordination
- i 9: Alternatives

– Glossary

– 26 Appendices

– Bibliography: 114 refs cited by DEC staff, 473 refs cited by consultants

Chapter 2 – Proposed Action



- **The proposed action is *well permit issuance* by DEC.**
 - The proposed permitted activities are *horizontal drilling and high-volume hydraulic fracturing to develop the Marcellus Shale and other low-permeability gas reservoirs.*
- **Discussion on *public need and benefit* required by SEQRA**
 - US & NY natural gas supply and consumption
 - Potential role of Marcellus Shale
 - NYS Energy Plan & Commission on State Asset Maximization
 - Broome County Economic and Fiscal Impacts Study

Chapter 3 – SEQRA Review Process



- **Project parameters – scope, size, lead agency**
- **EAF Addendum - Appendix 6**
 - i **Required information (14)**
 - ÷ **Water source for hydraulic fracturing**
 - ÷ **Hydraulic fracturing service company, fluid makeup including additives**
 - ÷ **Distances to water supply wells, springs, reservoirs**
 - i **Required attachments (5)**
 - ÷ **Topo map showing natural features and wellsite layout and equipment**
 - ÷ **Due diligence to determine public and private water supply wells**
 - ÷ **Fluid disposal plan**
 - i **Required affirmations (9)**
 - ÷ **Water withdrawal for hydraulic fracturing will only occur above appropriate flow threshold**
 - ÷ **Adherence to visual, noise, GHG and invasive species plans**
 - i **Additional submissions prior to site disturbance (2)**
 - ÷ **Road use agreement or trucking plan + documentation of efforts**
 - ÷ **Floodplain development permit, if required**

Chapter 4 – Geology



- **Supplements GEIS (Chapter 5)**
- **Utica and Marcellus emphasis**
 - Distribution, description, composition
 - Potential for gas production
 - Maps: extent, depth, thickness, fairways
- **Seismicity**
 - Risk, history and monitoring
 - Events associated with human activity
- **Marcellus NORM**

Chapter 5



- **Natural gas development and high-volume hydraulic fracturing**
 - i Description of the activity
 - i Composition of frac additives
 - ÷ 197 products/260 unique chemicals
 - i Flowback water quality and treatment/disposal options
 - i Description of existing regulatory programs for some ancillary activities, e.g., additive containers and transportation, pipelines
 - i Review of other states' regulations and conclusions





Chapters 6 & 7: Impacts and Mitigation



- **Water consumption**
- **Stormwater runoff**
- **Ground water protection**
- **Fluid and solid waste transport and disposal**
- **Operating in floodplains**
- **Ecosystems and wildlife (including invasive species)**
- **Freshwater wetlands**
- **Air quality**
- **Greenhouse gas emissions**
- **Naturally occurring radiation**
- **Visual impacts**
- **Noise**
- **Road use**
- **Community character**
- **Cumulative impacts**
- **Seismicity**
- **New York City watershed**

Potential Ground Water Impacts



- **Wellbore drilling and construction**
 - **Turbidity from aquifer penetration**
 - ÷ Discussed in GEIS and dSGEIS
 - ÷ Typically short-term and self-correcting
 - **Natural gas migration**
- **Subsurface pathways created by hydraulic fracturing**
- **Infiltration from surface spills**

Natural Gas Migration



- **Detailed discussion in the 1992 GEIS, summarized in dSGEIS**
 - Inadequate depth and integrity of surface casing
 - Inadequate annular cement, gas channeling or insufficient setting time
 - Excessive annular pressure
- **Mitigation requirements in place since mid-1980's**
 - Casing and cementing requirements – setting depths, annular space, cementing practices
 - Required venting of annular space between surface casing and next string
 - Pressure relief valve required if annular gas will be produced
- **dSGEIS – enhanced mitigation re: sufficiency of as-built wellbore construction**
 - Casing cement requirements, pre-frac checklist
- **Gas in water wells can be naturally occurring**

Subsurface Pathways Created by Hydraulic Fracturing



- **Concern:** Creation of subsurface pathways from the horizontal wellbore in the target formation to an overlying aquifer
- **Appendix 11: ICF subsurface mobility analysis**
 - i **Conclusion:** *“Hydraulic fracturing does not present a reasonably foreseeable risk of significant adverse environmental impacts to potential freshwater aquifers.”*
 - ÷ Vertical separation between target zone and freshwater aquifers: usually ≥ 1000 feet
 - ÷ Very short duration of positive pressure applied for fracturing
 - ÷ Volume of frac fluid vs. pore volume in intervening strata
 - ÷ Chemical adsorption
 - ÷ Diffusion/dilution
 - ÷ Flow through open fractures or unplugged wells reversed during flowback and is towards the production well during production operations
- **Mitigation**
 - i Site-specific SEQRA review above 2,000 feet or if less than 1,000 feet of separation
 - i All other wellbore construction and fluid handling requirements

Infiltration by Surface Spills



- Addressed in GEIS – surface water and ground water
- **dSGEIS - Enhanced risks relative to high-volume hydraulic fracturing and multi-well pad drilling**
 - Longer duration of reserve pit use
 - Larger volume of chemical additives
 - Larger volume of flowback water
- **dSGEIS – Enhanced mitigation**
 - Setbacks
 - Secondary containment
 - Stormwater permit coverage
 - ÷ SWPPP, BMP's
 - Reserve pit specifications, rapid fluid removal requirements in primary/principal aquifers; no reserve pit in floodplains
 - Tanks required for flowback management at the wellpad, rapid fluid removal requirements in primary and principal aquifers and unfiltered water supply areas

Private Water Well Testing



- **Operator required to sample and test using ELAP lab**
 - i Within 1,000 feet of wellpad, or 2,000 feet if no wells w/in 1,000 feet
 - i Baseline, prior to initial site disturbance
 - i At three month intervals until six months after last well is fractured
 - ÷ **OR a milestone-based schedule if activity not continuous**
 - i Final round one year after last well fractured
 - i Indicator parameters
 - i Results to landowner and local health department

Chapter 8



- **Permitting process, including use of 48 supplementary permit conditions for HVHF and multi-well pads (Appendix 10)**
 - i Operator must accept permit with these conditions to be covered by SGEIS
- **Intra- and inter-agency coordination**
 - i DEC: DMN, DEP, DOW, DSHM, DFWMR, DAR
 - i NYS: DOH, DOT, PSC, OPRHP
 - i EPA, SRBC, DRBC, USDOT, USACE
 - i NYCDEP, Local governments

Chapter 9 - Alternatives



- **Prohibition**
- **Phased permitting**
- **Green or non-chemical fracturing technologies and additives**

Status and Next Steps



- **Comment period closed 12/31/2009**
- **Evaluate comments**
 - Approx. 13,500 comments received
 - Phase 1: count, categorize, consolidate
 - Phase 2: technical review and response
 - DEC-wide and interagency effort
- **Final SGEIS, including responsiveness summary**
- **SEQRA Findings, at least 10 days after final SGEIS**
- **58 permits pending**

Thank you.



- *For more information and updates:*
- <http://www.dec.ny.gov/energy/46288.html> - *DEC Marcellus Shale page*
- <http://www.dec.ny.gov/energy/58440.html> - *dSGEIS page*
- <http://www.dec.ny.gov/energy/45912.html> - *Original GEIS*