**Introduction**

For over a year Riverkeeper has tracked the prospect of industrial gas drilling in New York State. While gas drilling in New York is not new, what is new is the magnitude, scope, and location of the proposed drilling method of high-volume hydraulic fracturing. Indeed, industrial gas drilling throughout the Marcellus Shale and other shale reserves in New York has the potential to impact the environment and communities dramatically.

Riverkeeper’s *Industrial Gas Drilling Reporter* compiles information from around the country associated with this activity – from New York’s ongoing environmental impact study to reported drinking water contamination in states where Marcellus industrial gas drilling already occurs.

Our goal is to educate our members and the general public on this important and dynamic issue, and to help concerned citizens make informed decisions during the public participation component of New York’s upcoming draft Supplemental Generic Environmental Impact Study. Riverkeeper will update this Reporter periodically.

This is Volume 4 of Riverkeeper’s *Industrial Gas Drilling Reporter*. Visit our website to review Volumes 1, 2 and 3: [http://www.riverkeeper.org/campaigns/safeguard/gas-drilling/](http://www.riverkeeper.org/campaigns/safeguard/gas-drilling/)

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Acknowledgements

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Riverkeeper is grateful for the support and generosity of our members, and to the New York Community Trust, the Robert Sterling Clark Foundation and the Scherman Foundation, Inc. for support of our Watershed Program.

Cover photo of contaminated well water in Pavillion, Wyoming (Freemont County). Hydraulic fracturing near this well is into the tight sands formation, approximately 8,000 – 10,000 feet underground. Used by permission of Pavillion Area Concerned Citizens and Powder River Basin Resource Council: www.powderriverbasin.org.

Riverkeeper is an independent environmental organization dedicated to protecting the Hudson River, its tributaries, and the New York City drinking water supply. For more information about us please visit www.riverkeeper.org.

Riverkeeper is a member of the Clean Drinking Water Coalition, comprised of certain environmental signatories to the 1997 New York City Watershed Memorandum of Agreement.

Riverkeeper is a founding member of the Waterkeeper Alliance (www.waterkeeper.org) an international organization that works with over 190 Waterkeepers to protect waterways around the globe.

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Background

What is the Marcellus Shale?

The Marcellus Shale is a layer of deep sedimentary rock, deposited by an ancient river delta, with the remains of it now forming the Catskill Mountains. The vast Marcellus Shale extends from Tennessee, through most of West Virginia, across Pennsylvania and eastern Ohio, and into the Southern Tier of New York, including the Catskills and the West-of-Hudson portion of the New York City Watershed. New York’s portion of the Marcellus Shale is approximately 18,750 square miles and is very deep – over 1 mile below ground.

What is Hydraulic Fracturing?

New technology, called hydraulic fracturing, allows drilling companies to extract natural gas from this shale. Natural gas is trapped within fractures between the grains of this fine-grained rock. Staged from a massive platform (towering hundreds of feet above ground), drillers drill down vertically into the shale, turn 90 degrees to drill horizontally (sometimes over a mile in length), and then inject water, sand and chemicals under high pressure to release the gas. The pressurized water forms fractures in the rock, which sand and chemicals then prop open.

What are some of the Environmental Impacts?

There are many environmental impacts associated with hydraulic fracturing, or “hydrofracking.” Among them are water consumption and wastewater disposal, use of toxic chemicals, substantial truck traffic, air pollution, noise from the loud, twenty-four hour hydrofracking operations, potential groundwater contamination, and surface water runoff from these large industrial sites. The cumulative effect of these impacts may indeed transform entire communities – turning previously rural, agrarian areas into “fractured communities.”

Hydraulic fracturing requires up to 3 million gallons of water per hydrofrack, and typically each well is hydrofracked many times. The water must be trucked in, stored on-site, and the wastewater disposed of properly (nearly all of the fracking fluid injected returns to the surface, bringing with it materials from underground including brines, heavy metals, radionuclides, and organics). Even though the gas industry claims that toxic chemicals represent less than 1% of hydrofrack fluid, the U.S. Geological Survey explains that a typical 3 million gallon hydrofrack produces 15,000 gallons of chemical waste. In existing Marcellus wells outside of New York this waste is stored on-site in large holding ponds until trucks haul it away.

What is the New York City Watershed?

The New York City Watershed, largely in the Catskills, is the source of tap water for over 9 million New Yorkers. The entire New York City Watershed comprises approximately 4.2% of the State’s land,
yet supplies *unfiltered* drinking water to half the State’s population. All surface water and stormwater runoff within the New York City Watershed drains into large reservoirs and travels via gravity through tunnels and aqueducts to the taps of 8 million New York City residents and 1 million upstate consumers. The entire system delivers 1.2 billion gallons daily. The 1,560 square mile system in the Catskills (1 million acres) includes six reservoirs and their drainage basins, hundreds of miles of aqueducts and tunnels, and is home to approximately 60,000 people. The New York City Watershed, including its infrastructure, is the State’s greatest natural resource and the City’s greatest capital asset.

Riverkeeper played an instrumental role in protecting the source of this tap water when it helped structure the 1997 Watershed Memorandum of Agreement, a landmark agreement that establishes ground-rules for protecting the City’s water supply. This agreement set the stage for the City to continue to receive a waiver from federal laws otherwise requiring filtration. This waiver is known as the filtration avoidance determination (FAD). The FAD allows the City to avoid building a new $10 billion water filtration plant to filter City water, in exchange for strong watershed protection programs.

**New York State Environmental Review**

No horizontal hydraulic fracturing into the Marcellus Shale or other shale reserves will take place in New York until the State completes an update to its 1992 Generic Environmental Impact Statement (GEIS), pursuant to the State Environmental Quality Review Act (SEQRA). Riverkeeper helped shape the scope of review for this study. Each *Industrial Gas Drilling Reporter* will provide a status update on this critical environmental review.

View Riverkeeper’s comments on the draft scope here:  

Read New York State Department of Environmental Conservation’s final scope here:  
Fractured Communities

EPA FINDS DRINKING WATER CONTAMINATION NEAR FRACTURING ACTIVITY

In August 2009 the U.S. Environmental Protection Agency released results of a site investigation near Pavillion, WY; EPA found elevated levels of arsenic, methane, petroleum hydrocarbons, and other toxic chemicals in drinking water wells. Notably, EPA confirmed the presence of 2-butoxyethanol (2-BE), a known constituent in hydraulic fracturing fluids; according to researchers this chemical causes the breakdown of red blood cells, and can damage the kidneys, liver, and bone marrow. EPA’s investigation concluded that many activities involving hydraulic fracturing “have the potential to create cross-contamination of aquifers.” EPA will continue this investigation. [NOTE: The cover picture of this Reporter is of well water from this area].

Read the study:  

Read articles about the study:  
http://www.riverreporter.com/issues/09-08-20/news-wells.html
http://www.reuters.com/article/environmentNews/idUSTRE57Q4BD20090827
http://www.ogj.com/index/article-display.articles.oil-gas-journal.general-interest-2.hse.2009.08.chemicals-found_in.html

GAS WELL FIRE IN TEXAS

An “explosive fire” at an industrial gas drilling site in Texas destroyed about $8 million worth of trucks and equipment. The site is operated by Chesapeake Energy. Firefighters from several surrounding cities were needed to contain the fire, which witnesses described as a “walls of flame.”

See:  
http://www.star-telegram.com/texas/story/1583269.html
http://cbs11tv.com/local/natural.gas.drilling.2.1159725.html

INDUSTRIAL GAS DRILLER PAYS $200,000 FINE IN PENNSYLVANIA

Following its cease and desist order, the Pennsylvania DEP issued a $200,000 civil penalty to U.S. Energy for “continued and numerous violations.” The legal violations included unpermitted discharges, encroachments into streams and wetlands, and failure to plug abandoned wells.

See:  
http://www.ahs2.dep.state.pa.us/newsreleases/default.asp?ID=5624

EXXON PLEADS GUILTY TO KILLING WATERFOWL IN GAS PITS – PAYS $600,000

ExxonMobil pleaded guilty in federal court on August 11, 2009 to charges it killed hawks, owls, and waterfowl by exposing the birds to hydrocarbons in uncovered natural gas pits. According to court
documents, open pits attract waterfowl and other birds which may land in the chemicals and ingest them.


LESSONS FROM THE BARNETT SHALE: FORT WORTH - FRACTURED COMMUNITY

This article from the Fort Worth Weekly documents many impacts from hydraulic fracturing, including infrared images of hydrocarbon emissions from hydraulic fracturing operations, storage tanks and pipelines. The Texas Commission on Environmental Quality took the images, which document otherwise invisible air pollution. The article also discusses planned gas wells across the street from an elementary school.


NY TOWN SUPERVISOR ON GAS DRILLING

The Town of Lebanon’s Supervisor writes about his experience with industrial gas drilling in Madison County. Supervisor Goldstein notes the two gas well rig fires in the past six months and a “profound drilling accident” in 2007 that contaminated drinking water wells and left some property worthless. The Supervisor notes NY DEC makes no mention of these incidents. Among other things, the Supervisor provides real-world advice on gas leases; how landowners should know what chemicals drillers use; discusses how 500 tons of contaminated soil had to be trucked away; and notes the “substantial” impact to local roads.

See: http://www.madisoncountycourier.com/county-events/lebanon-supervisor-comments-on-recent-natural-gas-article-3135/

NATURAL GAS WELL LEAKS IN PA; METHANE LEAKS INTO STREAMS

An industrial gas drilling well in Pennsylvania leaked into tributaries of Lycoming Creek last month. East Resources, the driller responsible, had to provide drinking water to four homes because methane entered their wells, and is monitoring water wells at 18 others. Pennsylvania confirmed the incident; state police closed roads near the area. The public was cautioned to stay away.

See: http://www.istockanalyst.com/article/viewiStockNews/articleid/3381190


DRINKING WATER CONTAMINATION IN PA

Another ProPublica investigative piece documents water problems in Pennsylvania, even with wells having cement casings.

See: http://www.propublica.org/feature/water-problems-from-drilling-are-more-frequent-than-officials-said-731
A WYOMING RANCHER WRITES ABOUT HER CHANGED LANDSCAPE

A Wyoming rancher writes about his experience with the drilling boom: a radically changed landscape, culture and economy.

See: http://www.denverpost.com/perspective/ci_12951569

CHEMUNG COUNTY, NY BRACES FOR SCHLUMBERGER

Schlumberger, a hydraulic fracturing services company, is planning a large facility near Elmira, New York to service the industrial gas drilling industry in Pennsylvania and New York’s Southern Tier. The facility is expected to provide radioactive materials used to analyze underground formations, toxic chemicals used in hydraulic fracturing, and will include fueling, maintenance and washing of the thousands of trucks necessary for the hydraulic fracturing process.


CARNEGIE MELLON PROFESSOR CAUTIONS ABOUT PAST GAS BOOMS

A Carnegie Mellon professor writes about past natural gas booms in Pennsylvania, cautioning how history teaches over-optimism helped fuel past booms, these booms left investors ruined, and also came with tragic environmental consequences.

See: http://www.post-gazette.com/pg/09214/987834-109.stm

SYRACUSE EDITORIAL WARNS ABOUT INDUSTRIAL GAS DRILLING

Syracuse’s Post-Standard cautioned landowners about signing mineral leases on their land, and warned that if not done correctly it could lead to “a man-made disaster in Central New York.”


UPDATE: DEAD COWS IN LOUISIANA

As noted in Vol. 1 of our Industrial Gas Drilling Reporter a spill from hydraulic fracturing operation is thought to have killed 17 cows in an adjacent pasture. Local papers now report Chesapeake Energy waited before notifying state officials of the spill, and never notified local officials.

GEOLOGIST SAYS BARNETT SHALE PRODUCTION OVERESTIMATED

A geological consultant, specializing in subsurface petroleum geology, found Barnett Shale gas reserve predictions were too optimistic. He found that the volume of commercially recoverable gas “has been greatly overestimated.”


WALL STREET JOURNAL - WASTEWATER DISPOSAL MAY HAVE CAUSED BARNETT SHALE EARTHQUAKES

Chesapeake Energy and researches from Southern Methodist University think underground disposal of wastewater may have caused recent earthquakes in Texas. Some drilling companies have turned to underground injection wells to dispose of produced water from hydraulic fracturing.

See: http://online.wsj.com/article/SB125020088034530363.html

DRILLING IMPACTS AIR QUALITY

An industrial gas well explosion earlier in the year has raised fears about the impact of drilling activities on air quality and the surrounding environment in the Barnett Shale and Haynesville Shale in Louisiana. Industrial gas drilling emits methane, a more dangerous greenhouse gas than carbon dioxide. Communities in the Barnett Shale have been suffering from smog as a result of oil and industrial gas activities.

See: http://www.shreveporttimes.com/article/20090811/NEWS01/908110318/1060

WEST VIRGINIA WASTEWATER TREATMENT PLANT SUSPENDS TREATMENT OF PRODUCED WATER

After a warning from the West Virginia Dept. of Environmental Protection regarding pollutants in wastewater, a WV wastewater treatment plant has stopped accepting such water for treatment until a gas drilling company provides extensive water testing. This was the only WV facility permitted to accept gas drilling wastewater.

See: http://www.wtrf.com/story.cfm?func=viewstory&storyid=64694

MONONGAHELA RIVER AGAIN HAS ELEVATED LEVELS OF POLLUTION FROM FRACKING

The Pennsylvania DEP again found elevated levels of total dissolved solids (TDS) in the Monongahela River. TDS can include chlorides, sulfates, and other pollutants from industrial gas drilling wastewater. The Monongahela supplies drinking water for many municipalities in PA; these water treatment plants are not equipped to remove TDS. Sources of the increased TDS include the millions of gallons of produced water from the Marcellus Shale. PA officials recommend people use bottled water for drinking and preparing foods when TDS levels are high.

See: http://www.ahs2.dep.state.pa.us/newsreleases/default.asp?ID=5619
FAMILY DILEMMA - TO LEASE OR NOT TO LEASE

A landowner writes about a family dilemma whether to lease land for industrial gas drilling. The writer cites examples of Pennsylvania landowners who now regret leasing land; while they gained money, some have had cattle die from contaminated water and have contaminated drinking water.

See: http://www.stargazette.com/article/20090816/VIEWPOINT02/908160304/-1/OPINION

INDUSTRIAL GAS DRILLING THREATENS TROUT HABITAT

Sportsmen are concerned about significant impacts to coldwater fisheries and trout habitat. Concerns include water quantity and quality, and secondary impacts from increased runoff.


NY DEC ENGINEER: HYDROFRACKING NEEDS MORE SCRUTINY

A retired engineer for the New York State Dept. of Environmental Conservation writes that DEC must take its time to study hydraulic fracturing impacts. While the technique has been around for years, horizontal drilling and disposal of millions of gallons of polluted wastewater are new challenges. The engineer also points out that even if hydraulic fracturing fluid is 99.5% water, that still means at least 5,000 parts per million of pollution (a very high number from a contamination perspective), and that we must know the composition of hydraulic fracturing fluids.

http://www.pressconnects.com/article/20090820/VIEWPOINT02/908200303/1120/OPINION02/Old+technology++but+new+use

ITHACA COUNCIL RAISES GAS DRILLING CONCERNS

Ithaca’s Common Council has raised numerous concerns regarding hydraulic fracturing in and around Ithaca. These include drinking water impacts, impacts to roads, safety for first-responders to a drilling site accident or fire, and tax structure for oil and gas revenue.

http://www.theithacajournal.com/article/20090820/NEWS01/908200393/1126/Ithaca+council+raises+natural+gas-drilling+concerns

COMMUNITY IMPACTS FROM INDUSTRIAL GAS DRILLING

Wayne County, PA residents are debating how industrial gas drilling will change their community—including out-of-state transient workers; substantial truck traffic on local roads (“equivalent to almost 4 million car trips”); and changing the community culture to an industrial work zone.

http://www.riverreporter.com/issues/09-08-20/news-impacts.html

INDUSTRIAL GAS DRILLING COMES TO CLARION COUNTY, PA

Clarion County, PA, where the Marcellus Shale is only 50 feet thick, will soon have big horizontal fracking rigs. Pennsylvania recently approved two permits to drill well in Elk Township.
CORNELL COOPERATIVE’S GAS LEASING YOUTUBE CHANNEL

Cornell Cooperative Extension has a gas leasing channel on YouTube, featuring testimonials from New Yorkers who have experience with leasing of vertical gas wells.

http://www.youtube.com/CCEGasLeasing

Legislative Update

DRBC DELAYS RULING ON WATER WITHDRAWAL APPLICATION – WILL HOLD PUBLIC HEARING

The Delaware River Basin Commission (DRBC) will hold a second public hearing on Chesapeake Energy’s water withdrawal application on September 23, 2009.

Chesapeake Energy has applied to withdraw 1 millions gallons of water per day from the Delaware River. The Delaware River Basin Commission (DRBC) held a public hearing on July 15, but due to the overwhelming response (DRBC received over 1,200 written comments) the Commission has decided to revise the docket for this application and hold a second hearing. The revised docket will be available September 11, 2009 and DRBC is requesting public comment on the revisions.

This is the first possible approval of water withdrawals from the Delaware River for industrial gas drilling. The DRBC regulates water use from the Delaware River; nearly 15 million people rely on water of the Delaware River Basin for drinking water and industrial use (this includes drinking water for New York City). Concerns have been raised of the effect of the withdrawals on the New York City water supply.

http://www.state.nj.us/drbc/dockets/D-2009-20-1.htm

http://www.riverreporter.com/issues/09-08-13/head2-drilling.html

NY ASSEMBLYWOMAN SEEKS NYC WATERSHED BAN AND FRAC ACT SUPPORT

Assemblywoman Janele Hyer-Spencer is co-sponsoring a bill, introduced by Assemblyman James Brennan, to prohibit industrial gas drilling within two miles of New York City water supply infrastructure. Assemblywoman Hyer-Spencer is also co-sponsoring a resolution asking Congress to pass the Fracturing Responsibility and Awareness of Chemicals Act (FRAC Act). The FRAC ACT would repeal the “Halliburton Loophole” and allow the Safe Drinking Water Act to regulate hydraulic fracturing.


View the bill: http://assembly.state.ny.us/leg/?bn=A01322
NEW YORK CITY COUNCILMEMBER INTRODUCES RESOLUTION IN SUPPORT OF FRAC ACT

NYC Council Member Jessica Lappin introduced a resolution calling on Congress to pass the FRAC Act. In the Huffington Post, Councilmember Lappin urged Congress to protect drinking water supplies from any risk due to hydraulic fracturing.

See: http://www.huffingtonpost.com/jessica-lappin/our-drinking-water-under_b_250835.html

MOTLEY FOOL ON FRAC ACT

The Motley Fool expresses support for the FRAC Act and disclosure of chemicals used in hydraulic fracturing. The Motley Fool also says industry claims of high costs for compliance are “a serious exaggeration.”


PENNSYLVANIA GOVERNOR DROPS PLAN TO TAX GAS DRILLING

Under intense pressure from the industrial gas drilling industry, Gov. Rendell dropped plans to tax Marcellus Shale gas extraction. The tax was estimated to bring Pennsylvania $90 million in revenue this year alone. Gov. Rendell appears to have left open the possibility of taxing next year.

See: http://www.washingtonexaminer.com/economy/ap/56377072.html


WEST VIRGINIA DEP PROPOSES TOUGHER RULES ON INDUSTRIAL DRILLING

The West Virginia DEP has proposed rule changes on industrial drilling, mainly addressing pollution concerns from the fracking fluid. Changes include requiring all fluid storage pits to have synthetic liners to prevent leaks, forcing operators to remove all solid waste during reclamation of pits, changing design and construction standards for the pits, and requiring inspection of the pits. If passed, this would be the first significant changes to WV drilling rules in over 25 years.

See: http://wvgazette.com/News/politics/200907150773


Link to the proposed law:

New Reports and Studies

NEW YORK STATE RELEASES DRAFT ENERGY PLAN

In August 2009, the State of New York’s Energy Planning Board released a draft of the 2009 State Energy Plan. The draft plan calls for encouraging the development of the Marcellus Shale with environmental safeguards that will protect natural resources and water supplies. However, the plan also recommends that New York support private interest and investment in drilling in the Marcellus Shale and study the potential for new private investments in extracting natural gas on State-owned lands. The plan also acknowledges that, because the Marcellus Shale has a high concentration of clay which can lead to re-closing of fractures if the gas is not immediately produced, some gas producers are calling for additional pipelines to be built before drilling begins.

See: http://www.pressconnects.com/article/20090825/NEWS01/908250353/1112/State+hears+Tier+views+on+natural+gas+drilling

Read the plan: http://www.nysenergyplan.com/

U.S. DEPARTMENT OF ENERGY AWARDS GRANTS TO STUDY WATER ISSUES RELATED TO HYDRAULIC FRACTURING

In August 2009 the U.S. Department of Energy awarded grants to several institutions to study water issues related to hydraulic fracturing and industrial gas drilling. The goal of the study is to improve water management in industrial gas drilling, including disposal, and to support the science that will aid regulatory programs.


http://mac10.umc.pitt.edu/FMPro?-db=ma-&-lay=a-&-format=d.html&id=3800&-Find

CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES (CSIS) RELEASES NATURAL GAS REPORT

In June 2009 CSIS released Crossing the Natural Gas Bridge, a report analyzing how natural gas may “build a bridge” to a secure, low-carbon energy system. The report acknowledges that there are energy security risks and climate change risks associated with a dramatic shift to natural gas. It recommends, among other things, that policymakers institute an environmentally sensitive and efficient natural gas development strategy.

Read the report: http://csis.org/publication/crossing-natural-gas-bridge
Take Action

GAS DRILLING PRESENTATION IN ANDES, NY

Wes Gillingham of Catskill Mountainkeeper and writer Anne Saxon-Hersh will present “What you need to know about gas drilling in the Catskills” at the Andes Public Library on Saturday, Sept. 12, 2009 at 2 pm. Admission is free.

PROTECT YOUR TAP WATER

New York boasts their excellent tap water and rightfully so. However, industry is proposing to jeopardize this precious resource by drilling underneath the NYC watershed, near other local watersheds, and near local aquifers. Click on the link below to sign a letter supporting the Ban Gas Drilling in the Catskills campaign.


CORNELL COOPERATIVE EXTENSION PUBLIC FORUM ON MARCELLUS SHALE

Cornell Cooperative Extension will host a Regional Cancer and Environmental Forum on September 22, 2009, 10:00am-3:00pm at Cornell University. The afternoon session will feature a presentation and panel discussion on water resources and natural gas production from the Marcellus Shale.

[http://gasleasing.cce.cornell.edu/](http://gasleasing.cce.cornell.edu/)

Residents should contact their local CCE Association for more details. In addition, CCE is planning a New York Marcellus Shale Summit on Monday, Nov. 30, 2009, at the Oswego Treadway Inn.

CONTACT YOUR CONGRESSIONAL REPRESENTATIVES TO SUPPORT FRAC ACT

The "Halliburton Loophole" exempts hydraulic fracturing from the Safe Drinking Water Act. Riverkeeper and other environmental groups urge you to contact your senators and representatives to repeal the Halliburton Loophole.

The Natural Resources Defense Council has posted a sample letter:

[https://secure.nrdconline.org/site/Advocacy?cmd=display&page=UserAction&id=1308&autologin=true&JServSessionIdr001=ne3f2fb83.app306a](https://secure.nrdconline.org/site/Advocacy?cmd=display&page=UserAction&id=1308&autologin=true&JServSessionIdr001=ne3f2fb83.app306a)

DRBC PUBLIC HEARING ON WATER WITHDRAWAL APPLICATION

The DRBC’s will hold a public hearing on Chesapeake Energy’s water withdrawal application on September 23, 2009 at 10:00am in Hawley, PA. This will be the only topic at this hearing.

[http://www.state.nj.us/drbc/dockets/D-2009-20-1.htm](http://www.state.nj.us/drbc/dockets/D-2009-20-1.htm)

PENNSYLVANIA TO HOLD HEARINGS ON WASTEWATER DISPOSAL PERMITS

The Pennsylvania DEP will hold public hearings for two permit applications to discharge wastewater from industrial gas drilling into the Susquehanna River and Meshoppen Creek. The wastewater
treatment plants want to discharge close to 1 million gallons a day of gas drilling wastewater. Both hearings will be held in October, 2009.

http://www.depweb.state.pa.us/news/cwp/view.asp?a=3&q=548327

ONLINE SEMINARS ON MARCELLUS SHALE

Penn State's College of Agricultural Sciences and Penn State Cooperative Extension are offering monthly online seminars on the impacts of industrial drilling in Pennsylvania. The webinars are designed to help prepare communities and local officials for drilling activities. Registration information for the webinars is available at http://naturalgas.extension.psu.edu/Events.htm. The one hour webinars will be held at 1 p.m. on the following dates:


Penn State also offered a seven-part series of online seminars that started in December and ran through May and covered topics such as local governments' roles in gas exploration, leasing concerns in the current economic climate, and the effects of deep-well drilling methods on water supplies. These previously held webinars can be viewed online at http://naturalgas.extension.psu.edu/webinars.htm.