

KEY TERMS

Horizontal Drilling with Hydraulic Fracturing (or *fracing*, pronounced “fracking”) — The process expected to be used in drilling the Marcellus Shale. It involves drilling down to the shale layer (3000-5000 ft. below ground) then turning and drilling horizontally to reach the natural gas trapped in the rock over a wider area. Fracing involves pumping large volumes of water (est. 1 million gallons or more per well) or other “stimulants,” typically mixed with sand and chemical lubricants, into the “well bore” to “fracture” the rock, thus releasing the embedded gas to reach the surface.

Vertical Drilling — The process typically used to reach natural gas deposits in New York State in the past. As the New York State Department of Environmental Conservation (DEC) finalizes its Supplemental Generic Environmental Impact Statement (SGEIS) for horizontal drilling, vertical drilling is allowed to go ahead and may be used to access and test the flow of gas in the Marcellus Shale in order to evaluate the geology of an area new to exploration (i.e. “exploratory wells” as opposed to “production wells”).

Spacing Unit – A geographically defined area approved for gas extraction within a DEC permit, typically via a single well-pad. It is the bounded area of land from which one producing well or a cluster of wells may be drilled to draw gas from a specific “reservoir” (i.e. a sub-surface layer like the Marcellus). Historically units were 40-60 acres; a 2008 change in NYS law allows for units of 640 acres or 1 square mile for multiple wells drilled from a single “pad”—the technique linked to horizontal drilling.

Compulsory Integration – The process prescribed under NYS Law under which an owner who has not leased his/her property may be required to participate in an approved spacing unit, in cases in which at least 60 % of the acreage within that unit has been leased from other owners. After the DEC issues a well permit, a public hearing will be held and owners of property that has not been leased are notified. They will receive a choice of three options for receiving “royalties” (proceeds) on the value of gas removed from the spacing unit, depending on the amount of risk or cost they are willing to assume up front.

Standard Gas Lease and Addendum — Gas companies and “landmen” (agents for gas companies working in the field) may present a Standard Lease containing the most common leasing terms. Changes and additional terms are negotiable and should be covered in an Addendum to the Standard Lease. Working with an experienced attorney, an owner should require extensive and specific “addenda” to add terms that pertain to his/her unique situation, as well as addressing liability issues and ensuring clean up of the well-site after drilling, or in the event of accidents.

Seismic Testing – A method of exploration for oil or gas by sending sound waves or other means of vibration into the earth, in order to read and interpret the response that is reflected or refracted by sub-surface geology. Geologists can chart the reflected sound waves to create a map of underground formations, i.e. the various layers of sub-surface rock, their depth, density and likelihood for containing natural gas.

Understanding Gas Drilling

A series of Public Forums On
Natural Gas Development in Sullivan County

Presented by the Sullivan County Legislature

Panel 2: Environmental & Health Concerns

Thursday, July 15, 2010

5:45 - 8:30 PM

Monticello High School

237 Route 42

Monticello, NY 12701

Organized by the Sullivan County Division of Planning
& Environmental Management

For More Information Call 845-807-0527 OR Email:
PLANNING@CO.SULLIVAN.NY.US



PROGRAM

5:45 — Arrival

6:00 — Welcome, Introductions and Program Format

- **David P. Fanslau, County Manager**
- **Luiz C. Aragon, Sullivan County Commissioner of Planning & Environmental Management**

6:15 — Panel Presentations:

- **Anthon R. Ingraffea, Ph. D.** — Impact of Spatial and Temporal Intensity of Development of Gas Shale Wells on Water and Waste Fluids
- **Adam Law, M.D.** — Protecting Our Future Health: The Case for a Moratorium
- **Kate Sinding, Esq.** — Overview & Assessment of NY's Environmental Review Process & Legislative Initiatives Related to Marcellus Shale Development
- **Paul Hartman** — "Drilling 101": Understanding Marcellus Shale Development

7:50 — Questions from the Audience —

In order to ensure that the panel receives a diverse range of questions, we ask that questions be written on the cards provided. Questions will be collected by volunteers and read aloud. If you wish to be contacted in the event your question is not read aloud, please provide name & contact info. (optional) on the cards.

SPEAKER PROFILES

Anthony R. Ingraffea, Ph. D., Dwight C. Baum Professor of Engineering & Weiss Presidential Teaching Fellow, School of Civil & Environmental Engineering, Cornell University, Ithaca, NY

Dr. Ingraffea's research concentrates on computer simulation and physical testing of complex fracturing processes. He and his students perform pioneering research in the use of interactive computer graphics in computational mechanics. With his students and research associates, he has authored over 250 papers in these areas, and he is Director of the Cornell Fracture Group (www.cfg.cornell.edu). Recognition for Dr. Ingraffea's research in hydraulic fracturing includes: the International Association for Computer Methods and Advances in Geomechanics' "1994 Significant Paper Award" (for one of five most significant papers in the category of Computational/Analytical Applications in the past 20 years); two National Research Council/U.S. National Committee for Rock Mechanics Awards for Research in Rock Mechanics; ASTM's George Irwin Award for outstanding research in fracture mechanics; and designation as a Fellow of the International Congress on Fracture. Professor Ingraffea is a founding member of ACI/ASCE Committee 447 on Finite Element Analysis of Reinforced Concrete and the ACI Committee 446 on Fracture Mechanics of Concrete. He is Co-Editor-in-Chief of *Engineering Fracture Mechanics* and directed the Cornell Center for Theory and Simulation in Engineering and Science from 2005-'07.

Since 1977, he has been a principal or co-principal investigator on over \$35M in R&D projects from the NSF, NASA Langley, Nichols Research, NASA Glenn, AFOSR, FAA, Kodak, U. S. Army Engineer Waterways Experiment Station, U.S. Dept. of Transportation, IBM, Schlumberger, Digital Equipment Corporation, the Gas Technology Institute, Sandia National Laboratories, the Association of Iron and Steel Engineers, General Dynamics, Boeing, Caterpillar Tractor, DARPA, and Northrop Grumman. Professor Ingraffea was a member of the first group of Presidential Young Investigators named by the National Science Foundation in 1984. He earned a Ph.D, Civil Engineering, University of Colorado/Boulder, a M.S. degree in Civil Engineering from Polytechnic Institute of New York and a B.S. in Aerospace Engineering from Notre Dame.

Speaker Profiles, Continued

Adam Law, M.D., Cayuga Medical Center, Ithaca, New York

Adam Law received his medical degree at the University of London. After his clinical training he studied for a masters degree in biochemistry and a doctorate in molecular medicine. He moved to the USA in 1988 as a European Molecular Biology Organization post-doctoral fellow and studied in the Department of Physiology at the University of California, San Francisco. He was a NIH post-doctoral fellow at the Department of Biochemistry at Cornell University until 1994. During his academic career, he was an author of 13 scientific papers. In 1994 he returned to his clinical roots to practice full-time in endocrinology and internal medicine as an attending physician at the Cayuga Medical Center, where he was president of the medical staff in 2009.

Dr. Law's interest in unconventional natural gas drilling was triggered at the end of 2009 when patients started asking him about the dangers of high volume horizontal hydraulic fracturing and its effects on health – particularly the effects on endocrine disruption. A reading of the available evidence has convinced him that there is insufficient scientific information on the health effects of natural gas drilling and that there should be a moratorium on the basis of the Precautionary Principle. He has inspired the physicians of Tompkins County to take a public stand on this issue. First, by a unanimous vote of the Tompkins County Medical Society in favor of a moratorium at their annual general meeting; and second, 70 physicians signed a petition that has been published as an advertisement in the Ithaca Journal and also sent to local and state officials.

Kate Sinding, Natural Resources Defense Council, New York, NY

Kate Sinding is a Senior Attorney and Deputy Director of the NY Urban Program at the Natural Resources Defense Council, where she specializes in New York urban and regional issues, including a variety of solid waste, land use and energy matters. Prior to joining NRDC in November 2006, Ms. Sinding was a partner in the specialty environmental law firm of Sive, Paget & Riesel, P.C. Kate is a member of the board of the New York Product Stewardship Council and sits on the Manhattan Citizens' Solid Waste Advisory Board. She is also an Adjunct Associate Professor of Environmental Law at Fordham University School of Law.

Ms. Sinding is a graduate of New York University Law School, the Woodrow Wilson School of International and Public Affairs at Princeton University, and Barnard College.

Paul Hartman, Dir. of State Government Relations, Chesapeake Energy Corp., Clarksville, NY

Paul Hartman oversees Chesapeake Energy Corporation's New York State Government Relations operations—promoting the development and implementation of public policies that advance the development of indigenous, clean burning natural gas resources in the state. Prior to joining Chesapeake in March 2010, Mr. Hartman served as Director of Government Relations with The Nature Conservancy of New York, leading its successful 2009-2010 state budget campaign that increased to the state's Environmental Protection Fund from \$205 million annually to \$222 million. He helped form a coalition of nearly 100 environmental, labor, public health, transit, local government authorities and civic organizations to promote placing the Clean Water, Clean Air and Green Jobs Bond Act on a future general election ballot.

Mr. Hartman has an extensive background in public policy, campaign planning, media advocacy, grassroots engagement and direct lobbying. He served as Senior Director of Advocacy for American Heart Association and was previously a lobbyist with the Albany offices of the Long Island-based law firm of Meyer, Suozzi, English & Klein, P.C. He served as Legislative Director for former State Senator Marty Markowitz (D-Brooklyn) and held other positions with the NYS Senate and Assembly Minority Conferences.

Mr. Hartman earned a BA in Political Science from the University at Albany.