Natural Gas Drilling:
Potential Environmental and Community Impacts

**Issue:** As natural gas prices rise, private companies are finding it cost effective to use horizontal drilling and hydraulic fracturing technologies to extract gas from underground shale basins. Just as industry asserts the technology is safe, communities are concerned about the environmental impacts associated with extraction, especially to drinking water supplies. Federal, state and potentially local governments have the responsibility to protect communities and the environment by ensuring that cumulative impacts from natural gas development are mitigated, exposure to toxic pollutants is minimized, and effects on communities and the environment are monitored.

**Status:** Natural gas extracting using horizontal drilling and hydraulic fracturing is underway in Texas, Pennsylvania, West Virginia, Ohio, Wyoming, Colorado, Louisiana, Montana and Arkansas, among other states. In New York, there is a moratorium on drilling while the state reviews public comments on a proposal to extract gas from the Marcellus Shale, a geologic formation extending across much of southern New York, northern and western Pennsylvania, eastern Ohio and West Virginia. Cornell University has placed a moratorium on considering proposals to lease its lands to natural gas development.

**Extraction Process:** Hydraulic fracturing, also known as “fracking,” involves the injection of water, sand and chemicals, into wells to pressurize and fracture the hard shale and release trapped gas. Large amounts of water will likely be needed to produce shale gas economically, and the use and disposal of this water could pose significant water quality and quantity issues. Without adequate controls on water withdrawals, strategies to minimize risk of ground and surface water contamination at the drill site, and appropriate methods to dispose of the wastewater, hydraulic fracturing could expose people and the environment to toxic pollutants and degrade surface and groundwater.

**Leasing:** Many companies, including Exxon/Mobil, BP and Conoco Phillips are securing leases from private landowners and states for shale gas development. Several groups of landowners have formed organizations to share information, to pool land to gain leverage in lease negotiations and to advise landowners on relevant issues.

**Environmental Concerns:** The primary environmental concerns involve the impact of hydrofracking on water resources. In 2005, federal law exempted hydraulic fracturing from restrictions in the Safe Drinking Water Act (SDWA) on underground injection of wells near drinking water. Pending legislation (H.R. 2766 and S.1215) would reinstate the applicability of the SDWA and require companies to disclose chemicals used in hydrofracking. In New York, companies are required to report the chemicals they use but it is not certain that this information will be made available to the public. The Environmental Protection Agency is currently reviewing whether hydrofracking has contaminated drinking water but is hampered by not knowing the specific chemicals that have been used.
The Energy Policy Act of 2005 exempted well site activities from the Clean Water Act’s National Pollutant Discharge Elimination System (NPDES) permit requirements for storm water runoff from construction sites. But states are free to implement their own laws. Given the expected density and intensity of gas well and pipeline expansion, the development and enforcement of appropriate Stormwater Pollution Prevention Plans is critical to maintaining surface and groundwater quality.

The Susquehanna River Basin Commission and the Delaware River Basin Commission regulate the location and volume of water withdrawals within their respective basins. In New York, there is currently no regulatory authority to restrict water withdrawals outside these basins, including areas in the Great Lakes and Mohawk-Hudson River basins that are underlain by the Marcellus shale. Before water is withdrawn from unregulated basins, legislation needs to be enacted and a system needs to be in place to mitigate environmental and drinking water supply impacts of cumulative withdrawals.

There is significant concern as to whether there is adequate capacity to treat and dispose of the water returned to the surface after the shale formation is fracked. Some of this water can be reused for hydrofracking. In addition to containing chemicals added by hydrofracking, this water can contain high levels of salts and naturally occurring radioactive materials (NORMS). Most of this water will likely be treated by private treatment plants or possibly by some publicly-owned treatment works with approved pretreatment programs, though current wastewater treatment capacity is limited. With wastewater treatment, salts and NORMS in frack water may be released into surface waters- which would be regulated, or may be disposed of as solid waste- which apparently is not currently regulated.

**Community and Economic Development.** Recent intensive natural gas development in other states has been accompanied by substantial changes in established trends in population, land use, environment, community, and economy. Factors such as changes in population, income, employment, housing costs and other costs of living, local government roles and demands in service are expected to result in significant cumulative impacts to communities.

**Research Needs:** Continued interest in hydrofracking and the uncertainty of the environmental, economic and community impacts, highlight the need for additional research, including studies on what is happening on the ground to ecosystem services, communities and public health. With drilling already underway throughout the country, there are excellent opportunities for future study.

**Additional Information:** Visit the Cornell Cooperative Extension Natural Gas Leasing website at http://gasleasing.cce.cornell.edu. Also, go to the New York State’s Water Resources Institute website at http://wri.eas.cornell.edu/.

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