

**Sierra Club Pennsylvania Chapter
Water Issues Committee
Gas Drilling in the Marcellus Shale**

What is the Marcellus Shale?

The Marcellus Shale is a rock formation 5000 to 9000 feet below the earth's surface, which has the potential of holding large gas reserves. The Marcellus Shale is similar to the Barnett Shale formation in Texas where gas production has reached 1 trillion cubic feet per year (out of a total US production of 30 trillion cubic feet from all sources). The Marcellus Shale is a very large formation that underlies parts of NY, PA, OH and WV, and which may hold a total of 16 to 50 trillion feet of recoverable gas.

How does one drill for gas so deep?

Recent advances in deep well drilling, horizontal drilling and hydraulic fracturing have made gas extraction from deep wells practical and economical for gas companies.

Hydraulic fracturing, or hydrofracturing, is a technique that creates long fractures in rock and coal to release gas from the shale formation to wells to be collected. In order to create these fractures, a mixture of water, "proppants" particles (sand or ceramic beads) and chemicals is pumped into the rock at high pressures. The pressure causes the rock to fracture and the proppants hold open the fracture to allow the gas to flow.

Hydrofracturing requires a large quantity of water. Typical projects use 1 to 3 million gallons of water and .5 million pounds of sand. Large projects may require up to 5 million gallons of water. The water must be pumped into the well from surface sources or from underground aquifers or brought in by tank trucks. Hydrofracturing also pumps process fluid called "flow-back" to be reused or disposed of. The fluid is often contaminated with chloride or other chemicals. A large percentage (20-40%) of the injected fluid remains underground.

Who owns the rights to drill?

In Pennsylvania, land is often separated into surface and mineral estates. The surface landowner may not own the mineral rights below ground. Often a title search must be conducted to determine who owns the mineral rights beneath the surface of land. An exploration company often will negotiate a gas lease with a mineral rights owner or group of owners to explore on their land. The lease agreement may cover access to property, compensation for damages to the surface, and royalty payments to the mineral rights owner.

What DEP permits are necessary?

A well driller must obtain several permits and approvals from DEP and other agencies before drilling:

- Well Drilling Permit – The operator must obtain a drilling permit, pursuant to 25 Pa. Code 78.11-33.
- Earth Disturbance Permit (ESCGP-1) -- The operator must obtain a permit for implementation of erosion and sedimentation controls, including stormwater management, if the site disturbance area is more than 5 acres. A plan for erosion and sedimentation control is required if the site is less than 5 acres.

- Preparedness, Prevention and Contingency (PPC) Plan -- The operator must have an approved spill prevention plan.
- Water Withdrawal Permits – DEP and the Susquehanna River Basin Commission have required water allocation permits for large withdrawals of surface or groundwater.
- Pit Approval for Control, Handling or Storage of Production Fluids – The operator must obtain approval for storage pits under 25 Pa. Code 78.54-58
- Water Treatment, Reuse and Disposal – An operator who discharges to a stream must obtain a permit under the Clean Streams Law.
- Stormwater – An operator is required to meet DEP stormwater requirements, which are part of the Earth Disturbance Permit.
- Encroachment Permit – An operator must obtain a permit from DEP for construction, excavation or operation in a wetland, stream, or body of water.

What is the Sierra Club's position on gas drilling?

The Sierra Club views natural gas as a transitional fuel as the US transitions to a clean energy economy. However, the Sierra Club is concerned about the environmental effects of drilling. Deep well drilling on such a large scale is a relatively new to Pennsylvania; the environmental effects have not been fully evaluated. DEP recently warned of problems associated with violations of environmental requirements.

What are potential environmental problems?

- Well drilling and fracturing consume large quantities of water that will not be replaced since large quantities of drilling water will remain underground.
- Drinking water supplies (surface waters and underground aquifers) and fisheries and streams can be damaged by intentional or accidental discharges of contaminated water from the well head site.
- Drilling and fracturing can affect water quality in water wells and aquifers in the area.
- Operations of diesel generators and trucks can affect local air quality.
- Land clearing for the well site, haul roads, and gas pipelines can disrupt wildlife and can introduce invasive species.

For more detailed information on gas drilling in the Marcellus shale, go to the oil and gas accountability website: http://www.earthworksaction.org/oil_and_gas.cfm (This website is not affiliated with the Sierra Club)

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