Disposal Wells a Concern for Folks in the Marcellus Gas Field

by Sue Smith-Heavenrich
Broader View Weekly, April 24, 2009

Residents of Chemung and Tioga County joined nearly 130 Bradford County residents for a forum on "Underground Injection Wells for Waste Disposal" at Towonda High School on Tuesday, April 14. The forum, hosted by Penn State Cooperative Extension and the Bradford County Natural Gas Advisory Committee focused on the geology of the region and regulations concerning Underground Injection Control (UIC).

Dan Vilello, of Pennsylvania Department of Environmental Protection said that DEP issued 8,000 permits last year and 4200 new wells were drilled, 196 of them into Marcellus shale. Since January the DEP has issued 1662 drilling permits and Vilello estimated that by the end of the year they would approve 7,000 Marcellus permits.

Tom Murphy, from Penn State Cooperative Extension examined what the influx of drilling means in terms of the quantity of water that will be used and the management of wastewater from the wells. He cited the Susquehanna River Basin Coalition, estimating that 28 million gallons of water a day will be withdrawn from the basin at peak use. Twenty to 30 percent of that water will return from the well containing high levels of salts, heavy metals and fracking chemicals.

"That water must be treated before it can be disposed of," Murphy said. One option is to truck the water to a commercial wastewater treatment facility. Another option is to send it through a reverse osmosis unit to extract the salts.

Disposal Wells an Option

"Due to costs and environmental concerns, the preferred option is deep well injections," Murphy said. He noted that there are already eight underground injection (disposal) wells in Pennsylvania; there are about five currently in use in New York.

But with the increased drilling activity planned for 2009 Murphy said that number is likely to increase. In the Barnett shale they plan on one underground injection well for every 100 producing gas wells, he explained. These deep wells would lie below the Marcellus formation, most likely 5,000 to 9,000 feet deep.

Murphy emphasized that disposal wells are industrial, and there would be a lot of truck traffic – up to 100 trucks/day with traffic running 24-hours-a-day, seven-days-a-week throughout the year. He mentioned possible issues of noise as well, and the need for access roads.

"There will have to be some type of manifest system to assure that wastewater is disposed of properly," Murphy noted. The biggest environmental issue, aside from ensuring that there are no surface spills, is to make sure old and abandoned wells are properly plugged.

Tom Rice, a consulting engineering geologist from Wellsboro, PA gave an overview of geologic considerations when siting a disposal well. One of the concerns he noted was

that there be no existing fractures in the rock and that wastewater be injected below the Marcellus layer.

Regulatory Issues

EPA hydrologist Karen Johnson addressed the federal regulations regarding underground disposal. “The purpose of the Underground Injection Control (UIC) program is to protect water,” she said. The EPA regulations assure that UIC wells meet the requirements of the Safe Drinking Water Act (SDWA). Thus a disposal well would not be allowed to contaminate any portion of an aquifer that supplies a public water system or is “capable of supporting a public water system.”

Johnson clarified that UIC regulations prohibit the movement of fluid that may pose a potential endangerment to an underground source of drinking water. “Plop a person anywhere east of the Mississippi and there’s a good chance there’s an aquifer directly beneath his feet or within a quarter mile,” Johnson said.

Underground injection does not include hydro-fracking, as that process was specifically exempted from the SDWA in 2005. UIC also does not regulate the storage of gas nor does it regulate any surface activity associated with injection wells including ponds, pits, access roads or pipelines, Johnson explained.

There are five classes of underground injection wells, and the ones under discussion for wastewater are Class II. These wells require operators to do preliminary tests in order to determine at what pressure there will be no fractures, and whether the underground geology will accept the wastewater. Because of the extensive testing, Johnson is confident that the disposal wells will not cause underground fractures.

Johnson pointed out that Texas has close to 7,000 brine disposal wells, and requires one brine disposal well for every four production wells. “I think they [gas companies] are going to go back to those depleted or unproductive wells and try to use them as underground injection wells,” she said, referring to future development of the Marcellus shale.

When a gas company applies for a UIC permit they must document that all other wells in their “area of review” have been adequately plugged. If old wells aren’t adequately plugged, the wastewater injected under pressure may travel up through the old wells and pollute groundwater. Although the “area of review” usually extends 1/2 mile around the proposed injection well, the UIC well owner needs to identify all water wells within a one-mile radius of the proposed UIC well and notify those landowners.

When asked about horizontal disposal wells, Johnson admitted that generally disposal wells are vertical – they do not go beneath other properties. “At a minimum we expect the pressure cone to go as far as 1/2 mile,” she said. That means that fluid injected into a disposal well is expected to migrate up to half a mile from the injection site.

“But how can we be sure that toxic chemicals won’t leak out of the UIC well?” someone asked.

“The premise of the area of review is that any pathway of migration, such as an abandoned well, would be plugged,” Johnson said. “Faults and fractures are taken into account as well,” she added, but pointed out that no seismic information was required.