

Energy Production and Exploration

Natural Gas Production

Recent public interest in natural gas production is due to several factors:

- Improved directional drilling technologies.
- New information about the scope of energy reserves in the Marcellus and in the deeper Utica shale layers in the northeastern US.
- Development of a new extraction technology, hydraulic fracturing (or more commonly “fracing”), that accelerates the release of gas in commercially viable production rates.

Production Marcellus wells require drilling into the shale layer, 7,000 to 10,000 below the surface, and then sideways through the shale seam as shown in figure 1. The well casing is then perforated at predetermined locations, and the shale fractured with a high pressure “fracing fluid” composed of mostly water and sand, but also small concentrations of specified hydrocarbons. A significant amount of water is used in this process, One of the environmental concerns, disposal of the used fracing fluid, can be addressed by [SeaMonitor™](#) technology.

A land based SeaMonitor™ can measure and report the hydrocarbon concentration in fracing fluid in real time.

Since it uses a membrane inlet, this precision instrument can be operated on land with a flow-by sampling system, or immersed in the fluid in a special housing. SeaMonitor™ can therefore be used to control a variety of commercially available filter/reverse osmosis water treatment systems to assure acceptable water purity prior to discharge.

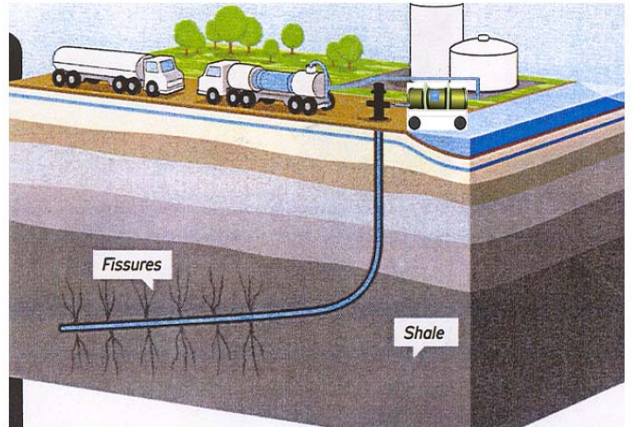


Figure 1: Fracing fluid analysis in real time prior to injection and during recovery with the SeaMonitor.

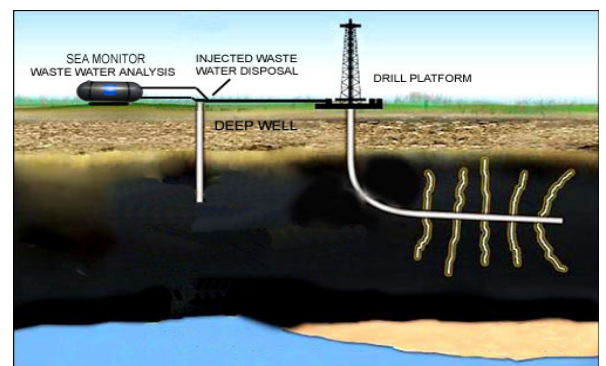


Figure 2: The SeaMonitor™ (not drawn to scale) can measure hydrocarbon concentrations in recovered fluid to assure adherence to regulatory limits in areas where it can be injected into a class 2 deep disposal well.