**Introduction**

Since 1925, Michigan has been one of the nation’s important sources of natural gas and crude oil. Michigan’s natural gas producers supply 21.8 percent of the natural gas used by Michigan residents and businesses for heating and energy needs (U.S. Energy Information Administration, 2009). Natural gas is clean and abundant, making it a reliable energy source for Michigan.

In Michigan, where renewable energy sources like wind power are being developed to diversify our energy mix, natural gas will continue to be a major fuel source, as we bridge to a wider range of energy sources in the future.

**Horizontal Wells – Hydraulic Fracturing in Michigan**

**Hydraulic fracturing in Michigan**

Hydraulic fracturing is a safe, proven and essential process for recovering natural gas and oil from Michigan’s Utica/Collingwood and other “unconventional” formations. This proven and economic method is critical to our energy supply, and will continue to be a major fuel source, as we bridge to a wider range of energy sources in the future.

**Can hydraulic fracturing be done safely?**

Yes, with proper well construction as required by Michigan regulations, and proper disposal of waste fluids. Michigan has a program for ensuring proper disposal. In Michigan, fracturing fluids are disposed of in regulated disposal wells.

**Is horizontal hydraulic fracturing occurring in Michigan?**

Hydraulic fracturing of horizontal wells has been and is being conducted in Michigan in several geologic formations. More recently in Michigan, some producers are assessing the Utica/Collingwood as a potential significant source of natural gas, as well as its economic feasibility and the need for this additional energy source for individuals, businesses, and manufacturers. Development, if it occurs on a significant scale, is expected to involve much longer wells of greater length, utilizing multi-stage fracturing to access greater reserves of energy.

**What is Michigan’s experience with hydraulic fracturing and horizontal drilling?**

Hydraulic fracturing has been used in Michigan since the 1950s, in more than 12,000 wells. More commonly, a straight vertical well has been used as a horizontal well—where the vertical well reaches its depth and then is extended horizontally underground—i.e. an approach being used by producers where appropriate to the producing formation. The approach used depends upon the geologic conditions and the economic reality of a particular situation. Increased demand by citizens for clean burning natural gas and greater energy independence, and the potential of lower natural gas production from Michigan’s abundant resources, suggest that horizontal drilling could play a beneficial role in helping to grow, while boosting job creation and economic growth.

**How is horizontal hydraulic fracturing regulated?**

Michigan oil and gas production, including hydraulic fracturing, is strictly regulated. Regulations govern well construction, drilling sites, environmental monitoring, hydraulic fracturing, and waste fluid disposal. Michigan’s Utica/Collingwood, found at a depth that ranges from 2,000 to about 9,000 feet below the surface of the earth, is an example of an unconventional source that may have the potential to produce significant energy.

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**In recent years, production of natural gas and oil from shale rock formations and other “unconventional” sources has continued to grow as producers seek opportunities to deliver more energy from onshore domestic sources for meeting energy needs. Michigan’s Utica/Collingwood is an example of an unconventional source that may have the potential to produce significant energy.**

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Each well drilled in Michigan is constructed with the protection of the environment and water resources in mind, and in accordance with regulatory requirements.

**Vertical and horizontal wells**

Whether the well is a vertical well or horizontal well, the purpose and method of fracturing is the same. The purpose is to create fissures — or pathways — that allow sufficient quantities of oil or gas locked in the rock to move to the well, thereby making production economically viable. All wells require these pathways: hydraulic fracturing in tight rock formations (where the pathways do not occur naturally) allows producers to create the pathways necessary for oil or gas to move more freely from the tight formations. Fracturing may be conducted in one stage, or in multiple stages, depending on the specific circumstances of the well and the reservoir formation.

**Vertical wells**

In Michigan, vertical wells are most common, as producers have developed energy reserves from reservoirs that can be efficiently produced through vertical wells. Vertical wells extend straight down from the earth’s surface to reach formations containing gas and/or oil reservoirs.

**Horizontal Wells**

A horizontal well is a vertical well with a horizontal leg, or a lateral extension, that stretches out within the deep productive formation. Horizontal wells have been commercially used in Michigan since the 1980s. Hydraulic fracturing in horizontal wells uses the same process of fracturing as used in vertical wells. Where the horizontal leg is extended, the hydraulic fracturing process is typically conducted in several stages along the length of the leg. This creates micro-fractures along the horizontal leg of the well, allowing a single well to produce from a larger area within the producing formation. Fracturing — whether in a single stage or multiple stages — takes place in a regulated, well-engineered and controlled procedure.

The opportunity for increased production to meet energy needs and reduce dependence on foreign energy sources, by using clean-burning natural gas, could spur development of deep shale and other unconventional sources in Michigan, such as the Utica/Collingwood. Such development could utilize longer horizontal wells and multistage hydraulic fracturing. It efforts to develop the Utica/Collingwood using longer horizontal wells are successful, another positive aspect would be the relatively low surface impact of a single well producing from a large area within the underground formation.

**Safety and responsibility**

Well construction

Fracturing operations in Michigan take place in an oil and gas-producing zone below the freshwater aquifers. Each well drilled in Michigan is constructed with the protection of the environment and water resources in mind, and in accordance with regulatory requirements.

**Typical Utica/Collingwood Horizontal Well In Michigan**

Hydraulic fracturing is not a drilling method. After a well has been drilled, hydraulic fracturing involves pumping water, sand, and a small amount of additives down the well under controlled pressure. As the mixture is forced out through perforations in the well casing and into the surrounding rock, the pressure causes the rock to fracture — creating micro-fractures that enable gas and/or oil to flow from tight or low-permeability rock to the well.

Steel surface casing is set from the earth’s surface down to a depth of 100 feet below the deepest potential fresh water zone, and cemented to the surface. Utica/Collingwood horizontal wells in Michigan also have an intermediate casing extending up to half the vertical well depth, providing additional protection against potential gas migration. Finally, production steel casing is set deeper into the production zone and through the horizontal leg and cemented, ensuring the protection of groundwater by multiple cemented steel casings.

Michigan has taken prudent steps to strengthen its regulatory framework. Michigan fosters energy production while maintaining a clean environment.

New requirements for larger-volume hydraulic fracturing include:

- **Changes to water usage oversight** – Operators must document where they are getting the fresh water used in the process, using the DEQ’s water withdrawal assessment tool to ensure that neither surface water nor any neighboring water wells are adversely impacted. They must also report the total volume of fracturing water recovered during operation.
- **Reporting** – The DEQ requires operators to file Material Safety Data Sheets (MSDSs) in compliance with federal Occupational Safety and Health Administration (OSHA) standards, and the DEQ will post that information on the department’s website for public review. The MSDSs list characteristics of chemical additives and their potential health effects.
- **Fracturing records** – Operators must submit service company fracturing records and associated charts showing fracturing volumes, rates, and pressures.

**Deep horizontal wells:** access to more energy, more efficiently, less impact

Federal and state regulations affecting well construction, drilling sites, environmental monitoring, and waste fluid disposal strictly regulate hydraulic fracturing in Michigan. Horizontal drilling, coupled with multi-stage hydraulic fracturing, has many advantages for accessing gas and oil located in certain deep formations. The approach:

- **Makes production from certain deep reserves economically viable, even with the immense development costs, because the resulting micro-fractures allow significant volumes of oil or gas tight-rock formations to reach the well.**
- **Enables a single well to produce from an extended area, with the surface facilities located in one location.**

A horizontal well is a vertical well with a horizontal leg, or a lateral extension, that stretches out within the deep productive formation. The approach:

- Enables a single well to produce from an larger area within the producing formation. Fracturing — whether in a single stage or multiple stages — takes place in a regulated, well-engineered and controlled procedure.

In May 2011, the Michigan Department of Environmental Quality (DEQ) announced additional regulations for the gas and oil industry to provide disclosure and transparency related to larger-volume hydraulic fracturing activities in Michigan.