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Tip of the Mitt Watershed Council and National Wildlife Federation

This is the second in a series of bi-weekly information sheets that will be provided to Michigan legislators on hydraulic fracturing or “fracking,” a natural gas and oil extraction technique.

Quantity of Water Required for Fracking Operations

Water is essential to unconventional deep shale development, both during the drilling and extraction processes. In preparation for hydraulic fracturing, or “fracking,” treatments, water is transported to a well site either by truck or pipeline.¹ Water is then stored onsite in impoundment pits, or more rarely, in 20,000-gallon portable steel “frac” tanks, before it is mixed with sand and chemicals and injected into drilled wells at high enough pressure to create fractures in the rock formations below and encourage natural gas flow.

While a fracking treatment for a typical Antrim gas well in Michigan requires 50,000 gallons of water, a single fracture treatment in deeper, “unconventional” shales such as the Marcellus can require about 10 times more water, or 500,000 gallons—nearly as much water as is contained in an Olympic-size swimming pool.² These deep wells often receive multiple treatments. Such a multi-stage operation can consume up to 5 million gallons of water, the amount used by eight to ten acres of corn during a growing season.³

Shale gas extraction and processing requires less water than onshore oil and biofuel production and most coal and nuclear fuel production for electricity. However, multiple wells in a limited area can significantly impact water resources. In addition, most of the injected fracking fluid does not resurface, and the “flowback” water that does return is typically not treated for reuse but instead is injected in underground disposal wells.²

Impact of Water Withdrawal on Water Resources

Energy companies using hydraulic fracturing get source water from rivers, lakes, ground water, industrial or city wastewater treatment discharge, and reused frack fluid. Michigan oil and gas regulations prohibit the use of surface water for drilling fluid.⁴

Large ground water withdrawals can cause upwelling of lower quality, deeper water; create subsidences; and lower aquifer water levels exposing minerals to oxygen, causing chemical contamination, salination, and affecting taste and odor. Surface water withdrawals can impact hydrology, changing flow, depth, and temperature of a water source and increasing contaminant concentration by reducing dilution. Withdrawals from one source affect others since ground water and surface water are hydraulically connected.

¹ Chesapeake Energy, *Hydraulic Fracturing Facts*, www.hydraulicfracturing.com/Water-Usage/Pages/Information.aspx.

² Congressional Research Service, *Unconventional Gas Shales: Development, Technology, and Policy Issues*, at 24, Oct. 30, 2009, www.fas.org/sgp/crs/misc/R40894.pdf.

³ Office of Geological Survey, Dep’t of Environmental Quality, *Hydraulic Fracturing of Natural Gas Wells in Michigan*, May 31, 2011, www.michigan.gov/documents/deq/Hydrofrac-2010-08-13_331787_7.pdf.

⁴ Mich Comp. Laws § 324.404 (2006).

Regulation of Water Use in Hydraulic Fracturing

Regulation of environmental impacts of a water withdrawal is generally done by states.

Michigan state law requires an internet-based assessment tool be used to determine whether large quantity withdrawals will adversely impact water flow of rivers, streams, or ground water, as indicated by a decrease in fish populations. Large quantity withdrawals are defined as those in a common system exceeding 100,000 gallons of water per day average in any 30-day period. If the tool signals a withdrawal will not have adverse impacts, the user may register the withdrawal and proceed. If the tool does indicate a withdrawal may have adverse impacts, a site-specific review is required.⁵ A water withdrawal of over 2 million gallons per day is subject to separate permitting. However, water withdrawals for oil and natural gas extraction, if permitted under Part 615, are exempt from these requirements.⁶

In May of 2011, the DEQ issued permitting instructions requiring well operators to document the source and quantity of freshwater used and post a material safety data sheet for chemicals used in the fracking fluid.⁷ The DEQ has indicated well operators will be subject to the same standards as other water users, including site-specific review requirements and prohibition on withdrawals likely to cause an adverse resource impact, though the withdrawals will not be formally registered.⁸

In addition to state regulation, state water rights can affect water withdrawals for fracking. Eastern states follow a reasonable use doctrine of water rights wherein water users share water resources, while western states have adopted the appropriation doctrine, wherein water users are subject to a hierarchy determined by prior use.⁹ In Michigan, a reasonable use balancing test is applied, which takes into account the type of water source, purpose of the contested use, extent of any harm stemming from the use, economic and social benefits, necessity of the use, and effects on state interests such as fishing. This test seeks "fair participation" in water use for the greatest number of users and protection of "reasonable and ordinary" uses.¹⁰

⁵ Mich. Comp. Laws Ann. § 324.34706(b) (2011).

⁶ Mich. Comp. Laws Ann. § 324.32727 (2011) (exemption for "withdrawal undertaken as part of an activity authorized by the department" under part 615, which regulates the oil and gas industries).

⁷ Michigan DEQ, Office of Geological Survey, Supervisor of Wells Instruction 1-2011.

⁸ Letter from Harold R. Fitch, Chief, Resource Management Division of the Office of Geological Survey, to the DEQ, to Grenetta Thomassey, Program Director, Tip of the Mitt Watershed Council (July 6, 2011).

⁹ EPA, *supra* note 6, at 21.

¹⁰ *Michigan Citizens for Water Conservation v. Nestle Waters North America Inc.*, 709 N.W.2d 174, 201-03 (Mich. Ct. App. 2005).

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