

Hydraulic Fracturing: Treatment and Disposal of Fracking Fluid Waste

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Tip of the Mitt Watershed Council and National Wildlife Federation

This is the fourth 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.

Fracking Fluid Wastewater

During the first month of drilling and production alone, a single well can produce a million or more gallons of wastewater. This wastewater consists of some originally injected fracking fluid, known as “flowback,” as well as naturally occurring salts, metals, and potentially radioactive material leached from underground. Between 10-40% of the fracking fluid injected in a well is recovered within two weeks of injection. Chemicals in fracking wastewater can include formaldehyde, boric acid, methanol, hydrochloric acid, and isopropanol.¹ According to the Michigan Office of Oil, Gas, and Minerals, some additives can adversely affect health or the environment if improperly handled or contained.²

Treatment Options

Fracking wastewater contains a high level of total dissolved solids (TDS), which is a measure of dissolved elements including carbonates, chlorides, sulfates, nitrates, sodium, potassium, calcium, and magnesium. TDS can be corrosive, harming sewage treatment facilities and interfering with industrial equipment. Although commercial wastewater treatment facilities can be designed to treat fracking wastewater, publicly owned treatment works are not,³ and large quantities of sodium and chloride can harm processing parts called digesters.⁴ Elevated levels of radionuclides and bromide are problematic, as chlorination will produce brominated disinfection byproduct, which is a health hazard.⁵

Underground injection wells are the primary disposal method with the exception of the Marcellus Shale.⁶ When local injection in wells is impossible, well operators may be able to send wastewater to out-of-state injection wells. For example, in response to tighter regulations regarding surface water disposal, Pennsylvania drillers have increasingly sent their fracking wastewater to Ohio. The state made \$1 million in fees from out-of-state drillers this year; the drillers sent 14.8 million gallons of fracking wastewater to Ohio in the last six months of 2010.⁷

¹ Robert B. Jackson & Brooks Rainey Pearson & Stephen G. Osborn & Nathaniel R. Warner & Avner Vengosh, *Research and Policy Recommendations for Hydraulic Fracturing and Shale Gas Extraction*, 2011, available at www.nicholas.duke.edu/cgc/HydraulicFracturingWhitepaper2011.pdf.

² Office of Geological Survey, Department 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.

³ Pennsylvania Department of Environmental Protection, *DEP Investigates Source of Elevated Total Dissolved Solids in Monongahela River*, October 22, 2008.

⁴ EPA, *Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources*, at 40, Feb. 7, 2011, <http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/index.cfm>.

⁵ *Id.*

⁶ *Id.*

⁷ Associated Press, *Ohio starts taking Pa. fracking wastewater*, July 5, 2011, available at <http://online.wsj.com/article/AP8b990f4a891743c9beab97af4c16463c.html#articleTabs%3Darticle>.

Some oil and gas regulatory agencies allow drilling operators to use wastewater on dirt roads for dust suppression, particularly in areas with dust-generating surface coal mining operations, such as Wyoming's Powder River Basin.⁸

Another option for wastewater is reuse in other fracking projects. While recycling reduces the amount of freshwater needed and the volume of waste, the high concentration of TDS presents challenges. One company reports reuse of 6% of the water required for a fracking job.

Regulation

"Flowback" from a fracking operation is exempted from the cradle-to-grave hazardous waste requirements of the federal Resource, Conservation, and Recovery Act (RCRA), including restrictions on disposal.⁹ While hydraulic fracturing of a well is exempt from the federal Safe Drinking Water Act (SDWA) Underground Injection Control (UIC) program, disposal of flowback in injection wells must meet the applicable SDWA requirements to ensure that below ground sources of drinking water are not contaminated. Under the Clean Water Act, operators may not discharge flowback into surface waters. EPA recently announced that it will develop pre-treatment requirements flowback will have to meet before sending it to treatment plants.¹⁰

In Michigan, oil and gas fluid wastes must be injected into underground formations.¹¹ Underground injection is subject to casing tests;¹² surface pressure limits; and monitoring and recording of injection pressure, injection rate, and volume of injected fluid.¹³ However, there is no requirement that drilling operators test wastewater to determine its chemical constituents. Additionally, applicants who wish to inject wastes associated with oil and gas operations in a disposal well do not have to identify hazardous waste components, even if there are hazardous chemicals in the wastes.¹⁴ Earthen pits are banned in Michigan,¹⁵ and brines may not be used for dust control purposes unless they meet chemical concentration limits.¹⁶

State and local regulations can require drilling operators to provide financial assurance for any possible spill, ensuring that companies pay for any damages caused. In Michigan, the DEQ is authorized to require "the filing of an adequate surety or security bond" and provide for its release.¹⁷

⁸ Chesapeake Energy, *Deep Shale Natural Gas and Water Use*, at 9, www.chk.com/Media/CorpMediaKits/Water_Use_Fact_Sheet.pdf.

⁹ 42 U.S.C. § 6921(b)(2) (2011); Clarification of the Regulatory Determination for Wastes From the Exploration, Development and Production of Crude Oil, Natural Gas and Geothermal Energy, 58 Fed. Reg. 15,284, 15,284 (Mar. 22, 1993).

¹⁰ EPA, EPA Announces Schedule to Develop Natural Gas Wastewater Standards, Oct. 20, 2011.

¹¹ Mich. Comp. Laws Ann. § 324.703 (2011).

¹² Mich. Comp. Laws Ann. § 324.803 (2011).

¹³ Mich. Comp. Laws Ann. § 324.804-806 (2011).

¹⁴ Mich. Comp. Laws Ann. § R 299.2312(h)(ii) (2011).

¹⁵ Mich. Comp. Laws Ann. § 324.702 (2011).

¹⁶ Mich. Comp. Laws Ann. §§ 324.705(2)-(3) (2011).

¹⁷ Mich. Comp. Laws Ann. § 324.62508 (2011).

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