

November 17, 2010

Director Rebecca Humphries
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RE: Regulation of Horizontal Drilling and Multi-stage Fracking Techniques

Dear Ms. Humphries and Mr. Fitch:

The undersigned organizations urge you to strengthen Michigan's oversight of hydraulic fracturing to ensure adequate protections of our valuable natural resources.

A new gas discovery recently occurred in Michigan, revealing potential natural gas reserves in the Collingwood and Utica Shale. Horizontal drilling and multi-stage fracking will be used to collect this gas, which is different than the hydraulic fracturing techniques historically used in Michigan. This drilling is not only deeper, it also uses substantially more fresh water and chemicals.

This development is different than any other gas and oil development which has preceded it. This development has resulted in documented problems in other states including surface, ground, and drinking water contamination. Subsequently, more robust oversight is needed to address future development in an orderly and sustainable manner while protecting Michigan's natural resources.

To that end, we recommend the following steps be taken to address wells drilled for gas in the Collingwood and Utica Shale in Michigan:

- **Require the use of the water withdrawal assessment process for these wells, and ideally all water withdrawals for oil and gas drilling**

With the signing of the Great Lakes Compact, Michigan and the other Great Lakes states have been charged with the mission of developing a statewide program to manage and regulate new and expanding large water withdrawals. Using science as the basis for policy development, Michigan has responded by enacting a new law, which requires the development and use of a water withdrawal assessment process and tool to be used to protect and conserve the waters of the state. Through the water withdrawal assessment process, all proposed Large Quantity Withdrawals (LQWs) are required to ensure that no individual or cumulative adverse resource impact to the source watershed will result. A

science-based tool for LQWs from rivers, streams, or ground water determines the likelihood of a withdrawal causing a serious impact on a nearby stream or river and provides guidance towards minimizing the impact. The definition of a LQW and the threshold for registration with the program has remained the same since its inception: the capacity to cumulatively withdraw over 100,000 gallons per day average in any consecutive 30-day period from all sources of water in the state.

The gas wells in the Utica Shale formation and Collingwood Shale formation are expected to withdraw ground water at rates that meet the definition of a Large Quantity Withdrawal. For example, the Petoskey Pioneer #1-3 well had a withdrawal of approximately 5.5 - 5.8 million gallons of water. However, a withdrawal undertaken as part of an activity authorized under Part 615 is currently exempt from the registration and permitting requirements under Part 327. This means the impacts of such a withdrawal are not assessed through the science-based tool. Yet the water withdrawals for water used in fracking still hold the potential to cause significant environmental harm. Ground water withdrawals can affect both ground water and surface water. Withdrawals have led to cases where wells, springs, and wetlands have gone dry, lake levels have dropped, stream flow has been reduced with great harm to wildlife, and contamination has prevented installation of new wells.

Part 615 prohibits waste in the development and production of gas, including "[u]nreasonable damage to underground fresh or mineral waters" and "unnecessary damage to or destruction of . . . animal, fish, or aquatic life; . . . or other environmental values." MCL 324.61504; 324.61501(q). The Supervisor of Wells is specifically empowered to "require the . . . drilling [and] operating . . . of wells . . . to be done in such manner and by such means as . . . to prevent pollution of, damage to, or destruction of fresh water supplies, including inland lakes and streams and the Great Lakes and connecting waters." MCL 324.61506(c). In addition, Rule 324.405 states that the "water . . . used in the drilling fluid shall be from a source approved by the supervisor or authorized representative of the supervisor, . . . and tested as instructed by the supervisor."

To ensure exploitation and damage to our water resources does not occur from water withdrawals associated with such gas drilling, we recommend that all LQWs be required to use the Water Withdrawal Assessment Tool and if necessary be subject to a site-specific review. Requiring withdrawals to use the tool ensures that gas drilling will not cause waste under Part 615 and fulfills the Supervisor's duty to protect fresh water supplies from damage and destruction. Moreover, consideration of environmental impacts from such withdrawals is appropriate given the Supervisor's responsibility to approve a source of water used to supply gas drilling. While the Supervisor currently has authority to require use of the tool and site-specific reviews as permit conditions, we believe this should ultimately be a requirement in state regulations.

- **Develop a standard for site-specific reviews for water withdrawals associated with oil and gas drilling**

Under certain circumstances, the water withdrawal assessment process requires water withdrawals to be reviewed on a site-specific basis. However, there is currently no standard for the site-specific reviews. We understand that a "cookie-cutter" approach is not

appropriate, but there should be a baseline standard of review developed that applies to all site-specific reviews associated with oil and gas water withdrawals. A baseline standard will allow both the companies and the public to understand how the impacts of the withdrawal are being evaluated, which leads to a more accountable and transparent process.

- **Remove exemption for Oil and Gas under Part 327**

As previously mentioned, Part 327 prohibits new or increased large quantity water withdrawals that cause an adverse resource impact. When the water withdrawal legislation was originally enacted in 2006 and revised in 2008, Michigan's oil and gas industry was using techniques that did not require large quantity withdrawals of water. As a result, a withdrawal associated with oil and gas production is exempt from Part 327.

MCL324.32727(1)(a). However, recent hydraulic fracturing techniques use significantly greater quantities of water than traditional methods. Given the changing technology and potential impact upon ground water resources of the state from these withdrawals, the exemption granted for activities authorized under Part 615 needs to be removed from Part 327.

- **Require public disclosure of chemicals used during the fracturing process**

Because the fluids in each fracturing treatment would contain a different subset of these chemicals, and because these chemicals could be hazardous in sufficient concentrations, public disclosure of the chemical constituents used in hydraulic fracturing on a site-by-site basis is necessary to enable regulatory agencies, health professionals, and citizens to conduct baseline water testing and respond appropriately should contamination or exposure occur. The DNRE has authority to request a full chemical analysis based on the broad authority given in Part 615 and should do so for every well that uses hydraulic fracturing. The Supervisor of Wells is empowered to "collect data to make inspections, studies, and investigations" and to "require the . . . keeping and filing of logs, well samples, and drilling, testing, and operating records or reports." MCL 324.61506(b), (d). Moreover, the Supervisor has the authority to "do whatever may be necessary with respect to the subject matter stated in this part to implement this part, whether or not indicated, specified, or enumerated in this or any other section of this part." MCL 324.61506(a).

While Part 615 directs that "well data and samples" be kept confidential upon the request of the owner of the well, data regarding releases, spills or leaks of products and chemicals used in drilling is not protected, presumably because this information is needed to address the spill. MCL 324.61506(d); R 324.416(3). For the same reasons, the chemical constituents of a fluid that has the potential to migrate into water supplies should not be kept confidential. The formula should only be kept confidential upon the request of the owner of the well justifying the need for the proprietary designation and with permission of the Supervisor. This should be a requirement in state regulations. (Sample language from the Wyoming Oil and Gas Conservation Commission is included as an attachment.)

- **Require the listing of constituents in permit applications for injection wells even though designated oil and gas wastes include hazardous chemicals used in fracturing process**

Because flowback fluids are part of an oil and gas operation, the fluids are designated as an oil and gas waste, even if there are hazardous chemicals in the wastes. This designation results in less protective requirements such as no requirement under Part 625 to analyze the constituents in the fluids prior to injection. According to R 299.2312(h)(ii), applicants who wish to inject wastes associated with oil and gas operations in a disposal well do not have to identify hazardous waste components in their analysis of the waste product. However, disclosure of the constituents to be injected is necessary to enable regulatory agencies, health professionals, and citizens to respond appropriately should contamination or exposure occur. This should be a requirement in state regulations.

- **Increase conformance bond and financial responsibility statement requirements for the gas drilling operations and plugging the injection well**

Part 615 specifically empowers the Supervisor to "require the filing of an adequate surety, security, or cash bonds of owners, producers, operators, or their authorized representatives in such reasonable form, condition, term, and amount as will ensure compliance with this part and with the rules promulgated or orders issued under this part." MCL 324.61506(p). There have been documented problems associated with the more recent hydraulic fracking techniques associated with gas development. In Pennsylvania, state regulators found that gas drilling using high-volume hydraulic fracturing has caused contaminated drinking water, polluted surface waters, polluted air, and contaminated soils. Given documented contamination, in addition to a technique that does not have precedent in Michigan, it only makes sense to increase the conformance bond and financial responsibility statement requirements to ensure adequate financial resources are available in the event hydraulic fracturing causes waste.

Furthermore, the injection well conformance bond and financial responsibility statement requirements need to be considerably higher. Part 625 specifically empowers the Supervisor to "require the filing of an adequate surety or security bond and provide for the release of that surety or security bond." MCL 324.62508(h). Because flowback fluids are part of an oil and gas operation, there is no requirement to analyze the constituents in the fluids prior to injection.

According to a 2003 United States General Accounting Office (GAO) report¹, current federal financial assurance requirements for deep injection wells rarely ensure adequate resources are available to close a deep injection well. Unfortunately, the only test of whether financial assurances are adequate will occur when the well needs to be closed. At that time, if the finances are inadequate, drinking water is at risk of contamination and the public will likely bear the cost of closing the well. Given that uncertainties about the adequacy of final assurance requirements have been raised by the federal government, and the greater risk associated with the presence of hazardous chemicals, requiring additional state financial

¹ United States General Accounting Office, 2003. Deep Injection Wells: EPA Needs to Involve Communities Earlier and Ensure That Financial Assurance Requirements Are Adequate. GAO-03-761. www.gao.gov/cgi-bin/getrpt?GAO-03-761.

assurance is necessary to ensure all costs associated with closing the well are adequately accounted for. This should be a requirement in state regulations.

- **Require seismic monitoring to ensure that hydraulic fracturing is inducing microseismic activity only within the shale gas reservoir**

Microseismic monitoring can reduce the risk of environmental hazards caused by the fracking process. Requiring such monitoring would help to prohibit waste under Part 615 by preventing "unreasonable damage to underground fresh or mineral waters, natural brines, or other mineral deposits from operations for the discovery, development, and production and handling of oil or gas." MCL 324.61501(q)(i)(B). Microseismic monitoring can optimize the placement of fractures and their connection with networks of natural fractures within hydrocarbon-bearing rock formations, not only increasing the recovery of domestic natural gas and oil resources but minimizing the potential environmental impacts. This technique provides direct measurement of the location of fracture propagation which can help operators to know where the fracking fluids are going. This should be a requirement in state regulations.

- **Require monitoring and reporting of fracturing fluid flowback volume**

The extent of volume of flowback varies in various basins and shale gas plays. In some cases, flowback may account for less than 30 percent of the original fracture fluid, while in other cases, it may be more than 70 percent. Within 60 days after well completion operations, a permittee is required to file a report with data on all perforating, acidizing, fracturing, shooting, and testing. R 324.418(b). Companies should be required to include data on the volume of flowback as part of the record of well completion. This will allow Michigan to obtain an accurate representation of the volume of fluid remaining underground and the reservoir as well as be better prepared for future proposals. This should be a requirement in state regulations.

- **Require companies to use Best Management Practices**

It is essential for Michigan to be proactive in protecting against unnecessary negative impact to the environment and in protecting public health and safety while encouraging the wise development and use of the state's energy sources. Michigan is at a crossroads with the new technology and innovative approaches in the exploration and development of oil and gas that allow for new reserves to be tapped. Prior to an influx of gas wells in the Utica and Collingwood Shale, we have the opportunity to be a leader by setting an example for the rest of the country on how sustainable development and protection of natural resources and environment can go hand-in-hand. Requiring use of BMPs can help ensure that energy development in Michigan is conducted in an environmentally responsible manner. The oil and gas industry and other states as well as the Bureau of Land Management are constantly developing and improving BMPs to lessen the effects of oil and gas development on the environment. Michigan should develop BMPs specific to Michigan's oil and gas industry as well as our natural resources. Below are oil and gas BMPs that appear applicable to Michigan and should be incorporated in state regulations:

Flowback

- Recycling of water – Require recycling of flowback, when possible, to reduce ground water withdrawals. However, water must be recycled in a manner that prohibits contamination of surface and ground water resources and soils.
- Where networks of pipes are used to transport flowback and produced water for hauling to disposal sites, pipeline “pigging” should be performed to evaluate pipe thickness and leak detection and monitoring must be in place.
- Fluid transfer operations from tanks to tanker trucks must be manned at the truck and at the tank if the tank is not visible to the truck operator from the truck.

Utility Lines

- Whenever practical, bury utilities, particularly in and near areas of sensitive species critical habitat. Minimize the disturbance footprint by burying utilities along the road rather than cross-country.

Noise control

- Use noise control strategies such as sound barrier technology, alternative equipment, or even site plan designs through terrain and vegetation modifications to minimize noise from fracking operations.

Air emission controls

- Electric motors should be used to drive gas compressors and other stationary oil and gas-field infrastructure.
- Use natural gas-fired engines in place of diesel.
- On-site electric generation using one lean-burn engine instead of several rich-burn engines.
- Condensate tanks should be equipped with vapor recovery units and monitored for the control of VOC emissions.

Reclamation

- In addition to final reclamation, there should also be interim reclamation up to the wellhead. This entails short-term reclamation that occurs as the well is beginning initial production of oil and/or gas and includes partially reshaping and revegetating roads, and well pads to reduce the amount of bare ground created during construction and drilling activity.
- Reclamation should also consider controlling invasive species, using native vegetation, and habitat creation.

Water Protections

- All surface disturbance, permanent facilities, etc., should remain a minimum of 500 feet away from the edge of surface waters, riparian areas, wetlands, and 100-year floodplains.
- All stimulation fluids, especially hazardous materials, should be located in a secondary containment area with loading and unloading areas constructed and sealed to prevent seepage into surrounding surface or ground waters in accordance with R. 324.1002.

Stormwater management – A study was conducted in Texas to demonstrate the impacts of oil and gas exploration on water quality² and the study found the following:

- Event Mean Concentrations (EMC) of total dissolved solids, conductivity, calcium, chlorides, hardness, alkalinity and pH were higher at gas well sites compared to reference sites and differences were statistically significant for all parameters except conductivity.
- Overall, the concentrations of metals tend to be higher at gas well sites compared to both nearby reference sites and storm water runoff from local mixed use watersheds.
- TSS and turbidity EMCs at gas wells sites were significantly greater than those observed at reference sites.

The findings in this research suggest that gas well sites have the potential to negatively impact the aquatic environment due to site activities that result in increased sedimentation rates and an increase in the presence of metals in stormwater runoff. Therefore, the state should require stormwater pollution and prevention and erosion and sediment control best management practices.

Wildlife considerations:

- Reduce vehicle traffic
 - Seasonal restriction of vehicular access in new development areas such as dead-end, well access roads or designated portions of the field.
 - Operator enforced speed limits during critical seasons.
 - Using shuttle vans and buses to transport drilling rig workers and field service personnel.
- Any pits or tanks that are in use should be fenced and covered to prevent entry by birds and other wildlife, including amphibians.

Toxicity on site

- Substitutions for toxic oil and gas field materials (e.g., proppants, solvents, friction reducers, acid neutralizers, paints, etc.) must be used when non-polluting options are available.

Closed-loop drilling system

- Under Rule 324.504(1), "[a]ll wells, surface facilities, gathering lines, and flow lines shall be constructed and operated so that the materials contained in the facilities do not cause waste." Steel tanks, with secondary containment and leak detectors, should be used to store oil and gas fluids during operations, including to store drilling mud and to replace typical working pits. Steel tanks will minimize the size of the well site footprint and provide protection to the environment. During drilling operations, "closed-loop" drilling fluid systems can greatly reduce or eliminate the discharge of

² Banks, Kenneth, Wachal, David, 2007. United States Environmental Protection Agency Final Report for Catalog of Federal Domestic Assistance Grant Assistance Number 66.463 Water Quality Cooperative Agreement for Project Entitled "Demonstrating the Impacts of Oil and Gas Exploration on Water Quality and How to Minimize these Impacts Through Targeted Monitoring Activities and Local Ordinances." http://www.epa.gov/npdes/pubs/oilandgas_impactgrant.pdf.

toxic drilling wastes on site and eliminates risk of waterfowl and wildlife mortality related to pits.

- **Reassess rules and regulations after EPA releases results of the hydraulic fracturing study due out in 2012 and modify, if necessary**

EPA is conducting research to ensure drinking water protection and address related public health and environmental issues over the lifecycle of hydraulic fracturing. While the details of the study are still preliminary, draft recommendations are that initial, short-term research be directed to study sources and pathways of potential impacts of hydraulic fracturing on water resources, especially potential drinking water sources. While current and potential drinking water sources are a recommended starting point/priority for ORD research, investigations should eventually occur on the impact on water resources more generally, and their aquatic ecosystems and ability to support fishing and recreation. Given the extent of knowledge that can be gained from the research, in addition to lessons learned in the field while the research is underway, we recommend that Michigan reassess the regulations governing gas wells in the Utica and Collingwood Shale formations after the EPA releases the study findings in 2012. Based upon the findings, modifications may be needed to provide additional protections for Michigan's natural resources and public health.

Again, we ask you to strengthen Michigan's regulations with the above recommendations to ensure Michigan's environment and water resources are protected. If you have any questions, please feel free to contact Jennifer McKay or Grenetta Thomassey at 231-347-1181 or jenniferm@watershedcouncil.org or grenetta@watershedcouncil.org.

Sincerely,

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Attachment

Wyoming Oil and Gas Conservation Commission Rule requiring public disclosure of chemical constituents in fracking fluids.

(Chapter 3, Section 45. Well Stimulation.)

The Owner or Operator shall provide detailed information to the Supervisor as to the base stimulation fluid source. The Owner or Operator or service company shall provide to the Supervisor, for each stage of the well stimulation program, the chemical additives, compounds and concentrations or rates proposed to be mixed and injected, including:

(i) Stimulation fluid identified by additive type (such as but not limited to acid, biocide, breaker, brine, corrosion inhibitor, crosslinker, demulsifier, friction reducer, gel, iron control, oxygen scavenger, pH adjusting agent, proppant, scale inhibitor, surfactant);

(ii) The chemical compound name and Chemical Abstracts Service (CAS) number shall be identified (such as the additive biocide is glutaraldehyde, or the additive breaker is aluminum persulfate, or the proppant is silica or quartz sand, and so on for each additive used);

(iii) The proposed rate or concentration for each additive shall be provided (such as gel as pounds per thousand gallons, or biocide at gallons per thousand gallons, or proppant at pounds per gallon, or expressed as percent by weight or percent by volume, or parts per million, or parts per billion);

(iv) The Owner or Operator or service company may also provide a copy of the contractor's proposed well stimulation program design including the above detail;

(v) The Supervisor may request additional information under this subsection prior to the approval of the Application for Permit to Drill (Form 1) or of the Sundry Notice (Form 4);

(vi) The Supervisor retains discretion to request from the Owner or Operator and/or the service company, the formulary disclosure for the chemical compounds used in the well stimulation(s).

(e) The Owner or Operator shall provide a detailed description of the proposed well stimulation design, which shall include:

(i) The anticipated surface treating pressure range;

(ii) The maximum injection treating pressure;

(iii) The estimated or calculated fracture length and fracture height.

(f) Upon prior request via Application for Permit to Drill (Form 1), and/or a comprehensive drilling/completion/recompletion plan, or by Well Completion Report (Form 3), or by Sundry Notice (Form 4), and/or by written letter to the Supervisor justifying and documenting the nature and extent of the proprietary information, confidentiality protection shall be provided consistent with WYO. STAT. ANN. § 16-4-203(d)(v) of the Wyoming Public Records Act for the following records: “trade secrets, privileged information and confidential commercial, financial, geological or geophysical data furnished by or obtained from any [person](#).”

(g) The injection of volatile organic compounds, such as benzene, toluene, ethylbenzene and xylene, also known as BTEX compounds or any petroleum distillates, into [groundwater](#) is prohibited. The proposed use of volatile organic compounds, such as benzene, toluene, ethylbenzene and xylene, also known as BTEX compounds or any petroleum distillates for well stimulation into hydrocarbon bearing zones is authorized with prior approval of the Supervisor. It is accepted practice to use produced water that may contain small amounts of naturally occurring petroleum distillates as well stimulation fluid in hydrocarbon bearing zones.

(h) The Owner or Operator or service company shall provide the Supervisor, on a Well Completion or Recompletion [Log](#) (Form 3), or on a Sundry Notice (Form 4) for an existing well, the following [post](#) well stimulation detail:

(i) The actual total well stimulation treatment volume pumped;

(ii) Detail as to each fluid stage pumped, including actual volume by fluid stage, proppant rate or concentration, actual chemical additive name, type, concentration or rate, and amounts;