

# Ohio Hydraulic Fracturing State Review

January, 2011



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## INTRODUCTION

In 1990, the Interstate Oil Compact Commission (IOCC) and the U.S. Environmental Protection Agency (USEPA) jointly published a Study of State Regulation of Oil and Gas Exploration and Production Waste, which contained guidelines for the regulation of oil and gas exploration and production wastes by the IOCC member states (the “1990 Guidelines”). The published guidelines, developed by state, environmental and industry stakeholders, provided the basis for the State Review Process, a multi-stakeholder review of state exploration and production (E&P) waste management programs against the guidelines. The purposes of the State Review Process are to document the successes of states in regulating E&P wastes and to offer recommendations for program improvement. In 1994, the guidelines were updated and revised (the “1994 Guidelines”) by the IOCC, now named the Interstate Oil and Gas Compact Commission (IOGCC).

In 1999, administration of the State Review Process devolved to a non-profit, multi-stakeholder organization named State Review of Oil and Natural Gas Environmental Regulations, Inc. (STRONGER). STRONGER again revised, expanded and updated the Guidelines, which were accepted by the IOGCC and published in June 2000 as Guidelines for the Review of State Oil and Natural Gas Environmental Regulatory Programs (the “2000 Guidelines”). In 2005, STRONGER again revised, expanded and updated the Guidelines (the “2005 Guidelines”).

In 2009, STRONGER formed a Hydraulic Fracturing Workgroup consisting of stakeholders to review issues associated with hydraulic fracturing and develop guidelines for state regulatory programs to address identified issues. After several meetings and a round of public comment, the workgroup submitted to STRONGER a set of guidelines that represented the consensus of the workgroup. In 2010, STRONGER distributed the workgroup’s guidelines (the “2010 Hydraulic Fracturing Guidelines”) for state regulation of hydraulic fracturing. Those guidelines were used as the basis of this review.

In May 2010, the Ohio Department of Natural Resources (ODNR), Division of Mineral Resources Management (DMRM), volunteered to have its hydraulic fracturing program reviewed by STRONGER. The Ohio oil and gas regulatory program has undergone two prior reviews. The report of the initial review of the Ohio oil and gas regulatory program was published in 1995. The report of the follow-up review, conducted after the guidelines were revised, was published in 2005.

The current review began with a questionnaire that was sent to the DMRM. The questionnaire had been prepared by the STRONGER Board. STRONGER intended the questionnaire to capture the status of the Ohio program relative to the 2010 Hydraulic Fracturing Guidelines. The DMRM prepared a response to the questionnaire, which was then sent to the review team.

In August to December 2010 an eight-person team appointed by STRONGER conducted a review to evaluate the ODNR program compared to the 2010 Hydraulic Fracturing Guidelines. The review team consisted of three team members and five official observers. The three team members were: Lori Wrotenbery, Oil and Gas Conservation Division of the Oklahoma Corporation Commission; Wilma Subra, Subra Co., New Iberia, Louisiana; and Jim Collins,

Independent Petroleum Association of America. The official observers were: Kari Matsko, Northeast Ohio Gas Accountability Project; Greg Russell, Vorys, Sater, Seymour and Pease LLP; David Neslin, Colorado Oil and Gas Commission; Nancy Johnson, U.S. Department of Energy; and Dr. Robert Puls, U.S. Environmental Protection Agency.

The review team conducted a meeting, the in-state portion of the review, in the conference facilities of the ODNR in Akron, Ohio on August 27, 2010. Mr. Richard Simmers, North Regional Manager of the DMRM, presented an overview of hydraulic fracturing requirements in Ohio. Mr. Simmers, Mr. Tom Tugend, Mr. Tom Tomastik and Mr. Steve Opritza, also of the DMRM, Mr. Rich Blasick of the Ohio Environmental Protection Agency (OEPA), and Mr. Steve Helmer of the Ohio Department of Health (ODH) responded to questions from the team members and official observers. In addition to the Ohio state representatives who participated in the review, there were four environmental, three industry and two citizen attendees who observed the proceedings and offered questions for consideration by the review team. Following the meeting and after reviewing the written materials provided by the DMRM, the team members compiled this review report.

This is the report of the review of the Ohio program against the 2010 Hydraulic Fracturing Guidelines of STRONGER. Appendix A is a glossary of acronyms used in the report. Appendix B contains Ohio's written response to the STRONGER questionnaire.

## **EXECUTIVE SUMMARY**

An in-depth review of the Ohio hydraulic fracturing regulatory program has been completed by a multi-stakeholder review team. The review team has concluded that the Ohio program is, over all, well-managed, professional and meeting its program objectives. The review team also made recommendations for improvements in the program.

### **Program Strengths**

During the 2010 review of Ohio's regulation of hydraulic fracturing, the review team and observers were granted full access to DMRM staff, and all questions were answered in a responsive and open manner. During the review, the review team identified strengths of the Ohio program, which also are noted in several of the report's findings. The following offers an overview of some of the Ohio program's strengths.

#### **1. Comprehensive Change to Oil and Gas Law**

Since 2000, DMRM has conducted a thorough assessment of its oil and gas program. As a result of that assessment, DMRM developed a plan, with stakeholder input, that included revisions to its regulatory program. Those revisions address, among other things, hydraulic fracturing, funding, staffing levels and workload priorities. This plan was used as a guideline in the development of Senate Bill 165, which became effective on June 30, 2010. DMRM is in the beginning stages of revising Chapter 1501:9 of the Ohio Administrative Code (OAC) to reflect SB 165 changes. DMRM is commended for its role in revising Ohio's oil and gas laws.

#### **2. Comprehensive Well Completion Reporting Requirements**

Chapter 1509 of the Ohio Revised Code (ORC) requires the operator to submit all electric logs and an accurate well completion record to DMRM within 60 days after the completion of drilling operations. Hydraulic fracturing information, including the type, volume and concentration of acid used, the type and volume of fluid used to stimulate the well, the reservoir breakdown pressure, the method used for the containment of fluids recovered, and the average pumping rate, is summarized on the well completion report. SB 165 requires the operator to submit along with the well completion report copies of the well stimulation log, the fracture pressure chart and the invoices, which provide a record of what happened on the job, including materials that were used, when they were used, and in what volumes, as well as whether well integrity has been maintained throughout the operation. DMRM is provided with information that would indicate a failure should one occur. The review team views these reporting requirements as a program strength.

### **3. Review of Potential Pathways of Contamination**

The review of a well permit application includes a review of wells or other potential pathways for contamination of groundwater within the minimum spacing distance for the well. This review extends along the entire lateral of a horizontal well. The review includes plugging records for plugged wells and casing records for other offset wells. This review is both appropriate and commendable.

### **4. Strong Enforcement Tools**

DMRM has an arsenal of enforcement tools at its disposal to assure compliance with regulatory requirements. These tools include the ability to require the replacement of water supplies and the authority to shut-in production from wells in material and substantial violation. If casing or cement is determined to be defective, the operator must cease operations and notify the DMRM within 24 hours. The defect must be immediately repaired. Immediate well repair means NOW if there is an existing threat and means “as soon as practical” if there is no existing threat.

The chief of DMRM can order the plugging of a well that is irreparably damaged. If the chief has determined a well should be plugged, he must notify the owner in writing of the decision and specify a reasonable timeframe for compliance. Orders can be delivered electronically and can be issued in as little as 30 minutes. If an order is issued, the company must obtain a plugging permit and provide notice to DMRM at least 48 hours prior to plugging. Failure by the operator to plug a well within a reasonable period of time is cause for the DMRM to take action to plug the well. Costs of that action must be reimbursed by the operator. An inspector must be on site to witness plugging unless this presence is waived by the chief of DMRM.

These remedies provide a strong incentive to prevent or correct problems that could lead to groundwater contamination.

### **5. Increase in Staffing Levels**

In July of 2000, the Division of Mines and Reclamation was merged with the Division of Oil and Gas. Work assignments were shared among staff. More recently DMRM decided to realign staff into the single program areas. The oil and gas program developed a realignment plan, with stakeholder input, that included an analysis of funding, staffing levels and priority workloads. This plan was used as a guideline in the development of SB 165. Specific positions and classifications were developed.

ODNR has seven field offices. Three district supervisors and a statewide field enforcement administrator have direct authority over the field offices. Most oil and gas activity is located in the eastern half of the state. DMRM has 21 full-time-equivalent

(FTE) oil and gas inspectors assigned to five of the seven field offices. Inspectors are responsible for all field aspects of oil and gas operations. ODNR has an inspector priority matrix that assesses risk and defines the work priorities for inspectors. Well construction and hydraulic fracturing operations are prioritized as critical.

The Ohio Attorney General's office assigns attorneys to support enforcement activities, plus there is one in-house counsel.

SB 165 included fee increases to support new positions and creates multiple new funding mechanisms to support DMRM activities. There are now about 35 FTE positions in the oil and gas program. Plan implementation and new funding will about double this complement. DMRM is currently posting job descriptions for eight new inspectors and will evaluate the need for eight additional inspector positions during FY2010/2011.

The review team supports DMRM efforts to increase and train staff to meet identified workload priorities, including their plans to increase the percentage of hydraulic fracturing operations witnessed.

## **6. Use of the Web Site to Disseminate Information**

DMRM has increasingly used its web site to disseminate information. The web site includes Education and Frequently Asked Question (FAQ) sections to provide information arranged by topic. Links to the Ohio Revised Code and Ohio Administrative Code are provided.

DMRM is making good use of its web site to disseminate information. DMRM has begun posting Material Safety Data Sheet (MSDS) information it receives on its web site. This recent addition should help inform the public about hydraulic fracturing operations.

## **Program Recommendations**

The following are the primary areas where recommendations are made by the review team for improvements of the Ohio hydraulic fracturing program. Discussion and findings for these recommendations can be found in the various sections of the report. Readers are encouraged to review the specific discussion and finding for each recommendation

### **1. Pending Rulemaking to Update OAC Chapter 1501:9**

Statutes pertaining to hydraulic fracturing are contained in Chapter 1509 of the ORC. These laws were amended with the passage of SB 165, which became effective on June 30, 2010. DMRM is in the beginning stages of revising OAC Chapter 1501:9 to reflect SB 165 changes. The review team acknowledges this rulemaking effort and encourages

the expeditious completion of those portions necessary or appropriate to implement the hydraulic fracturing provisions of SB 165.

## **2. Chemical Information Availability**

SB 165 requires operators to submit the well stimulation log, the fracture pressure chart and the invoices with the well completion report, and also requires the DMRM to maintain MSDS information. If DMRM does not already have an MSDS for a material listed on an invoice, DMRM must obtain one. This information is used by investigating geologists during complaint investigations and by emergency responders in the event that a spill or other incident occurs. In addition, DMRM is considering a requirement for including Chemical Abstract Services (CAS) numbers.

If specific chemical constituents of hydraulic fracturing fluids are not included on the MSDS, DMRM can request submission of the specific chemical information. If that chemical information is not submitted as requested, a variety of enforcement actions may be taken.

DMRM should consider whether they will be getting all the chemical information they will need for investigations from the MSDS. An MSDS does not always contain the specific chemical constituents of a product. Also, the state should ensure that information on chemical constituents of fracturing fluids is available to medical personnel in the event of a medical emergency.

## **3. Evaluation of Water Withdrawals for Hydraulic Fracturing Operations**

Most hydraulic fracturing operations in Ohio are of vertical wells and use relatively low volumes of water. Some companies buy water from municipal water plants, especially in urban areas, but the main source is surface water. The Division of Soil and Water Resources in ODNR requires the registration of water withdrawals that may exceed 100,000 gallons per day. If large volume hydraulic fracturing occurs in a watershed where a river basin commission or other watershed authority has jurisdiction, a permit may be required by the watershed authority. Within the Great Lakes Watershed, a Water Resources Management Decision Support System has been developed and a water use database has been created to inventory water withdrawals and use. While ODNR has the authority to promulgate rules for the protection of public health and safety, including the use of natural resources, the scale of hydraulic fracturing operations in Ohio has not approached that in neighboring states where the Marcellus Shale is being developed, so there has not been a need to further evaluate the availability of water for hydraulic fracturing. Nonetheless, in light of the anticipated development of the Marcellus and Utica Shales in Ohio, the state should continue to evaluate the need and availability of surface and ground water for hydraulic fracturing in the context of all competing uses and potential environmental impacts resulting from the volume of water used for hydraulic fracturing.

# **HYDRAULIC FRACTURING**

## **I. BACKGROUND**

The first oil well in Ohio drilled for commercial production was located in Macksburg, Washington County. It was drilled in 1860, one year after Colonel Drake discovered the first oil well in Titusville, Pennsylvania. From 1861 through the early 1900's shallow sandstone reservoirs were developed in southeastern Ohio. In 1884 the Lima oil field was discovered in northwestern Ohio, making Ohio the world's largest oil producer at the time. Between 1888 and 1937 over 70,000 wells were drilled to the Ordovician Trenton Limestone in northwestern Ohio. In 1887 natural gas was discovered in the Silurian "Clinton sandstone" in Fairfield County. Since that time, over 75,000 wells have been completed in the Clinton sandstone throughout eastern Ohio. There has been little development of shales for gas production at this point in time.

Ohio has approximately 64,500 active wells, most of which are characterized as stripper wells (producing 10 barrels of oil or 60,000 cubic feet (Mcf) of natural gas per day or less).

Hydraulic fracturing began in Ohio in the 1950s. Most wells drilled and completed today are completed by hydraulic fracturing operations. Most of these wells are vertical wells. Although an estimated 80,000 wells have been fractured in Ohio, state agencies have not identified a single instance where groundwater has been contaminated by hydraulic fracturing operations.

## **II. GENERAL**

The Ohio Department of Natural Resources (ODNR), Division of Mineral Resources Management (DMRM) has jurisdiction over production operations generally, and hydraulic fracturing operations more specifically, in Ohio. Other state agencies having related authorities include the Ohio Environmental Protection Agency (OEPA), which generally regulates pollution of water and air, and the Ohio Department of Health (ODH), which generally regulates radiation. Each of these agencies have been provided with broad statutory authority to enable them to protect public health and the environment. This authority includes the development and enforcement of regulations. The agencies communicate frequently on issues of common concern. They have recently been discussing anticipated program changes that may be necessary due to anticipated development of the Marcellus and Utica Shales.

ODNR has been provided strong enforcement authority. That authority includes, among other remedies, a provision that allows the chief of DRMR to order the replacement of an affected water supply or order a halt to production from wells in material and substantial violation.

Statutes pertaining to hydraulic fracturing are contained in Chapter 1509 of the Ohio Revised Code (ORC). These laws were amended with the passage of Senate Bill 165, which became

effective on June 30, 2010. DMRM is in the beginning stages of revising Chapter 1501:9 of the Ohio Administrative Code (OAC) to reflect SB 165 changes.

Chapter 1509 of the ORC contains provisions for protection of health, safety and the environment. They include standards for hydraulic fracturing that address well location and depth, proximity of the reservoir to fresh groundwater, well design, well completion, fluid containment and spill response.

There is a general prohibition against groundwater contamination. Well stimulation must not endanger underground sources of drinking water (USDWs). DMRM uses the USEPA definition for USDWs.

DMRM expects to process about 450 permits for drilling wells during the current year. They anticipate about the same number of wells will be plugged.

About 98 percent of waste from E&P operations is injected into Class II disposal wells. Ohio is a Class II UIC primacy state. There are currently about 22 applications for Class II wells under review. There has been a recent increase in the number of Class II well applications due in part to activities in Pennsylvania and West Virginia related to development of the Marcellus Shale. Wastewater from E&P activities in those states, including flowback fluids from hydraulic fracturing, is being injected in Ohio Class II wells.

DMRM has a complaint tracking system developed in an Access database. DMRM staff conduct investigations and collect samples where needed. Complaint response is required within 24 hours. Samples that are collected are analyzed in the DMRM laboratory or a contract laboratory. DMRM staff review all oil and gas activity within ¼ to ½ mile as part of the initial complaint investigation. The complainant receives a copy of the analytical results with a cover letter explaining the information. Upon closure of the investigation a summary report is sent to the complainant. Complainants may request an internal review of a complaint investigation finding. Further recourse includes civil action. Complainants do not have to identify themselves.

The regulation of naturally occurring radioactive materials (NORM) generally falls within the jurisdiction of the ODH. In the past, ODH has relied on information about NORM from a neighboring state. Prior review teams recommended that ODH complete an assessment of NORM occurrence in Ohio. (See 1995 Review Recommendation IX.1. and 2005 Review Recommendation IX.1.) ODH, in coordination with the DMRM, is now beginning to assess the occurrence and need for regulation of NORM in Ohio in connection with the management of flowback water.

DMRM utilizes the Risk Based Data Management System (RBDMS) for the management of oil and gas data. This assists in the sharing of information among staff. They are currently upgrading the system to make information more readily available to the public.

The MSDS for hydraulic fracturing chemicals used by service companies in Ohio are being posted on the DMRM website.

**Finding 9.2.1.**

Since 2000, DMRM has conducted a thorough assessment of its oil and gas program. As a result of that assessment, DMRM developed a plan, with stakeholder input, that included revisions to its regulatory program. Those revisions address, among other things, hydraulic fracturing, funding, staffing levels and workload priorities. This plan was used as a guideline in the development of SB 165, which became effective on June 30, 2010. DMRM is commended for its role in revising Ohio's oil and gas laws.

**Recommendation 9.2.1.**

DMRM is in the beginning stages of revising OAC Chapter 1501:9 to reflect SB 165 changes. The review team acknowledges this rulemaking effort and encourages the expeditious completion of those portions necessary or appropriate to implement the hydraulic fracturing provisions of SB 165. (STRONGER Guidelines Section 9.2.)

**Finding 9.2.2.**

The ODNR, OEPA and ODH have been communicating effectively on issues of mutual concern and have had discussions regarding future program changes necessitated by the anticipated development of the Marcellus and Utica Shales.

**Finding 9.2.3.**

DMRM has an effective process for following up on complaints and documenting investigations.

**Finding 9.2.4.**

ODH, in coordination with DMRM, is beginning to look at the issue of NORM in connection with the management of flowback water.

**Recommendation 9.2.4.**

The review team recommends that ODH, in coordination with DMRM, complete the assessment of the occurrence and need for regulation of NORM associated with hydraulic fracturing. (STRONGER Guidelines Section 7.2.)

**Finding 9.2.5.**

DMRM's data management system (RBDMS) provides a good base to begin collecting hydraulic fracturing data.

## **STANDARDS**

Standards relating to hydraulic fracturing are found in Chapter 1509 of the ORC and SB 165. These standards are intended to prevent the contamination of surface water and groundwater, assure that casing and cement are sufficient to meet anticipated pressures, manage risks from potential conduits for fluid migration, address unanticipated operational or mechanical changes, establish requirements for pits and tanks used during hydraulic fracturing, provide for contingency planning and spill risk management, establish waste characterization and testing requirements, encourage waste volume reduction, manage transportation of hydraulic fracturing fluids, and provide for the receipt and investigation of complaints.

DMRM issues permits to drill and to plug wells. Well permit applications are processed in the Columbus office of DMRM. There are two types of drilling permits, urban and non-urban. Urban applications account for approximately 25 percent of drilling. There are standards for each type of permit.

All well permit applications must include proposed casing and cementing plans which are reviewed against general standards to ensure the protection of USDWs both during well completion and well operation. Casing and cementing requirements can be modified by the field inspector in consultation with the main office. These modifications are considered to be conditions of a permit based on real-time information. Surface casing must be set at least 50 feet below USDWs as shown on maps developed by the Division of Water. Cement must be allowed to set undisturbed until an initial compressive strength of 500 psi has been achieved. Blow out preventers (BOPs) are required for deep or wildcat wells or wells drilled within 200 feet of an inhabited structure or otherwise as required by permit..

Review of a well permit application includes a review of wells or other potential pathways for contamination of groundwater within the minimum spacing distance for the well. This review extends along the entire lateral of a horizontal well. The review includes plugging records for plugged wells and casing records for other offset wells.

In urban areas, applicants must meet additional requirements. Urban applications must include photo imagery and location information for tanks and flow lines, and notification of the application must be given to property owners within a 500-foot radius around the well. A pre-permit onsite review is conducted, which may be attended by local officials or their designees. Issues identified in the pre-permit site inspection can be addressed through permit conditions. Also, water wells within 300 feet are required to have baseline testing prior to the drilling of an urban well. This requirement can be changed to a greater distance by the chief of DMRM.

Almost all urban wells have special permit conditions. Deep wells generally also have special permit conditions. Wells in areas where hydrogen sulfide is known to occur also have special permit conditions, as do all Class II injection wells. Other environmental protection provisions are established on a well-specific basis through special conditions. DMRM utilizes about two dozen special permit conditions for various situations when issuing permits.

Operators are required to notify DMRM at least 24 hours before the initiation of hydraulic fracturing. During the monitoring of a hydraulic fracturing operation, the annulus between the surface and production casings is kept open and is filled with fluid. If circulation from the annulus is observed during hydraulic fracturing, operations must be immediately terminated and the DMRM must be notified. If the casing or cement is found to be defective, the operator must cease operations and notify the DMRM within 24 hours. The defect must be immediately repaired. Immediate well repair means “NOW” if there is an existing threat and means “as soon as practical” if there is no existing threat.

The chief of DMRM has the authority to determine the conditions under which a tank or pit can be used. The placement and construction of pits are addressed in guidelines that can be applied as permit conditions. Rules and/or standards are in place to address pit construction and freeboard requirements.

ODNR regulates spills under Chapter 1509 of the ORC and its implementing regulations. At present, spills are reported to the National Response Center. Notification of DMRM is not currently required. ODNR has been working on proposed rulemaking that would require that they be notified in the event of a spill. Development of the SPCC rule is not as high a priority as rules for implementing SB 165.

Well logs and well completion records are required to be submitted to DMRM within 60 days of the completion of drilling. A supplemental well completion report may be filed if the well has not been completed for production within 60 days of drilling. The operator is required to submit a well stimulation log, fracture pressure chart, and other information with the completion report.

The chief of DMRM can order the plugging of a well that is irreparably damaged. If the chief has determined a well should be plugged, he must notify the owner in writing of the decision and specify a reasonable timeframe for compliance. Orders can be delivered electronically and can be issued in as little as 30 minutes. If an order is issued, the company must obtain a plugging permit and provide notice to DMRM at least 48 hours prior to plugging. Failure by the operator to plug a well within a reasonable period of time is cause for the DMRM to take action to plug the well. Costs of that action must be reimbursed by the operator. An inspector must be on site to witness plugging unless this presence is waived by the chief of DMRM.

#### **Finding 9.2.1.1.**

DMRM has different standards for the permitting of urban and non-urban wells. Urban applications are required to include photo imagery and location information for tanks and flow lines. A 500-foot radius around the well defines where notification of property owners must be given. A pre-permit onsite review is conducted, which may be attended by city officials or their designees. Issues identified in the pre-permit site inspection can be addressed through permit conditions. Water wells within 300 feet, or a greater distance specified by the chief of DMRM, are required to have baseline testing prior to the drilling of an urban oil or gas well.

**Finding 9.2.1.2.**

Well permit application reviews include an evaluation of potential pathways for contamination of groundwater, including along the lateral on horizontal wells. These reviews are appropriate and commendable.

**Finding 9.2.1.3.**

All well permit applications contain casing and cementing plans, which become a condition of the permit. If the casing or cement is found to be defective, the operator must cease operations and notify the DMRM within 24 hours. The defect must be immediately repaired or an order can be issued to plug the well. These remedies provide a strong incentive to prevent or correct problems that could lead to groundwater contamination.

**Finding 9.2.1.4.**

Pit placement and construction guidelines may be applied through the use of permit conditions. Regulatory standards exist for pit construction, freeboard, and timeframes for closure.

**Finding 9.2.1.5.**

DMRM has begun rulemaking regarding SPCC plans, response and training; however, this effort has been given a lower priority than the rulemaking to incorporate revisions contained in SB 165.

**Recommendation 9.2.1.5.**

The review team recommends that DMRM meld the hydraulic fracturing SPCC component into the rulemaking that is being initiated for revisions contained in SB 165 or initiate an SPCC rulemaking process. (STRONGER Guidelines Section 9.2.)

**Finding 9.2.1.6.**

Spills are not reported directly to DMRM. Spills that impact waters of the state are reported to the National Response Center.

**Recommendation 9.2.1.6.**

The review team recommends that DMRM adopt regulations requiring spills from hydraulic fracturing activities to be reported directly to the state and/or county so that staff can provide a timely response. (STRONGER Guidelines Section 9.2.)

## **REPORTING**

Permits are required prior to drilling a well. Permits may contain specific requirements for notification. Chapter 1509 of the ORC requires the operator to notify the inspector before casing and cementing a well. It also requires notification at least 24 hours prior to commencement of hydraulic fracturing so that the inspector can witness the well completion activities. If an inspector is present, a report of the inspection is filed in the data management system.

Chapter 1509 of the ORC requires the operator to submit all electric logs and an accurate well completion record to DMRM within 60 days after the completion of drilling operations. Hydraulic fracturing information, including the type, volume and concentration of acid used, the type and volume of fluid used to stimulate the well, the reservoir breakdown pressure, the method used for the containment of fluids recovered, and the average pumping rate, is summarized on the well completion report. SB 165 requires the operator to submit along with the well completion report copies of the well stimulation log, the fracture pressure chart and the invoices, which provide a record of what happened on the job, including materials that were used, when they were used, and in what volumes, as well as whether well integrity has been maintained throughout the operation. DMRM is provided with information that would indicate a failure should one occur.

Chapter 1509 of the ORC as amended by SB 165 requires ODNR to obtain MSDS information for materials used in hydraulic fracturing. If DMRM does not have an MSDS for a material listed on an invoice submitted with a well completion report, DMRM must obtain one. This information is used by investigating geologists during complaint investigations and by emergency responders in the event that a spill or other incident occurs. DMRM is considering a requirement for including Chemical Abstract Services (CAS) numbers.

If specific chemical constituents of hydraulic fracturing fluids are not included on the MSDS, DMRM can request submission of the specific chemical information. If that chemical information is not submitted as requested, a variety of enforcement actions may be taken.

DMRM has only recently started to receive MSDS information for hydraulic fracturing materials. To date no information has been indicated as “confidential.” The anticipated rulemaking will address the handling of confidential information. DMRM is also considering development of a Standard Operating Procedure (SOP) to address this issue.

### **Finding 9.2.2.1.**

Chapter 1509 of the ORC requires operators to provide notification at least 24 hours prior to commencement of hydraulic fracturing so that the inspector can witness the well completion activities.

### **Finding 9.2.2.2.**

DMRM has begun to receive MSDS information for hydraulic fracturing materials.

### **Recommendation 9.2.2.2.**

The review team recommends that DMRM consider whether they will be getting all the chemical information they will need for investigations from the MSDS. An MSDS does not always contain the specific chemical constituents of a product. Also, the state should ensure that information on chemical constituents of fracturing fluids is available to medical personnel in the event of a medical emergency. (STRONGER Guidelines Section 9.2.2.)

### **Finding 9.2.2.3.**

Chapter 1509 of the ORC requires the operator to submit all electric logs and an accurate well completion record to DMRM within 60 days after the completion of drilling operations. In addition to the hydraulic fracturing information summarized on the well completion report, SB 165 requires the operator to submit copies of the well stimulation log, the fracture pressure chart, and the invoices, which provide a detailed record of what happened on the job. DMRM is provided with information that would indicate a failure should one occur. The review team views these reporting requirements as a program strength.

## **STAFFING AND TRAINING**

In 2000, the Division of Mines and Reclamation was merged with the Division of Oil and Gas. Work assignments were shared among staff. More recently DMRM decided to realign staff into the single program areas. The oil and gas program developed a realignment plan, with stakeholder input, that included an analysis of funding, staffing levels and priority workloads. This plan was used as a guideline in the development of SB 165. Specific positions and classifications were developed.

ODNR has seven field offices. Three district supervisors and a statewide field enforcement administrator have direct authority over the field offices. Most oil and gas activity is located in the eastern half of the state. DMRM has 21 full-time-equivalent (FTE) oil and gas inspectors assigned to five of the seven district offices. Inspectors are responsible for all field aspects of oil and gas operations. ODNR has an inspector priority matrix that assesses risk and defines the work priorities for inspectors. Well construction and hydraulic fracturing operations are prioritized as critical.

The Ohio Attorney General's office assigns attorneys to support enforcement activities, plus there is one in-house counsel.

SB 165 included fee increases to support new positions and creates some new funding mechanisms to support DMRM activities. There are now about 35 FTE positions in the oil and

gas program. Plan implementation and new funding will about double this complement. ODNR is currently posting job descriptions for eight new inspectors and will evaluate the need for eight additional inspector positions during FY 2010/2011.

DMRM has identified training as a high priority. Consequently, an extensive training needs list was prepared. That list includes hydraulic fracturing training. DMRM assigns new staff to work with experienced inspectors to become knowledgeable about practices and procedures, including hydraulic fracturing. They also work with trade associations, service companies, the Ground Water Protection Council and the Interstate Oil and Gas Compact Commission to find training opportunities.

#### **Finding 9.2.3.1.**

The review team supports DMRM efforts to increase and train staff to meet identified workload priorities, including an increase in the percentage of hydraulic fracturing operations witnessed.

#### **Recommendation 9.2.3.1.**

The review team recommends that new staff receive adequate training to stay current with new and developing hydraulic fracturing technology. (STRONGER Guidelines Section 9.2.3.)

#### **Finding 9.2.3.2.**

DMRM has a well-developed process for assessing risk and assigning resources accordingly.

### **PUBLIC INFORMATION**

DMRM has been increasingly using its web site to disseminate information. The web site includes Education and Frequently Asked Question (FAQ) sections to provide information arranged by topic. Links to the Ohio Revised Code and Ohio Administrative Code are provided. DMRM has begun posting MSDS information it receives on its web site.

DMRM frequently participates in public meetings to share information and answer questions. During July and August 2010, DMRM staff participated in five public meetings with the Ohio Farm Bureau that had an estimated 1,300 attendees. Seven additional meetings are being scheduled.

DMRM has a Public Information Officer who addresses general questions and researches and responds to specific public requests for information.

#### **Finding 9.2.4.1.**

DMRM is making good use of its web site to disseminate information. The recent addition of MSDS information to the web site, coupled with the information required to be submitted with the well completion report, should help inform the public about hydraulic fracturing operations.

### **III. WATER AND WASTE MANAGEMENT**

Most hydraulic fracturing operations in Ohio are of vertical wells and use relatively low volumes of water. Some companies buy water from municipal water plants, especially in urban areas, but the main source is surface water. The Division of Soil and Water Resources at ODNR requires the registration of water withdrawals that may exceed 100,000 gallons per day. If large volume hydraulic fracturing occurs in a watershed where a river basin commission or other watershed authority has jurisdiction, a permit may be required by the watershed authority. Within the Great Lakes Watershed, a Water Resources Management Decision Support System has been developed and a water use database has been created to inventory water withdrawals and use.

While ODNR has the authority to promulgate rules for the protection of public health and safety, including the use of natural resources, the scale of hydraulic fracturing operations in Ohio has not approached those in neighboring states where the Marcellus Shale is being developed, so there has not been a need to further evaluate the availability of water for hydraulic fracturing.

Because of the anticipation that Marcellus and Utica Shale development will occur, the DMRM, OEPA and ODH have initiated discussions on drilling, water use, waste management and infrastructure issues. These discussions have been centered on jurisdictional boundaries and coordination among the agencies.

Recycling of flowback is not prohibited but is not typically done due to the small size of operations in Ohio and the associated transportation costs. The logistics and timing of water re-use make re-use difficult. DMRM encourages the use of alternate sources of water for hydraulic fracturing, and some companies are experimenting with the reuse of produced water which is available in large quantities.

Fluid wastes from hydraulic fracturing operations are subject to numerous requirements. Chapter 1509 of the ORC prohibits the placement of wastes in surface or ground water or in or on the land in quantities or in a manner that could cause water to exceed the Safe Drinking Water Act standards or damage or injure public health and safety or the environment. These fluids must be transported by registered haulers, whose duties, including the reporting of volumes transported, are spelled out in the regulations. Disposal by injection at a permitted Class II well is the most common practice (98 percent).

OEPA regulates discharges through the delegated National Pollution Discharge Elimination System (NPDES) program. They have been approached by municipalities about accepting

applications for oil and gas wastewater, including flowback from hydraulic fracturing operations, to publically owned treatment works (POTWs), and have one application pending.

OEPA is working with ODH on monitoring of wastewater for NORM and other constituents as part of accepting wastewaters at POTWs. A test of POTW treatment of flowback water is underway. ODH has not yet received the full analysis of the data, but initial results from the ODH laboratory indicate that NORM levels of flowback from hydraulic fracturing operations are very low.

Produced water is sometimes spread on roads for dust and ice control at the request of a municipal or county authority. Flowback fluids from hydraulic fracturing operations may not be spread on roads because that practice is prohibited by statute.

Ohio has primacy over the Class II injection well program. There are 170 permitted Class II disposal wells in Ohio. The injection capacity is sufficient for the currently anticipated volumes of waste. Transportation of waste fluids occurs by registered brine haulers or by designated pipeline. The capacity of these delivery systems is sufficient to meet anticipated needs. A number of new injection well permit applications have been received by DMRM. These applications are in part based on the demand for disposal of fluids from the Marcellus Shale play in Pennsylvania and West Virginia.

#### **Finding 9.3.1.**

Ohio agencies are meeting to evaluate the potential withdrawal of surface water for hydraulic fracturing operations for the Marcellus and Utica Shales.

#### **Recommendation 9.3.1.**

In light of the anticipated development of the Marcellus and Utica Shales in Ohio, the review team recommends that Ohio continue to evaluate the need and availability of surface and ground water for hydraulic fracturing in the context of all competing uses and potential environmental impacts resulting from the volume of water used for hydraulic fracturing. (STRONGER Guidelines Section 9.3.)

#### **Finding 9.3.2.**

Recycling of flowback is not prohibited.

#### **Recommendation 9.3.2.**

The review team recommends that DMRM continue to encourage the use of recycled flowback water for hydraulic fracturing, particularly in light of the anticipated development of the Marcellus and Utica Shales. (STRONGER Guidelines Section 9.3.)

## **Appendix A**

### **Acronyms**

BOP	Blow-Out Preventer
CAS	Chemical Abstract Services
CBM	Coal Bed Methane
DMRM	Division of Mineral Resources Management
E&P	Exploration and Production
FAQ	Frequently Asked Question
FTE	Full Time Equivalent
IOCC	Interstate Oil Compact Commission
IOGCC	Interstate Oil and Gas Compact Commission
MSDS	Material Safety Data Sheet
NPDES	National Pollution Discharge Elimination System
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
ODH	Ohio Department of Health
ODNR	Department of Natural Resources
ORC	Ohio Revised Code
POTW	Publicly Owned Treatment Works
RBDMS	Risk Based Data Management System
SOP	Standard Operating Procedure
SPCC	Spill Prevention, Control, and Countermeasure
STRONGER	State Review of Oil and Natural Gas Environmental Regulations, Inc.
UIC	Underground Injection Control
USEPA	U.S. Environmental Protection Agency
USDW	Underground Source of Drinking Water

## Appendix B

June 23, 2010

### Hydraulic Fracturing Questionnaire

(Note: Written responses to questions should be brief (i.e., 1 paragraph in length). Additional information may be requested by the review team during the in-state portion of the review.)

#### General [X.2]

1. Has the state evaluated potential **risks associated with hydraulic fracturing**, taking into account factors such as depth of the reservoir to be fractured, proximity of the reservoir to fresh water resources, well completion practices, well design, and volume and nature of fluids?

The Division of Mineral Resources Management (DMRM) has evaluated the potential risks associated with hydraulic fracturing.

Chapter 1509 of the Ohio Revised Code (ORC), as amended in SB 165 (copies are available at <http://www.ohiodnr.com/mineral/law/tabid/10375/Default.aspx>), does address the potential risks associated with hydraulic fracturing. Section 1509.17 addresses well construction; isolation of oil and gas reservoirs; isolation of underground sources of drinking water as defined by the Safe Drinking Water Act; notification of inspectors for well construction; limits perforation of casing that protects USDW's; and provides authority to promulgate rules for well construction. Section 1509.06 provides authority for permitting and all associated requirements, including notification before drilling or well stimulation operations begin. Section 1509.23 provides authority for practices to be followed in drilling and treatment; devices; methods of operation, equipment and procedures; SARA Title III information and authority to promulgate rules.

2. Has the state developed **standards to prevent the contamination** of groundwater and surface water from hydraulic fracturing?

DMRM has created standards to prevent the contamination of groundwater and surface water. Section 1509.06 ORC requires a permit to drill, deepen, reopen, or convert a well. The application review includes a standardized casing review, cementing standards, and may include "special permit conditions" based on area or well specific factors. Section 1509.10 requires a company to submit well logs and well completion records. Section 1509.12 addresses deficiencies in well construction and provides authority to require defective wells to be plugged. The well construction standards contained in Section 1509.17 address the isolation of underground sources of drinking water and the isolation of oil and gas reservoirs. Section 1509.19 addresses certain well stimulation requirements including protection of the USDW's; isolation of fluids, and oil and gas bearing zones; well integrity testing; and the repair or plugging of wells. Section 1509.22 requires the protection of surface and groundwater. This section also prohibits the use of muds, cuttings, or other waste substances

in violation of any rule. Approved pits or steel tanks are required and to be constructed to prevent the escape of brine or other waste substance. DMRM has developed standards for pit construction.

## Hydraulic Fracturing Standards [X.2.1]

3. Describe how state standards for **casing and cementing** meet anticipated pressures associated with hydraulic fracturing to protect other resources and the environment.

Through the permit application process defined in Section 1509.06, the proposed construction standards for each well are critically reviewed. A standardized casing program is applied to each permit to ensure adequate casing depths for the protection of USDW's. Cement standards have been developed and are applied to the well through the permitting process. Section 1509.10 requires a company to submit logs and well completion records, including reservoir breakdown pressures. Section 1509.12 addresses defective casing and requires notification to the state inspector. The immediate repair of defective casing is required or the well must be plugged and abandoned. Section 1509.17 requires a well to be constructed using materials that comply with industry standards for the type and depth of the well and the anticipated fluid pressures that are associated with the well. Notification of the state inspector is required before cementing any string of casing. An owner is required to submit cement tickets for each cemented string and a copy of all logs that were used to evaluate the quality of the cementing. Section 1509.23 authorizes the promulgation of rules for practices to be followed in the drilling and treatment of wells for the protection of public health and safety and for the protection of the environment.

4. Discuss how the program identifies and, where deemed appropriate, manages risks associated with **potential conduits for fluid migration** in the area of hydraulic fracturing.

Section 1509.06 requires a company to submit an application for a permit to drill, deepen, reopen or convert any well. As a part of the application review, DMRM Permitting or UIC Geologists review permit files or historic well records to evaluate wells that may have been drilled near a proposed well site. Section 1509.06 requires the chief to issue an order denying a permit if there is a substantial risk that the operation will result in violations or if it will present an imminent danger to public health or safety or damage to the environment. Section 1509.17 requires the isolation of the USDW and an oil and gas reservoir must be isolated during well stimulation and the productive life of the well. Notification of the inspector is required before cementing of the casing. Stimulation through a casing protecting a USDW is prohibited without written permission from the chief. In areas with underground mines, Section 1509.18 provides authority for an intermediate casing to protect miners and to isolate the mine.

5. Describe program requirements that address actions to be taken in **response to unanticipated operational or mechanical changes** encountered during hydraulic fracturing that may cause concern.

Section 1509.12 prohibits an owner from constructing a well or allowing defective casing to leak fluids or gases to cause damage to permeable strata, the USDW, surface of the land or threatens the public health and safety or the environment. Companies are required to report such problems to DMRM and immediately repair or plug such a well. Section 1509.17 authorizes the chief to promulgate rules for evaluating the quality of well construction materials and for completing remedial cementing. Section 1509.23 provides authority to specify procedures, methods, and equipment to prevent and contain surface and subsurface discharges of fluids, condensates, and gases. Section 1509.071 allows the chief to respond to situations that the chief has determined to be causing imminent health and safety risks when an owner cannot be contacted to initiate a corrective action in a reasonable period of time. DMRM also works closely with the Ohio EPA – Division of Emergency and Remedial Response (DERR) to coordinate agency response to unanticipated problems. Section 1509.19 requires well stimulation to occur in a manner that will not endanger the USDW. State inspectors must be notified 24 hours before the operation begins. If during stimulation, damage to casing or cement occurs, the owner must immediately terminate the stimulation and contact the chief. If the chief determines the well may be repaired, the company may proceed with corrective actions. If the chief determines the well stimulation resulted in irreparable damage to the well, the chief shall order the well plugged. In order to determine the extent of damage, the chief may require the owner to test the well.

6. Briefly describe how **surface controls** associated with hydraulic fracturing, such as dikes, pits, or tanks, meet Sections 5.5 and 5.9 of the guidelines.

Pits are generally addressed through Section 1509.06 and may have special conditions attached to address a variety of factors. Pit placement and construction have been addressed through a task force guideline project. These guidelines may be applied as a condition of a permit. Rules and/or standards are in place to address pit construction, freeboard requirements. Section 1509.23 provides authority for procedures, methods, and equipment to prevent and contain discharges. Section 1509.22 prohibits wastes to be placed in surface or ground water or in or on the land that could reasonably be anticipated to affect public health and safety or the environment. Section 1509.072 addresses timeframes for the closure of pits. Section 1509.071 allows the chief to initiate actions if the chief has reasonably determined they are causing imminent health or safety risks and the owner cannot be contacted to initiate such actions. The chief may order the owner to pay the actual documented costs of a corrective action.

7. Briefly describe how **contingency planning and spill risk management** procedures related to hydraulic fracturing meet Section 4.2.1 of the guidelines

Section 1509.23 authorizes the chief to define procedures, methods, and equipment to contain or prevent discharges, consistent with and equivalent in scope, content, and coverage to section 311(j)(1)(c) of the “Federal Water Pollution Control Act Amendments of 1972”. Section 1509.06 allows the chief to attach specific conditions to a permit. The division has drafted SPCC standards. The draft standards must be reviewed before rules are promulgated.

An SPCC “calculator” has also been developed to assist inspection staff with field reviews of existing facilities or real time reviews of new sites as they are being constructed. In addition, Section 1509.071 authorizes the chief to initiate a corrective action if the chief has reasonably determined conditions are causing health and safety risks and the owner cannot be contacted in order to initiate a corrective action. DMRM also works closely with OEPA – DERR if a water of the state has been impacted.

8. Briefly discuss how hydraulic fracturing **waste characterization requirements**, including, as appropriate, testing of fracturing fluids, are consistent with Section 5.2 of the guidelines.

Section 1509.10 requires a company to submit all wireline electric logs and an accurate well completion record on a form that is approved by the chief. Data shall include the type, volume, and concentration of acid; the type and volume of fluid used to stimulate the reservoir; the reservoir breakdown pressure; methods used to contain recovered fluids; the average pumping rate and the company that performed the well stimulation. Well stimulation logs must also be submitted. DMRM will maintain a library of Material Safety Data Sheets (MSDS) for all chemicals identified through the completion reports. The DMRM operates an analytical laboratory and has the ability to use private laboratories when necessary. Section 1509.06, the permitting authority, authorizes DMRM to require water sampling prior to drilling in Urban Areas. DMRM staff is trained in sampling techniques and follow chain-of-custody procedures. Staff may collect samples on location.

9. Briefly describe how the **waste management hierarchy** contained in Section 5.3 of the guidelines (source reduction, recycling, treatment, and disposal), including the provisions relating to toxicity reduction, are promoted for hydraulic fracturing.

DMRM has a cradle to grave waste tracking system. The Division received primacy for the UIC program from the USEPA, Region 5, in 1982. In 1983, statutes and rules were promulgated to enforce UIC program requirements. Within the waste management hierarchy, the preferred method of fluid disposal is through Class II injection wells. Section 1509.22 prohibits fluid injection without a permit. Section 1509.221 provides authority to issue a permit provided that the goals of the Safe Drinking Water Act are met. SB 165 established a funding mechanism in Section 1509.221 whereby certain fees are collected from injection operations to assure sufficient monies are available to properly implement and enforce UIC requirements. Section 1509.222 requires all brine haulers to obtain a registration certificate and identification number from the chief. The chief is authorized to suspend a hauler’s registration certificate. Section 1509.223 defines the duties and responsibilities of a transporter. Section 1509.225 requires a hauler to be bonded. Section 1509.226 allows for the surface application of certain brine streams with the approval of local authorities. Criteria are established for such spreading, if approved. SB 165 provided language to limit the materials that may be surface spread. DMRM encourages operators to recycle fluids when possible.

10. Briefly describe how the **tracking of hydraulic fracturing waste** disposed at commercial or centralized facilities meets the requirements of Section 5.10.2.3 of the guidelines.

DMRM received primacy to oversee the USEPA Class II program in 1982. To receive primacy, the Division was required to establish statutes and promulgate rules that are at least as stringent as Federal law. The DMRM UIC Section requires injection facilities to be permitted (Section 1509.221). Brine haulers must receive a registration certificate and identification number (Section 1509.222). Section 1509.225 requires a brine hauler to be bonded. Brine haulers must complete and maintain logs for all fluids transported. A well owner is required to submit well completion reports within 60 days of such activity under authority of Section 1509.10. The owner is also required to submit production reports as defined in Section 1509.11. Section 1509.223 defines the duties and responsibilities of a transporter. Section 1509.226 prohibits the surface application of drilling fluids, treatment fluids, or flowback from well stimulation. A combination of well completion records, production reports, brine hauler logs, and injection well records may be used to track hydraulic fracturing waste.

11. Briefly describe how procedures in place for receipt of **complaints** related to hydraulic fracturing are consistent with Section 4.1.2.1.

Under the authority granted in Section 1509.32, any person adversely affected may file a written complaint with the chief. Although this section specifically addresses restoration violations, it is broadly applied for all violation. Division procedures require staff to address all complaints. A complaint may be received in writing, by e-mail, via phone, or in person. Complaints are logged and tracked in an electronic log. Reports are maintained within the DMRM Risk Based Data Management System (RBDMS) and/or a hard copy complaint file. When water samples are collected and analyzed, analytical information is maintained within the DMRM Laboratory Information Management System (LIMS). The LIMS data, along with other data, populates the DMRM RBDMS-Water (RBDMS-W) data management system. The DMRM has an investigation manual for ground water related complaints. Staff is trained in sample collection techniques and follow a chain-of-custody. The Oil and Gas Program has a Geologist 4 within the UIC Program and a Geologist 3 within the Enforcement Program to investigate such complaints.

## Reporting Associated with Hydraulic Fracturing [X.2.2]

12. Describe any required **notification** prior to, and reporting after completion of, hydraulic fracturing operations.

Permits are required under Section 1509.06. A permit may contain specific notification requirements under authority of a specific condition. Section 1509.17 requires the notification of the inspector before the cementing of casing and Section 1509.19 requires the notification of the inspector at least 24 hours before commencing the stimulation of a well. If problems are encountered during the stimulation of a well, the owner is required to immediately cease the operation and contact the chief. Section 1509.23 authorizes the promulgation of rules, which may include additional notification requirements, if necessary. Section 1509.10 requires an owner to submit all wireline electric logs and well completion records on a form approved by the chief. The information to be included in the completion record is listed in this section.

13. Is notification sufficient to allow for the **presence of field staff** to monitor hydraulic fracturing activities?

Yes, Section 1509.19 requires at least 24 hours notice to the inspector prior to commencing the stimulation of a well. Inspectors may utilize a flexible work schedule, or with a manager's approval, receive compensatory or overtime to witness well completion activities. If an inspector is present, a report is filed in RBDMS

14. Describe **reporting requirements** for hydraulic fracturing activities and whether they include the identification of materials used, aggregate volumes of fracturing fluids and proppant used, and fracture pressures recorded.

Hydraulic fracturing reporting requirements are included under Section 1509.10. The well completion record must be submitted on a form approved by the chief. If applicable, the type, volume, and concentration of acid used; the type and volume of fluid used to stimulate the well, including proppants; the reservoir breakdown pressure and the average pumping rate are recorded.

15. Describe any mechanisms for **disclosure of information on chemical constituents** used in hydraulic fracturing fluids to the state in the event of an investigation or to medical personnel in the event of a medical emergency.

The transport of materials is regulated by the US DOT and the Ohio DOT. Placards and MSDS are required as prescribed by law. Section 1509.10 requires the chief to obtain MSDS information for materials listed on invoices or well completion reports. Investigating

geologists may utilize MSDS information as part of an investigation. Emergency responders would access MSDS information provided by the well owner, contractor, transporter, or manufacturer.

16. Briefly describe how hydraulic fracturing information submitted that is of a **confidential business nature**, is treated consistent with Section 4.2.2 of the guidelines?

DMRM is just starting to receive hydraulic fracturing information as required by Section 1509.10. No information has been flagged as “confidential”. We should know soon if this will be an issue and can respond one of two ways.

1. In early September, a DMRM Rule Workgroup of Division, industry, and public members will begin development of rules to amplify the new law under SB 165. If confidentiality issues arise with the submittal of completion information, the Workgroup can be charged with the development of rules to address the issue.
2. The Division may also develop a Standard Operating Procedure (SOP).

## Staffing and Training [X.2.3]

17. Briefly discuss if, in addition to the personnel and funding recommendations found in Section 4.3 of the guidelines, **state staffing levels** sufficient to receive, record and respond to complaints of human health impacts and environmental damage resulting from hydraulic fracturing.

In 2000, the Division of Mines and Reclamation merged with the Division of Oil and Gas. The work assignments of many staff were shared amongst various program areas. Several years ago a decision was made to “realign” staff into single program areas. The Oil and Gas Program developed a very detailed realignment plan, which included a thorough analysis of funding, staffing levels, and priority workloads. The realignment plan was used as a guideline for the development of SB 165. Specific positions, including inspectors and geologists, were identified as necessary to address complaints, including those associated with hydraulic fracturing. Well construction and hydraulic fracturing operations were re-prioritized as critical job coverage. SB 165 included increases in certain fee schedules and created a number of new funding mechanisms to support division activities. The division staffing levels will almost double and hiring of staff has been initiated.

18. Describe staff **training** to stay current with new and developing hydraulic fracturing technology.

DMRM utilizes a Strategic Planning process to identify goals and objectives. As part of this process, staff training was identified as a high priority. A fairly comprehensive training needs list was prepared. The list included hydraulic fracturing training. New geologist and inspectors work very closely with Oil and Gas Program managers, geologists, and inspectors through a probation period. New personnel work with staff to become knowledgeable of practices and procedures, including hydraulic fracturing. DMRM also works with various industry or trade organizations to address training needs. Individual service companies are also utilized for training. DMRM is a member of the Ground Water Protection Council and the Interstate Oil and Gas Compact Commission. These organizations are utilized for training or for a point of contact for other state regulatory programs.

## Public Information [X.2.4]

19. Briefly describe how the state agency provides for **dissemination of educational information** regarding well construction and hydraulic fracturing to bridge the knowledge gap between experts and the public as provided in Section 4.2.2.2 of the guidelines. This is especially important in areas where development has not occurred historically and in areas where high volume water use for hydraulic fracturing is occurring.

Increasingly, the DMRM is utilizing its website to disseminate information. Links to other sources of information may be provided. Education and Frequently Asked Questions (FAQ) sections provide topical information. Links to the Ohio Revised Code and Ohio Administrative Code are maintained. Participation at public meetings is another mechanism to address questions or share information. During July and August 2010, DMRM staff participated in five public meetings with the Ohio Farm Bureau. An estimated 1300 people attended the meetings. Seven additional meetings are being scheduled. Staff frequently attend local meetings. The Division's Public Information Officer addresses general questions and researches and responds to specific public requests for information.

## **Water and Waste Management Associated with Hydraulic Fracturing [X.3]**

20. Fundamental differences exist from state to state, and between regions within a state, in terms of geology and hydrology. Describe how the state evaluated and addressed, where necessary, the **availability of water for hydraulic fracturing** in the context of all competing uses and potential environmental impacts resulting from the volume of water used for hydraulic fracturing.

The DMRM does not evaluate water resources for hydraulic fracturing operations. The division does encourage operators to work closely with landowners and local governments. The scale of fracturing operations in Ohio have not approached those of our neighboring states, but it is likely only a matter of time until the larger hydraulic fracturing operations are used in Ohio. Within the Great Lakes Watershed, a Water Resources Management Decision Support System has been developed. A water use database has been created and study of the inventory of water withdrawal and use has been completed. A technical subcommittee has studied an inventory of information on ecological impacts. The DMRM, OEPA, and Ohio Department of Health have initiated discussions on Marcellus drilling, water use, waste management, and infrastructure issues. Regular workgroup meetings are being scheduled. This is an issue that will require ongoing work.

21. Describe how the availability and use of **alternative water sources** for hydraulic fracturing, including recycled water, is encouraged

Nothing in Ohio Oil and Gas law prohibits the beneficial reuse of materials, including hydraulic fracturing fluids. Alternate water sources, such as recycled water, are encouraged. Companies are experimenting with various technologies to treat hydraulic fracturing fluids for re-use. Companies are also experimenting with waters such as production brine. Production brine is available in large quantities, but trucking and infrastructure issues must be considered. With this in mind, companies are required to include such information on completion reports as required by Section 1509.10. If produced waters are utilized, the production report (1509.11) and brine haulers log (1509.223) must reflect this information.

22. Briefly describe how **waste** associated with hydraulic fracturing is managed consistent with Section 4.1.1 and Section 7 of the guidelines.

Fluid wastes from hydraulic fracturing operations are subject to requirements of a number of sections of law. Section 1509.22 prohibits the placement of wastes in surface or ground water or in or on the land in such quantities or in such manner as actually causes or could reasonably be anticipated to cause water to exceed the standards of the Safe Drinking Water Act or damage or injury to the public health and safety or environment. Section 1509.226 prohibits the surface spreading of such fluids. Fluids may only be transported by a registered brine hauler as described in Section 1509.222. The brine hauler must meet transporter duties as described in Section 1509.223. Disposal by injection in a Class II well may only occur at

a permitted facility as defined in Section 1509.221. Naturally occurring radioactive materials are regulated by the Ohio Department of Health.

23. Discuss how the state encourages the efficient development of adequate **capacity and infrastructure** for the management of hydraulic fracturing fluids, including the transportation, recycling, treatment, and disposal of source water and hydraulic fracturing wastes.

DMRM encourages the recycling or reuse of hydraulic fracturing fluids. Ohio has primacy over the Class II injection program, which includes the permitting and compliance at the injection facility and brine hauler registration. There are some 168 Class II injection wells permitted in Ohio. The injection capacity of the wells is sufficient for the volumes of waste that may be anticipated. Transportation of the waste fluids occurs by registered brine haulers or in some cases by designated brine transport pipelines. The capacity of the delivery systems is sufficient for the volumes of water that may be anticipated. In addition, a number of new injection well applications have been received. The proposed locations are in the counties where the primary Marcellus development is likely to occur. This will lessen transport and increases the number of permitted wells as part of the overall infrastructure. If drilling to the Marcellus does increase, the potential for reuse of hydraulic fracturing fluids will improve. Horizontal wells, especially those with multi-lateral completions, minimize the total number of wells drilled, which can reduce the overall footprint from the activity. The state permitting system is designed to review such requests.

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