



## A Report and Summary of Outcomes from 2010-2012 Hydraulic Fracturing State Reviews



## **BACKGROUND**

During the late 1980s and early 1990s, a unique regulatory approach to improve state oil and gas exploration and production environmental programs was developed by state, industry and environmental stakeholders, with assistance by the Federal government. The Interstate Oil and Gas Compact Commission (IOGCC) spearheaded a collaborative effort to benchmark state regulatory programs, develop recommended state program Guidelines, establish a review process to evaluate state regulatory programs against those guidelines, and address regulatory gaps identified by EPA in its 1988 regulatory determination under the federal Resource Conservation and Recovery Act (RCRA),

This State Review process has undergone a number of changes since its inception. Management of the process has shifted to a non-profit educational corporation named State Review of Oil and Natural Gas Environmental Regulations (STRONGER), and the Guidelines have been updated and expanded in scope. STRONGER maintains multi-stakeholder governance and involvement on its Board of Directors, with stakeholders representing state government, the oil and gas industry, and environmental groups.

The STRONGER State Review process is a voluntary and open, multi-stakeholder process rather than a bureaucratic oversight exercise between federal and state agency personnel. The voluntary and open nature of the process greatly enhances the credibility of the reviews, and of the recommendations made to the reviewed programs. During a State Review, the volunteer state regulatory program is measured against the criteria of the STRONGER Guidelines. State Reviews focus on program strengths as well as areas needing improvement. Program strengths are recognized, documented, and shared. Recommendations for program improvement are based on the criteria contained in the Guidelines, rather than on subjective judgments about "how it should be done." With the overall objective to improve human health and the environment, the State Review process contains a "consulting" role in addition to its "audit" role to assist states with improving their performance.

## **GUIDELINES DEVELOPMENT**

In 2009 STRONGER formed a Hydraulic Fracturing Workgroup charged with examining issues associated with hydraulic fracturing, and developing draft guidelines for state regulatory programs. Draft guidelines were distributed to

states, environmental groups, industry associations, and posted on the STRONGER website for public comments. The Workgroup reviewed all comments received and sent a final draft to the Board for approval. The STRONGER Board adopted the draft HF Guidelines in 2010. The HF Guidelines were added to the full Guidelines as a new topic section, and a questionnaire was developed for targeted State Reviews.

## **TARGETED REVIEWS 2010-2012**

Targeted reviews of state hydraulic fracturing requirements began in 2010 and carried through 2012, with six states volunteering for HF-specific reviews. Reviews were conducted in Pennsylvania (2010), Ohio (2011), Oklahoma (2011), Louisiana (2011), Arkansas (2012) and Colorado (2011). Three-person Review Teams representing the STRONGER stakeholder interests conducted the in-state interview portion of the reviews. The teams were assisted by Official Observers representing the stakeholder interests, and, when available, representatives from the U.S. Environmental Protection Agency (EPA) and U.S. Department of Energy (DOE). State Review Reports summarizing the volunteer programs and containing findings and recommendations were developed by the Review Teams. These reports were distributed to the states and published on the STRONGER website.

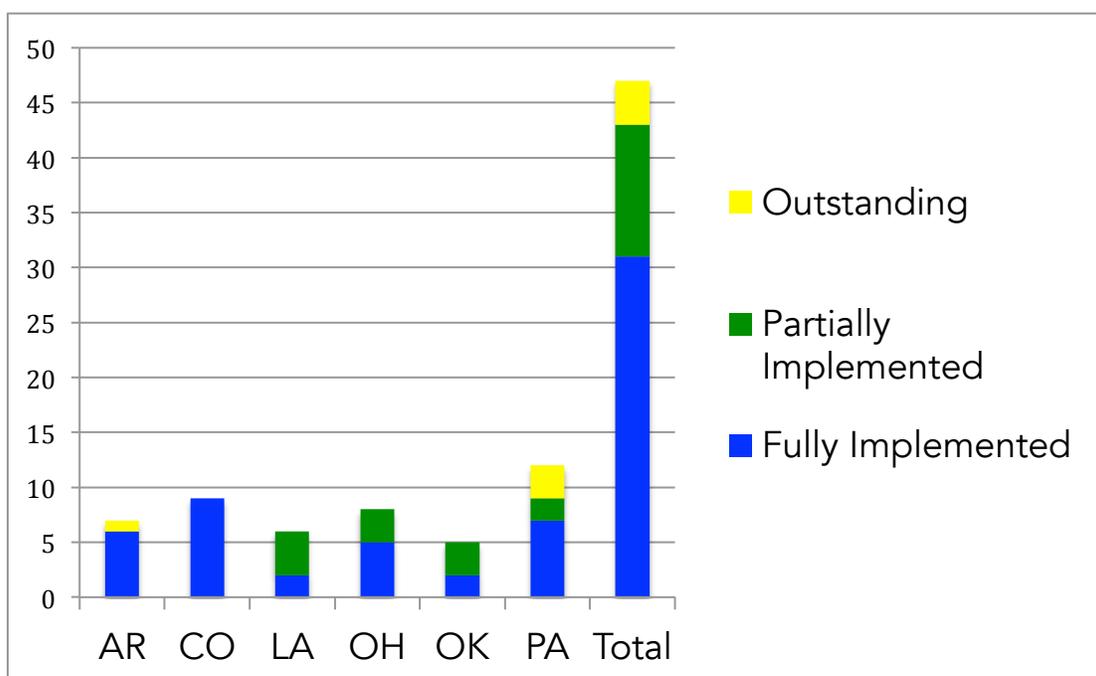
## **UPDATES AND REVISIONS**

During the 2010-2012 reviews, the Review Teams and volunteer states identified areas in which the HF Guidelines could be strengthened. Consequently, in 2012 the STRONGER Board reassembled the original workgroup, tasking it with revising and updating the HF Guidelines based on lessons learned during those reviews. Draft revisions were shared with EPA, DOE and the Bureau of Land Management (BLM). Comments from those agencies were considered by the workgroup, and the HF Guidelines were then sent to state oil and gas directors, industry associations, environmental organizations, and posted on the STRONGER website for public comment. The workgroup reviewed all comments received and sent a final draft to the Board for approval. The revised HF Guidelines were adopted in May 2013 and have been used in State Reviews in Alaska (2015) and Virginia (2016).

## OUTCOMES

This report is intended to provide a broad overview of outcomes of the 2010-2012 targeted reviews in Arkansas, Colorado, Louisiana, Ohio, Oklahoma, and Pennsylvania under the original 2010 STRONGER Hydraulic Fracturing Guidelines. Surveys were sent to each state containing the recommendations from their respective reviews. The surveys requested basic information on actions taken as a result of each state's recommendations. The state surveys should not be considered formal Follow-Up Reviews. This report, therefore, is not a Follow-Up Review Report, and is not as in-depth as a formal Follow-Up Review Report would be. Recommendations are classified as fully implemented, partially implemented, or outstanding. For the purposes of this report, work in progress related to a recommendation is considered partially implemented.

A total of 47 recommendations were made in the 2010-2012 HF review reports. Of those, 31 have been fully implemented, 12 have been partially implemented, and 4 are outstanding. Of the 7 recommendations made to Arkansas, 6 have been fully implemented and 1 is outstanding. All of the 9 recommendations made to Colorado have been fully implemented. Of the 6 recommendations made to Louisiana, 2 have been fully implemented and 4 are partially implemented. Of the 8 recommendations made to Ohio, 5 have been fully implemented and 3 are partially implemented. Of the 5 recommendations made to Oklahoma, 2 have been fully implemented and 3 are partially implemented. Of the 12 recommendations made to Pennsylvania, 7 have been fully implemented, 2 are partially implemented, and 3 are outstanding.



Combined, Arkansas, Colorado, Louisiana, Ohio, Oklahoma, and Pennsylvania have fully implemented 66% of STRONGER's recommendations for program improvement in hydraulic fracturing regulation. When coupled with partially implemented actions, the number of STRONGER recommendations resulting in program improvement rises to 91%.

## CONCLUSION

The STRONGER Hydraulic Fracturing Reviews in Arkansas, Colorado, Louisiana, Ohio, Oklahoma, and Pennsylvania were successful and led to demonstrable improvements in the states' programs. The reviews also led to improvements in the HF Guidelines, which have since been used in reviews of Alaska and Virginia. The reviews also led to changes in STRONGER's administration of the State Review process. Prior to the 2010-2012 HF Reviews, the only options available were Full Reviews and Follow-Up Reviews. Following the success of these targeted reviews, the Board in 2014 amended the Rules of Participation for the State Review process to give states the option to request a review based on one or more topics in the Guidelines. This change makes it easier for to states to participate in the State Review process by opening up a "menu" of standalone review options that require a smaller time and resource commitment than a Full Review.

While these reviews were successful, more work remains to be done. Several states have not volunteered for follow-up reviews to their initial reviews that took place in the 1990's. Other states have not volunteered for an initial review. The State Review process provides a framework for encouraging and measuring continuous improvement of state oil and gas environmental regulatory programs. States that have volunteered for multiple reviews should be commended for demonstrating their commitment to continuous improvement through the State Review process. States that have not yet volunteered should be encouraged to do so. At a time when oil and gas development is occurring in more areas that have not historically been familiar with the industry, public interest in the state programs that protect human health and the environment is understandably high. At its core, STRONGER is an educational institution. As an open process, State Reviews provide a venue to not only assist states with improving their programs, but also to educate the public. STRONGER exists to serve the states, and will continue to be an independent vehicle through which states can demonstrate the competency

and adequacy of their programs while achieving public transparency goals and continuing their commitment to continuous improvement.

## **STATE SURVEYS**

Following are the survey responses from Arkansas, Colorado, Louisiana, Ohio, Oklahoma, and Pennsylvania to their respective recommendations from their targeted HF reviews. The State Review Reports from which these recommendations are derived are available online at [www.strongerinc.org](http://www.strongerinc.org).

## ARKANSAS

### **Recommendation 9.2.1.3:**

The AOGC should require appropriate notification prior to hydraulic fracturing operations. Notification should be sufficient to allow for the presence of field staff to monitor activities. (2010 STRONGER Guidelines, Section 9.2.2.)

### **Response:**

AOGC amended General Rule B-19 (Hydraulic Fracturing) to require notification, as follows:

- g) The Permit Holder shall notify the Director or his designee via e-mail, fax or other approved method, a minimum of forty-eight (48) hours prior to commencement of a Hydraulic Fracturing Treatment on a well. If the Permit Holder cannot provide notice a minimum of forty-eight (48) hours prior to commencement, the Permit Holder shall provide a written explanation as to why the notice could not be provided, and the Permit Holder shall provide notice in the manner described above as soon as the Permit Holder is aware that a Hydraulic Fracturing Treatment has been scheduled.

In addition, all notices are posted on the AOGC webpage.

### **Recommendation 9.2.1.4:**

The review team recommends that the AOGC continue to increase the number of field inspectors as necessary to maintain staffing levels sufficient to meet AOGC inspection goals as well as receive, record and respond to complaints of human health impacts and environmental damage resulting from hydraulic fracturing. (2010 STRONGER Guidelines, Section 9.2.3.)

### **Response:**

AOGC requested four additional staff positions (three field inspectors and one geologist position) in the FY14-15 budget. The positions were approved and have been filled.

### **Recommendation 9.2.1.6:**

The review team recommends that the AOGC re-evaluate their safety concerns related to conducting inspections during hydraulic fracturing operations. The review team further recommends that the AOGC develop field procedures to

ensure that field staff conduct inspections in a safe manner during hydraulic fracturing operations. (2010 STRONGER Guidelines, Section 9.2.3.)

**Response:**

AOGC adopted a hydraulic fracturing inspection protocol addressing the safety issue concerns. The inspection activity is documented on a new field inspection form.

**Recommendation 9.2.1.7:**

The review team recommends that the ADEQ seek resources for the continued funding of these positions as well as additional positions as needed in the Fayetteville Shale development area and to develop and maintain their data management capabilities. (2010 STRONGER Guidelines, Section 9.2.3.)

**Response:**

The AOGC appropriation for FY14-15 Biennium Budget was increased to accommodate a grant to ADEQ from AOGC funds, for the purpose of funding the ADEQ inspectors assigned to the Fayetteville Shale production area. The same funding mechanism has been proposed for the AOGC FY16-17 Biennium Budget.

**Recommendation 9.2.1.8:**

The review team recommends that the AOGC seek additional opportunities for the dissemination of educational information regarding well construction and hydraulic fracturing to bridge the knowledge gap between experts and the public. (2010 STRONGER Guidelines, Section 9.2.4.)

**Response:**

AOGC webpage resources have been expanded to further document well construction and hydraulic fracturing information and provide links to other outside sources of information. AOGC continues to participate in outreach efforts as they become available, the most recent participating in a 3 day Teacher Training CLE for high school science teachers, dealing with energy issues in Arkansas.

**Recommendation 9.2.1.9:**

The review team recommends that the agencies continue their efforts to obtain additional funding for improvements to and integration of their data management systems. (2010 STRONGER Guidelines, Section 9.2.4.)

**Response:**

No specific efforts have been adopted; however the agencies continue to cooperate as needed.

**Recommendation 9.2.1.10:**

The reviews team recommends that the ANRC develop a database to provide for the dissemination of information related to hydraulic fracturing information to the public. (2010 STRONGER Guidelines, Section 9.2.4.)

**Response:**

Data regarding water use in the Fayetteville Shale production area is being developed as part of the update of the Arkansas Water Plan. The ongoing progress of the water plan work efforts are made available to public on the ANRC web page at: <http://www.arwaterplan.arkansas.gov/>.

## COLORADO

### **Recommendation 9.2.1.1:**

The review team recommends that the COGCC work with stakeholders to review how available information is used to determine minimum surface casing depths and how those depths assure that casing and cementing procedures are adequate to protect fresh groundwater. The setting of surface casing to an appropriate depth is critical for meeting anticipated pressures and for protecting fresh water aquifers. The recommended review should include a determination of the percentage of surface casing depths determined on the basis of existing water well depths, oil and gas well electric logs, area aquifer studies, or a combination of these sources of information. Additionally, this review should determine the percentage of wells in which the surface casing is set through the base of the freshwater aquifer. (STRONGER Guidelines, Section 9.2.1.)

### **Response:**

As described in detail in COGCC's October 2011 response to the STRONGER Review, COGCC staff reviews all available information, including area aquifer studies, oil and gas well geophysical logs, existing water well depths, and any other information before approving surface casing depths. COGCC staff performs this review on every single Application for Permit-to-Drill. COGCC Rules have required all wells to have a casing design that isolates all wellbore fluids and prevents fluid migration and adverse impacts to ground water since 1997. The well casing requirements are supplemented by Rules 317.e. and f, which require that surface casing be set below the base of known freshwater aquifers.

COGCC adopted the "DJ Basin Horizontal Offset Policy" on June 20, 2013 as an additional measure to protect fresh groundwater during hydraulic fracture stimulation. The Horizontal Offset policy requires operators to list all existing wellbores within 1500 feet of the lateral portion of a planned horizontal well so that COGCC engineering staff can evaluate the casing and cement records for those existing wells. If COGCC staff concludes the casing or cement in an existing well is potentially inadequate to isolate freshwater-bearing zones, the planned well may not be hydraulically fractured as planned until remediation of the existing wellbore or another preventative measure is taken. The Horizontal Offset policy applied statewide in the "Interim Statewide Horizontal Offset Policy" on February 10, 2014.

### **Recommendation 9.2.1.2:**

The review team recommends that the COGCC review any past instances where problems occurred in the setting or cementing of surface casing in a well to be hydraulically fractured, where casing or cement failures occurred during hydraulic fracturing, and other available relevant information, and consider whether establishing a maximum surface casing depth may be in order to prevent well control or cementing problems that may arise when lost circulation zones or gas-producing formations are penetrated before surface casing is set and cemented. (STRONGER Guidelines, Section 9.2.1.)

**Response:**

The COGCC has reviewed its records, including Well Control Reports, Form 23s, and can find no incidence where problems occurred in the setting or cementing of surface casing in a well to be hydraulic fractured or during hydraulic fracturing treatments. Taking this into consideration, COGCC has determined that current COGCC rules are adequate and there is no need for a maximum surface casing depth.

**Recommendation 9.2.1.5:**

The COGCC should consider whether there are additional circumstances or expanded areas where operators should be required to identify and address potential conduits for fluid migration in the area of hydraulic fracturing. (STRONGER Guidelines, Section 9.2.1.)

**Response:**

The COGCC has implemented the “DJ Basis Horizontal Offset Policy” and “Interim Statewide Horizontal Offset Policy” to confirm zonal isolation in the adjacent wells within 1,500 feet of a proposed horizontal wellbore. In order to confirm zonal isolation, these policies require operators to identify and address potential conduits for fluid migration in the area of any hydraulic fracturing treatment.

**Recommendation 9.2.2.1:**

The review team recommends that COGCC review its notification requirements to ensure they are sufficient to allow for the presence of field staff to monitor hydraulic fracturing operations. (STRONGER Guidelines, Section 9.2.2)

**Response:**

In December 2011, shortly after the STRONGER Review, the COGCC adopted Rule 316C, which requires operators to give at least 48 hours advance written notice to the Commission of a hydraulic fracturing treatment. Additionally, as part of COGCC’s 2014 Risk-Based Inspection Strategy Report, the agency has

made it a priority to increase the inspection frequency of hydraulic fracturing operations.

**Recommendation 9.2.2.2:**

The review team recommends that the COGCC revise form 5A to include the identification of materials used, aggregate volumes of fracturing fluids and proppant used, and fracture pressures recorded. (STRONGER Guidelines, Section 9.2.2.)

**Response:**

In 2012, the COGCC revised its Completed Interval Report, Form 5A, to identify materials, aggregate volumes of fracturing fluids, and proppant used during completion. Operators must also identify pressures recorded during treatment and across gradients (psi) where necessary.

**Recommendation 9.2.4.1:**

The review team recommends that the COGCC consider highlighting, on the Hydraulic Fracturing Information page or elsewhere on its website, a summary of the changes to the rules that pertain to hydraulic fracturing so that the public can have a better understanding of the program. (STRONGER Guidelines, Section 9.2.4.)

**Response:**

The COGCC website includes links for the 2011 Fracture Treatment Disclosure rulemaking (under the "Rules" tab) and a Hydraulic Fracturing Information webpage (under the "Library" tab). The Hydraulic Fracturing Information webpage includes a summary of COGCC Rules that apply to hydraulic fracturing.

**Recommendation 9.2.4.2:**

To further enhance the website, the review team recommends that the COGCC consider:

1. developing the capability for the public to make a comment or file a complaint through the website and post guidance for the public on the complaint response process;
2. adding average complaint response time to the monthly Staff Report; and
3. adding a link to the STRONGER website on the Hydraulic Fracturing Information page.

**Response:**

The COGCC website currently provides the opportunity for the public to make a comment or file a complaint. The Complaint Form, Form 18, is available online. Comments to pending applications or permits may be submitted electronically through the eForms process. Rulemaking comments may be submitted electronically (generally via email) as detailed in the Notice of Rulemaking or Prehearing Order.

COGCC staff contacts all complainants as soon as possible, which in nearly all cases is within 24 hours of receipt of a complaint. The COGCC does not publish this statistic in the Staff Report, because the average response time is consistently within 24 hours.

The COGCC has a link to the STRONGER website on the Hydraulic Fracturing Information webpage.

**Recommendation 9.3.1:**

The review team recommends that the COGCC and DWR jointly evaluate available sources of water for use in hydraulic fracturing. Given the significant water supply issues in this arid region, this project should also include an evaluation of whether or not availability of water for hydraulic fracturing is an issue and, in the event that water supply is an issue, how best to maximize water reuse and recycling for oil and gas hydraulic fracturing. COGCC should consider posting the results of that evaluation on the Hydraulic Fracturing Information page of the COGCC's website. (STRONGER Guidelines, Section 9.3.)

**Response:**

In 2011, the Colorado Division of Water Resources, the Colorado Water Conservation Board, and the COGCC jointly evaluated available sources of water for use in hydraulic fracturing. The report also compared water amounts used in hydraulic fracturing against other water uses and determined that in hydraulic fracturing used 0.08% of Colorado's annual water use in 2010 and would only use 0.10% by 2015.

This report, Water Sources and Demand for the Hydraulic Fracturing of Oil and Gas Wells in Colorado from 2010 through 2015 (1/19/2012), is available on COGCC's website under the "Library" tab.

**Recommendation 9.3.2:**

The review team recommends that the COGCC include an evaluation of NORM

in wastes associated with hydraulic fracturing operations as part of the study recommended in the report of the 1996 review. (STRONGER Guidelines, Section 9.3.)

**Response:**

The COGCC is studying land application of drilling waste in accordance with Rule 907 and its relationship with Naturally Occurring Radioactive Materials (NORM) in the DJ Basin. Staff has collected samples of land applied materials, stockpiled drill cuttings and background soils and is evaluating the analytical results. The analytical results will be compared to data from Colorado Department of Health and Environment's solid waste unrestricted use criteria for Technologically-Enhanced, Naturally Occurring Radioactive Material (TENORM). A report summarizing the study will be prepared for the Commissioners and will be presented at a regularly scheduled hearing.

## LOUISIANA

### **Recommendation 9.2.1.2:**

The review team recommends that, in order to protect groundwater, the Office of Conservation should consider the depth of the USDW and the depths of any saline or productive zones, in addition to the total depth of the well, in setting surface casing requirements.

### **Response:**

At the time of the issuance of a permit to drill, the Office of Conservation sends a fresh water protection letter to the applicant specifying the depth of the USDW at the site. Included are the requirements for the setting of sufficient casing and cement to protect the fresh water sands, or provisions for alternatives such as the use of a cementing collar around the production string at the fresh water-salt water contact.

Through a joint effort by representatives from the regulatory agency, industry, and the academic sector, proposed regulations have been developed to establish additional requirements. The proposed regulations are in the process of being codified and promulgated.

### **Recommendation 9.2.1.3:**

The review team recommends that the Office of Conservation develop cement standards to meet anticipated pressures and protect other resources and the environment. (STRONGER Guidelines, Section 9.2.1.)

### **Response:**

At the time of the issuance of a permit to drill, the Office of Conservation sends a fresh water protection letter to the applicant specifying the depth of the USDW at the site. Included are the requirements for the setting of sufficient casing and cement to protect the fresh water sands, or provisions for alternatives such as the use of a cementing collar around the production string at the fresh water-salt water contact.

Through a joint effort by representatives from the regulatory agency, industry, and the academic sector, proposed regulations have been developed to establish additional requirements addressing volume of cement, testing and verification of placement. The proposed regulations are in the process of being codified and promulgated.

**Recommendation 9.2.1.4:**

The review team recommends that the Office of Conservation develop casing standards to meet anticipated pressures and protect other resources (including treatable groundwater) and the environment. (STRONGER Guidelines, Section 9.2.1.)

**Response:**

Through a joint effort by representatives from the regulatory agency, industry, and the academic sector, proposed regulations have been developed to establish additional requirements. The proposed regulations are in the process of being codified and promulgated.

**Recommendation 9.2.1.5:**

The review team recommends that the State of Louisiana develop contingency planning and spill risk management procedures for hydraulic fracturing which meet the requirements of Section 4.2.1 of the STRONGER guidelines. (STRONGER Guidelines Section 9.2.1.)

**Response:**

Regulatory management of this environmental aspect and oversight parallels current LADEQ regulation, and thus was referred to LADEQ for response.

**Recommendation 9.2.2.2:**

The review team recommends that reporting should include the identification of materials used, aggregate volumes of fracturing fluids and proppant used, and fracture pressures recorded. (STRONGER Guidelines Section 9.2.2.)

**Response:**

The Louisiana hydraulic fracturing disclosure regulation, effective October 20, 2011, requires operators to report all additives used in hydraulic fracturing fluids and the names and concentrations of chemicals which are subject to Occupational Safety and Health Administration (OSHA) Hazard Communication requirements (29 CFR 1910.1200) and are not deemed trade secret. Disclosure can be made by reporting directly to the Office of Conservation or via the FracFocus website.

**Recommendation 9.2.3.2:**

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

**Response:**

Training modules regarding drilling, completion and production have been provided to the respective District office management to supplement their training material for the Conservation Enforcement Specialists (field staff) under their supervision, although the job description and work requirements of the field staff are more closely associated with physical site conditions, equipment integrity and productivity assessments. The technical aspects of hydraulic fracturing technology are managed by the technical staffs within the respective District offices and shared with field staff as required in performance of their duties.

## OHIO

### **Recommendation 9.2.1:**

DMRM is in the beginning stages of revising Chapter 1501:9 of the OAC 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.)

### **Response:**

During the past five years, the ODNR has worked diligently with the Ohio General Assembly, the regulated industry, and our sister agencies (OEPA, ODH, and ODOT) to amend the regulatory framework for exploration and development of oil and gas resources in Ohio. From June 30, 2010, when Sub. S.B. 165 became effective, to present, five significant bills have been passed adding 22 new sections to Chapter 1509 of the ORC (45 % increase) while 33 other sections have been amended at least once. The majority of these amendments are substantive changes that address important issues involving the protection of public health, safety and the environment; ranging from pre-drill water sampling, chemical disclosure, and wellbore integrity, to waste recycling. These amendments are directly or indirectly related to hydraulic fracturing stimulation. Attachment A is a topical summary of amendments that are related to hydraulic fracturing stimulations.

Some of these amendments to oil and gas law authorize or require the Chief to elaborate on statutory authority through subsequent rule- makings. The DOGRM has adopted new standards for well construction and wellbore integrity that are essential to protecting groundwater resources during and after hydraulic fracturing stimulations. During FY 2014, ODNR began to draft rules on a variety of important topics, including horizontal well site construction practices, secondary containment, discharge reporting, and emergency response.

### **Recommendation 9.2.4:**

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

### **Response:**

Substitute H.B. 59 (effective September 29, 2013) requires the owner of a well to determine the concentration level of radium in representative samples of

material defined as TENORM. TENORM must be transported and disposed in accordance with applicable rules enacted by the Ohio Department of Health and the Ohio Environmental Protection Agency. The owner of a solid waste facility is prohibited from accepting TENORM without first obtaining analytical results, or if the concentration of radium exceeds specified levels. The law authorized the Director of the Department of Health to establish rules regarding maintenance of TENORM testing and disposal records. The law also authorized the Director of Ohio EPA to adopt rules regarding the receipt, processing, handling, management and disposal of TENORM at solid waste facilities, as well as monitoring for radionuclides in leachate from solid waste facilities. The Chief of DOGRM has entered into a MOU with the Ohio Department of Health that authorizes the Chief of DOGRM to transfer funds for ODH technical assistance such as advice appropriate methods for collection and analysis of representative samples

**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.)

**Response:**

The DOGRM has drafted a rule pertaining to secondary containment related to producing operations including hydraulic fracturing stimulations. The draft rule that was under development at the time of the 2011 STRONGER review of the Ohio program has been further amended to address spill containment at multi-staged hydraulic fracturing stimulations that are conducted at horizontal wells associated with the new Utica/Point Pleasant Play and Marcellus development. The DOGRM is planning to post the draft rule to begin the information stakeholder review and comment process during 2014.

**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.)

**Response:**

The draft secondary containment regulations mandate reporting of spills and discharges to the DOGRM, including discharges of chemicals or fluids generated for or by hydraulic fracturing stimulations, in addition to other

required notifications. The regulated industry typically provides notice to the DOGRM even in the absence of a specific rule standard.

**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 MSDS. MSDS do not always contain the chemical constituents for a product. Also, the state should ensure that necessary 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.)

**Response:**

Amended Substitute Senate Bill 315 (effective September 10, 2012) effectively amended Ohio's chemical disclosure law relative to chemical additives in hydraulic fracturing fluids. Section 1509.10 of the ORC now requires owners to disclose all chemical additives used in hydraulic fracturing stimulations to FRAC FOCUS, or an alternative reporting system approved by the Chief within 60 days after completion operations. In addition, owners must continue to submit MSDSs for all new chemical products used during hydraulic fracturing stimulations that are not listed on our comprehensive, web-based MSDS library.

**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.)

**Response:**

Inspectors are receiving on the jobsite training by witnessing multiple stages of hydraulic fracturing stimulations and by reviewing summary reports including pump rate and pressure graphs. Fracturing technology is discussed in monthly regional inspector meetings. On November 13, 2013, all DOGRM field staff received eight hours of cement training provided by Glen Benge, a distinguished expert and the former chair of API's cement standards committee.

**Recommendation 9.3.1:**

In light of the anticipated development of the Marcellus and Utica shale 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.) Recycling of flowback is not prohibited.

**Response:**

Amended Substitute Senate Bill 315, effective September 10, 2012, established requirements for permit applicants to provide information on anticipated water withdrawal sources and volumes and estimated recycled water volumes. The ODNR Division of Soil and Water Resources requires persons who withdraw more than 100,000 gallons per day to register and report water withdrawals.

**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 shale. (STRONGER Guidelines Section 9.3.)

**Response:**

Substitute House Bill 59, effective September 2013, authorizes waste recycling facilities by order, or permit after January 1, 2014. Section 1509 of the ORC, authorizes the Chief to adopt rules regarding brine treatment and recycling facilities. The DOGRM is planning to post the draft rule to begin the informal stakeholder review and comment during 2014.

Topical Summary of Ohio Statute Amendments Pertaining to  
Hydraulic Fracturing Stimulations (2010 – 2014)

## Attachment A

**1. Agency organization/authority**

- Re-established a separate division with singular focus and sole responsibility to permit and regulate oil and gas exploration and production including inspection and documentation of hydraulic fracturing stimulations. As a result, agency employees no longer split time enforcing rules for multiple mineral industries.
- Grants the division sole and exclusive authority to regulate production operations including hydraulic fracturing stimulations.
- Authorizes the Chief to enter into cooperative agreements with other state agencies for advice and consultation. For example, the Chief has entered an MOU with the Ohio Department of Health to provide consultation and advice pertaining to management of wastes that are TENORM that may originate from solids removal

during recycling of hydraulic fracturing flow-back fluids or disposal at Class II injection wells.

## 2. Agency funding

- Increased existing fees and established new fees to improve agency funding.
- The increased revenue has enabled the agency to triple its staff from 37 in 2010 to 110 in 2014.
- One of the most successful new fees is the new brine disposal fee assessed on each barrel (42 gallons) of brine (including flow-back wastewaters) injected at a Class II disposal well. Over 50 percent of the brine disposed at Class II wells in Ohio originates from wastewaters generated after hydraulic fracturing stimulations in neighboring Pennsylvania and West Virginia. This fee has enabled the agency to significantly increase the UIC Program staff.

## 3. Unitization Agreements

- Established a \$10,000 fee for a unitization application. Unitization agreements are necessary to assemble the acreage for multi-well drilling operations from a common pad.

## 4. Permitting

- Requires the applicant for a permit to drill a horizontal well to identify the proposed source of ground and surface water to be used in production operations (including drilling and hydraulic fracturing stimulation operations) at each well, the identification of the watershed, and estimated volume of water withdrawal.
- Requires the applicant to provide the estimated volume of recycled water that will be used in production operations (including drilling and well stimulation operations).
- Requires the Chief to post on the Division website a notice of all approved oil and gas well permits within two business days after approval.

## 5. Insurance thresholds

- Requires the owner of a horizontal well to obtain liability insurance coverage of at least \$5M to pay for damages for property or injury to persons. All horizontal wells are stimulated by hydraulic fracturing.
- Increased minimum insurance requirements for owners of urban wells from \$600,000 to \$3 million. Most urban wells are stimulated by hydraulic fracturing.

## 6. Road maintenance

- Requires the applicant for a horizontal well permit to submit a copy of a Road Use Maintenance Agreement signed by the local jurisdictional authority that establishes the terms for maintenance, upgrading and safe use of roads used for access to and egress from a well site, or an affidavit attesting good faith efforts to negotiate such an agreement. These roads can be used to transport the large volumes of equipment and water used during multi-staged hydraulic fracturing operations.
- Requires the Directors of ODNR and ODOT to jointly prepare a report, with input from statewide organizations and local jurisdictions that analyze the effectiveness of RUMAs, with recommendations for improvements by March 10, 2014.

## 7. Pad construction

- Requires the Division to conduct a site review prior to commencement of horizontal well site (pad and access road) construction.
- Requires the permittee to notify the Division inspector prior to commencement of horizontal well site construction.
- Requires the Chief to enact rules regarding horizontal well sites including pad and access road construction. Pads must be properly constructed to support the weight of equipment and materials used during multi-staged hydraulic fracturing operations.

## 8. Pre-activity notifications

- Permittees are required to notify the Division inspector at least 24 hours in advance of all casing cement jobs and commencement of all hydraulic fracturing operations.
- Ohio requires more pre-activity notifications than any state or federal oil and gas regulatory authority in the United States.

#### **9. Pre-permit determination inspections**

- The Division is required to conduct an inspection prior to:
  - 1) Issuance of a permit at an urban site;
  - 2) Issuance of permit at a horizontal well site;
  - 3) Issuance of a permit to drill in a 100-year floodplain;
  - 4) Issuance of a permit to drill in a five-year time of travel wellhead protection area;
  - 5) Permitting a Class II injection well.
- Draft horizontal well site construction rules require a site inspection to evaluate the suitability of the site for the proposed pad and access road and to consider terms and conditions that may need to be applied to an approval order. The Division is required to conduct more pre-permit determination site inspections than any other federal or state oil and gas regulatory agency in the United States.

#### **10. Pre-drill water sampling**

- The applicant for a permit to drill a vertical well in an urban area must provide the analytical results from sampling water wells within 300 feet of the proposed well location prior to the commencement of drilling.
- The applicant for a permit to drill a horizontal well must provide the analytical results from sampling water wells within 1,500 feet of the proposed well location prior to the commencement of drilling.

#### **11. Well construction**

- Modernizes well construction objectives, requiring that all wells are constructed in a manner that accomplishes the following objective:

- 1) Support unconsolidated materials and prevent wellbore collapse;
  - 2) Isolate and protect all USDWs;
  - 3) Provide a base for a blowout preventer;
  - 4) Control well pressures during all phases of operation from drilling through stimulation;
  - 5) Isolate gas-bearing flow zones to prevent sustained annular over-pressurization;
  - 6) Isolate corrosive zones.
  - 7) Isolate the target hydrocarbon reservoir during and after hydraulic fracturing stimulations.
- Authorizes the Chief to enact rules that establish standards and procedures to meet these statutorily mandated objectives. These rules were enacted effective August 1, 2012.

#### **12. Defective construction**

- Requires immediate notification of a Division inspector upon detection of defective construction such as annular circulation during a hydraulic fracturing stimulation.

#### **13. Wellbore integrity**

- Requires annular pressure monitoring during stimulation operations and immediate cessation of operations if there are indications of lost integrity such as abnormal annular pressure increase or annular circulation of fluids.

#### **14. Freshwater impoundments**

- Authorizes the Chief to specify requirements by rule governing the location and construction of freshwater impoundments that are constructed to supply water for oil and gas drilling operations or hydraulic fracturing stimulations.

#### **15. Hydraulic fracturing**

- Requires owners to notify the Division inspector prior to commencement of hydraulic fracturing operations.

- Requires that wells be stimulated in a manner that will not endanger USDWs.
- Requires continuous monitoring of annular pressures throughout stimulation operations to assess wellbore integrity.
- Mandates cessation of stimulation operations if there are indications of wellbore integrity failure such as abnormal annular pressure or annular fluid circulation.
- Requires immediate notification of Division inspector if cemented production casing does not effectively contain all pumped stimulation fluids.
- Requires owner to submit detailed records documenting hydraulic fracturing stimulations including job logs, invoices, and pumping pressure and rate charts.
- Requires owners to contain “flowback” wastewater in steel tanks or properly constructed, lined pits.

#### **16. Chemical disclosure (stimulations)**

- Requires owners to disclose chemical additives used in hydraulic fracturing stimulations to FRAC FOCUS, or an alternative reporting system approved by the Chief within 60 days after completion of stimulation operations.
- Requires the owner to disclose by additive: supplier, trade name, chemical names, CAS numbers and maximum concentration of each chemical.
- Requires the owner to immediately disclose the identity of proprietary chemical additives upon verbal request by a medical professional or to the Chief of DOGRM.

#### **17. Trade secrets**

- Allows the owner or supplier to withhold chemical names, CAS numbers, and purpose for additives that are designated as trade secrets.

#### **18. Trade secret challenges**

- Property owners and adjacent property owners may challenge trade secret claims by filing a civil action in the court of common pleas in Franklin County
- The owner must disclose the identity, CAS number and concentration of any trade secret protected additive upon request by the Chief in the event of a spill, release or investigation.

#### **19. Public accessibility**

- All chemical additive information is publically available by well at the FRAC FOCUS website maintained by the GWPC and IOGCC.
- All well completion reports, invoices, pump and rate charts, and job summaries are scanned and posted on the Division's website.
- All MSDS for chemical additives are posted on the Division's website.
- The Division makes more records and data associated with hydraulic fracturing stimulations publicly available than any other federal or state program in the United States.

#### **20. Brine (including flow-back fluid) disposal/injection**

- Increases the fee for a Class II injection well permit from \$100 to \$1,000.
- Authorizes the Chief to adopt rules requiring electronic, quarterly reporting of brine by source and volume.

#### **21. Brine (including flow-back fluid) transportation**

- Expands registration requirements for brine transporters.
- Authorizes the Chief to adopt rules that establish procedures for electronic submittal of daily brine transportation logs.

#### **22. Brine treatment/recycling**

- Requires a person who stores, recycles, treats, processes or disposes brine or other waste substances to have such operations authorized by order or permit after January 1, 2014.
- Requires the Chief to adopt rules regarding recycling, treatment, and processing of brine.

- Establishes a \$2,500 permit application fee for brine recycling and treatment facilities.

### **23. Road spreading**

- Prohibits use of water produced during the flowback phase of stimulation, including all waste water from horizontal shale wells, from being spread on a road for dust or ice control. As before, road spreading is subject to minimum statewide standards, and must be approved by the local road jurisdiction via resolution after a public meeting.

### **24. TENORM**

- Defines TENORM and NORM.
- Requires the owner of a well to determine the concentration level of radium in representative samples of material if it is technologically enhanced naturally occurring radiation material (TENORM).
- Requires TENORM to be transported and disposed in accordance with applicable laws enacted by ODH and OEPA.
- Prohibits the owner of a solid waste facility from accepting TENORM without first obtaining analytical results, and if the concentration of radium exceeds specified levels.
- Authorizes the Director of EPA to adopt rules regarding receipt, processing, handling, management and disposal of TENORM as solid waste facilities. Rules must include procedures for monitoring leachate and groundwater for radionuclides.
- Requires Director of ODH to establish rules regarding maintenance of TENORM testing and disposal records.

### **25. Waste water impoundments**

- Authorizes the use of lined impoundments to store waste substances (brine) subject to Division standards established by rule.

### **26. Records submittal**

- Requires owners to submit all logs and casing cement tickets no later than 60 days after cementing.
- Owner must file a well completion record within 60 days after completion of drilling that includes summary stimulation data.
- Owners must submit well stimulation invoices, job logs, pumping pressure and rate graphs by stage in addition to summary information on well completion records. (Ohio requires more information for well stimulations than any state or federal regulatory agency.)

## OKLAHOMA

### **Recommendation 9.2.1.4:**

OCC rules should be amended to include a definition of hydrologically sensitive areas or to provide appropriate reference to such a definition. (STRONGER Guidelines, Section 9.2.1.)

### **Response:**

The OGCD has written a definition of hydrologically sensitive areas. It is now included in our definitions section 165:10-1-2.

### **Recommendation 9.2.2.1:**

Although the review team considered this to be sufficient for meeting the intent of the STRONGER guidelines for wells being drilled, notice should be given to the OGCD for wells to be fractured that have been in production. (STRONGER Guidelines Section 9.2.2.)

### **Response:**

The OGCD has modified our rules to now require all wells to be fractured stimulated, new or existing, to give notice to the OGCD. This can be found in 165:10-3-10(b).

### **Recommendation 9.2.2.2:**

The review team recommends that OGCD, as part of the conversion of its data management system to RBDMS, revise the well completion form to include individual fields for reporting aggregate volumes of fracturing fluids and proppant used, the fracture pressures recorded, pressure behind the casing and hydraulic fracture materials used. (STRONGER Guidelines Section 9.2.2)

### **Response:**

The OGCD has modified the completion report Form 1002A to included fracture fluids, volume, proppant amounts. Due to budget constraints all of the modifications to RBDMS have not been fully completed.

### **Recommendation 9.2.3.1:**

The review team recommends that the State of Oklahoma develop a more stable source of funding for the OGCD and provide resources to allow the filling of positions and provision of equipment to a level that is sufficient to meet program responsibilities. (STRONGER Guidelines, Section 9.2.3.)

**Response:**

The OGCD has made strides to improve funding sources by obtaining legislative approval to receive a portion of the state petroleum excise tax. However, a state that is heavily dependent on revenues generated by the oil and gas industry much more work needs to be pursued in this area.

**Recommendation 9.2.3.2:**

The review team recommends that the OCC provide resources to allow existing OGCD staff the opportunity to receive specialized training related to hydraulic fracturing and to properly train new staff to equip them to properly do their job. (STRONGER Guidelines, Section 9.2.3.)

**Response:**

The OGCD places a high priority on education and training, however funding streams that do not allow for a dependable funding source from one fiscal year to the next still remains a major hindrance on this issue.

## PENNSYLVANIA

### **Recommendation on Pending Rulemaking:**

DEP has developed proposed rulemaking to amend 25 Pa. Code Chapter 78 to strengthen its regulatory requirements. On May 17, 2010, the Environmental Quality Board adopted the amendments as Proposed Rulemaking and published the changes on July 10, 2010 for a 30-day public comment period.

The Proposed Rulemaking requires that operators prepare a casing and cementing plan and keep it on site during well construction for review by DEP. The Proposed Rulemaking also requires that a cement job log, that documents the actual procedures and specifications of the cementing operation, be maintained by the operator. The Proposed Rulemaking also addresses blow-out prevention equipment requirements, centralizers, areas where alternate methods are required, lost circulation, and intermediate and production casing.

The review team recommends that DEP finalize its Proposed Rulemaking in a manner that provides at least the levels of protection that were presented by the BOGM during the review.

### **Response:**

This recommendation has been complied with by publication of the final rules on February 2011.

### **Recommendation on Baseline Surveys:**

The review team recommends that the Commonwealth consider whether there are areas or situations in which risk factors, such as the absence of confining rock layers or the presence of potential pathways for fluid movement into groundwater, establish a basis for encouraging more extensive baseline groundwater quality testing.

The review team also noted that DEP has not required operators to identify potential conduits for fluid migration (such as active and abandoned wells) in the area of hydraulic fracturing. The review team recommends that DEP consider whether there are areas or situations in which wells (active and abandoned) in the vicinity of hydraulic fracturing operations provide pathways for fluid movement into groundwater. In such areas or situations, DEP should require operators to identify and eliminate these potential pathways for fluid movement into groundwater before conducting hydraulic fracturing operations.

**Response:**

In 2012, the Pennsylvania legislature extended the presumption of liability for water supply impacts from 1,000 feet to 2,500 feet from the vertical unconventional wellbore and from 6 months from the completion of drilling to 12 months after hydraulic fracturing. As a result, companies routinely test water supplies beyond the 2,500 presumptive liability zone.

As part of new regulation revisions that will be enacted in 2016, DEP's regulations will require a comprehensive review of active, abandoned, orphaned and plugged wells prior to the drilling of any new unconventional wells to determine the potential for environmental impact. This new requirement would have applied to conventional wells but the Pennsylvania legislature struck down all new regulations governing the conventional oil and gas industry.

**Recommendation on Casing and Cementing Plans:**

The review team recommends that the depth of surface casing be added to the well drilling permit application so that BOGM can assure that groundwater protection concerns are addressed.

**Response:**

DEP has not accepted this recommendation at this time, as criteria for determining deepest useable fresh groundwater in Pennsylvania have not been established.

**Recommendation on Chemical Information Availability:**

The review team recommends that the Commonwealth of Pennsylvania adopt provisions necessary to assure that information on chemical constituents used in fracturing fluids is available to medical personnel in the event of a medical emergency related to hydraulic fracturing.

**Response:**

This information is required to be maintained at the wellsite during hydraulic fracturing, reported to FracFocus and reported to DEP on the driller's well completion report.

**Recommendation on Prior Notification of Hydraulic Fracturing Operations:**

The review team recommends that DEP require notification prior to hydraulic fracturing operations. DEP should have the opportunity to conduct inspections at critical stages, including during hydraulic fracturing and flowback.

**Response:**

24 hour notification prior to hydraulic fracturing is now required due to statutory updates made in 2012.

**Recommendation on Pit Construction:**

The review team recommends that, during the next round of rulemaking, procedures for inspecting pit construction or a certification process for pit construction, that includes pit bottom preparation and liner placement, should be considered. The review team further recommends that secondary containment requirements be established for tanks used in hydraulic fracturing operations.

**Response:**

New regulations for unconventional wells will ban pits for unconventional wells. Legislative enactments in 2012 require secondary containment at all unconventional well sites during all phases of operations. Conventional wells are currently exempt from these requirements.

**Recommendation 9.2.1.1:**

The review team recommends that DEP identify a standardized methodology to ensure that sampling and analysis for gas content in water is done consistently. (STRONGER Guidelines Section 9.2.1.)

**Response:**

This work is still on going with industry partnership.

**Recommendation 9.2.1.5:**

The review team recommends that DEP finalize its Proposed Rulemaking to include the requirement to keep a copy of the PPC plan at the well site during drilling and completion activities so that specific chemical information can be obtained during an investigation.

**Response:**

This recommendation has been fulfilled.

**Recommendation 9.2.1.8:**

The review team recommends that the proposed amendments, when finally adopted, should clearly address hydraulic fracturing of wells with open hole completion to assure that the annular space above the packer does not fill with fluid to the point that groundwater could be impacted. The operator should make a demonstration through monitoring of the annulus or other acceptable method that fluid does not escape the well bore. (STRONGER Guidelines Section 9.2.1.)

**Response:**

This recommendation has not been addressed.

**Recommendation 9.2.1.12:**

The review team recommends that DEP determine a way to track complaints and investigations related to hydraulic fracturing. (STRONGER Guidelines Section 9.2.1.)

**Response:**

DEP will develop a comprehensive water supply complaint tracking system that will identify and be able to report on the suspected causes, locations and resolutions of all water supply complaints in 2016.

**Recommendation 9.3.1:**

The review team recommends that DEP provide the opportunity for broader public comment during the water management planning process. (STRONGER Guidelines Section 9.3.)

**Response:**

This recommendation has not been complied with.

**Recommendation 9.3.3:**

The review team recommends that DEP work closely with the river basin commissions to incentivize the use of AMD-impacted waters and other wastewater resources through streamlined permitting and inter-basin transfers. (STRONGER Guidelines Section 9.3.)

**Response:**

This recommendation has been met. DEP has developed a paper on the use of AMD impacted water and worked with the Susquehanna River Basin Commission to allow the exportation of impacted water outside the Commission boundaries.

## **BACKGROUND**

During the late 1980s and early 1990s, a unique regulatory approach to improve state oil and gas exploration and production environmental programs was developed by state, industry and environmental stakeholders, with assistance by the Federal government. The Interstate Oil and Gas Compact Commission (IOGCC) spearheaded a collaborative effort to benchmark state regulatory programs, develop recommended state program Guidelines, establish a review process to evaluate state regulatory programs against those guidelines, and address regulatory gaps identified by EPA in its 1988 regulatory determination under the federal Resource Conservation and Recovery Act (RCRA),

This State Review process has undergone a number of changes since its inception. Management of the process has shifted to a non-profit educational corporation named State Review of Oil and Natural Gas Environmental Regulations (STRONGER), and the Guidelines have been updated and expanded in scope. STRONGER maintains multi-stakeholder governance and involvement on its Board of Directors, with stakeholders representing state government, the oil and gas industry, and environmental groups.

The STRONGER State Review process is a voluntary and open, multi-stakeholder process rather than a bureaucratic oversight exercise between federal and state agency personnel. The voluntary and open nature of the process greatly enhances the credibility of the reviews, and of the recommendations made to the reviewed programs. During a State Review, the volunteer state regulatory program is measured against the criteria of the STRONGER Guidelines. State Reviews focus on program strengths as well as areas needing improvement. Program strengths are recognized, documented, and shared. Recommendations for program improvement are based on the criteria contained in the Guidelines, rather than on subjective judgments about “how it should be done.” With the overall objective to improve human health and the environment, the State Review process contains a “consulting” role in addition to its “audit” role to assist states with improving their performance.

## **GUIDELINES DEVELOPMENT**

In 2009 STRONGER formed a Hydraulic Fracturing Workgroup charged with examining issues associated with hydraulic fracturing, and developing draft guidelines for state regulatory programs. Draft guidelines were distributed to

states, environmental groups, industry associations, and posted on the STRONGER website for public comments. The workgroup reviewed all comments received and sent a final draft to the Board for approval. The STRONGER Board adopted the draft HF Guidelines in 2010. The HF Guidelines were added to the full Guidelines as a new topic section, and a questionnaire was developed for targeted State Reviews.

## **TARGETED REVIEWS 2010-2012**

Targeted reviews of state hydraulic fracturing requirements began in 2010 and carried through 2012, with six states volunteering for HF-specific reviews. Reviews were conducted in Pennsylvania (2010), Ohio (2011), Oklahoma (2011), Louisiana (2011), Arkansas (2012) and Colorado (2011). Three-person Review Teams representing the STRONGER stakeholder interests conducted the in-state interview portion of the reviews. The teams were assisted by Official Observers representing the stakeholder interests, and, when available, representatives from the U.S. Environmental Protection Agency (EPA) and U.S. Department of Energy (DOE). State Review Reports summarizing the volunteer programs and containing findings and recommendations were developed by the Review Teams. These reports were distributed to the states and published on the STRONGER website.

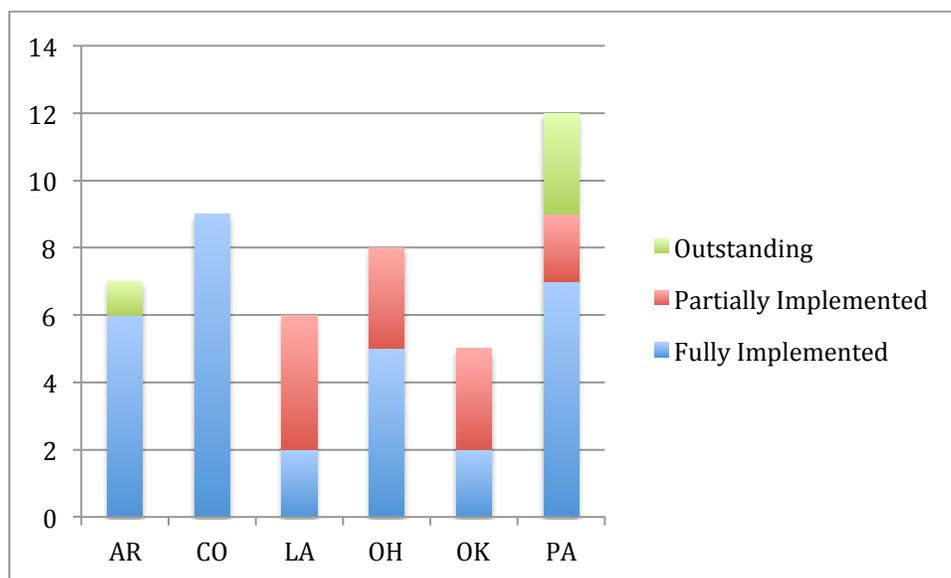
## **UPDATES AND REVISIONS**

During the 2010-2012 reviews, the Review Teams and volunteer states identified areas in which the HF Guidelines could be strengthened. Consequently, in 2012 the STRONGER Board reassembled the original workgroup, tasking it with revising and updating the HF Guidelines based on lessons learned during those reviews. Draft revisions were shared with EPA, DOE and the Bureau of Land Management (BLM). Comments from those agencies were considered by the workgroup, and the HF Guidelines were then sent to state oil and gas directors, industry associations, environmental organizations, and posted on the STRONGER website for public comment. The workgroup reviewed all comments received and sent a final draft to the Board for approval. The revised HF Guidelines were adopted in May 2013 and have been used in State Reviews in Alaska (2015) and Virginia (2016).

## OUTCOMES

This report is intended to provide a broad overview of outcomes of the 2010-2012 targeted reviews in Arkansas, Colorado, Louisiana, Ohio, Oklahoma, and Pennsylvania under the original 2010 STRONGER Hydraulic Fracturing Guidelines. Surveys were sent to each state containing the recommendations from their respective reviews. The surveys requested basic information on actions taken as a result of each state's recommendations. The state surveys should not be considered formal Follow-Up Reviews. This report, therefore, is not a Follow-Up Review Report, and is not as in-depth as a formal Follow-Up Review Report would be. Recommendations are classified as fully implemented, partially implemented, or outstanding. For the purposes of this report, work in progress related to a recommendation is considered partially implemented.

A total of 47 recommendations were made in the 2010-2012 HF review reports. Of those, 31 have been fully implemented, 12 have been partially implemented, and 4 are outstanding. Of the 7 recommendations made to Arkansas, 6 have been fully implemented and 1 is outstanding. All of the 9 recommendations made to Colorado have been fully implemented. Of the 6 recommendations made to Louisiana, 2 have been fully implemented and 4 are partially implemented. Of the 8 recommendations made to Ohio, 5 have been fully implemented and 3 are partially implemented. Of the 5 recommendations made to Oklahoma, 2 have been fully implemented and 3 are partially implemented. Of the 12 recommendations made to Pennsylvania, 7 have been fully implemented, 2 are partially implemented, and 3 are outstanding.



Combined, Arkansas, Colorado, Louisiana, Ohio, Oklahoma, and Pennsylvania have fully implemented 66% of STRONGER's recommendations for program improvement in hydraulic fracturing regulation. When coupled with partially implemented actions, the number of STRONGER recommendations resulting in program improvement rises to 91%.

## CONCLUSION

The STRONGER Hydraulic Fracturing Reviews in Arkansas, Colorado, Louisiana, Ohio, Oklahoma, and Pennsylvania were successful and led to demonstrable improvements in the states' programs. The reviews also led to improvements in the HF Guidelines, which have since been used in reviews of Alaska and Virginia. The reviews also led to changes in STRONGER's administration of the State Review process. Prior to the 2010-2012 HF Reviews, the only options available were Full Reviews and Follow-Up Reviews. Following the success of these targeted reviews, the Board in 2014 amended the Rules of Participation for the State Review process to give states the option to request a review based on one or more topics in the Guidelines. This change makes it easier for to states to participate in the State Review process by opening up a "menu" of standalone review options that require a smaller time and resource commitment than a Full Review.

While these reviews were successful, more work remains to be done. Several states have not volunteered for follow-up reviews to their initial reviews that took place in the 1990's. Other states have not volunteered for an initial review. The State Review process provides a framework for encouraging and measuring continuous improvement of state oil and gas environmental regulatory programs. States that have volunteered for multiple reviews should be commended for demonstrating their commitment to continuous improvement through the State Review process. States that have not yet volunteered should be encouraged to do so.

At a time when oil and gas development is occurring in more areas that have not historically been familiar with the industry, public interest in the state programs that protect human health and the environment is understandably high. At its core, STRONGER is an educational institution. As an open process, State Reviews provide a venue to not only assist states with improving their programs, but also to educate the public. STRONGER exists to serve the states, and will continue to be an independent vehicle through which states can

demonstrate the competency and adequacy of their programs while achieving public transparency goals and continuing their commitment to continuous improvement.

## **STATE SURVEYS**

Following are the survey responses from Arkansas, Colorado, Louisiana, Ohio, Oklahoma, and Pennsylvania to their respective recommendations from their targeted HF reviews. The State Review Reports from which these recommendations are derived are available online at [www.strongerinc.org](http://www.strongerinc.org).

## ARKANSAS

### **Recommendation 9.2.1.3:**

The AOGC should require appropriate notification prior to hydraulic fracturing operations. Notification should be sufficient to allow for the presence of field staff to monitor activities. (2010 STRONGER Guidelines, Section 9.2.2.)

### **Response:**

AOGC amended General Rule B-19 (Hydraulic Fracturing) to require notification, as follows:

- g) The Permit Holder shall notify the Director or his designee via e-mail, fax or other approved method, a minimum of forty-eight (48) hours prior to commencement of a Hydraulic Fracturing Treatment on a well. If the Permit Holder cannot provide notice a minimum of forty-eight (48) hours prior to commencement, the Permit Holder shall provide a written explanation as to why the notice could not be provided, and the Permit Holder shall provide notice in the manner described above as soon as the Permit Holder is aware that a Hydraulic Fracturing Treatment has been scheduled.

In addition, all notices are posted on the AOGC webpage.

### **Recommendation 9.2.1.4:**

The review team recommends that the AOGC continue to increase the number of field inspectors as necessary to maintain staffing levels sufficient to meet AOGC inspection goals as well as receive, record and respond to complaints of human health impacts and environmental damage resulting from hydraulic fracturing. (2010 STRONGER Guidelines, Section 9.2.3.)

### **Response:**

AOGC requested four additional staff positions (three field inspectors and one geologist position) in the FY14-15 budget. The positions were approved and have been filled.

### **Recommendation 9.2.1.6:**

The review team recommends that the AOGC re-evaluate their safety concerns related to conducting inspections during hydraulic fracturing operations. The review team further recommends that the AOGC develop field procedures to

ensure that field staff conduct inspections in a safe manner during hydraulic fracturing operations. (2010 STRONGER Guidelines, Section 9.2.3.)

**Response:**

AOGC adopted a hydraulic fracturing inspection protocol addressing the safety issue concerns. The inspection activity is documented on a new field inspection form.

**Recommendation 9.2.1.7:**

The review team recommends that the ADEQ seek resources for the continued funding of these positions as well as additional positions as needed in the Fayetteville Shale development area and to develop and maintain their data management capabilities. (2010 STRONGER Guidelines, Section 9.2.3.)

**Response:**

The AOGC appropriation for FY14-15 Biennium Budget was increased to accommodate a grant to ADEQ from AOGC funds, for the purpose of funding the ADEQ inspectors assigned to the Fayetteville Shale production area. The same funding mechanism has been proposed for the AOGC FY16-17 Biennium Budget.

**Recommendation 9.2.1.8:**

The review team recommends that the AOGC seek additional opportunities for the dissemination of educational information regarding well construction and hydraulic fracturing to bridge the knowledge gap between experts and the public. (2010 STRONGER Guidelines, Section 9.2.4.)

**Response:**

AOGC webpage resources have been expanded to further document well construction and hydraulic fracturing information and provide links to other outside sources of information. AOGC continues to participate in outreach efforts as they become available, the most recent participating in a 3 day Teacher Training CLE for high school science teachers, dealing with energy issues in Arkansas.

**Recommendation 9.2.1.9:**

The review team recommends that the agencies continue their efforts to obtain additional funding for improvements to and integration of their data management systems. (2010 STRONGER Guidelines, Section 9.2.4.)

**Response:**

No specific efforts have been adopted; however the agencies continue to cooperate as needed.

**Recommendation 9.2.1.10:**

The reviews team recommends that the ANRC develop a database to provide for the dissemination of information related to hydraulic fracturing information to the public. (2010 STRONGER Guidelines, Section 9.2.4.)

**Response:**

Data regarding water use in the Fayetteville Shale production area is being developed as part of the update of the Arkansas Water Plan. The ongoing progress of the water plan work efforts are made available to public on the ANRC web page at: <http://www.arwaterplan.arkansas.gov/>.

## COLORADO

### **Recommendation 9.2.1.1:**

The review team recommends that the COGCC work with stakeholders to review how available information is used to determine minimum surface casing depths and how those depths assure that casing and cementing procedures are adequate to protect fresh groundwater. The setting of surface casing to an appropriate depth is critical for meeting anticipated pressures and for protecting fresh water aquifers. The recommended review should include a determination of the percentage of surface casing depths determined on the basis of existing water well depths, oil and gas well electric logs, area aquifer studies, or a combination of these sources of information. Additionally, this review should determine the percentage of wells in which the surface casing is set through the base of the freshwater aquifer. (STRONGER Guidelines, Section 9.2.1.)

### **Response:**

As described in detail in COGCC's October 2011 response to the STRONGER Review, COGCC staff reviews all available information, including area aquifer studies, oil and gas well geophysical logs, existing water well depths, and any other information before approving surface casing depths. COGCC staff performs this review on every single Application for Permit-to-Drill. COGCC Rules have required all wells to have a casing design that isolates all wellbore fluids and prevents fluid migration and adverse impacts to ground water since 1997. The well casing requirements are supplemented by Rules 317.e. and f, which require that surface casing be set below the base of known freshwater aquifers.

COGCC adopted the "DJ Basin Horizontal Offset Policy" on June 20, 2013 as an additional measure to protect fresh groundwater during hydraulic fracture stimulation. The Horizontal Offset policy requires operators to list all existing wellbores within 1500 feet of the lateral portion of a planned horizontal well so that COGCC engineering staff can evaluate the casing and cement records for those existing wells. If COGCC staff concludes the casing or cement in an existing well is potentially inadequate to isolate freshwater-bearing zones, the planned well may not be hydraulically fractured as planned until remediation of the existing wellbore or another preventative measure is taken. The Horizontal Offset policy applied statewide in the "Interim Statewide Horizontal Offset Policy" on February 10, 2014.

### **Recommendation 9.2.1.2:**

The review team recommends that the COGCC review any past instances where problems occurred in the setting or cementing of surface casing in a well to be hydraulically fractured, where casing or cement failures occurred during hydraulic fracturing, and other available relevant information, and consider whether establishing a maximum surface casing depth may be in order to prevent well control or cementing problems that may arise when lost circulation zones or gas-producing formations are penetrated before surface casing is set and cemented. (STRONGER Guidelines, Section 9.2.1.)

**Response:**

The COGCC has reviewed its records, including Well Control Reports, Form 23s, and can find no incidence where problems occurred in the setting or cementing of surface casing in a well to be hydraulic fractured or during hydraulic fracturing treatments. Taking this into consideration, COGCC has determined that current COGCC rules are adequate and there is no need for a maximum surface casing depth.

**Recommendation 9.2.1.5:**

The COGCC should consider whether there are additional circumstances or expanded areas where operators should be required to identify and address potential conduits for fluid migration in the area of hydraulic fracturing. (STRONGER Guidelines, Section 9.2.1.)

**Response:**

The COGCC has implemented the "DJ Basis Horizontal Offset Policy" and "Interim Statewide Horizontal Offset Policy" to confirm zonal isolation in the adjacent wells within 1,500 feet of a proposed horizontal wellbore. In order to confirm zonal isolation, these policies require operators to identify and address potential conduits for fluid migration in the area of any hydraulic fracturing treatment.

**Recommendation 9.2.2.1:**

The review team recommends that COGCC review its notification requirements to ensure they are sufficient to allow for the presence of field staff to monitor hydraulic fracturing operations. (STRONGER Guidelines, Section 9.2.2)

**Response:**

In December 2011, shortly after the STRONGER Review, the COGCC adopted Rule 316C, which requires operators to give at least 48 hours advance written notice to the Commission of a hydraulic fracturing treatment. Additionally, as part of COGCC's 2014 Risk-Based Inspection Strategy Report, the agency has

made it a priority to increase the inspection frequency of hydraulic fracturing operations.

**Recommendation 9.2.2.2:**

The review team recommends that the COGCC revise form 5A to include the identification of materials used, aggregate volumes of fracturing fluids and proppant used, and fracture pressures recorded. (STRONGER Guidelines, Section 9.2.2.)

**Response:**

In 2012, the COGCC revised its Completed Interval Report, Form 5A, to identify materials, aggregate volumes of fracturing fluids, and proppant used during completion. Operators must also identify pressures recorded during treatment and across gradients (psi) where necessary.

**Recommendation 9.2.4.1:**

The review team recommends that the COGCC consider highlighting, on the Hydraulic Fracturing Information page or elsewhere on its website, a summary of the changes to the rules that pertain to hydraulic fracturing so that the public can have a better understanding of the program. (STRONGER Guidelines, Section 9.2.4.)

**Response:**

The COGCC website includes links for the 2011 Fracture Treatment Disclosure rulemaking (under the "Rules" tab) and a Hydraulic Fracturing Information webpage (under the "Library" tab). The Hydraulic Fracturing Information webpage includes a summary of COGCC Rules that apply to hydraulic fracturing.

**Recommendation 9.2.4.2:**

To further enhance the website, the review team recommends that the COGCC consider:

1. developing the capability for the public to make a comment or file a complaint through the website and post guidance for the public on the complaint response process;
2. adding average complaint response time to the monthly Staff Report; and
3. adding a link to the STRONGER website on the Hydraulic Fracturing Information page.

**Response:**

The COGCC website currently provides the opportunity for the public to make a comment or file a complaint. The Complaint Form, Form 18, is available online. Comments to pending applications or permits may be submitted electronically through the eForms process. Rulemaking comments may be submitted electronically (generally via email) as detailed in the Notice of Rulemaking or Prehearing Order.

COGCC staff contacts all complainants as soon as possible, which in nearly all cases is within 24 hours of receipt of a complaint. The COGCC does not publish this statistic in the Staff Report, because the average response time is consistently within 24 hours.

The COGCC has a link to the STRONGER website on the Hydraulic Fracturing Information webpage.

**Recommendation 9.3.1:**

The review team recommends that the COGCC and DWR jointly evaluate available sources of water for use in hydraulic fracturing. Given the significant water supply issues in this arid region, this project should also include an evaluation of whether or not availability of water for hydraulic fracturing is an issue and, in the event that water supply is an issue, how best to maximize water reuse and recycling for oil and gas hydraulic fracturing. COGCC should consider posting the results of that evaluation on the Hydraulic Fracturing Information page of the COGCC's website. (STRONGER Guidelines, Section 9.3.)

**Response:**

In 2011, the Colorado Division of Water Resources, the Colorado Water Conservation Board, and the COGCC jointly evaluated available sources of water for use in hydraulic fracturing. The report also compared water amounts used in hydraulic fracturing against other water uses and determined that in hydraulic fracturing used 0.08% of Colorado's annual water use in 2010 and would only use 0.10% by 2015.

This report, Water Sources and Demand for the Hydraulic Fracturing of Oil and Gas Wells in Colorado from 2010 through 2015 (1/19/2012), is available on COGCC's website under the "Library" tab.

**Recommendation 9.3.2:**

The review team recommends that the COGCC include an evaluation of NORM

in wastes associated with hydraulic fracturing operations as part of the study recommended in the report of the 1996 review. (STRONGER Guidelines, Section 9.3.)

**Response:**

The COGCC is studying land application of drilling waste in accordance with Rule 907 and its relationship with Naturally Occurring Radioactive Materials (NORM) in the DJ Basin. Staff has collected samples of land applied materials, stockpiled drill cuttings and background soils and is evaluating the analytical results. The analytical results will be compared to data from Colorado Department of Health and Environment's solid waste unrestricted use criteria for Technologically-Enhanced, Naturally Occurring Radioactive Material (TENORM). A report summarizing the study will be prepared for the Commissioners and will be presented at a regularly scheduled hearing.

## LOUISIANA

### **Recommendation 9.2.1.2:**

The review team recommends that, in order to protect groundwater, the Office of Conservation should consider the depth of the USDW and the depths of any saline or productive zones, in addition to the total depth of the well, in setting surface casing requirements.

### **Response:**

At the time of the issuance of a permit to drill, the Office of Conservation sends a fresh water protection letter to the applicant specifying the depth of the USDW at the site. Included are the requirements for the setting of sufficient casing and cement to protect the fresh water sands, or provisions for alternatives such as the use of a cementing collar around the production string at the fresh water-salt water contact.

Through a joint effort by representatives from the regulatory agency, industry, and the academic sector, proposed regulations have been developed to establish additional requirements. The proposed regulations are in the process of being codified and promulgated.

### **Recommendation 9.2.1.3:**

The review team recommends that the Office of Conservation develop cement standards to meet anticipated pressures and protect other resources and the environment. (STRONGER Guidelines, Section 9.2.1.)

### **Response:**

At the time of the issuance of a permit to drill, the Office of Conservation sends a fresh water protection letter to the applicant specifying the depth of the USDW at the site. Included are the requirements for the setting of sufficient casing and cement to protect the fresh water sands, or provisions for alternatives such as the use of a cementing collar around the production string at the fresh water-salt water contact.

Through a joint effort by representatives from the regulatory agency, industry, and the academic sector, proposed regulations have been developed to establish additional requirements addressing volume of cement, testing and verification of placement. The proposed regulations are in the process of being codified and promulgated.

**Recommendation 9.2.1.4:**

The review team recommends that the Office of Conservation develop casing standards to meet anticipated pressures and protect other resources (including treatable groundwater) and the environment. (STRONGER Guidelines, Section 9.2.1.)

**Response:**

Through a joint effort by representatives from the regulatory agency, industry, and the academic sector, proposed regulations have been developed to establish additional requirements. The proposed regulations are in the process of being codified and promulgated.

**Recommendation 9.2.1.5:**

The review team recommends that the State of Louisiana develop contingency planning and spill risk management procedures for hydraulic fracturing which meet the requirements of Section 4.2.1 of the STRONGER guidelines. (STRONGER Guidelines Section 9.2.1.)

**Response:**

Regulatory management of this environmental aspect and oversight parallels current LADEQ regulation, and thus was referred to LADEQ for response.

**Recommendation 9.2.2.2:**

The review team recommends that reporting should include the identification of materials used, aggregate volumes of fracturing fluids and proppant used, and fracture pressures recorded. (STRONGER Guidelines Section 9.2.2.)

**Response:**

The Louisiana hydraulic fracturing disclosure regulation, effective October 20, 2011, requires operators to report all additives used in hydraulic fracturing fluids and the names and concentrations of chemicals which are subject to Occupational Safety and Health Administration (OSHA) Hazard Communication requirements (29 CFR 1910.1200) and are not deemed trade secret. Disclosure can be made by reporting directly to the Office of Conservation or via the FracFocus website.

**Recommendation 9.2.3.2:**

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

**Response:**

Training modules regarding drilling, completion and production have been provided to the respective District office management to supplement their training material for the Conservation Enforcement Specialists (field staff) under their supervision, although the job description and work requirements of the field staff are more closely associated with physical site conditions, equipment integrity and productivity assessments. The technical aspects of hydraulic fracturing technology are managed by the technical staffs within the respective District offices and shared with field staff as required in performance of their duties.

## OHIO

### **Recommendation 9.2.1:**

DMRM is in the beginning stages of revising Chapter 1501:9 of the OAC 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.)

### **Response:**

During the past five years, the ODNR has worked diligently with the Ohio General Assembly, the regulated industry, and our sister agencies (OEPA, ODH, and ODOT) to amend the regulatory framework for exploration and development of oil and gas resources in Ohio. From June 30, 2010, when Sub. S.B. 165 became effective, to present, five significant bills have been passed adding 22 new sections to Chapter 1509 of the ORC (45 % increase) while 33 other sections have been amended at least once. The majority of these amendments are substantive changes that address important issues involving the protection of public health, safety and the environment; ranging from pre-drill water sampling, chemical disclosure, and wellbore integrity, to waste recycling. These amendments are directly or indirectly related to hydraulic fracturing stimulation. Attachment A is a topical summary of amendments that are related to hydraulic fracturing stimulations.

Some of these amendments to oil and gas law authorize or require the Chief to elaborate on statutory authority through subsequent rule- makings. The DOGRM has adopted new standards for well construction and wellbore integrity that are essential to protecting groundwater resources during and after hydraulic fracturing stimulations. During FY 2014, ODNR began to draft rules on a variety of important topics, including horizontal well site construction practices, secondary containment, discharge reporting, and emergency response.

### **Recommendation 9.2.4:**

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

### **Response:**

Substitute H.B. 59 (effective September 29, 2013) requires the owner of a well to determine the concentration level of radium in representative samples of

material defined as TENORM. TENORM must be transported and disposed in accordance with applicable rules enacted by the Ohio Department of Health and the Ohio Environmental Protection Agency. The owner of a solid waste facility is prohibited from accepting TENORM without first obtaining analytical results, or if the concentration of radium exceeds specified levels. The law authorized the Director of the Department of Health to establish rules regarding maintenance of TENORM testing and disposal records. The law also authorized the Director of Ohio EPA to adopt rules regarding the receipt, processing, handling, management and disposal of TENORM at solid waste facilities, as well as monitoring for radionuclides in leachate from solid waste facilities. The Chief of DOGRM has entered into a MOU with the Ohio Department of Health that authorizes the Chief of DOGRM to transfer funds for ODH technical assistance such as advice appropriate methods for collection and analysis of representative samples

**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.)

**Response:**

The DOGRM has drafted a rule pertaining to secondary containment related to producing operations including hydraulic fracturing stimulations. The draft rule that was under development at the time of the 2011 STRONGER review of the Ohio program has been further amended to address spill containment at multi-staged hydraulic fracturing stimulations that are conducted at horizontal wells associated with the new Utica/Point Pleasant Play and Marcellus development. The DOGRM is planning to post the draft rule to begin the information stakeholder review and comment process during 2014.

**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.)

**Response:**

The draft secondary containment regulations mandate reporting of spills and discharges to the DOGRM, including discharges of chemicals or fluids generated for or by hydraulic fracturing stimulations, in addition to other

required notifications. The regulated industry typically provides notice to the DOGRM even in the absence of a specific rule standard.

**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 MSDS. MSDS do not always contain the chemical constituents for a product. Also, the state should ensure that necessary 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.)

**Response:**

Amended Substitute Senate Bill 315 (effective September 10, 2012) effectively amended Ohio's chemical disclosure law relative to chemical additives in hydraulic fracturing fluids. Section 1509.10 of the ORC now requires owners to disclose all chemical additives used in hydraulic fracturing stimulations to FRAC FOCUS, or an alternative reporting system approved by the Chief within 60 days after completion operations. In addition, owners must continue to submit MSDSs for all new chemical products used during hydraulic fracturing stimulations that are not listed on our comprehensive, web-based MSDS library.

**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.)

**Response:**

Inspectors are receiving on the jobsite training by witnessing multiple stages of hydraulic fracturing stimulations and by reviewing summary reports including pump rate and pressure graphs. Fracturing technology is discussed in monthly regional inspector meetings. On November 13, 2013, all DOGRM field staff received eight hours of cement training provided by Glen Benge, a distinguished expert and the former chair of API's cement standards committee.

**Recommendation 9.3.1:**

In light of the anticipated development of the Marcellus and Utica shale 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.) Recycling of flowback is not prohibited.

**Response:**

Amended Substitute Senate Bill 315, effective September 10, 2012, established requirements for permit applicants to provide information on anticipated water withdrawal sources and volumes and estimated recycled water volumes. The ODNR Division of Soil and Water Resources requires persons who withdraw more than 100,000 gallons per day to register and report water withdrawals.

**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 shale. (STRONGER Guidelines Section 9.3.)

**Response:**

Substitute House Bill 59, effective September 2013, authorizes waste recycling facilities by order, or permit after January 1, 2014. Section 1509 of the ORC, authorizes the Chief to adopt rules regarding brine treatment and recycling facilities. The DOGRM is planning to post the draft rule to begin the informal stakeholder review and comment during 2014.

Topical Summary of Ohio Statute Amendments Pertaining to  
Hydraulic Fracturing Stimulations (2010 – 2014)

Attachment A

1. Agency organization/authority

- Re-established a separate division with singular focus and sole responsibility to permit and regulate oil and gas exploration and production including inspection and documentation of hydraulic fracturing stimulations. As a result, agency employees no longer split time enforcing rules for multiple mineral industries.
- Grants the division sole and exclusive authority to regulate production operations including hydraulic fracturing stimulations.
- Authorizes the Chief to enter into cooperative agreements with other state agencies for advice and consultation. For example, the Chief has entered an MOU with the Ohio Department of Health to provide consultation and advice pertaining to management of wastes that are TENORM that may originate from solids removal

during recycling of hydraulic fracturing flow-back fluids or disposal at Class II injection wells.

## 2. Agency funding

- Increased existing fees and established new fees to improve agency funding.
- The increased revenue has enabled the agency to triple its staff from 37 in 2010 to 110 in 2014.
- One of the most successful new fees is the new brine disposal fee assessed on each barrel (42 gallons) of brine (including flow-back wastewaters) injected at a Class II disposal well. Over 50 percent of the brine disposed at Class II wells in Ohio originates from wastewaters generated after hydraulic fracturing stimulations in neighboring Pennsylvania and West Virginia. This fee has enabled the agency to significantly increase the UIC Program staff.

## 3. Unitization Agreements

- Established a \$10,000 fee for a unitization application. Unitization agreements are necessary to assemble the acreage for multi-well drilling operations from a common pad.

## 4. Permitting

- Requires the applicant for a permit to drill a horizontal well to identify the proposed source of ground and surface water to be used in production operations (including drilling and hydraulic fracturing stimulation operations) at each well, the identification of the watershed, and estimated volume of water withdrawal.
- Requires the applicant to provide the estimated volume of recycled water that will be used in production operations (including drilling and well stimulation operations).
- Requires the Chief to post on the Division website a notice of all approved oil and gas well permits within two business days after approval.

## 5. Insurance thresholds

- Requires the owner of a horizontal well to obtain liability insurance coverage of at least \$5M to pay for damages for property or injury to persons. All horizontal wells are stimulated by hydraulic fracturing.
- Increased minimum insurance requirements for owners of urban wells from \$600,000 to \$3 million. Most urban wells are stimulated by hydraulic fracturing.

## 6. Road maintenance

- Requires the applicant for a horizontal well permit to submit a copy of a Road Use Maintenance Agreement signed by the local jurisdictional authority that establishes the terms for maintenance, upgrading and safe use of roads used for access to and egress from a well site, or an affidavit attesting good faith efforts to negotiate such an agreement. These roads can be used to transport the large volumes of equipment and water used during multi-staged hydraulic fracturing operations.
- Requires the Directors of ODNR and ODOT to jointly prepare a report, with input from statewide organizations and local jurisdictions that analyze the effectiveness of RUMAs, with recommendations for improvements by March 10, 2014.

## 7. Pad construction

- Requires the Division to conduct a site review prior to commencement of horizontal well site (pad and access road) construction.
- Requires the permittee to notify the Division inspector prior to commencement of horizontal well site construction.
- Requires the Chief to enact rules regarding horizontal well sites including pad and access road construction. Pads must be properly constructed to support the weight of equipment and materials used during multi-staged hydraulic fracturing operations.

## 8. Pre-activity notifications

- Permittees are required to notify the Division inspector at least 24 hours in advance of all casing cement jobs and commencement of all hydraulic fracturing operations.
- Ohio requires more pre-activity notifications than any state or federal oil and gas regulatory authority in the United States.

#### **9. Pre-permit determination inspections**

- The Division is required to conduct an inspection prior to:
  - 1) Issuance of a permit at an urban site;
  - 2) Issuance of permit at a horizontal well site;
  - 3) Issuance of a permit to drill in a 100-year floodplain;
  - 4) Issuance of a permit to drill in a five-year time of travel wellhead protection area;
  - 5) Permitting a Class II injection well.
- Draft horizontal well site construction rules require a site inspection to evaluate the suitability of the site for the proposed pad and access road and to consider terms and conditions that may need to be applied to an approval order. The Division is required to conduct more pre-permit determination site inspections than any other federal or state oil and gas regulatory agency in the United States.

#### **10. Pre-drill water sampling**

- The applicant for a permit to drill a vertical well in an urban area must provide the analytical results from sampling water wells within 300 feet of the proposed well location prior to the commencement of drilling.
- The applicant for a permit to drill a horizontal well must provide the analytical results from sampling water wells within 1,500 feet of the proposed well location prior to the commencement of drilling.

#### **11. Well construction**

- Modernizes well construction objectives, requiring that all wells are constructed in a manner that accomplishes the following objective:

- 1) Support unconsolidated materials and prevent wellbore collapse;
  - 2) Isolate and protect all USDWs;
  - 3) Provide a base for a blowout preventer;
  - 4) Control well pressures during all phases of operation from drilling through stimulation;
  - 5) Isolate gas-bearing flow zones to prevent sustained annular over-pressurization;
  - 6) Isolate corrosive zones.
  - 7) Isolate the target hydrocarbon reservoir during and after hydraulic fracturing stimulations.
- Authorizes the Chief to enact rules that establish standards and procedures to meet these statutorily mandated objectives. These rules were enacted effective August 1, 2012.

#### **12. Defective construction**

- Requires immediate notification of a Division inspector upon detection of defective construction such as annular circulation during a hydraulic fracturing stimulation.

#### **13. Wellbore integrity**

- Requires annular pressure monitoring during stimulation operations and immediate cessation of operations if there are indications of lost integrity such as abnormal annular pressure increase or annular circulation of fluids.

#### **14. Freshwater impoundments**

- Authorizes the Chief to specify requirements by rule governing the location and construction of freshwater impoundments that are constructed to supply water for oil and gas drilling operations or hydraulic fracturing stimulations.

#### **15. Hydraulic fracturing**

- Requires owners to notify the Division inspector prior to commencement of hydraulic fracturing operations.

- Requires that wells be stimulated in a manner that will not endanger USDWs.
- Requires continuous monitoring of annular pressures throughout stimulation operations to assess wellbore integrity.
- Mandates cessation of stimulation operations if there are indications of wellbore integrity failure such as abnormal annular pressure or annular fluid circulation.
- Requires immediate notification of Division inspector if cemented production casing does not effectively contain all pumped stimulation fluids.
- Requires owner to submit detailed records documenting hydraulic fracturing stimulations including job logs, invoices, and pumping pressure and rate charts.
- Requires owners to contain “flowback” wastewater in steel tanks or properly constructed, lined pits.

#### **16. Chemical disclosure (stimulations)**

- Requires owners to disclose chemical additives used in hydraulic fracturing stimulations to FRAC FOCUS, or an alternative reporting system approved by the Chief within 60 days after completion of stimulation operations.
- Requires the owner to disclose by additive: supplier, trade name, chemical names, CAS numbers and maximum concentration of each chemical.
- Requires the owner to immediately disclose the identity of proprietary chemical additives upon verbal request by a medical professional or to the Chief of DOGRM.

#### **17. Trade secrets**

- Allows the owner or supplier to withhold chemical names, CAS numbers, and purpose for additives that are designated as trade secrets.

#### **18. Trade secret challenges**

- Property owners and adjacent property owners may challenge trade secret claims by filing a civil action in the court of common pleas in Franklin County
- The owner must disclose the identity, CAS number and concentration of any trade secret protected additive upon request by the Chief in the event of a spill, release or investigation.

#### **19. Public accessibility**

- All chemical additive information is publically available by well at the FRAC FOCUS website maintained by the GWPC and IOGCC.
- All well completion reports, invoices, pump and rate charts, and job summaries are scanned and posted on the Division's website.
- All MSDS for chemical additives are posted on the Division's website.
- The Division makes more records and data associated with hydraulic fracturing stimulations publicly available than any other federal or state program in the United States.

#### **20. Brine (including flow-back fluid) disposal/injection**

- Increases the fee for a Class II injection well permit from \$100 to \$1,000.
- Authorizes the Chief to adopt rules requiring electronic, quarterly reporting of brine by source and volume.

#### **21. Brine (including flow-back fluid) transportation**

- Expands registration requirements for brine transporters.
- Authorizes the Chief to adopt rules that establish procedures for electronic submittal of daily brine transportation logs.

#### **22. Brine treatment/recycling**

- Requires a person who stores, recycles, treats, processes or disposes brine or other waste substances to have such operations authorized by order or permit after January 1, 2014.
- Requires the Chief to adopt rules regarding recycling, treatment, and processing of brine.

- Establishes a \$2,500 permit application fee for brine recycling and treatment facilities.

### **23. Road spreading**

- Prohibits use of water produced during the flowback phase of stimulation, including all waste water from horizontal shale wells, from being spread on a road for dust or ice control. As before, road spreading is subject to minimum statewide standards, and must be approved by the local road jurisdiction via resolution after a public meeting.

### **24. TENORM**

- Defines TENORM and NORM.
- Requires the owner of a well to determine the concentration level of radium in representative samples of material if it is technologically enhanced naturally occurring radiation material (TENORM).
- Requires TENORM to be transported and disposed in accordance with applicable laws enacted by ODH and OEPA.
- Prohibits the owner of a solid waste facility from accepting TENORM without first obtaining analytical results, and if the concentration of radium exceeds specified levels.
- Authorizes the Director of EPA to adopt rules regarding receipt, processing, handling, management and disposal of TENORM as solid waste facilities. Rules must include procedures for monitoring leachate and groundwater for radionuclides.
- Requires Director of ODH to establish rules regarding maintenance of TENORM testing and disposal records.

### **25. Waste water impoundments**

- Authorizes the use of lined impoundments to store waste substances (brine) subject to Division standards established by rule.

### **26. Records submittal**

- Requires owners to submit all logs and casing cement tickets no later than 60 days after cementing.
- Owner must file a well completion record within 60 days after completion of drilling that includes summary stimulation data.
- Owners must submit well stimulation invoices, job logs, pumping pressure and rate graphs by stage in addition to summary information on well completion records. (Ohio requires more information for well stimulations than any state or federal regulatory agency.)

## OKLAHOMA

### **Recommendation 9.2.1.4:**

OCC rules should be amended to include a definition of hydrologically sensitive areas or to provide appropriate reference to such a definition. (STRONGER Guidelines, Section 9.2.1.)

### **Response:**

The OGCD has written a definition of hydrologically sensitive areas. It is now included in our definitions section 165:10-1-2.

### **Recommendation 9.2.2.1:**

Although the review team considered this to be sufficient for meeting the intent of the STRONGER guidelines for wells being drilled, notice should be given to the OGCD for wells to be fractured that have been in production. (STRONGER Guidelines Section 9.2.2.)

### **Response:**

The OGCD has modified our rules to now require all wells to be fractured stimulated, new or existing, to give notice to the OGCD. This can be found in 165:10-3-10(b).

### **Recommendation 9.2.2.2:**

The review team recommends that OGCD, as part of the conversion of its data management system to RBDMS, revise the well completion form to include individual fields for reporting aggregate volumes of fracturing fluids and proppant used, the fracture pressures recorded, pressure behind the casing and hydraulic fracture materials used. (STRONGER Guidelines Section 9.2.2)

### **Response:**

The OGCD has modified the completion report Form 1002A to included fracture fluids, volume, proppant amounts. Due to budget constraints all of the modifications to RBDMS have not been fully completed.

### **Recommendation 9.2.3.1:**

The review team recommends that the State of Oklahoma develop a more stable source of funding for the OGCD and provide resources to allow the filling of positions and provision of equipment to a level that is sufficient to meet program responsibilities. (STRONGER Guidelines, Section 9.2.3.)

**Response:**

The OGCD has made strides to improve funding sources by obtaining legislative approval to receive a portion of the state petroleum excise tax. However, a state that is heavily dependent on revenues generated by the oil and gas industry much more work needs to be pursued in this area.

**Recommendation 9.2.3.2:**

The review team recommends that the OCC provide resources to allow existing OGCD staff the opportunity to receive specialized training related to hydraulic fracturing and to properly train new staff to equip them to properly do their job. (STRONGER Guidelines, Section 9.2.3.)

**Response:**

The OGCD places a high priority on education and training, however funding streams that do not allow for a dependable funding source from one fiscal year to the next still remains a major hindrance on this issue.

## PENNSYLVANIA

### **Recommendation on Pending Rulemaking:**

DEP has developed proposed rulemaking to amend 25 Pa. Code Chapter 78 to strengthen its regulatory requirements. On May 17, 2010, the Environmental Quality Board adopted the amendments as Proposed Rulemaking and published the changes on July 10, 2010 for a 30-day public comment period.

The Proposed Rulemaking requires that operators prepare a casing and cementing plan and keep it on site during well construction for review by DEP. The Proposed Rulemaking also requires that a cement job log, that documents the actual procedures and specifications of the cementing operation, be maintained by the operator. The Proposed Rulemaking also addresses blow-out prevention equipment requirements, centralizers, areas where alternate methods are required, lost circulation, and intermediate and production casing.

The review team recommends that DEP finalize its Proposed Rulemaking in a manner that provides at least the levels of protection that were presented by the BOGM during the review.

### **Response:**

This recommendation has been complied with by publication of the final rules on February 2011.

### **Recommendation on Baseline Surveys:**

The review team recommends that the Commonwealth consider whether there are areas or situations in which risk factors, such as the absence of confining rock layers or the presence of potential pathways for fluid movement into groundwater, establish a basis for encouraging more extensive baseline groundwater quality testing.

The review team also noted that DEP has not required operators to identify potential conduits for fluid migration (such as active and abandoned wells) in the area of hydraulic fracturing. The review team recommends that DEP consider whether there are areas or situations in which wells (active and abandoned) in the vicinity of hydraulic fracturing operations provide pathways for fluid movement into groundwater. In such areas or situations, DEP should require operators to identify and eliminate these potential pathways for fluid movement into groundwater before conducting hydraulic fracturing operations.

**Response:**

In 2012, the Pennsylvania legislature extended the presumption of liability for water supply impacts from 1,000 feet to 2,500 feet from the vertical unconventional wellbore and from 6 months from the completion of drilling to 12 months after hydraulic fracturing. As a result, companies routinely test water supplies beyond the 2,500 presumptive liability zone.

As part of new regulation revisions that will be enacted in 2016, DEP's regulations will require a comprehensive review of active, abandoned, orphaned and plugged wells prior to the drilling of any new unconventional wells to determine the potential for environmental impact. This new requirement would have applied to conventional wells but the Pennsylvania legislature struck down all new regulations governing the conventional oil and gas industry.

**Recommendation on Casing and Cementing Plans:**

The review team recommends that the depth of surface casing be added to the well drilling permit application so that BOGM can assure that groundwater protection concerns are addressed.

**Response:**

DEP has not accepted this recommendation at this time, as criteria for determining deepest useable fresh groundwater in Pennsylvania have not been established.

**Recommendation on Chemical Information Availability:**

The review team recommends that the Commonwealth of Pennsylvania adopt provisions necessary to assure that information on chemical constituents used in fracturing fluids is available to medical personnel in the event of a medical emergency related to hydraulic fracturing.

**Response:**

This information is required to be maintained at the wellsite during hydraulic fracturing, reported to FracFocus and reported to DEP on the driller's well completion report.

**Recommendation on Prior Notification of Hydraulic Fracturing Operations:**

The review team recommends that DEP require notification prior to hydraulic fracturing operations. DEP should have the opportunity to conduct inspections at critical stages, including during hydraulic fracturing and flowback.

**Response:**

24 hour notification prior to hydraulic fracturing is now required due to statutory updates made in 2012.

**Recommendation on Pit Construction:**

The review team recommends that, during the next round of rulemaking, procedures for inspecting pit construction or a certification process for pit construction, that includes pit bottom preparation and liner placement, should be considered. The review team further recommends that secondary containment requirements be established for tanks used in hydraulic fracturing operations.

**Response:**

New regulations for unconventional wells will ban pits for unconventional wells. Legislative enactments in 2012 require secondary containment at all unconventional well sites during all phases of operations. Conventional wells are currently exempt from these requirements.

**Recommendation 9.2.1.1:**

The review team recommends that DEP identify a standardized methodology to ensure that sampling and analysis for gas content in water is done consistently. (STRONGER Guidelines Section 9.2.1.)

**Response:**

This work is still on going with industry partnership.

**Recommendation 9.2.1.5:**

The review team recommends that DEP finalize its Proposed Rulemaking to include the requirement to keep a copy of the PPC plan at the well site during drilling and completion activities so that specific chemical information can be obtained during an investigation.

**Response:**

This recommendation has been fulfilled.

**Recommendation 9.2.1.8:**

The review team recommends that the proposed amendments, when finally adopted, should clearly address hydraulic fracturing of wells with open hole completion to assure that the annular space above the packer does not fill with fluid to the point that groundwater could be impacted. The operator should make a demonstration through monitoring of the annulus or other acceptable method that fluid does not escape the well bore. (STRONGER Guidelines Section 9.2.1.)

**Response:**

This recommendation has not been addressed.

**Recommendation 9.2.1.12:**

The review team recommends that DEP determine a way to track complaints and investigations related to hydraulic fracturing. (STRONGER Guidelines Section 9.2.1.)

**Response:**

DEP will develop a comprehensive water supply complaint tracking system that will identify and be able to report on the suspected causes, locations and resolutions of all water supply complaints in 2016.

**Recommendation 9.3.1:**

The review team recommends that DEP provide the opportunity for broader public comment during the water management planning process. (STRONGER Guidelines Section 9.3.)

**Response:**

This recommendation has not been complied with.

**Recommendation 9.3.3:**

The review team recommends that DEP work closely with the river basin commissions to incentivize the use of AMD-impacted waters and other wastewater resources through streamlined permitting and inter-basin transfers. (STRONGER Guidelines Section 9.3.)

**Response:**

This recommendation has been met. DEP has developed a paper on the use of AMD impacted water and worked with the Susquehanna River Basin Commission to allow the exportation of impacted water outside the Commission boundaries.