

Notice of Final Rulemaking
Department of Environmental Protection
Environmental Quality Board
25 Pa. Code, Chapter 78
Oil and Gas Well Cementing and Casing

Order

The Environmental Quality Board (Board) by this order amends 25 Pa. Code, Chapter 78 (relating to oil and gas well requirements) as set forth in Annex A.

Properly constructed and operated oil and gas wells are critical to protecting water supplies and public safety. If a well is not properly cased and cemented, natural gas in subsurface formations may potentially migrate from the wellbore through bedrock and soil. This stray gas may adversely affect water supplies, as well as accumulate in or adjacent to structures such as residences and water wells. Under certain conditions, stray gas has the potential to cause a fire or explosion. These situations present a serious threat to public health and safety as well as the environment. The purpose of this final rulemaking is to improve drilling, casing, cement, testing, monitoring and plugging requirements for oil and gas wells to minimize gas migration and protect water supplies.

The final form rulemaking differs from the proposed rulemaking in several important respects. The differences reflect the concerns raised by the regulated community and the public, resulting in an improved rule. The changes to the final form rulemaking strengthen well design requirements to prevent gas migration incidents.

The significant revisions to the final form rulemaking include: the addition of a provision that requires operators to have a pressure barriers plan to minimize well control events; the addition of a provision that requires operators to keep a list of emergency contact phone numbers at the well site; amended provisions that clarify how and when blow-out prevention equipment is to be installed and operated; the addition of a provision that requires operators to condition the wellbore to ensure an adequate bond between the cement, casing and the formation; the addition of provisions that require the use of centralizers to ensure that casings are properly positioned in the wellbore; the addition of a provision that improves the quality of the cement placed in the casing that protects fresh groundwater; the addition of provisions that specify the actions an operator must take in the event of a gas migration incident; and revisions to the reporting requirements for chemicals used to hydraulically fracture a well.

This order was adopted by the Board at its meeting of _____ (blank)_____.

A. Effective Date

These amendments will go into effect upon publication in the *Pennsylvania Bulletin* as final rulemaking.

B. Contact Persons

For further information contact Scott R. Perry, Director, Bureau of Oil and Gas Management, Rachel Carson State Office Building, 5th Floor, P.O. Box 8765, Harrisburg, PA 17105-8461, (717) 772-2199; or Elizabeth A. Nolan, Assistant Counsel, Bureau of Regulatory Counsel, Rachel Carson State Office Building, 9th Floor, P.O. Box 8464, Harrisburg, PA 17105-8464, (717) 787-7060. Persons with a disability may use the AT&T Relay Service by calling (800) 654-5984 (TDD users) or (800) 654-5988 (voice users). This final form rulemaking is available on the Department of Environmental Protection's website at <http://www.dep.state.pa.us>

C. Statutory Authority

The final form rulemaking is being made under the authority of Section 604 of the Oil and Gas Act (58 P.S. § 601.604), which directs the Board to adopt regulations necessary to implement the Act, and Section 1917-A and 1920-A of the Administrative Code (71 P.S. §§ 510-17 and 510-20). Section 1917-A authorizes and requires the Department to protect the people of this Commonwealth from unsanitary conditions and other nuisances, including any condition that is declared to be a nuisance by any law administered by the Department. Section 1920-A authorizes the Board to promulgate regulations of the Department.

D. Background of the Amendments

Many of the regulations governing well construction and water supply replacement were promulgated in July 1989 and remained largely unchanged until this rulemaking. Since that time, recent advances in drilling technology have attracted interest in producing natural gas from the Marcellus Shale, a rock formation that underlies approximately two-thirds of Pennsylvania. New well drilling and completion practices now employed to extract natural gas from the Marcellus Shale and other similar shale formations in Pennsylvania, as well as several recent incidents of contaminated drinking water caused by traditional and Marcellus Shale wells resulted in the Department's decision to re-evaluate the existing well construction requirements.

It was determined that the existing regulations were not specific enough in detailing the Department's expectations of a properly cased and cemented well, especially in light of the new techniques used by Marcellus Shale operators. The Department also determined that the existing regulations did not address the need for an immediate response by operators to a gas migration complaint and did not require routine inspection of existing wells by the operator.

The final rulemaking contains revised design, construction, operational, monitoring, plugging, water supply replacement, and hydraulic fracturing reporting requirements. The final rulemaking also provides material specifications and performance testing to ensure the proper casing, cementing and operation of a well. Additionally, the final rulemaking contains new provisions that require routine inspection of wells and outline the actions an operator and the Department must take in the event of a gas migration incident.

The proposed rulemaking was published in the *Pennsylvania Bulletin* on July 10, 2010. See 40 *Pa.B.* 3845 (July 10, 2010). The public comment period closed on August 9, 2010. In addition,

five public hearings were held: July 19, 2010, in Tunkhannock, PA; July 21, 2010, in Williamsport, PA; July 22, 2010, in Meadville, PA; July 22, 2010, in Pittsburgh, PA; and July 26, 2010, in Pittsburgh, PA.

Prior to recommending that the proposed regulations be offered to the Environmental Quality board, the Oil and Gas Technical Advisory board (TAB) formed a technical subcommittee with representatives from various companies, trade groups and consultants to review and provide comments on the proposed rulemaking. The Department met with TAB and this subcommittee on October 28, 2009, January 14, 2010, January 21, 2010 and March 25, 2010.

The Department presented the draft final form rulemaking to TAB on September 16, 2010. During this discussion, TAB members made several recommendations regarding the definition of unconventional formations, use of blow-out preventers, cementing the intermediate casing, producing gas off the intermediate casing, and the actions the operator must take when it loses circulation of cement. At the conclusion of the meeting, TAB members were not able to endorse nor disapprove the rulemaking and instead expressed an interest in having the TAB subcommittee review the amendments to the final form rulemaking.

E. Summary of Comments and Responses

The Board received approximately 2,000 comments regarding the proposed Oil and Gas Well Casing and Cementing regulations during the public hearings and public comment period. Many of the comments received sought clarification or additional protective measures. The majority of comments were supportive of the proposal.

Several commentators made suggestions seeking to clarify the definition of “deepest fresh groundwater, including suggesting that the term be defined with reference to certain levels of total dissolved solids (TDS) ranging from 500 to 10,000 mg/l TDS. The Board appreciated these comments, but decided that numerical criteria should not be used to define deepest fresh groundwater because many water supplies provide water that exceed the 500 mg/l drinking water standard, but 10,000 mg/l is far too saline for Pennsylvania drinking water supplies. It is critical that the casing be set deep enough to isolate usable water supplies but not so deep that brine be permitted to co-mingle with fresh groundwater. It is also important to recognize that testing water produced during drilling will not yield accurate test results. For these reasons, the final form rulemaking has been amended to require operators to identify how the deepest fresh groundwater was determined and record the information in the casing and cementing plan.

Many commentators sought clarification regarding the provisions that require an operator who affects a water supply to restore or replace the affected water supply with an alternate supply adequate in quantity and quality for the purposes served by the supply. The amendments to § 78.51 reflect the Department’s interpretation of an adequate alternate water supply according to recent caselaw.

Several commentators suggest that all replaced or restored water should meet safe drinking water standards. The Board deems a supply adequate if it meets safe drinking water standards or is comparable to the unaffected water supply if that water supply didn’t meet those standards.

A commentator was uncertain about who would determine reasonable foreseeable uses. The regulation states that it is the duty of the Department to determine if the operator is in compliance with this subsection.

Additionally, several commentators were concerned that § 78.51(h) did not provide a timely response for affected water supplies. The Board agrees and amends § 78.51(h) to require operators to notify the Department within 24 hours of receiving a report that a water supply has been affected by pollution or diminution caused by drilling activities.

Several commentators objected to the provisions that would allow the use of used pipe. The Board considers used casing to be acceptable in certain applications, notably in low pressured shallow oil wells that do not produce gas. In these instances, used casing has been utilized successfully and has been shown to be suitable for long-term use in these applications. All used casing, however, is subject to the casing integrity requirement of § 78.84(b), as well as new requirements for pressure testing in § 78.84(c).

Many commentators suggested amendments to § 78.85(b) that would require a 72-hour compressive strength standard of at least 1,200 psi across critical zones of cement at the bottom of the casing seat where the highest pressures and stresses are likely to be encountered and in places where the well bore passes through aquifers and drinking water. The Board agrees and has amended §78.85(b) to require a zone of critical cement at the surface casing seat which must achieve a 72-hour compressive strength of 1200 psi and have a free-water separation of no more than six milliliters per 250 milliliters of cement.

Several commentators suggest that the cement ticket include testing of pH, temperature, and a record of the wait on cement time. The Board agrees and the regulation has been revised accordingly.

Some commentators objected to the quarterly mechanical integrity inspections required by §78.88(a), arguing that the requirement is excessive. While several commentators believed that quarterly inspections were not enough, other commentators supported § 78.88(a) quarterly inspection requirements. The Board has decided that quarterly inspections are sufficient to ensure that well pressures are within allowable limits and the casing is structurally sound. The Board does not consider quarterly mechanical integrity testing to be excessive. Rather, the inspections provide the operator an opportunity to correct problems at the well before such problems create a condition that will require significant time and expense to address. The Board has also determined that required evaluation of the well does not include invasive procedures.

Several commentators made suggestions to § 78.89 regarding the gas migration response requirements, including a provision requiring immediate notification to the Department. The Board agrees and has amended the final form rulemaking to require the operator to immediately conduct an investigation and contact the Department.

Commentators suggested that operators conduct an initial response action to determine the nature of the incident, assess the potential for hazards to public health and safety, and mitigate any hazard posed by the concentration of stray natural gas in the environment. Commentators

suggested what the investigation include a site visit and an interview of the complainant. Commentators suggested that the actions that an operator must take in the event of a reported gas migration incident be delineated by the concentration of combustible gas detected in the investigation. Commentators also suggested other additional investigation and mitigation measures that operators should be required to take, including a field survey, the collection of gas and/or water samples, the establishment of monitoring locations, and an evaluation of the operator's adjacent wells. Commentators also suggested certain reporting requirements following a reported gas migration incident. The Board agrees with many of the commentators suggestions and has revised § 78.89. These changes largely follow the commentators' suggestions. The revisions also require continued monitoring of gas migration complaints where the levels of dissolved methane in the water supply exceed 7 milligrams per liter. This level is based on 25% of the capacity of water to contain dissolved methane under one atmosphere of pressure. This number is much more certain and scientifically based than the unknown "background" level proposed by the commentator.

Commentators suggested that the information required in the completion report's stimulation record be expanded to require more specific information, including information regarding the chemical additives used and a the chemicals listed in the operator's Material Safety Data Sheets by Chemical Abstract Number. Other commentators object to requirements that require operators to submit confidential information and suggest that the issue of confidentiality be addressed in § 78.122. The Board has expanded the stimulation record requirements in subsection §78.122(b)(6) to include the Chemical Abstract Number for each Material Safety Data Sheet-listed hydraulic fracturing chemical used, as well as the percent (by volume) of each listed chemical used. The Board has also amended this subsection allowing the designation of confidential or trade secret information. The Department shall prevent disclosure of such designated confidential information to the extent permitted by the Right To Know Law, 65 P.S. 67.101 et seq.

F. Summary of Final Form Regulation and Changes from Proposed to Final Form Rulemaking

§ 78.1. Definitions.

Section 78.1 amends the definitions of the following terms to improve clarity or to explain new or existing provisions: "casing seat," "cement" and "surface casing." Section 78.1 also adds definitions for the following terms to explain new or existing provisions within Chapter 78: "cement job log," "conductor pipe" and "intermediate casing."

The final form rulemaking amends the following definitions listed above in response to public comment to improve clarity: "casing seat," "cement job log," "intermediate casing" and "surface casing."

Section 78.1 removes the definition of "retrievable" and inserts the substantive portion of the definition into the appropriate plugging regulations.

The final form rulemaking § 78.1 adds definitions for “L.E.L” and “unconventional formation.”

§ 78.51. Protection of water supplies.

The Oil and Gas Act requires an operator who affects a water supply by pollution or diminution as a result of gas or oil well drilling to restore or replace the affected water supply. Section 78.51 reflects current caselaw regarding an operator’s duty to replace or restore a water supply.

Section 78.51(d)(2) provides that a restored or replaced water supply must meet safe drinking water standards. If the pre-contamination water supply did not meet safe drinking water standards, the operator must restore or replace the contaminated water supply with a supply that is comparable to the water supply that existed prior to contamination.

Section 78.51(d)(1)(v) requires the operator to provide permanent payment for any increased cost to operate or maintain the restored or replaced water supply. Sections 78.51(d)(3)(i) and 78.51(d)(3)(ii) clarify that the replaced or restored water supply must be able to satisfy the water user’s needs.

The final form rulemaking modifies proposed § 78.51 (d) to provide uniform terms and add clarity and amends § 78.51(h), in response to public comment, providing that an operator who receives notice that a water supply has been affected by pollution or diminution must notify the Department within twenty-four hours of receiving that notice.

§ 78.52 Predrilling or prealteration survey.

Section 78.52(d) provides that an operator must provide the Department and the landowner or water purveyor with the results of their predrilling survey within ten business days of receiving the survey results. The final form rulemaking establishes that survey results not received within ten days may not be used to preserve the operator’s defenses under § 601.208(d)(1) of the Oil and Gas Act.

§ 78.55. Control and disposal plan.

Section 78.55(b) of the final form rulemaking establishes that an operator’s control and disposal plan must include a pressure barrier policy identifying the pressure barriers to be used during identified well drilling and completion operations. The final form rulemaking section 78.55(e) provides that an operator’s control and disposal plan must also contain a list of emergency contact phone numbers and that this list must also be displayed at the well site.

Section 78.55(d) of the final form rulemaking establishes that an operator’s control and disposal plan must be available at the well site during well drilling and completion operations.

§ 78.71. Use of safety devices—well casing.

Section 78.71(a) clarifies that the well control equipment must be attached to casing that is cemented in place.

§ 78.72. Use of safety devices—blow-out prevention equipment.

Section 78.72(a) of the final form rulemaking clarifies when blow-out equipment must be used. The final form rulemaking specifies that blow-out equipment must be used when drilling a well intending to produce from an unconventional formation and when drilling out solid core hydraulic fracturing plugs to complete a well.

Section 78.72(c) establishes that controls for the blow-out preventer must be accessible in case of an emergency. The final form rulemaking §78.72(c) specifies that controls for a blow-out preventer with a high pressure rating must be located at least 50 feet away from the drilling rig to assure accessibility in the event of loss of well control.

Section 78.72 (f) was amended to clarify when drilling must cease when blow-out prevention equipment is discovered to be in poor working order.

Section 78.72(h) of the final form rulemaking establishes that an individual with specified certifications must be at the well site when blow-out prevention equipment is being used and that those certifications must be available at the well site.

The final form rulemaking adds § 78.72(i), establishing that pressure barriers must be comprised of at least two mechanical pressure barriers between the open producing formation and the atmosphere. Additionally, these mechanical pressure barriers must be capable of being tested according to the manufacturers' specifications prior to operation. Moreover, if the operator has only one pressure barrier, operations must cease until additional pressure barriers are added or repaired and tested.

The final form rulemaking § 78.72(j) establishes that a hydraulic workover unit must be used during post-completion cleanout operations in unconventional formations.

The final form rulemaking specifies that intermediate casing must be cemented to surface, and now allows blow-out preventers to be attached to surface casing without regard to its length.

§ 78.73. General provision for well construction and operation.

Sections 78.73(a) and 78.73(b) further clarify that the well must be constructed and operated in a manner that protects public health and safety and the environment.

§ 78.73(c) reduces the allowable pressure that may be exerted on the surface and coal protective casing seats. The final form rulemaking clarifies how to calculate the pressure that must not be exceeded on the surface and coal protective casings. The final form rulemaking specifies that the pressure on the surface or coal protective casing seats is determined by

measuring the surface shut-in pressure and the surface producing back pressure exerted on the surface or coal protective casing.

Section 78.73(e) was added in the proposed rulemaking, requiring excess gas encountered during drilling to be flared, captured or diverted away from the drilling rig. Section 78.73(f) was also added in the proposed rulemaking, requiring check flow valves that prevent backflow from the pipelines into the well.

§ 78.75a. Area of alternative methods.

The Oil and Gas Act provides that the Department may approve alternative methods for the casing, plugging or equipping of a well. Section 78.75a, added in the proposed rulemaking, establishes procedures by which the Department may on its own initiative designate an area of alternative methods – an area that requires alternative drilling, casing, equipping, or plugging methods to operate the well in a safe and environmentally protective manner. Establishing such an area requires notice in the Pennsylvania Bulletin and an opportunity for the public to comment.

§ 78.81. General provisions.

Section 78.81(c), which stated that certain sections of the regulation do not apply to production or intermediate casings, is deleted to reflect new casing requirements.

§ 78.82. Use of conductor pipe.

The final form rulemaking § 78.82 clarifies that conductor pipe is used to stabilize the top hole of a well and must be driven into place or cemented from the seat to the surface to prevent the infiltration of water or other fluids into the subsurface.

§ 78.83 Surface and coal protective casing and cementing procedures.

Section 78.83(a) prohibits the use of surface casing as production casing and requires an additional string of casing to be installed in a well unless the well is only used to produce oil that does not present a threat to groundwater or if the operator of a gas well demonstrates that all gas and fluids will be contained in the well and installs a working pressure gauge that can be inspected by the Department.

The final form rulemaking deletes § 78.83(c), which gave operators the ability to drill to producing zones prior to isolating the fresh groundwater under certain circumstances, and adds a new § 78.83(c), requiring the use of air or freshwater based fluids when drilling through the fresh groundwater zone. Additionally, final form rulemaking § 78.83(c) specifies that the surface casing must be set fifty feet below the deepest fresh groundwater or at least fifty feet into consolidated rock, but not more than 200 feet below the deepest fresh groundwater unless necessary to set the casing in consolidating rock. The final form rulemaking also establishes that the wellbore must be conditioned prior to cementing.

The final form rulemaking amends §§ 78.83(c), (f), (g) and (i), mandating the use of centralizers to position the surface casing, coal protective casing, and any additional fresh groundwater casings in the wellbore. Subsections (f) and (i) have been further amended to require the additional water string to be cemented to the surface as opposed to 20 feet into the surface or coal protective casing.

§ 78.83a. Casing and cementing plan.

Section 78.83a establishes that operators must develop a casing and cementing plan that is available for the Department to review at the well site. The plan must describe the casing to be used and the cementing practices to be employed. The Department may request a copy of the plan for review and approval prior to drilling.

The final form rulemaking amends § 78.83a(a)(1) and (a)(6), specifying that the operator must include in its casing and cementing plan the method or information by which the depth of the deepest fresh groundwater was determined and the proposed wellbore conditioning procedures.

§ 78.83b. Casing and cementing—lost circulation.

Section 78.83b(a), added on proposed rulemaking, requires operators to notify the Department when cement used to protect fresh groundwater is not returned to the surface despite pumping more than 120% of the estimated required volume. If cement is not returned to the surface, the operator must determine the top of the cement and additional casing must be run and cemented, unless the well only produces oil off a vented production pipe if approved by the Department. Final form rulemaking § 78.83b(a)(1) clarifies what the operator must do when this happens and what additional measures must be taken.

The final form rulemaking adds § 78.83b(b) which provides that, in the event of lost circulation, the operator may, in addition to § 78.83a(a)'s requirements, pump additional cement through a pour string from the surface to fill the annular space.

§ 78.83c. Intermediate and production casing.

Section 78.83c, added on proposed rulemaking, specifies the cementing requirements for intermediate and production casing and establishes the pressure limitation for wells that produce gas off the annulus of the intermediate casing string.

The final form rulemaking adds a new § 78.83c(a) to require the intermediate and production borehole to be prepared prior to cementing.

The final form rulemaking amends § 78.83c(b) to mandate the use of centralizers when cementing the intermediate casing and requires the intermediate casing to be cemented to the surface.

The final form rulemaking amends § 78.83(c) to mandate the use of centralizers when cementing the production casing and further specifies how much cement must be used to cement production casing.

§ 78.84. Casing standards.

The substantial amendments to § 78.84 require specified pressure ratings or pressure testing for different types of casings. Final form rulemaking § 78.84(d)(3) clarifies the certification requirements for a person welding casing.

The final form rulemaking § 78.84(f) clarifies that if the casing attached to the blow-out preventer has a pressure rating of greater than 3,000 psi, it must be pressure tested after it is cemented. To pass this pressure test, the casing must be able to hold the anticipated maximum pressure to which the casing will be exposed for thirty minutes with not more than a ten percent decrease.

§ 78.85. Cement standards.

Section 78.85 provides additional standards for well casing cement, as well as references to ASTM International and American Petroleum Institute standards.

The final form rulemaking amends § 78.85(a)(4) and deletes proposed § 78.85(a)(5), clarifying that cement must protect the casing from corrosion and degradation, including that the cement used for coal protective casing must be formulated to withstand elevated sulfate concentrations in the surrounding wellbore. The final form rulemaking new § 78.85(a)(5) specifies that gas block additives and low fluid loss slurries must be used in areas of known shallow gas producing zones.

The final form rulemaking amends § 78.85(b) by adding requirements regarding surface casing cement. This subsection specifies that the cement at the bottom 300 feet of the surface casing constitutes a zone of critical cement, meaning that the cement in this zone must achieve a seventy-two hour compressive strength of 1,200 psi and the free water separation must not be more than six milliliters per 250 milliliters of cement.

The final form rulemaking amends § 78.85(c) by clarifying the actions that are prohibited during the mandatory eight-hour wait time on the cement for all casings.

The final form rulemaking § 78.85(f) specifies the information that must be included in the operator's cement job log.

§ 78.88. Mechanical integrity of operating well.

Section 78.88, added on proposed rulemaking, requires operators to inspect their wells at least quarterly for signs of physical degradation in addition to determining whether the pressure in the well is within allowable limits. Wells that fail inspection must be attended to immediately and the Department must be notified.

§ 78.89. Gas migration response.

Section 78.89 is substantially amended in the final form rulemaking to specify the actions an operator must take in the event of a gas migration incident. Section 78.89(a) of the final form rulemaking requires an operator to conduct an investigation immediately after it is notified or otherwise made aware of a potential gas migration incident to assess the nature of the incident, assess any potential hazards, and mitigate any hazards. Section 78.89(b) of the final form rulemaking specifies that the investigation must consist of a site visit, an interview of the complainant, a field survey, and if necessary, monitoring locations must be established. If the operator detects a high concentration of combustible gas inside a building or structure, the final-form rulemaking § 78.89(c) establishes that the operator must immediately notify the Department and local emergency response agencies, initiate mitigation measures and conduct further investigation and monitoring of the surrounding area.

Section 78.89(d) of the final form rulemaking specifies that if sustained detectable concentrations of combustible gas are detected at certain specified levels, the operator must notify the Department and take measures to ensure public health and safety. If the operator conducts an investigation and is not required to take the measures outlined in §§78.89(c) or (d), § 78.89(f) requires the operator to conduct additional monitoring, document its findings, and submit a report.

The final form rulemaking adds § 78.89(e) which establishes that the Department may require the operator to take additional investigative and monitoring measures in the event of a reported natural gas migration incident. The final form rulemaking §§ 78.89(g)-(i) provide additional notification and reporting requirements.

§§ 78.92–78.95. Plugging.

Sections 78.92–78.95 incorporate the substantive requirements of the eliminated definition of “retrievable” along with requiring an additional attempt to remove uncemented casing prior to plugging a well. The revised sections also require cement to be placed across the formerly producing formation as opposed to placing the cement plug on top of the formation as is the current requirement.

§ 78.96. Marking the location of a plugged well.

Section 78.96(a) permits the use of materials other than cement and metal to mark and hold a marker for a plugged well.

§ 78.121. Well record and completion report.

Section 78.121 incorporates the requirements of Act 15 of 2010 which mandate semi-annual production reporting of Marcellus Shale wells. In § 78.121(a), the dates are amended to reflect Act 15’s requirements. Because Act 15 also requires the Department to post the production of Marcellus Shale wells on the Department’s website, § 78.121(b) is amended to require that the production reports be submitted electronically.

§ 78.122. Well record and completion report.

Section 78.122(a)(10) requires the operator to certify that the well has been properly constructed. The final form rulemaking amends § 78.122(b)(6), requiring the operator to submit additional information in its completion report's stimulation record, including a descriptive list of the chemical additives used in the stimulation fluid, the percent by volume of those chemical additives, a list of the hazardous chemicals used in the stimulation fluid, the percent by volume of those hazardous chemicals, the total volume of water used and a list of the water sources used pursuant to an approved water management plan. The final form rulemaking § 78.122(c) provides that a well operator may designate any trade secrets or confidential proprietary information in the completion report and the Department will prevent disclosure of confidential information to the extent permitted by the Right to Know Law, 65 P.S. 67.101 *et seq.* Additionally, § 78.122(d) specifies that the operator must maintain records of every chemical used to hydraulically fracture the well and provide those records to the Department upon request.

G. Benefits, Costs and Compliance

Benefits

Both the residents of this Commonwealth and the regulated community will benefit from this regulation

The public will benefit in several ways. The updated casing and cementing requirements will provide an increased degree of protection for homeowners and both public and private water supplies. The construction standards will align Pennsylvania's regulations with other states' rules as well as current industry standards. Pressure testing the casing and testing surface casing seats will detect construction deficiencies before a well could create a potential safety or environmental problem. Minimizing annular pressure will reduce the potential for gas migration. The new quarterly inspections and annual reporting will be a vital tool for operators to use in detecting potential safety or environmental impacts before they may become an issue. The proposed regulations also outline the procedures the operator and the Department will utilize if there is a reported gas migration incident.

The new construction standards and the well remediation measures will far outweigh the liability to the operator from the potential impacts to public safety and harm to the environment from gas migration or from polluting water resources that may result without these additional precautions. As new areas of the Commonwealth are developed for natural gas, these proposed regulations will avoid many potential health, safety and environmental issues.

Compliance Costs

This rulemaking will impose minimal additional cost on the Department. This proposal will help the Department offset potential health, safety and environmental issues.

The Department finds that most gas migration issues stem from inadequate cementing procedures, cement returns, or combinations of inadequate casing and cementing or over-pressured casing seats. Because many of the Marcellus Shale well operators meet or exceed the current well casing and cementing regulations, any increased cost associated with drilling and operating oil and gas wells will be minimal. All of the potential increases in cost to an operator will be associated with assuring a well is properly completed, operated and plugged.

The potential increase in cost is minor when compared to the overall cost of well construction. Where cement is not returned to the surface or when excessive pressure is placed on the surface casing seat, the revised regulations require the operator to install an additional string of casing. The construction cost for the additional string of casing is about \$10,000 per well.

Some commentators questioned the Department's estimate for the additional string of casing, stating that the cost of an additional casing string is much more than \$10,000 per well, and is more likely on the order of \$300,000 to \$500,000 per well, depending on depth and area. The commentators stated that if the additional string of casing is justified from a technical standpoint, then it is the correct course of action. But nowhere do the proposed regulations provide a technical justification for an additional casing string.

The added expense described by the commentators does not apply to situations where cement is not returned to the surface. Where production casing is run and set on a packer or casing is set 50 feet deeper than the surface casing, the Department's estimate is sound. Instead, the scenario described more directly relates to the Board's decision to prohibit operators from comingling fresh groundwater with brine by setting very deep surface casing. By setting deep surface casing, operators avoid using deeper intermediate casing and costly cement and cementing practices.

The proposed casing design advocated by the commentators has resulted in several recent gas migration cases in Pennsylvania. These gas migration cases threaten the lives and safety of the citizens of the Commonwealth. The Board did not consider the expense of an intermediate string of casing when it crafted the regulations because the casing design advocated by the commentator results in an unlawful condition. Prohibiting gas migration is the cornerstone of these regulations and compromising on the issue to save money on a necessary string of casing is not acceptable.

Used casing, welded casing and casing attached to a blow-out preventer must be pressure tested to demonstrate its ability to withstand the highest anticipated working pressures to which the casing will be exposed. If the casing fails this test, the operator must repair or replace the casing and ultimately pass the pressure test. The cost to repair or replace the defective casing is completely outweighed by the environmental damage that would result from a failed string of casing and the fact that the casing would still need to be repaired or replaced.

The typical cost to develop a Marcellus Shale well is around \$5,000,000. The additional cost of compliance would only be approximately 0.2% of the overall cost to develop a Marcellus Shale well.

The typical cost to develop a shallow gas well is \$250,000 and the typical cost to develop an oil well is \$200,000. In either situation, the additional cost of compliance would only be approximately 4% to 5% of the overall cost of the well.

All of the additional measures are proposed to reduce the potential for gas migration. If an operator fails to prevent a pollution event of a water supply, the anticipated cost to permanently replace one private water supply would be approximately \$4,000 to drill a new water well or \$30,000 to provide and permanently pay for a treatment system.

Compliance Assistance Plan

The Department has worked extensively with representatives from the regulated community and leaders the several trade organizations. The requirements of this regulation are, therefore, well known.

The Department, however, several scheduled training sessions for the regulated community to address the Department's regulatory requirements. The Department will use these training sessions as an opportunity to further education the industry about the new requirements.

Paperwork Requirements

The annual well inspection report, the semi-annual production report mandated by Act 15 for operators of Marcellus Shale wells and the additional information required in the completion report will require submittal of two additional forms and additional information on an existing form. The results of gas migration investigations will also require additional reporting obligations.

H. Pollution Prevention

The Federal Pollution Prevention Act of 1990 established a national policy that promotes pollution prevention as the preferred means for achieving state environmental protection goals. The Department encourages pollution prevention, which is the reduction or elimination of pollution at its source, through the substitution of environmentally friendly materials, more efficient use of raw materials, or the incorporation of energy efficiency strategies. Pollution prevention practices can provide greater environmental protection with greater efficiency because they can result in significant cost savings to facilities that permanently achieve or move beyond compliance. This regulation has incorporated the following pollution prevention provisions and incentives:

This regulation will minimize gas migration and will provide an increased degree of protection for both public and private water supplies by updating material specifications and performance testing as well as adding more specific design, construction, operational an monitoring requirements. The plugging, water supply replacement, and gas migrations reporting regulations have been amended to ensure that public safety and groundwater are protected.

I. Sunset Review

This regulation will be reviewed in accordance with the sunset review schedule published by the Department to determine whether the regulation effectively fulfills the goals for which it was intended.

J. Regulatory Review

Under section 5(a) of the Regulatory Review Act (71 P.S. § 745.5(a)), on June 25, 2010, the Department submitted a copy of the notice of proposed rulemaking, published at 40 *Pa.B.* 3845, to the Independent Regulatory Review Commission (IRRC) and the Chairpersons of the House and Senate Environmental Resources and Energy Committees for review and comment.

Under section 5(c) of the Regulatory Review Act, IRRC and the Committees were provided with copies of the comments received during the public comment period, as well as other documents when requested. In preparing these final form regulations, the Department has considered all comments from IRRC, the Committees and the public.

Under section 5.1(j.2) of the Regulatory Review Act, on ___ (blank) ___, these final form regulations were deemed approved by the House and Senate Committees. Under section 5.1(e) of the Regulatory Review Act, IRRC met on ___ (blank) ___ and approved the final form regulations.

K. Findings of the Board

The Board finds that:

- (1) Public notice of proposed rulemaking was given under sections 201 and 202 of the act of July 31, 1968 (P.L. 769, No. 240) (45 P.S. §§ 1201 and 1202) and regulations promulgated thereunder at *1 Pennsylvania Code* §§ 7.1 and 7.2.
- (2) A public comment period was provided as required by law, and all comments were considered.
- (3) These regulations do not enlarge the purpose of the proposal published at 40 *Pa.B.* 3845.
- (4) These regulations are necessary and appropriate for administration and enforcement of the authorizing acts identified in Section C of this order.

L. Order of the Board

The Board, acting under the authorizing statutes, orders that:

- (1) The regulations of the Department of Environmental Protection, *25 Pennsylvania Code*, Chapter 78 are amended to read as set forth in Annex A.

(2) The Chairperson of the Board shall submit this order and Annex A to the Office of General Counsel and the Office of Attorney General for review and approval as to legality and form, as required by law.

(3) The Chairperson of the Board shall submit this order and Annex A to the Independent Regulatory Review Commission and the Senate and House Environmental Resources and Energy Committees as required by the Regulatory Review Act.

(4) The Chairperson of the Board shall certify this order and Annex A and deposit them with the Legislative Reference Bureau, as required by law.

(5) This order shall take effect immediately upon publication in the *Pennsylvania Bulletin*.

BY:

JOHN HANGER
Chairperson
Environmental Quality Board