

RULES AND REGULATIONS

Title 25—ENVIRONMENTAL PROTECTION

ENVIRONMENTAL QUALITY BOARD

[25 PA. CODE CH. 78]

Oil and Gas Wells

The Environmental Quality Board (Board) amends Chapter 78 (relating to oil and gas wells) to read 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-form 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 improved regulations. 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 following: 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 shall 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 October 12, 2010.

A. *Effective Date*

This final-form rulemaking will go into effect upon publication in the *Pennsylvania Bulletin*.

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 Pennsylvania AT&T Relay Service, (800) 654-5984 (TDD users) or (800) 654-5988 (voice users). This final-form rulemaking is available on the Department of Environmental Protection's (Department) web site at <http://www.depweb.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 (act) (58 P. S. § 601.604), which directs the Board to adopt regulations necessary to implement the act, and sections 1917-A and 1920-A of The Administrative Code of 1929 (71 P. S. §§ 510-17 and 510-20). Section 1917-A of The Administrative Code of 1929 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 of The Administrative Code of 1929 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 final-form 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 2/3 of this Commonwealth. New well drilling and completion practices now employed to extract natural gas from the Marcellus Shale and other similar shale formations in this Commonwealth, as well as several recent incidents of contaminated drinking water caused by traditional and Marcellus Shale wells resulted in the Department's decision to reevaluate 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-form rulemaking contains revised design, construction, operational, monitoring, plugging, water supply replacement and hydraulic fracturing reporting requirements. The final-form rulemaking also provides material specifications and performance testing to ensure the proper casing, cementing and operation of a well. Additionally, the final-form rulemaking contains new provisions that require routine inspection of wells and outline the actions an operator and the Department will take in the event of a gas migration incident.

The proposed rulemaking was published at 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 Board, the Oil and Gas Technical Advisory Board (TAB) formed a technical subcommittee with repre-

sentatives from various companies, trade groups and consultants to review and provide comments on the proposed rulemaking. The Department met with TAB and the technical subcommittee on October 28, 2009, January 14, 2010, January 21, 2010 and March 25, 2010.

The Department presented the draft final-form rulemaking to the 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 shall take when it loses circulation of cement. At the conclusion of the meeting, TAB members were neither 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 proposed rulemaking.

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 drinking water supplies in this Commonwealth. It is critical that the casing be set deep enough to isolate usable water supplies but not so deep that brine be permitted to come in contact 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 (relating to protection of water supplies) reflect the Department's interpretation of an adequate alternate water supply according to recent case law.

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 in § 78.84(b) (relating to casing standards), as well as new requirements for pressure testing in § 78.84(c).

Many commentators suggested amendments to § 78.85(b) (relating to cement standards) 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 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 1,200 psi and have a free-water separation of no more than 6 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 under § 78.88(a) (relating to mechanical integrity of operating wells), arguing that the requirement is excessive. While several commentators believed that quarterly inspections were not enough, other commentators supported the quarterly inspection requirements in § 78.88(a). The Board 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 the problems create a condition that will require significant time and expense to address. The Board also determined that required evaluation of the well does not include invasive procedures.

Several commentators made suggestions to § 78.89 (relating to gas migration response), regarding gas migration response requirements, including a provision requiring immediate notification to the Department. The Board agrees and 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 that the investigation include a site visit and an interview of the complainant. Commentators suggested that the actions that an operator shall 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 or water, or both, 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 revised § 78.89. These changes largely follow the commentators' suggestions. The revisions also require continued monitoring of gas migration complaints when 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 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 (relating to well record and completion report). The Board expanded the stimulation record requirements in § 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 also amended this subsection allowing the designation of confidential or trade secret information. The Department will prevent disclosure of the designated confidential information to the extent permitted under the Right-to-Know Law (65 P. S. §§ 67.101—67.3103).

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 in response to public comment to improve clarity: "casing seat," "cement job log," "intermediate casing" and "surface casing."

The definition of the term "retrievable" has been deleted. The substantive portion of the term has been added to the appropriate plugging regulations.

Definitions for "L.E.L" and "unconventional formations" have also been added to § 78.1.

§ 78.51. *Protection of water supplies*

The 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 case law 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 precontamination water supply did not meet safe drinking water standards, the operator shall 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. Section 78.51(d)(3)(i) and (ii) clarifies 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 shall notify the Department within 24 hours of receiving that notice.

§ 78.52. *Predrilling or prealteration survey*

Section 78.52(d) provides that an operator shall provide the Department and the landowner or water purveyor with the results of their predrilling survey within 10 business days of receiving the survey results. The final-form rulemaking establishes that survey results not received within 10 days may not be used to preserve the operator's defenses under section 208(d)(1) of the act (58 P. S. § 601.208(d)(1)).

§ 78.55. *Control and disposal plan*

Final-form § 78.55(b) 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. Final-form § 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 shall also be displayed at the well site.

Final-form § 78.55(d) establishes that an operator's control and disposal plan shall 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*

Final-form § 78.72(a) clarifies when blow-out equipment shall be used. The final-form rulemaking specifies that blow-out equipment shall 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 shall be accessible in case of an emergency. Final-form § 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) is amended to clarify when drilling shall cease when blow-out prevention equipment is discovered to be in poor working order.

Final-form § 78.72(h) establishes that an individual with specified certifications shall be at the well site when blow-out prevention equipment is being used and that those certifications shall be available at the well site.

The final-form rulemaking adds § 78.72(i) to establish 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 shall cease until additional pressure barriers are added or repaired and tested.

Final-form § 78.72(j) establishes that a hydraulic workover unit shall be used during postcompletion 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

Section 78.73(a) and (b) further clarifies that the well shall be constructed and operated in a manner that protects public health and safety and the environment.

Final-form § 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) is added to require excess gas encountered during drilling to be flared, captured or diverted away from the drilling rig. Section 78.73(f) is added to require check flow valves that prevent backflow from the pipelines into the well.

§ 78.75a. Area of alternative methods

The act provides that the Department may approve alternative methods for the casing, plugging or equipping of a well. New § 78.75a 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 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 chapter did not apply to production or intermediate casings, is deleted to reflect new casing requirements.

§ 78.82. Use of conductor pipe

Final-form § 78.82 clarifies that conductor pipe is used to stabilize the top hole of a well and shall 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 new § 78.83(c) to require the use of air or freshwater based fluids when drilling through the

fresh groundwater zone. Additionally, final-form § 78.83(c) specifies that the surface casing must be set 50 feet below the deepest fresh groundwater or at least 50 feet into consolidated rock, but not more than 200 feet below the deepest fresh groundwater unless necessary to set the casing in consolidated rock. The final-form rulemaking also establishes that the wellbore shall be conditioned prior to cementing.

The final-form rulemaking amends § 78.83(c), (f), (g) and (i) to mandate 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 shall 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 (6) to specify that the operator shall 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 shall 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 § 78.83b(a)(1) clarifies what the operator shall do when this happens and what additional measures must be taken.

The final-form rulemaking adds § 78.83b(b) to provide that, in the event of lost circulation, the operator may, in addition to the requirements in § 78.83a(a), 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 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 § 78.83c(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 § 78.84(d)(3) clarifies the certification requirements for a person welding casing.

Final-form § 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 shall 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 30 minutes with not more than a 10% 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. New § 78.85(a)(5) specifies that gas block additives and low fluid loss slurries shall 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 72-hour compressive strength of 1,200 psi and the free water separation must not be more than 6 milliliters per 250 milliliters of cement.

The final-form rulemaking amends § 78.85(c) by clarifying the actions that are prohibited during the mandatory 8-hour wait time on the cement for all casings.

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

§ 78.88. *Mechanical integrity of operating wells*

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 shall be attended to immediately and the Department shall be notified.

§ 78.89. *Gas migration response*

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

Final-form § 78.89(d) specifies that if sustained detectable concentrations of combustible gas are detected at

certain specified levels, the operator shall 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 specified 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) to establish that the Department may require the operator to take additional investigative and monitoring measures in the event of a reported natural gas migration incident. Final-form § 78.89(g)—(i) provides additional notification and reporting requirements.

§§ 78.92—78.95

Sections 78.92—78.95 incorporate the substantive requirements of the deleted 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. *Production reporting*

Section 78.121 incorporates the requirements of the act of March 22, 2010 (P. L. 169, No. 15) (Act 15), which mandates semiannual production reporting of Marcellus Shale wells. In § 78.121(a), the dates are amended to reflect the requirements in Act 15. Because Act 15 also requires the Department to post the production of Marcellus Shale wells on the Department's web site, § 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) to require 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 or water used and a list of the water sources used under an approved water management plan. Final-form § 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. Additionally, § 78.122(d) specifies that the operator shall 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 final-form rulemaking.

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 the Commonwealth'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 final-form rulemaking also outlines 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 this Commonwealth are developed for natural gas, this final-form rulemaking will avoid many potential health, safety and environmental issues.

Compliance Costs

This final-form rulemaking will impose minimal additional cost on the Department. This final-form rulemaking 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. When cement is not returned to the surface or when excessive pressure is placed on the surface casing seat, the 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. The final-form rulemaking does not provide a technical justification for an additional casing string.

The added expense described by the commentators does not apply to situations when cement is not returned to the surface. When 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 this Commonwealth. These gas migration cases threaten the lives and safety of the citizens of this 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 shall 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 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 worked extensively with representatives from the regulated community and leaders the several trade organizations. The requirements of this final-form rulemaking are, therefore, well known.

The Department, however, scheduled several 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 educate the industry about the new requirements.

Paperwork Requirements

The annual well inspection report, the semiannual 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 Pollution Prevention Act of 1990 (42 U.S.C.A. §§ 13101—13109) 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 final-form rulemaking incorporates the following pollution prevention provisions and incentives:

This final-form rulemaking will minimize gas migration and 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 and 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

These regulations will be reviewed in accordance with the sunset review schedule published by the Department to determine whether the regulations effectively fulfill the goals for which they were 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 House and Senate Committees were provided with copies of the comments received during the public comment period, as well as other documents when requested. In preparing the final-form rulemaking, the Department has considered all comments from IRRC, the House and Senate Committees and the public.

Under section 5.1(j.2) of the Regulatory Review Act (71 P. S. § 745.5a(j.2)), on November 17, 2010, the final-form rulemaking was deemed approved by the House and Senate Committees. Under section 5.1(e) of the Regulatory Review Act, IRRC met on November 18, 2010, and approved the final-form rulemaking.

K. Findings

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, 1 Pa. 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 proposed rulemaking 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 preamble.

L. Order

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

(a) The regulations of the Department, 25 Pa. Code Chapter 78 are amended by amending §§ 78.1, 78.51, 78.52, 78.55, 78.71—78.73, 78.76, 78.81, 78.82, 78.83, 78.84, 78.85, 78.92—78.96, 78.121 and 78.122; and by

adding §§ 78.75a, 78.83a, 78.83b, 78.83c, 78.88 and 78.89 to read as set forth in Annex A, with ellipses referring to the existing text of the regulations.

(Editor's Note: The amendment of § 78.55 was not included in the proposed rulemaking at 40 Pa.B. 3845.)

(b) 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.

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

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

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

JOHN HANGER,
Chairperson

(Editor's Note: For the text of the order of the Independent Regulatory Review Commission relating to this document, see 40 Pa.B. 7000 (December 4, 2010).)

Fiscal Note: Fiscal Note 7-459 remains valid for the final adoption of the subject regulations.

Annex A

TITLE 25. ENVIRONMENTAL PROTECTION
PART I. DEPARTMENT OF ENVIRONMENTAL PROTECTION
Subpart C. PROTECTION OF NATURAL RESOURCES
ARTICLE I. LAND RESOURCES
CHAPTER 78. OIL AND GAS WELLS
Subchapter A. GENERAL PROVISIONS

§ 78.1. Definitions.

(a) The words and terms defined in section 103 of the act (58 P. S. § 601.103), section 2 of the Coal and Gas Resource Coordination Act (58 P. S. § 502), section 2 of the Oil and Gas Conservation Law (58 P. S. § 402), section 103 of the Solid Waste Management Act (35 P. S. § 6018.103) and section 1 of The Clean Stream Law (35 P. S. § 691.1), have the meanings set forth in those statutes when the terms are used in this chapter.

(b) The following words and terms, when used in this chapter, have the following meanings, unless the context clearly indicates otherwise:

* * * * *

Casing seat—The depth to which casing is set.

Cement—A mixture of materials for bonding or sealing that attains a 7-day maximum permeability of 0.01 millidarcies and a 24-hour compressive strength of at least 500 psi in accordance with applicable standards and specifications.

Cement job log—A written record that documents the actual procedures and specifications of the cementing operation.

* * * * *

Conductor pipe—A short string of large-diameter casing used to stabilize the top of the wellbore in shallow unconsolidated formations.

* * * * *

Intermediate casing—A string of casing set after the surface casing and before production casing, not to include coal protection casing, that is used in the wellbore to isolate, stabilize or provide well control.

* * * * *

L.E.L.—Lower explosive limit.

* * * * *

Reportable release of brine—Spilling, leaking, emitting, discharging, escaping or disposing of one of the following:

(i) More than 5 gallons of brine within a 24-hour period on or into the ground at the well site where the total dissolved solids concentration of the brine is equal or greater than 10,000 mg/l.

(ii) More than 15 gallons of brine within a 24-hour period on or into the ground at the well site where the total dissolved solids concentration of the brine is less than 10,000 mg/l.

Seasonal high groundwater table—The saturated condition in the soil profile during certain periods of the year. The condition can be caused by a slowly permeable layer within the soil profile and is commonly indicated by the presence of soil mottling.

* * * * *

Surface casing—A string or strings of casing used to isolate the wellbore from fresh groundwater and to prevent the escape or migration of gas, oil or other fluids from the wellbore into fresh groundwater. The surface casing is also commonly referred to as the water string or water casing.

* * * * *

Unconventional formations—Formations that typically produce gas through the use of enhanced drilling or completion technologies such as the Rhinestreet, Burket, Marcellus, Mandata and Utica Shale formations, or other formations identified by the Department.

* * * * *

Subchapter C. ENVIRONMENTAL PROTECTION PERFORMANCE STANDARDS

§ 78.51. Protection of water supplies.

(a) A well operator who affects a public or private water supply by pollution or diminution shall restore or replace the affected supply with an alternate source of water adequate in quantity and quality for the purposes served by the supply as determined by the Department.

(b) A landowner, water purveyor or affected person suffering pollution or diminution of a water supply as a result of drilling, altering or operating an oil or gas well may so notify the Department and request that an investigation be conducted. The notice and request must include the following:

- (1) The name, address and telephone number of the person requesting the investigation.
- (2) The type, location and use of the water supply.
- (3) Available background quality and quantity data regarding the water supply, if known.
- (4) Well depth, pump setting and water level, if known.

(5) A description of the pollution or diminution.

(c) Within 10 days of the receipt of the investigation request, the Department will investigate the claim and will, within 45 days of receipt of the request, make a determination. If the Department finds that pollution or diminution was caused by the drilling, alteration or operation activities or if it presumes the well operator responsible for polluting the water supply of the landowner or water purveyor under section 208(c) of the act (58 P. S. § 601.208(c)), the Department will issue orders to the well operator necessary to assure compliance with this section.

(d) A restored or replaced water supply includes any well, spring, public water system or other water supply approved by the Department, which meets the criteria for adequacy as follows:

(1) *Reliability, cost, maintenance and control.* A restored or replaced water supply, at a minimum, must:

- (i) Be as reliable as the previous water supply.
- (ii) Be as permanent as the previous water supply.
- (iii) Not require excessive maintenance.

(iv) Provide the water user with as much control and accessibility as exercised over the previous water supply.

(v) Not result in increased costs to operate and maintain. If the operating and maintenance costs of the restored or replaced water supply are increased, the operator shall provide for permanent payment of the increased operating and maintenance costs of the restored or replaced water supply.

(2) *Quality.* The quality of a restored or replaced water supply will be deemed adequate if it meets the standards established under the Pennsylvania Safe Drinking Water Act (35 P. S. §§ 721.1—721.17), or is comparable to the quality of the water supply before it was affected by the operator if that water supply did not meet these standards.

(3) *Adequate quantity.* A restored or replaced water supply will be deemed adequate in quantity if it meets one of the following as determined by the Department:

(i) It delivers the amount of water necessary to satisfy the water user's needs and the demands of any reasonably foreseeable uses.

(ii) It is established through a connection to a public water supply system that is capable of delivering the amount of water necessary to satisfy the water user's needs and the demands of any reasonably foreseeable uses.

(iii) For purposes of this paragraph and with respect to agricultural water supplies, the term reasonably foreseeable uses includes the reasonable expansion of use where the water supply available prior to drilling exceeded the actual use.

(4) *Water source serviceability.* Replacement of a water supply includes providing plumbing, conveyance, pumping or auxiliary equipment and facilities necessary for the water user to utilize the water supply.

(e) If the water supply is for uses other than human consumption, the operator shall demonstrate to the Department's satisfaction that the restored or replaced water supply is adequate for the purposes served by the supply.

(f) Tank trucks or bottled water are acceptable only as temporary water replacement for a period approved by

the Department and do not relieve the operator of the obligation to provide a restored or replaced water supply.

(g) If the well operator and the water user are unable to reach agreement on the means for restoring or replacing the water supply, the Department or either party may request a conference under section 501 of the act (58 P. S. § 601.501).

(h) A well operator who receives notice from a landowner, water purveyor or affected person that a water supply has been affected by pollution or diminution, shall report receipt of notice from an affected person to the Department within 24 hours of receiving the notice.

§ 78.52. Predrilling or prealteration survey.

(a) A well operator who wishes to preserve its defense under section 208(d)(1) of the act (58 P. S. § 601.208(d)(1)) that the pollution of a water supply existed prior to the drilling or alteration of the well shall conduct a predrilling or prealteration survey in accordance with this section.

(b) A person who wishes to document the quality of a water supply to support a future claim that the drilling or alteration of the well affected the water supply by pollution may conduct a predrilling or prealteration survey in accordance with this section.

(c) The survey shall be conducted by an independent certified laboratory. A person independent of the well owner or well operator, other than an employee of the certified laboratory, may collect the sample and document the condition of the water supply, if the certified laboratory affirms that the sampling and documentation is performed in accordance with the laboratory's approved sample collection, preservation and handling procedure and chain of custody.

(d) An operator electing to preserve its defenses under section 208(d)(1) of the act shall provide a copy of the results of the survey to the Department and the landowner or water purveyor within 10-business days of receipt of the results. Test results not received by the Department within 10 business days may not be used to preserve the operator's defenses under section 208(d)(1) of the act.

(e) The report describing the results of the survey must contain the following information:

- (1) The location of the water supply and the name of the surface landowner or water purveyor.
- (2) The date of the survey, and the name of the certified laboratory and the person who conducted the survey.
- (3) A description of where and how the sample was collected.
- (4) A description of the type and age, if known, of the water supply, and treatment, if any.
- (5) The name of the well operator, name and number of well to be drilled and permit number if known.
- (6) The results of the laboratory analysis.

(f) A well operator who wishes to preserve the defense under section 208(d)(2) of the act that the landowner or water purveyor refused the operator access to conduct a survey shall confirm the desire to conduct this survey and that access was refused by issuing notice to the person by certified mail, or otherwise document that access was refused. The notice must include the following:

- (1) The operator's intention to drill or alter a well.
- (2) The desire to conduct a predrilling or prealteration survey.
- (3) The name of the person who requested and was refused access to conduct the survey and the date of the request and refusal.
- (4) The name and address of the well operator and the address of the Department, to which the water purveyor or landowner may respond.

§ 78.55. Control and disposal plan.

(a) Prior to generation of waste, the well operator shall prepare and implement a plan under § 91.34 (relating to activities utilizing pollutants) for the control and disposal of fluids, residual waste and drill cuttings, including tophole water, brines, drilling fluids, additives, drilling muds, stimulation fluids, well servicing fluids, oil, production fluids and drill cuttings from the drilling, alteration, production, plugging or other activity associated with oil and gas wells.

(b) The plan must identify the control and disposal methods and practices utilized by the well operator and be consistent with the act, The Clean Streams Law (35 P. S. §§ 691.1—691.1001), the Solid Waste Management Act (35 P. S. §§ 6018.101—6018.1003) and §§ 78.54, 78.56—78.58 and 78.60—78.63. The plan must also include a pressure barrier policy that identifies barriers to be used during identified operations.

(c) The operator shall revise the plan prior to implementing a change to the practices identified in the plan.

(d) A copy of the plan shall be provided to the Department upon request and shall be available at the well site during drilling and completion activities for review.

(e) A list of emergency contact phone numbers for the area in which the well site is located must be included in the plan and be prominently displayed at the well site during drilling, completion or alteration activities.

**Subchapter D. WELL DRILLING, OPERATION AND PLUGGING
GENERAL**

§ 78.71. Use of safety devices—well casing.

(a) The operator shall equip the well with one or more strings of casing of sufficient cemented length and strength to attach proper well control equipment and prevent blowouts, explosions, fires and casing failures during installation, completion and operation.

(b) The operator shall determine the amount and type of casing to be run and the amount and type of cement to be used in accordance with current prudent industry practices and engineering. In making the determinations, the operator shall consider the following:

- (1) Successful local practices for similar wells.
- (2) Maximum anticipated surface pressure.
- (3) Collapse resistance.
- (4) Tensile strength.
- (5) Chemical environment.
- (6) Potential mechanical damage.

(7) Manufacturing standards, including American Petroleum Institute or equivalent specifications for pipe used in wells drilled below the Onondaga formation or where blow-out preventers are required.

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

(a) The operator shall use blow-out prevention equipment after setting casing with a competent casing seat in the following circumstances:

(1) When drilling a well that is intended to produce natural gas from an unconventional formation.

(2) When drilling out solid core hydraulic fracturing plugs to complete a well.

(3) When well head pressures or natural open flows are anticipated at the well site that may result in a loss of well control.

(4) When the operator is drilling in an area where there is no prior knowledge of the pressures or natural open flows to be encountered.

(5) On wells regulated by the Oil and Gas Conservation Law (58 P. S. §§ 401—419).

(6) When drilling within 200 feet of a building.

(b) Blow-out prevention equipment used must be in good working condition at all times.

(c) Controls for the blow-out preventer shall be accessible to allow actuation of the equipment. Additional controls for a blow-out preventer with a pressure rating of greater than 3,000 psi, not associated with the rig hydraulic system, shall be located at least 50 feet away from the drilling rig so that the blow-out preventer can be actuated if control of the well is lost.

(d) The operator shall use pipe fittings, valves and unions placed on or connected to the blow-out prevention systems that have a working pressure capability that exceeds the anticipated pressures.

(e) The operator shall conduct a complete test of the ram type blow-out preventer and related equipment for both pressure and ram operation before placing it in service on the well. The operator shall test the annular type blow-out preventer in accordance with the manufacturer's published instructions, or the instructions of a professional engineer, prior to the device being placed in service. Blow-out prevention equipment that fails the test may not be used until it is repaired and passes the test.

(f) When the equipment is in service, the operator shall visually inspect blow-out prevention equipment during each tour of drilling operation and during actual drilling operations test the pipe rams for closure daily and the blind rams for closure on each round trip. When more than one round trip is made in a day, one daily closure test for blind rams is sufficient. Testing shall be conducted in accordance with American Petroleum Institute publication API RP53, "API Recommended Practice for Blowout Prevention Equipment Systems for Drilling Wells," or other procedure approved by the Department. The operator shall record the results of the inspection and closure test in the drillers log before the end of the tour. If blow-out prevention equipment is not in good working order, drilling shall cease when cessation of drilling can be accomplished safely and not resume until the blow-out prevention equipment is repaired or replaced and retested.

(g) All lines, valves and fittings between the closing unit and the blow-out preventer stack must be flame resistant and have a rated working pressure that meets or exceeds the requirements of the blow-out preventer system.

(h) When a blowout preventer is installed or required under subsection (a), there shall be present on the well site an individual with a current certification from a well control course accredited by the International Association of Drilling Contractors or other organization approved by the Department. The certification shall be available for review at the well site. The Department will maintain a list of approved accrediting organizations on its web site.

(i) Well drilling and completion operations requiring pressure barriers, as identified by the operator under § 78.55(b) (relating to control and disposal plan), shall employ at least two mechanical pressure barriers between the open producing formation and the atmosphere that are capable of being tested. The mechanical pressure barriers shall be tested according to manufacturer specifications prior to operation. If during the course of operations the operator only has one functioning barrier, operations must cease until additional barriers are added and tested or the redundant barrier is repaired and tested. Stripper rubber or a stripper head may not be considered a barrier.

(j) A coiled tubing rig or a hydraulic workover unit with appropriate blowout prevention equipment must be employed during post completion cleanup operations in horizontal unconventional formations.

(k) The minimum amount of intermediate casing that is cemented to the surface to which blow-out prevention equipment may be attached, shall be in accordance with the following:

<i>Proposed Total Vertical Depth (in feet)</i>	<i>Minimum Cemented Casing Required (in feet of casing cemented)</i>
Up to 5,000	400
5,001 to 5,500	500
5,501 to 6,000	600
6,001 to 6,500	700
6,501 to 7,000	800
7,001 to 8,000	1,000
8,001 to 9,000	1,200
9,001 to 10,000	1,400
Deeper than 10,000	1,800

(l) Upon completion of the drilling operations at a well, the operator shall install and utilize equipment, such as a shut-off valve of sufficient rating to contain anticipated pressure, lubricator or similar device, as may be necessary to enable the well to be effectively shut-in while logging and servicing the well and after completion of the well.

§ 78.73. General provision for well construction and operation.

(a) The operator shall construct and operate the well in accordance with this chapter and ensure that the integrity of the well is maintained and health, safety, environment and property are protected.

(b) The operator shall prevent gas, oil, brine, completion and servicing fluids, and any other fluids or materials from below the casing seat from entering fresh groundwater, and shall otherwise prevent pollution or diminution of fresh groundwater.

(c) After a well has been completed, recompleted, reconditioned or altered the operator shall prevent surface shut-in pressure and surface producing back pressure

inside the surface casing or coal protective casing from exceeding the following pressure: 80% multiplied by 0.433 psi per foot multiplied by the casing length (in feet) of the applicable casing.

(d) After a well has been completed, recompleted, reconditioned or altered, if the surface shut-in pressure or surface producing back pressure exceeds the pressure as calculated in subsection (c), the operator shall take action to prevent the migration of gas and other fluids from lower formations into fresh groundwater. To meet this standard the operator may cement or install on a packer sufficient intermediate or production casing or take other actions approved by the Department. This section does not apply during testing for mechanical integrity in accordance with State or Federal requirements.

(e) Excess gas encountered during drilling, completion or stimulation shall be flared, captured or diverted away from the drilling rig in a manner that does not create a hazard to the public health or safety.

(f) Except for gas storage wells, the well must be equipped with a check valve to prevent backflow from the pipelines into the well.

§ 78.75a. Area of alternative methods.

(a) The Department may designate an area of alternative methods if the Department determines that well drilling requirements beyond those provided in this chapter are necessary to drill, operate or plug a well in a safe and environmentally protective manner.

(b) To establish an area of alternative methods, the Department will publish a notice in the *Pennsylvania Bulletin* of the proposed area of alternative methods and provide the public with an opportunity to comment on the proposal. After reviewing any comments received on the proposal, the Department will publish a final designation of the area and required alternative methods in the *Pennsylvania Bulletin*.

(c) Wells drilled within an area of alternative methods established under subsection (b) must meet the requirements specified by the Department unless the operator obtains approval from the Department to drill, operate or plug the well in a different manner that is at least as safe and protective of the environment as the requirements of the area of alternative methods.

§ 78.76. Drilling within a gas storage reservoir area.

(a) An operator proposing to drill a well within a gas storage reservoir area or a reservoir protective area to produce gas or oil shall forward by certified mail a copy of the well location plat, the drilling, casing and cementing plan and the anticipated date drilling will commence to the gas storage reservoir operator and to the Department for approval by the Department and shall submit proof of notification to the gas storage reservoir operator to the Department with the well permit application.

(b) The storage operator may file an objection with the Department to the drilling, casing and cementing plan or the proposed well location within 15 days of receipt of the notification and request a conference in accordance with section 501 of the act (58 P. S. § 601.501).

CASING AND CEMENTING

§ 78.81. General provisions.

(a) The operator shall conduct casing and cementing activities under this section and §§ 78.82—78.87 or an approved alternate method under § 78.75 (relating to

alternative methods). The operator shall case and cement a well to accomplish the following:

(1) Allow effective control of the well at all times.

(2) Prevent the migration of gas or other fluids into sources of fresh groundwater.

(3) Prevent pollution or diminution of fresh groundwater.

(4) Prevent the migration of gas or other fluids into coal seams.

(b) The operator shall drill through fresh groundwater zones with diligence and as efficiently as practical to minimize drilling disturbance and commingling of groundwaters.

§ 78.82. Use of conductor pipe.

If the operator installs conductor pipe in the well, the following provisions apply:

(1) The operator may not remove the pipe;

(2) Conductor pipe shall be installed in a manner that prevents the subsurface infiltration of surface water or fluids by either driving the pipe into place or cementing the pipe from the seat to the surface;

(3) Conductor pipe must be made of steel unless a different material is approved for use by the Department.

§ 78.83. Surface and coal protective casing and cementing procedures.

(a) For wells drilled, altered, reconditioned or recompleted after February 5, 2011, surface casing or any casing functioning as a water protection casing may not be utilized as production casing unless one of the following applies:

(1) In oil wells where the operator does not produce any gas generated by the well and the annulus between the surface casing and the production pipe is left open.

(2) The operator demonstrates that the pressure in the well is no greater than the pressure permitted under 78.73(c) (relating to general provision for well construction and operation), demonstrates through a pressure test or other method approved by the Department that all gas and fluids will be contained within the well, and installs a working pressure gauge that can be inspected by the Department.

(b) If the well is to be equipped with threaded and coupled casing, the operator shall drill a hole so that the diameter is at least 1 inch greater than the outside diameter of the casing collar to be installed. If the well is to be equipped with plain-end welded casing, the operator shall drill a hole so that the diameter is at least 1 inch greater than the outside diameter of the casing coupling.

(c) The operator shall drill to approximately 50 feet below the deepest fresh groundwater or at least 50 feet into consolidated rock, whichever is deeper, and immediately set and permanently cement a string of surface casing to that depth. Except as provided in subsection (f), the surface casing may not be set more than 200 feet below the deepest fresh groundwater except if necessary to set the casing in consolidated rock. The surface hole shall be drilled using air, freshwater, or freshwater-based drilling fluid. Prior to cementing, the wellbore shall be conditioned to ensure an adequate cement bond between the casing and the formation. The surface casing seat shall be set in consolidated rock. When drilling a new well or re-drilling an existing well, the operator shall install at least one centralizer within 50 feet of the casing

seat and then install a centralizer in intervals no greater than every 150 feet above the first centralizer.

(d) The operator shall permanently cement the surface casing by placing the cement in the casing and displacing it into the annular space between the wall of the hole and the outside of the casing.

(e) Where potential oil or gas zones are anticipated to be found at depths within 50 feet below the deepest fresh groundwater, the operator shall set and permanently cement surface casing prior to drilling into a stratum known to contain, or likely containing, oil or gas.

(f) If additional fresh groundwater is encountered in drilling below the permanently cemented surface casing, the operator shall document the depth of the fresh groundwater zone in the well record and protect the additional fresh groundwater by installing and cementing a subsequent string of casing or other procedures approved by the Department to completely isolate and protect fresh groundwater. The string of casing may also penetrate zones bearing salty or brackish water with cement in the annular space being used to segregate the various zones. Sufficient cement shall be used to cement the casing to the surface. The operator shall install at least one centralizer within 50 feet of the casing seat and then install a centralizer in intervals no greater than, if possible, every 150 feet above the first centralizer.

(g) The operator shall set and cement a coal protective string of casing through workable coal seams. The base of the coal protective casing shall be at least 30 feet below the lowest workable coal seam. The operator shall install at least two centralizers. One centralizer shall be within 50 feet of the casing seat and the second centralizer shall be within 100 feet of the surface.

(h) Unless an alternative method has been approved by the Department in accordance with § 78.75 (relating to alternative methods), when a well is drilled through a coal seam at a location where the coal has been removed or when a well is drilled through a coal pillar, the operator shall drill to a depth of at least 30 feet but no more than 50 feet deeper than the bottom of the coal seam. The operator shall set and cement a coal protection string of casing to this depth. The operator shall equip the casing with a cement basket or other similar device above and as close to the top of the coal seam as practical. The bottom of the casing must be equipped with an appropriate device designed to prevent deformation of the bottom of the casing. The interval from the bottom of the casing to the bottom of the coal seam shall be filled with cement either by the balance method or by the displacement method. Cement shall be placed on top of the basket between the wall of the hole and the outside of the casing by pumping from the surface. If the operator penetrates more than one coal seam from which the coal has been removed, the operator shall protect each seam with a separate string of casing that is set and cemented or with a single string of casing which is stage cemented so that each coal seam is protected as described in this subsection. The operator shall cement the well to isolate workable coal seams from each other.

(i) If the operator sets and cements casing under subsection (g) or (h) and subsequently encounters additional fresh groundwater zones below the deepest cemented casing string installed, the operator shall protect the fresh groundwater by installing and cementing another string of casing or other method approved by the Department. Sufficient cement shall be used to cement the casing to the surface. The additional casing string

may also penetrate zones bearing brackish or salt water, but shall be run and cemented prior to penetrating a zone known to or likely to contain oil or gas. The operator shall install at least one centralizer within 50 feet of the casing seat and then, if possible, install a centralizer in intervals no greater than every 150 feet above the first centralizer.

(j) If it is anticipated that cement used to permanently cement the surface casing cannot be circulated to the surface a cement basket may be installed immediately above the depth of the anticipated lost circulation zone. The casing shall be permanently cemented by the displacement method. Additional cement may be added above the cement basket, if necessary, by pumping through a pour string from the surface to fill the annular space. Filling the annular space by this method does not constitute permanently cementing the surface or coal protective casing under § 78.83b (relating to casing and cementing-lost circulation).

§ 78.83a. Casing and cementing plan.

(a) The operator shall prepare and maintain a casing and cementing plan showing how the well will be drilled and completed. The plan must demonstrate compliance with this subchapter and include the following information:

(1) The anticipated depth and thickness of any producing formation, expected pressures, anticipated fresh groundwater zones and the method or information by which the depth of the deepest fresh groundwater was determined.

(2) The diameter of the borehole.

(3) Casing type, whether the casing is new or used, depth, diameter, wall thickness and burst pressure rating.

(4) Cement type, yield, additives, and estimated amount.

(5) The estimated location of centralizers.

(6) The proposed borehole conditioning procedures.

(7) Alternative methods or materials as required by the Department as a condition of the well permit.

(b) The plan shall be available at the well site for review by the Department.

(c) Upon request, the operator shall provide a copy of the well-specific casing and cementing plan to the Department for review and approval.

(d) Revisions to the plan made as a result of onsite modification shall be documented in the plan and be available for review by the Department. The person making the revisions to the plan shall initial and date the revisions.

§ 78.83b. Casing and cementing—lost circulation.

(a) If cement used to permanently cement the surface or coal protective casing is not circulated to the surface despite pumping a volume of cement equal to or greater than 120% of the calculated annular space, the operator shall determine the top of the cement, notify the Department, and meet one of the following requirements as approved by the Department:

(1) Run an additional string of casing at least 50 feet deeper than the string where circulation was lost and cement the additional string of casing back to the seat of the string where circulation was lost and vent the annulus of the additional casing string to the atmosphere at all times unless closed for well testing or maintenance. Shut-in pressure on the casing seat of the additional

string of casing may not exceed the requirements of § 78.73(c) (relating to intermediate and production casing).

(2) Run production casing and set the production casing on a packer in a competent formation below the string where circulation was lost and vent the annulus of the production casing to the atmosphere at all times unless closed for well testing or maintenance.

(3) Run production casing at least to the top of the formation that is being produced and cement the production casing to the surface.

(4) Run intermediate and production casing and cement both strings of casing to the surface.

(5) Produce oil but not gas and leave the annulus between the surface casing and the production pipe open.

(b) In addition to meeting the requirements of subsection (a), the operator may also pump additional cement through a pour string from the surface to fill the annular space.

§ 78.83c. Intermediate and production casing.

(a) Prior to cementing the intermediate and production casing, the borehole, mud and cement shall be conditioned to ensure an adequate cement bond between the casing and the formation.

(b) If the well is to be equipped with an intermediate casing, centralizers shall be used and the casing shall be cemented to the surface by the displacement method. Gas may be produced off the intermediate casing if a shoe test demonstrates that all gas will be contained within the well and a relief valve is installed at the surface that is set less than the shoe test pressure. The shoe test pressure shall be recorded in the completion report.

(c) Except as provided in § 78.83 (relating to surface and coal protective casing and cementing procedures), each well must be equipped with production casing. The production string may be set on a packer or cemented in place. If the production casing is cemented in place, centralizers shall be used and cement shall be placed by the displacement method with sufficient cement to fill the annular space to a point at least 500 feet above true vertical depth or at least 200 feet above the uppermost perforations, whichever is greater.

§ 78.84. Casing standards.

(a) The operator shall install casing that can withstand the effects of tension, and prevent leaks, burst and collapse during its installation, cementing and subsequent drilling and producing operations.

(b) Except as provided in subsection (c), all casing must be a string of new pipe with an internal pressure rating that is at least 20% greater than the anticipated maximum pressure to which the casing will be exposed.

(c) Used casing may be approved for use as surface, intermediate or production casing but shall be pressure tested after cementing and before continuation of drilling. A passing pressure test is holding the anticipated maximum pressure to which it will be exposed for 30 minutes with not more than a 10% decrease in pressure.

(d) New or used plain end casing, except when being used as conductor pipe, that is welded together for use must meet the following requirements:

(1) The casing must pass a pressure test by holding the anticipated maximum pressure to which the casing will be exposed for 30 minutes with not more than a 10% decrease in pressure. The operator shall notify the De-

partment at least 24 hours before conducting the test. The test results shall be entered on the drilling log.

(2) The casing shall be welded using at least three passes with the joint cleaned between each pass.

(3) The casing shall be welded by a person trained and certified in the applicable American Petroleum Institute, American Society of Mechanical Engineers, American Welding Society or equivalent standard for welding casing and pipe or an equivalent training and certification program as approved by the Department. The certification requirements of this paragraph shall take effect August 5, 2011. A person with 10 or more years of experience welding casing as of February 5, 2011, who registers with the Department by November 7, 2011, is deemed to be certified.

(e) When casing through a workable coal seam, the operator shall install coal protective casing that has a minimum wall thickness of 0.23 inch.

(f) Casing which is attached to a blow-out preventer with a pressure rating of greater than 3,000 psi shall be pressure tested after cementing. A passing pressure test must be holding the anticipated maximum pressure to which the casing will be exposed for 30 minutes with not more than a 10% decrease. Certification of the pressure test shall be confirmed by entry and signature of the person performing the test on the driller's log.

§ 78.85. Cement standards.

(a) When cementing surface casing or coal protective casing, the operator shall use cement that meets or exceeds the ASTM International C 150, Type I, II or III Standard or API Specification 10. The cement must also:

- (1) Secure the casing in the wellbore.
- (2) Isolate the wellbore from fresh groundwater.
- (3) Contain any pressure from drilling, completion and production.

(4) Protect the casing from corrosion from, and degradation by, the geochemical, lithologic and physical conditions of the surrounding wellbore. For wells employing coal protective casing, this includes, but is not limited to, formulating cement to withstand elevated sulfate concentrations and other geochemical constituents of coal and associated strata which have the potential to adversely affect the integrity of the cement.

(5) Prevent gas flow in the annulus. In areas of known shallow gas producing zones, gas block additives and low fluid loss slurries shall be used.

(b) After the casing cement is placed behind surface casing, the operator shall permit the cement to set to a minimum designed compressive strength of 350 pounds per square inch (psi) at the casing seat. The cement placed at the bottom 300 feet of the surface casing must constitute a zone of critical cement and achieve a 72-hour compressive strength of 1,200 psi and the free water separation may be no more than 6 milliliters per 250 milliliters of cement. If the surface casing is less than 300 feet, the entire cemented string constitutes a zone of critical cement.

(c) After any casing cement is placed and cementing operations are complete, the casing may not be disturbed for a minimum of 8 hours by doing any of the following:

(1) Releasing pressure on the cement head within 4 hours of cementing if casing equipment check valves did not hold or casing equipment was not equipped with check valves. After 4 hours, the pressure may be released

at a continuous, gradual rate over the next four hours provided the floats are secure.

- (2) Nippling up on or in conjunction to the casing.
- (3) Slacking off by the rig supporting the casing in the cement sheath.
- (4) Running drill pipe or other mechanical devices into or out of the wellbore with the exception of a wireline used to determine the top of cement.
- (d) Where special cement or additives are used, the operator may request approval from the Department to reduce the cement setting time specified in subsection (d).
- (e) The operator shall notify the Department a minimum of 1 day before cementing of the surface casing begins, unless the cementing operation begins within 72 hours of commencement of drilling.
- (f) A copy of the cement job log shall be available at the well site for inspection by the Department during drilling operations. The cement job log must include the mix water temperature and pH, type of cement with listing and quantity of additive types, the volume, yield and density in pounds per gallon of the cement and the amount of cement returned to the surface, if any. Cementing procedural information must include a description of the pumping rates in barrels per minute, pressures in pounds per square inch, time in minutes and sequence of events during the cementing operation.
- (g) The cement job log shall be maintained by the operator after drilling operations for at least 5 years and be made available to the Department upon request.

OPERATING WELLS

§ 78.88. Mechanical integrity of operating wells.

- (a) Except for wells regulated under Subchapter H (relating to underground gas storage) and wells that have been granted inactive status, the operator shall inspect each operating well at least quarterly to ensure it is in compliance with the well construction and operating requirements of this chapter and the act. The results of the inspections shall be recorded and retained by the operator for at least 5 years and be available for review by the Department and the coal owner or operator.
- (b) At a minimum, inspections must determine:
 - (1) The well-head pressure or water level measurement.
 - (2) The open flow on the annulus of the production casing or the annulus pressure if the annulus is shut in.
 - (3) If there is evidence of gas escaping from the well and the amount escaping, using measurement or best estimate of quantity.
 - (4) If there is evidence of progressive corrosion, rusting or other signs of equipment deterioration.
- (c) For structurally sound wells in compliance with § 78.73(c) (relating to surface and coal protective casing and cementing procedure), the operator shall follow the reporting schedule outlined in subsection (e).
- (d) For wells exhibiting progressive corrosion, rusting or other signs of equipment deterioration that compromise the integrity of the well, or the well is not in compliance with § 78.73(c), the operator shall immediately notify the Department and take corrective actions to repair or replace defective equipment or casing or mitigate the excess pressure on the surface casing seat or coal protective casing seat according to the following hierarchy:

- (1) The operator shall reduce the shut-in or producing back pressure on the casing seat to achieve compliance with § 78.73(c).

- (2) The operator shall retrofit the well by installing production casing to reduce the pressure on the casing seat to achieve compliance with § 78.73(c). The annular space surrounding the production casing must be open to the atmosphere. The production casing shall be either cemented to the surface or installed on a permanent packer. The operator shall notify the Department at least 7 days prior to initiating the corrective measure.

- (3) Additional mechanical integrity tests, including, but not limited to, pressure tests, may be required by the Department to demonstrate the integrity of the well.

- (e) The operator shall submit an annual report to the Department identifying the compliance status of each well with the mechanical integrity requirements of this section. The report shall be submitted on forms prescribed by, and available from, the Department or in a similar manner approved by the Department.

§ 78.89. Gas migration response.

- (a) When an operator or owner is notified of or otherwise made aware of a potential natural gas migration incident, the operator shall immediately conduct an investigation of the incident. The purpose of the investigation is to determine the nature of the incident, assess the potential for hazards to public health and safety, and mitigate any hazards posed by the concentrations of stray natural gas.

- (b) The investigation undertaken by the operator under subsection (a) must include, but not be limited to, the following:

- (1) A site visit and interview with the complainant to obtain information about the complaint and to assess the reported natural gas migration incident.

- (2) A field survey to assess the presence and concentrations of natural gas and aerial extent of the stray natural gas.

- (3) If necessary, establishment of monitoring locations at potential sources, in potentially impacted structures, and the subsurface.

- (c) If combustible gas is detected inside a building or structure at concentrations equal to or greater than 10% of the L.E.L., the operator shall do the following:

- (1) Immediately notify the Department, local emergency response agency, gas and electric utility companies, police and fire departments and, in conjunction with the Department and local emergency response agencies, take measures necessary to ensure public health and safety.

- (2) Initiate mitigation measures necessary to control and prevent further migration.

- (3) Implement the additional investigation and mitigation measures as provided in subsection (e)(1)–(5).

- (d) The operator shall notify the Department and, in conjunction with the Department, take measures necessary to ensure public health and safety, if sustained detectable concentrations of combustible gas satisfy any of the following:

- (1) Greater than 1% and less than 10% of the L.E.L., in a building or structure.

- (2) Equal to or greater than 25% of the L.E.L. in a water well head space.

- (3) Detectable in the soils.

(4) Equal to or greater than 7 mg/l dissolved methane in water.

(e) The Department may require the operator to take the following additional actions:

(1) Conduct a field survey to assess the presence and concentrations of combustible gas and the areal extent of the combustible gas in the soils, surface water bodies, water wells, and other potential migration pathways.

(2) Collect gas or water, or both, samples at a minimum for molecular and stable carbon and hydrogen isotope analyses from the impacted locations such as water wells, and from potential sources of the migration such as gas wells.

(3) Conduct an immediate evaluation of the operator's adjacent oil or gas wells to determine well cement and casing integrity and to evaluate the potential mechanism of migration. This evaluation may include assessing pressures for all casing intervals, reviewing records for indications of defective casing or cement, application of cement bond logs, ultrasonic imaging tools, geophysical logs, and other mechanical integrity tests as required. The initial area of assessment must include wells within a radius of 2,500 feet and may be expanded if required by the Department.

(4) Take action to correct any defect in the oil and gas wells to mitigate the stray gas incident.

(5) Establish monitoring locations and monitoring frequency in consultation with the Department at potential sources, in potentially impacted structures, and the subsurface.

(f) If concentrations of stray natural gas as defined in subsection (c) or (d) are not detected, the operator shall notify the Department, and do the following if requested by the Department:

- (1) Conduct additional monitoring.
- (2) Document findings.
- (3) Submit a closure report.

(g) If concentrations of stray natural gas are detected inside a building or structure at concentrations equal to or greater than 10% of the L.E.L., the operator and owner shall file a report with the Department by phone and email within 24 hours after the interview with the complainant and field survey of the extent of stray natural gas. Additional daily or weekly reports shall be submitted if requested by the Department.

(h) For all stray natural gas migration incidents, a final written report documenting the results of the investigation shall be submitted to the Department for approval within 30 days of the close of the incident, or in a time frame otherwise approved by the Department. The final report must include the following:

- (1) Documentation of all results of the investigation, including analytical data and monitoring results.
- (2) Operational changes established at the operator's oil and gas wells in this Commonwealth.
- (3) Measures taken by the operator to repair any defects at any of the investigated oil and gas wells.

(i) Reports submitted in accordance with this section that contain an analysis of geological or engineering data shall be prepared and sealed by a geologist or engineer licensed in this Commonwealth.

PLUGGING

§ 78.92. Wells in coal areas—surface or coal protective casing is cemented.

(a) In a well underlain by a workable coal seam, where the surface casing or coal protective casing is cemented and the production casing is not cemented or the production casing is not present, the owner or operator shall plug the well as follows:

(1) The retrievable production casing shall be removed by applying a pulling force at least equal to the casing weight plus 5,000 pounds or 120% whichever is greater. If this fails, an attempt shall be made to separate the casing by cutting, ripping, shooting or other method approved by the Department, and making a second attempt to remove the casing by exerting a pulling force equal to the casing weight plus 5,000 pounds or 120% of the casing weight, whichever is greater. The well shall be filled with nonporous material from the total depth or attainable bottom of the well, to a point 50 feet below the lowest stratum bearing or having borne oil, gas or water. At this point there shall be placed a plug of cement, which shall extend for at least 50 feet above this stratum. Each overlying formation bearing or having borne oil, gas or water shall be plugged with cement a minimum of 50 feet below this formation to a point 50 feet above this formation. The zone between cement plugs shall be filled with nonporous material. The cement plugs shall be placed in a manner that will completely seal the hole. The operator may treat multiple strata as one stratum and plug as described in this subsection with a single column of cement or other materials approved by the Department. Where the production casing is not retrievable, the operator shall plug that portion of the well under § 78.91(d) (relating to general provisions).

(2) After plugging strata bearing or having borne oil, gas or water, the well shall be filled with nonporous material to a point approximately 100 feet below the surface or coal protective casing seat, whichever is deeper. At this point, a 100-foot plug of cement shall be installed.

(3) After the plug has been installed below the casing seat, the inner casing shall be emptied of liquid from the surface to the plug of cement. A vent or other device approved by the Department shall then be installed on top of the inner string of casing to prevent liquids and solids from entering the well but permit access to the full internal diameter of the inner casing when required. The vent or other device approved by the Department must extend, when finally in place, a distance of at least 72 inches above ground level and the permit or registration number must be permanently affixed.

(b) The owner or operator shall plug a well, where the surface casing, coal protective casing and production casing are cemented, as follows:

(1) If the total depth or attainable bottom is deeper than the cemented production casing seat, the operator shall plug that portion of the well under subsection (a)(1).

(2) Cement plugs shall be set in the cemented portion of the production casing so that the plugs will extend from at least 50 feet below each stratum bearing or having borne oil, gas or water, to a point at least 100 feet above each stratum bearing or having borne oil, gas or water. A Department-approved mechanical plug may be set 20 feet above each stratum bearing or having borne oil, gas or water as a substitute for the plug of cement. Nonporous material must separate each cement plug or mechanical plug. The operator may treat multiple strata as one stratum and plug as described in this subsection

with a single column of cement or other materials as approved by the Department.

(3) Following the plugging of the cemented portion of the production casing, the uncemented portion of the production casing shall be separated from the cemented portion and retrieved by applying a pulling force at least equal to the casing weight plus 5,000 pounds or 120% whichever is greater. If this fails, an attempt shall be made to separate the casing by cutting, ripping, shooting or other method approved by the Department, and making a second attempt to remove the casing by exerting a pulling force equal to the casing weight plus 5,000 pounds or 120% of the casing weight, whichever is greater. The maximum distance the stub of the uncemented portion of the production casing may extend is 100 feet below the surface or coal protective casing whichever is lower. In no case may the uncemented portion of the casing left in the well extend through a formation bearing or having borne oil, gas or water. Other stratum above the cemented portion of the production casing bearing or having borne oil, gas or water shall be plugged by filling the hole with nonporous material to 20 feet above the stratum and setting a 50-foot plug of cement. The operator may treat multiple strata as one stratum and plug as described in this subsection with a single column of cement or other material as approved by the Department. When the uncemented portion of the production casing is not retrievable, the operator shall plug that portion of the well under § 78.91(d).

(4) After plugging all strata bearing or having borne oil, gas or water, the well shall be filled with nonporous material to a point approximately 100 feet below the surface or coal protective casing seat, whichever is deeper. At this point a 200-foot cement plug shall be placed so that the plug extends from 100 feet below the casing seat to a point at least 100 feet above the casing seat.

(5) After the 200-foot plug has been installed, the remainder of the well shall be plugged and vented as described in subsection (a)(3).

(c) A person authorized by the Department under the act or section 13 of the Coal and Gas Resource Coordination Act (58 P. S. § 513) to plug a gas well that penetrates a workable coal seam that was drilled prior to November 30, 1955, or which was permitted after that date but not plugged in accordance with the act, shall plug the well to mine through it in the following manner:

(1) The gas well shall be cleaned out to a depth of at least 200 feet below the coal seam which is proposed to be mined and, unless impracticable, to a point 200 feet below the deepest mineable coal seam that the well penetrates.

(2) The gas well shall be plugged in accordance with section 13(a)(1), (2), (3) or (4) of the Coal and Gas Resource Coordination Act.

§ 78.93. Wells in coal areas—surface or coal protective casing anchored with a packer or cement.

(a) In a well where the surface casing or coal protective casing and production casing are anchored with a packer or cement, the owner or operator shall plug the well as follows:

(1) The retrievable production casing shall be removed by applying a pulling force at least equal to the casing weight plus 5,000 pounds or 120% whichever is greater. If this fails, an attempt shall be made to separate the casing by cutting, ripping, shooting or other method approved by the Department, and making a second attempt to remove the casing by exerting a pulling force

equal to the casing weight plus 5,000 pounds or 120% of the casing weight, whichever is greater. The well shall be filled with nonporous material from the total depth or attainable bottom of the well, to a point 50 feet below the lowest stratum bearing or having borne oil, gas or water. At this point there shall be placed a plug of cement, which must extend for at least 50 feet above this stratum. Each overlying formation bearing or having borne oil, gas or water shall be plugged with cement a minimum of 50 feet below this formation to a point 50 feet above this formation. The zone between cement plugs shall be filled with nonporous material. The cement plugs shall be placed in a manner that will completely seal the hole. The operator may treat multiple strata as one stratum and plug as described in this subsection with a single column of cement or other material as approved by the Department. When the production casing is not retrievable, the operator shall plug this portion of the well under § 78.91(d) (relating to general provisions).

(2) The well shall then be filled with nonporous material to a point approximately 200 feet below the lowest workable coal seam, or surface or coal protective casing seat, whichever is deeper. Beginning at this point a 100-foot plug of cement shall be installed.

(3) After it has been established that the surface casing or coal protective casing is free and can be retrieved, the surface or coal protective casing shall be retrieved by applying a pulling force at least equal to the casing weight plus 5,000 pounds or 120% whichever is greater. If this fails, an attempt shall be made to separate the casing by cutting, ripping, shooting or other method approved by the Department, and making a second attempt to remove the casing by exerting a pulling force equal to the casing weight plus 5,000 pounds or 120% of the casing weight, whichever is greater. A string of casing with an outside diameter of at least 4 1/2 inches for gas wells, or at least 2 inches for oil wells, shall be run to the top of the 100-foot plug described in paragraph (2) and cemented to the surface.

(4) If the surface or coal protective string is not free and cannot be retrieved, it shall be perforated or cut below the lowest workable coal to allow the cement used to cement the 4 1/2-inch or 2-inch casing to communicate between the surface casing or coal protective casing, or both, and the well bore. A string of casing of at least 4 1/2 inches for gas wells or at least 2 inches for oil wells shall be run to the top of the 100-foot plug described in paragraph (2) and cemented to the surface.

(5) The inner casing shall then be emptied of liquid and cement from the base of the casing to the surface and a vent or other device approved by the Department shall be installed on the top of the casing to prevent liquids and solids from entering the well, but permit ready access to the full internal diameter of the inner casing. The inner string of casing and the vent or other device approved by the Department must extend, when finally in place, a distance of at least 72 inches above ground level and the permit or registration number must be permanently affixed to the vent.

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§ 78.94. Wells in noncoal areas—surface casing is not cemented or not present.

(a) The owner or operator shall plug a noncoal well, where the surface casing and production casing are not cemented, or is not present as follows:

(1) The retrievable production casing shall be removed by applying a pulling force at least equal to the casing

weight plus 5,000 pounds or 120% whichever is greater. If this fails, an attempt shall be made to separate the casing by cutting, ripping, shooting or other method approved by the Department, and making a second attempt to remove the casing by exerting a pulling force equal to the casing weight plus 5,000 pounds or 120% of the casing weight, whichever is greater. The well shall be filled with nonporous material from the total depth or attainable bottom of the well, to a point 50 feet below the lowest stratum bearing or having borne oil, gas or water. At this point there shall be placed a plug of cement, which must extend for at least 50 feet above this stratum. Each overlying formation bearing or having borne oil, gas or water shall be plugged with cement a minimum of 50 feet below this formation to a point 50 feet above this formation. The zone between cement plugs shall be filled with nonporous material. The cement plugs shall be placed in a manner that will completely seal the hole. The operator may treat multiple strata as one stratum and plug as described in this paragraph with a single column of cement or other materials as approved by the Department. When the production casing is not retrievable, the operator shall plug this portion of the well under § 78.91(d) (relating to general provisions).

(2) After plugging strata bearing or having borne oil, gas or water, the well shall be filled with nonporous material to approximately 100 feet below the surface casing seat and there shall be placed another plug of cement or other equally nonporous material approved by the Department extending at least 50 feet above that point.

(3) After setting the uppermost 50-foot plug, the retrievable surface casing shall be removed by applying a pulling force at least equal to the casing weight plus 5,000 pounds or 120% whichever is greater. If this fails, an attempt shall be made to separate the casing by cutting, ripping, shooting or other method approved by the Department, and making a second attempt to remove the casing by exerting a pulling force equal to the casing weight plus 5,000 pounds or 120% of the casing weight, whichever is greater. The hole shall be filled from the top of the 50-foot plug to the surface with nonporous material other than gel. If the surface casing is not retrievable, the hole shall be filled from the top of the 50-foot plug to the surface with a noncementing material.

(b) The owner or operator shall plug a well, where the surface casing is not cemented or not present, and the production casing is cemented as follows:

(1) If the total depth or attainable bottom is deeper than the cemented production casing seat, the operator shall plug that portion of the well under subsection (a)(1).

(2) Cement plugs shall be set in the cemented portion of the production casing so that each plug extends from at least 50 feet below each stratum bearing or having borne oil, gas or water, to a point at least 100 feet above each stratum. A Department-approved mechanical plug may be used as a substitute for the plug of cement. The mechanical plug shall be set 20 feet above each stratum having borne oil, gas or water. The operator may treat multiple strata as one stratum and plug as described in this subsection with a single column of cement or other material approved by the Department.

(3) Following the plugging of the cemented portion of the production casing, the uncemented portion of the production string shall be separated from the cemented portion and retrieved. The maximum distance the stub of the uncemented portion of the production casing may

extend is 100 feet below the surface casing. In no case may the uncemented portion of the production casing left in the hole extend through stratum bearing or having borne oil, gas or water. Other stratum bearing or having borne oil, gas or water shall be plugged by filling the hole with nonporous material to 20 feet above the stratum and setting a 50-foot plug of cement. When the uncemented portion of the production casing is not retrievable, the operator shall plug that portion of the well under § 78.91(d).

(4) The remainder of the well shall be plugged under subsection (a)(2) and (3).

§ 78.95. Wells in noncoal areas—surface casing is cemented.

(a) The owner or operator shall plug a well, where the surface casing is cemented and the production casing is not cemented or not present, as follows:

(1) The retrievable production casing shall be removed by applying a pulling force at least equal to the casing weight plus 5,000 pounds or 120% whichever is greater. If this fails, an attempt shall be made to separate the casing by cutting, ripping, shooting or other method approved by the Department, and making a second attempt to remove the casing by exerting a pulling force equal to the casing weight plus 5,000 pounds or 120% of the casing weight, whichever is greater. The well shall be filled with nonporous material from the total depth or attainable bottom of the well, to a point 50 feet below the lowest stratum bearing or having borne oil, gas or water. At this point there shall be placed a plug of cement, which extends for at least 50 feet above this stratum. Each overlying formation bearing or having borne oil, gas or water shall be plugged with cement a minimum of 50 feet below this formation to a point 50 feet above this formation. The zone between cement plugs shall be filled with nonporous material. The cement plugs shall be placed in a manner that will completely seal the hole. The operator may treat multiple strata as one stratum and plug as described in this subsection with a single column of cement or other materials as approved by the Department. When the production casing is not retrievable, the operator shall plug this portion of the well under § 78.91(d) (relating to general provisions).

(2) After plugging all strata bearing or having borne oil, gas or water, the well shall be filled with nonporous material to approximately 100 feet below the surface casing seat. Another plug of cement, or other equally nonporous material approved by the Department, shall be placed extending at least 50 feet above that point.

(3) After setting the 50-foot plug, the hole shall be filled from the top of the 50-foot plug to the surface with a noncementing material or the operator shall set a 100-foot cement plug which extends 50-feet into the surface casing and fill the hole to the surface with noncementing material.

(b) The owner or operator shall plug a noncoal well, where the surface casing and production casing are cemented, as follows:

(1) If the total depth or attainable bottom is deeper than the cemented production casing seat, the operator shall plug that portion of the well under subsection (a)(1).

(2) Cement plugs shall be set in the cemented portion of the production casing so that each plug extends from at least 50 feet below each stratum bearing or having borne oil, gas or water, to a point at least 100 feet above the stratum. A Department-approved mechanical plug may be

used as a substitute for the plug of cement. The mechanical plug shall be set 20 feet above each stratum having borne oil, gas or water. The operator may treat multiple strata as one stratum and plug as described in this subsection with a single column of cement or other materials approved by the Department.

(3) Following the plugging of the cemented portion of the production casing, the uncemented portion of the production string shall be separated from the cemented portion and retrieved. The maximum distance the stub of the uncemented portion of the production casing may extend is 100 feet below the surface casing. In no case may the uncemented portion of the production casing left in the hole extend through stratum bearing or having borne oil, gas or water. Other stratum bearing or having borne oil, gas or water shall be plugged by filling the hole with nonporous material to 20 feet above the stratum and setting a 50-foot plug of cement. When the uncemented portion of the production casing is not retrievable, the operator shall plug that portion of the well under § 78.91(d).

(4) The remainder of the well shall be plugged under subsection (a)(2) and (3).

§ 78.96. Marking the location of a plugged well.

Upon the completion of plugging or replugging a well, the operator shall erect over the plugged well a permanent marker of concrete, metal, plastic or equally durable material. The marker must extend at least 4 feet above the ground surface and enough below the surface to make the marker permanent. Cement may be used to hold the marker in place provided the cement does not prevent inspection of the adequacy of the well plugging. The permit or registration number shall be stamped or cast or otherwise permanently affixed to the marker. In lieu of placing the marker above the ground surface, the marker may be buried below plow depth and shall contain enough metal to be detected at the surface by conventional metal detectors

Subchapter E. WELL REPORTING

§ 78.121. Production reporting.

(a) The well operator shall submit an annual production and status report for each permitted or registered well on an individual basis, on or before February 15 of each year. The operator of a well permitted to produce gas from the Marcellus shale formation shall submit a production and status report for each well on an individual basis, on or before February 15 and August 15 of each year. Production shall be reported for the preceding calendar year or in the case of a Marcellus shale well, for the preceding 6 months. When the production data is not available to the operator on a well basis, the operator shall report production on the most well-specific basis available. The annual production report must include information on the amount and type of waste produced and the method of waste disposal or reuse. Waste information submitted to the Department in accordance with this subsection is deemed to satisfy the residual waste biennial reporting requirements of § 287.52 (relating to biennial report).

(b) The production report shall be submitted electronically to the Department through its web site.

§ 78.122. Well record and completion report.

(a) For each well that is drilled or altered, the operator shall keep a detailed drillers log at the well site available for inspection until drilling is completed. Within 30 calendar days of cessation of drilling or altering a well,

the well operator shall submit a well record to the Department on a form provided by the Department that includes the following information:

- (1) Name, address and telephone number of the permittee.
- (2) Permit number, and farm name and number.
- (3) Township and county.
- (4) Date drilling started and completed.
- (5) Method of drilling.
- (6) Size and depth of conductor pipe, surface casing, coal protective casing, intermediate casing, production casing and borehole.
- (7) Type and amount of cement and results of cementing procedures.
- (8) Elevation and total depth.
- (9) Drillers log that includes the name and depth of formations from the surface to total depth, depth of oil and gas producing zone, depth of fresh water and brines and source of information.
- (10) Certification by the operator that the well has been constructed in accordance with this chapter and any permit conditions imposed by the Department.

(11) Other information required by the Department.

(b) Within 30 calendar days after completion of the well, the well operator shall submit a completion report to the Department on a form provided by the Department that includes the following information:

- (1) Name, address and telephone number of the permittee.
- (2) Name, address and telephone number of the service companies.
- (3) Permit number and farm name and number.
- (4) Township and county.
- (5) Perforation record.
- (6) Stimulation record which includes the following:
 - (i) A descriptive list of the chemical additives in the stimulation fluid, including any acid, biocide, breaker, brine, corrosion inhibitor, crosslinker, demulsifier, friction reducer, gel, iron control, oxygen scavenger, pH adjusting agent, proppant, scale inhibitor and surfactant.
 - (ii) The percent by volume of each chemical additive in the stimulation fluid.
 - (iii) A list of the chemicals in the Material Safety Data Sheets, by name and chemical abstract service number, corresponding to the appropriate chemical additive.
 - (iv) The percent by volume of each chemical listed in the Material Safety Data Sheets.
 - (v) The total volume of the base fluid.
 - (vi) A list of water sources used under an approved water management plan and the volume of water used from each source.
 - (vii) The total volume of recycled water used.
 - (viii) The pump rate and pressure used in the well.
- (7) Actual open flow production and shut in surface pressure.
- (8) Open flow production and shut in surface pressure, measured 24 hours after completion.

(c) When the well operator submits a stimulation record, it may designate specific portions of the stimulation record as containing a trade secret or confidential proprietary information. The Department will prevent disclosure of the designated confidential information to the extent permitted under the Right-to-Know Law (65 P. S. §§ 67.101—67.3103).

(d) In addition to submitting a stimulation record to the Department under subsection (b), and subject to the protections afforded for trade secrets and confidential proprietary information under the Right-to-Know Law, the operator shall arrange to provide a list of the chemical constituents of the chemical additives used to hydraulically fracture a well, by chemical name and abstract service number, unless the additive does not have an abstract service number, to the Department upon written request by the Department.

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