Regulatory Analysis Form

(Completed by Promulgating Agency)

IRRC
Independent Regulatory Review Commission

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SECTION I: PROFILE

IRRC Number: 2857

(1) Agency:
Environmental Protection

(2) Agency Number:

Identification Number: #7-459

(3) Short Title:
Oil and Gas Well Technical Amendments

(4) PA Code Cite:
25 *Pa. Code* Chapter 78

(5) Agency Contacts (List Telephone Number, Address, Fax Number and Email Address):
Primary Contact:
Michele Tate, 783-8727; fax: 783-8926; mtate@sate.pa.us; RCSOB 16th Fl., Harrisburg, PA 17105
Secondary Contact:
Duke Adams, 783-8727; fax: 783-8926; ranadams@state.pa.us; RCSOB 16th Fl., Harrisburg, PA 17105

(6) Primary Contact for Public Comments (List Telephone Number, Address, Fax Number and Email Address) – Complete if different from #5:

EQB
P.O. Box 8477
Harrisburg, PA 17105-8477
regcomments@state.pa.us

(All Comments will appear on IRRC'S website)
(7) Type of Rulemaking (check applicable box):

- ☐ Proposed Regulation
- ☒ Final Regulation
- ☐ Final Omitted Regulation
- ☐ Emergency Certification Regulation
- ☐ Certification by the Governor
- ☐ Certification by the Attorney General

(8) Briefly explain the regulation in clear and nontechnical language. (100 words or less)

The proposed rulemaking would incorporate and update existing requirements, with modifications regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The new or amended sections are §§78.1, .51, .52, .55, .71-.73, .76, .81-.85, .88, .89, .91-.96, .121 and .122. The proposed modifications include updated material specifications and performance testing, and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. With this final-form rulemaking, the Department is adding additional measures that will further minimize the concerns associated with gas migration.

(9) Include a schedule for review of the regulation including:

A. The date by which the agency must receive public comments:	Summer 2010
B. The date or dates on which public meetings or hearings will be held:	N/A
C. The expected date of promulgation of the proposed regulation as a final-form regulation:	Fall 2010
D. The expected effective date of the final-form regulation:	Winter 2010
E. The date by which compliance with the final-form regulation will be required:	Winter 2010
F. The date by which required permits, licenses or other approvals must be obtained:	Winter 2010

(10) Provide the schedule for continual review of the regulation.

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

SECTION II: STATEMENT OF NEED

(11) State the statutory authority for the regulation. Include specific statutory citation.

This proposed rulemaking is being made under the statutory authority of the following:

Section 604 of the Oil and Gas Act (58 P.S. § 601.604) which directs the Board to adopt regulations necessary to implement the Act.

The Administrative Code of 1929 (71 P.S. §§510-1 - 510-27), which at Section 1917-A (71 P.S. §510-17) 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; and Section 1920-A (71 P.S. 510-20), which grants the Board the power and duty to formulate, adopt, and promulgate such rules and regulations as may be determined by the Board for the proper performance of the work of the Department.

(12) Is the regulation mandated by any federal or state law or court order, or federal regulation? Are there any relevant state or federal court decisions? If yes, cite the specific law, case or regulation as well as, any deadlines for action.

The final-form regulations are not mandated by any federal or state law, court order or federal regulation.

(13) State why the regulation is needed. Explain the compelling public interest that justifies the regulation. Describe who will benefit from the regulation. Quantify the benefits as completely as possible and approximate the number of people who will benefit.

The final-form regulations will amend the current oil and gas well regulations as well as add additional controls to the construction and operation of a well. The residents of the Commonwealth and the regulated community will benefit from this rulemaking since it further defines the necessary standards needed to safely construct and operate oil and gas wells. The final-form regulations will give the citizens of Pennsylvania additional safety measures that will continue to aid in the protection of the health, safety, environment and property of the Commonwealth while still allowing for the development of the state's oil and gas resources.

The updated casing and cementing requirements will provide an increased degree of protection for homeowners and both public and private water supplies. The proposed construction standards will align Pennsylvania's regulations with other states' rules as well as current industry standards. Casing and cement testing 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 for operating wells will be a vital tool for operators to use in detecting potential safety or environmental impacts before they may become a public health or safety issue.

The final-form regulations outline the procedures the operator and the Department will utilize if there is a reported gas migration event.

The citizens of the Commonwealth will be better served by the amendments being proposed in this rulemaking, which are summarized as follows:

- Improved well casing and cementing practices to prevent gas migration into homes and other occupied structures, water supplies and groundwater.
- Implementation of testing wellhead pressures for all operating wells and annual reporting; retrofitting existing wells that exceed required casing seat pressures; setting new standards for casing seat pressures; new requirements for casing and cementing plans to be located on site; welding casing required to be performed by a qualified welder; moving the cement plug to be situated across the producing formations; enhanced options for blow out prevention (BOP) control and availability in the event of an emergency; and increased cement set time for proper setting and corrective actions for lost circulation of cement on surface casing.
- Department notification when a gas migration occurrence is noted or reported in an area of wells and follow-up actions required by the operator.
- Quarterly surveys of all operating wells to ensure they are structurally sound and the integrity of

the well has not been compromised.

(14) If scientific data, studies, references are used to justify this regulation, please submit material with the regulatory package. Please provide full citation and/or links to internet source.

A considerable body of scientific research has been developed by various parties over many years regarding the construction of natural gas wells and, specifically, casing and cementing standards, BOP operation safety, training and groundwater protection. The Department monitors the development and requirements of other states and reviews that research and resulting reports and has taken those efforts under consideration in formulating these proposed regulations. The American Petroleum Institute (API) standards and recommended practices have been updated and are reflected in the proposed regulation. They are available at: http://api-ec.api.org/Standards/

(15) Describe who and how many will be adversely affected by the regulation. How are they affected?

Any person who currently has a well producing natural gas or oil or intends to drill and develop a well with the intention of producing natural gas or oil will be required to comply with the updated standards and practices proposed in these regulations. There are about 74,000 wells across the Commonwealth that are actively producing oil and gas under existing regulatory provisions. The Department anticipates it will permit 6,500 wells in 2010 and projects permitting approximately 7,500 to 9,000 wells in 2011, which must meet the new casing and cementing requirements.

The changes proposed in this rulemaking package reflect the updates needed to the Commonwealth's oil and gas program to bring well construction practices into line to be comparable with other states' requirements. Many of these requirements are already standard construction and operating practices for drilling operations in Pennsylvania.

The draft final-form regulation further delineates the necessary requirements for designing, constructing and operating oil and gas wells and responding to emergency situations that may be related to their well operations. Most of the updates are codifying existing best management practices that are already being utilized by numerous operators. The draft final-form regulations are expected to significantly reduce the risk of gas migration. The rulemaking will also minimize the cost to the operator; minimize their liability and compliance cost by minimizing the potential for a stray gas occurrence. If there is a stray gas situation, the draft final-form regulations outline the procedures for quickly identifying the source, and expedite remedying the situation.

SECTION III: COST AND IMPACT ANALYSIS

(17) Provide a specific estimate of the costs and/or savings to the regulated community associated with compliance, including any legal, accounting or consulting procedures which may be required. Explain

how the dollar estimates were derived.

The Department finds that most gas migrations stem from inadequate cement, cementing procedures, cement returns, combinations of inadequate casing and cementing or over-pressured casing seats. Because the Department is proposing regulations that generally codifying existing industry standards, any increased cost associated with drilling and operating oil and gas well will be minimal. All of the potential increases in cost to an operator will be associated with assuring a well is properly constructed.

The Department is proposing to require an eight hour Wait On Cement (WOC) set time. During the WOC a well driller can not disturb the casing or the cement as it sets. The elimination of any movement of the casing in the cement sheath will allow the cement to achieve a higher compressive strength without excessive accelerators being added to the cement. This will help ensure the cement maintains the integrity necessary to prevent the formation of preferential gas migration pathways in the annulus.

All of the additional measures are draft final-form to reduce the potential for gas mitigation. 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 $30,000 or greater. The cost would only occur if an operator fails to meet a construction requirement.

The operator must 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. The draft final-form regulations require the casing strings to pass pressure tests. Used casing, welded casing and casing attached to a high pressure blow out preventer must be pressure tested to demonstrate its ability to withstand the highest anticipated working pressures to which the casing will be exposed. If the casing fails this test, the operator must repair or replace the casing and ultimately pass the pressure test. Less than 1% of the casing used is anticipated to fail a pressure test. The cost to repair or replace the defective casing is overwhelmingly 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 construction cost for the new casing for a situation when the original casing string failed the pressure test is about $10,000 per well. The Department anticipates approximately 1% of the wells drilled in Pennsylvania will have casing fail the pressure test.

Another potential cost to an operator will be the use of an additional string of casing for situations when the cement is not returned to the surface. The draft final-form regulations will require an operator to install an additional string of casing past the bottom of the surface or coal protective casing. This requirement helps minimize the potential for stray gas migration. The construction cost for the additional string of casing for situations when the cement is not returned to the surface is about $10,000 per well. Lost circulation of cement happens to approximately 5% of the wells drilled in Pennsylvania.

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

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

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

The final form regulation includes language requiring operators to survey their wells on quarterly bases. This requirement is to aid in the early detection of potential gas migration issues. This requirement would only add a nominal cost to the operation of a well. Currently, all wells are tended to and this would only add a few additional items for the operator to inspect.

The potential increase in cost is minor when compared to the overall cost of well construction. The typical cost to develop a Marcellus Shale well is around $5,000,000. The typical cost to develop a shallow gas well is $250,000 and the typical cost to develop an oil well is $200,000. During the first two fiscal years, the Department anticipates a higher compliance cost for operators to review and repair any old wells that may pose a safety hazard.

(18) Provide a specific estimate of the costs and/or savings to **local governments** associated with compliance, including any legal, accounting or consulting procedures which may be required. Explain how the dollar estimates were derived.

The draft final-form rulemaking has no compliance, legal, accounting, or consulting effects on local governments. Local governments will benefit from this rulemaking because of the decrease incidents of gas migration.

(19) Provide a specific estimate of the costs and/or savings to **state government** associated with the implementation of the regulation, including any legal, accounting, or consulting procedures which may be required. Explain how the dollar estimates were derived.

Current Department expenditures for individual gas migration cases vary considerably, generally ranging from less then $1000 to over $150,000. Collectively, the components of these cases include isotopic composition analyses, combustible gas monitoring, installation of monitoring points, geophysical testing and logging, installation of alarms, and active or passive venting of impacted sites. The draft final-form regulations will reduce this cost by streamlining the inspecting, investigating, reporting and litigating of gas migration problems. The overall saving is difficult to estimate because of the uniqueness of each

investigation. From 2009 through August 2010 the Department has investigated approximately 30 confirmed gas mitigation events. The average cost per an investigation was approximately $10,000 in staff time and laboratory costs.

(20) In the table below, provide an estimate of the fiscal savings and costs associated with implementation and compliance for the regulated community, local government, and state government for the current year and five subsequent years.

	Current FY Year	FY +1 Year	FY +2 Year	FY +3 Year	FY +4 Year	FY +5 Year
SAVINGS:	$	$	$	$	$	$
Regulated Community	$0	$0	$0	$0	$0	$0
Local Government	$0	$0	$0	$0	$0	$0
State Government	$300,000	$300,000	$400,000	$400,000	$500,000	$500,000
Total Savings	$300,000	$300,000	$400,000	$400,000	$500,000	$500,000
COSTS:						
Regulated Community	$6,300,000	$6,675,000	$3,375,000	$3,375,000	$3,375,000	$3,375,000
Local Government	$0	$0	$0	$0	$0	$0
State Government	$0	$0	$0	$0	$0	$0
Total Costs	$6,300,000	$6,675,000	$3,375,000	$3,375,000	$3,375,000	$3,375,000
REVENUE LOSSES:						
Regulated Community	0	0	0	0	0	0
Local Government	0	0	0	0	0	0
State Government	0	0	0	0	0	0
Total Revenue Losses	0	0	0	0	0	0

(20a) Provide the past three year expenditure history for programs affected by the regulation.

Program	FY -3	FY -2	FY -1	Current FY
Environmental Program Management	$39,685,000	$37,664,000	$31,100,000	$29,357,000
Environmental Protection Operations	$98,574,000	$98,544,000	$84,218,000	$79,344,000

Well Plugging	$1,043,000	$950,000	$8,530,000	$16,631,000

(21) Explain how the benefits of the regulation outweigh any cost and adverse effects.

This is a new and exciting era of the oil and gas industry. As Pennsylvania continues to experience the development of unconventional shale the new construction standards and the well retrofit will far outweigh loss of life, personal, property and environmental damages that may result without these additional precautions.

Most of the updates are codifying existing best practices of the industry used by prudent operators. The increased cost of constructing the well in time and materials will decrease the risk of gas migrations resulting from defective casing or cementing. As new areas of the Commonwealth are developed for natural gas, these draft final-form regulations will preemptively abate many potential health, safety and environmental issues.

(22) Describe the communications with and input from the public and any advisory council/group in the development and drafting of the regulation. List the specific persons and/or groups who were involved.

The proposed rulemaking was presented to the Oil and Gas Technical Advisory Board (TAB) for their consideration on September 17, 2009. Due to the scope of the changes, TAB requested additional time to review and provide comment. As part of their review, TAB formed a technical review committee, with representatives from various companies, trade groups and consultants. Since the initial meeting in September, the Department met with TAB and their subcommittee on October 28, 2009, January 14, 2010, January 21, 2010 and March 25, 2010.

The Department received additional input from industry representatives, consultants and environmental groups. On January 30, 2010 the Department published an Advanced Notice of Proposed Rulemaking for a 30-day comment period. The Department received comments from 87 individuals representing industry, consultants and environmental groups, as well as private citizens. The current proposal is based on the comments received during the public comment period, comments submitted by TAB and comments developed by TAB's sub-committee members.

The proposed rulemaking was published in the *Pennsylvania Bulletin* on July 10, 2010. See 40 *Pa.B.* 3845 (July 10, 2010). The public comment period closed on August 9, 2010. In addition, four public hearing were held: July 19, 2010, in Tunkhannock, PA; July 21, 2010, in Williamsport, PA; July 22, 2010, in Meadville, PA; and July 22, 2010 and July 26, 2010, in Pittsburgh, PA. The EQB received approximately 2,000 commentators.

The Department presented the draft final form rulemaking to TAB on September 16, 2010. During this discussion, TAB members made several recommendations regarding the definition of unconventional formations, use of blow-out preventers, cementing the intermediate casing, producing gas off the intermediate casing, and the actions the operator must take when it loses circulation of cement.

(23) Include a description of any alternative regulatory provisions which have been considered and rejected and a statement that the least burdensome acceptable alternative has been selected.

There are no alternative regulatory provisions that achieve the same level of safety, health and environmental protection in a less burdensome manner.

(24) Are there any provisions that are more stringent than federal standards? If yes, identify the specific provisions and the compelling Pennsylvania interest that demands stronger regulations.

No.

(25) How does this regulation compare with those of other states? How will this affect Pennsylvania's ability to compete with other states?

The changes draft final-form in this rulemaking package reflect the updates needed to the Commonwealth's oil and gas program to bring well construction practices into line to be comparable with what other states and prudent operators implement as best practices. Comparison with the regulatory requirements of EPA as well as those of New York, West Virginia, Ohio, Texas, Oklahoma, Louisiana, Kansas and Montana were made while taking into consideration the differences in those areas with Pennsylvania geology, producing formations and historical practices. A side-by-side comparison with these states indicates that Pennsylvania's draft final-form cementing and casing standards would be line with those states with similar operations. There is not a comparable regulation for any of the state oil and gas programs reviewed regarding the gas migration response requirements for the operator as draft final-form by this regulation. Due to the potential risk of harm or death, Pennsylvania has taken the lead on this issue of safety. The Department believes the draft final-form rulemaking reflects a combination of the best practices of those states as applied to the peculiarities of Pennsylvania geology, producing formations and historical practices of the industry.

(26) Will the regulation affect any other regulations of the promulgating agency or other state agencies? If yes, explain and provide specific citations.

No.

(27) Submit a statement of legal, accounting or consulting procedures and additional reporting, recordkeeping or other paperwork, including copies of forms or reports, which will be required for implementation of the regulation and an explanation of measures which have been taken to minimize these requirements.

Section 78.88 requires annual reporting of the quarterly well inspection results. Records of the quarterly inspections as well as the cement job logs must be kept for 5 years.

Production data must be submitted electronically thus reducing filing and storage requirements.

The Department has amended § 78.122(b) to require the operator to include the following in its stimulation record: (i) a descriptive list of the chemical additives; (ii) the percent by volume of the chemical additives; (iii) a list of all the chemicals in the operator's Material Safety Data Sheets (MSDS);

(iv) the percent by volume of each MSDS-listed chemical; (v) the base fluid's total volume; (vi) a list of water sources; (vii) the total volume of recycled water; and (viii) the pump rates and pressures used at the well. Additionally, § 78.122(d) provides that an operator must maintain records of every chemical used to hydraulically fracture a well by chemical name and must provide this list to the Department upon request.

Additionally, the Department has added new § 78.122(c) which provides that an operator may designate specific portions of its stimulation records as containing a trade secret or confidential proprietary information (CPI) and that the Department shall prevent disclosure of such designated trade secrets or CPI to the extent permitted by the Right To Know Law, 65 P.S. 67.101 *et seq.*

(28) Please list any special provisions which have been developed to meet the particular needs of affected groups or persons including, but not limited to, minorities, elderly, small businesses, and farmers.

Not Applicable

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Copy below is hereby approved as to form and legality.
Attorney General

By:
(Deputy Attorney General)

DATE OF APPROVAL

☐ Check if applicable
Copy not approved. Objections attached.

Copy below is hereby certified to be true and correct copy of a document issued, prescribed or promulgated by:

DEPARTMENT OF ENVIRONMENTAL PROTECTION
ENVIRONMENTAL QUALITY BOARD

(AGENCY)

DOCUMENT/FISCAL NOTE NO. 7-459

DATE OF ADOPTION October 12, 2010

BY John Hanger

TITLE JOHN HANGER
CHAIRMAN

EXECUTIVE OFFICER CHAIRMAN OR SECRETARY

Copy below is hereby approved as to form and legality
Executive or Independent Agencies

BY Andrew C. Clark

DATE OF APPROVAL OCT 12 2010

(Deputy General Counsel)
~~(Chief Counsel - Independent Agency)~~
~~(Strike inapplicable title)~~

☐ Check if applicable. No Attorney General Approval or objection within 30 days after submission.

NOTICE OF FINAL RULEMAKING

DEPARTMENT OF ENVIRONMENTAL PROTECTION
ENVIRONMENTAL QUALITY BOARD

OIL AND GAS WELL CASING AND CEMENTING

25 *Pa. Code,* Chapter 78

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

Order

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

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

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

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

This order was adopted by the Board at its meeting of October 12, 2010.

A. Effective Date

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

B. Contact Persons

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

C. Statutory Authority

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

D. Background of the Amendments

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

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

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

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

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

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

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

E. Summary of Comments and Responses

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

§ 78.1. Definitions.

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

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

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

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

§ 78.51. Protection of water supplies.

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

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

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

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

§ 78.52 Predrilling or prealteration survey.

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

§ 78.55. Control and disposal plan.

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

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

§ 78.71. Use of safety devices—well casing.

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

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

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

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

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

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

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

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

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

§ 78.73. General provision for well construction and operation.

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

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

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

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

§ 78.75a. Area of alternative methods.

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

§ 78.81. General provisions.

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

§ 78.82. Use of conductor pipe.

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

§ 78.83 Surface and coal protective casing and cementing procedures.

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

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

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

§ 78.83a. Casing and cementing plan.

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

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

§ 78.83b. Casing and cementing—lost circulation.

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

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

§ 78.83c. Intermediate and production casing.

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

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

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

The final form rulemaking amends § 78.83c(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 rulemaking § 78.84(d)(3) clarifies the certification requirements for a person welding casing.

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

§ 78.85. Cement standards.

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

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

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

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

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

§ 78.88. Mechanical integrity of operating well.

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

§ 78.89. Gas migration response.

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

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

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

§§ 78.92–78.95. Plugging.

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

§ 78.96. Marking the location of a plugged well.

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

§ 78.121. Well record and completion report.

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

§ 78.122. Well record and completion report.

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

G. Benefits, Costs and Compliance

Benefits

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

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

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

Compliance Costs

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

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

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

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

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

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

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

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

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

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

Compliance Assistance Plan

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

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

Paperwork Requirements

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

H. Pollution Prevention

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

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

I. Sunset Review

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

J. Regulatory Review

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

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

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

K. Findings of the Board

The Board finds that:

(1) Public notice of proposed rulemaking was given under sections 201 and 202 of the act of July 31, 1968 (P.L. 769, No. 240) (45 P.S. §§ 1201 and 1202) and regulations promulgated thereunder at *1 Pennsylvania Code* §§ 7.1 and 7.2.

(2) A public comment period was provided as required by law, and all comments were considered.

(3) These regulations do not enlarge the purpose of the proposal published at 40 *Pa.B.* 3845.

(4) These regulations are necessary and appropriate for administration and enforcement of the authorizing acts identified in Section C of this order.

L. Order of the Board

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

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

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

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

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

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

BY:

JOHN HANGER
Chairperson
Environmental Quality Board

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 [~~**the surface casing or coal protection**~~] casing **[is run] [~~or intermediate casing~~] is set.** [~~In wells without surface casing, the~~ **~~surface~~** ~~casing seat shall be~~ **~~considered to be~~** ~~equal to~~ **~~50 feet below the deepest fresh groundwater~~** **~~[the depth of casing which is normal for wells in the area]~~**.

* * * * *

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 **[API]** standards and specifications.

Cement job log **– a written record that documents the actual procedures and specifications of the cementing operation. [~~The record must include the type of cement with additives, 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 bbls per minute, pressures in psi, time in minutes and sequence of events during 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 [~~other than~~] production casing, NOT TO INCLUDE COAL PROTECTION CASING, that is used in the wellbore to isolate, stabilize or provide well control. [~~to a greater depth than that provided by the surface casing or coal protection casing.~~]**

* * * * *

L.E.L.— LOWER EXPLOSIVE LIMIT

* * * * *

[*Retrievable*—When used in conjunction with surface casing, coal protective casing or production casing, the casing that can be removed after exerting a prudent effort to pull the casing while applying a pulling force at least equal to the casing weight plus 5000 pounds or 120% of the casing weight, whichever is greater.]

* * * * *

Surface Casing—**[A string of pipe which extends from the surface and that segregates and protects fresh groundwater and stabilizes the hole.][~~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 [~~and~~] 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**.

* * * * *

(d) **[The operator shall affirmatively demonstrate to the Department's satisfaction that the quality of the restored or replaced water supply to be used for human consumption is at least equal to the quality of the water supply before it was affected by the operator. If the quality of the water supply before it was affected by the operator cannot be affirmatively established, the operator shall demonstrate that the concentrations of substances in the restored or replaced water supply do not exceed the primary and secondary maximum contaminant levels established under § 109.202 (relating to State MCLs and treatment technique requirements).] A restored or replaced water supply shall include 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 [~~owner and 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 pursuant to the Pennsylvania Safe Drinking Water Act (35 P. S. § § 721.1—721.17), or is comparable to the [~~unaffected~~] THE QUALITY OF THE water supply BEFORE IT WAS AFFECTED BY THE OPERATOR if that water supply did not meet these standards.

(3) A*dequate 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 [~~which~~] 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 [~~surface landowner or water purveyor~~] 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) **[The oil or gas well operator's duty to replace or restore a water supply includes providing plumbing, conveyance, pumping or auxiliary equipment and facilities necessary for the surface landowner or water purveyor to utilize the water supply.]**

[(g)] 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.

[(h)] (g) If the well operator and the [~~**landowner, water purveyor or affected person**~~] **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 [~~such~~] notice FROM AN AFFECTED PERSON to the Department within [~~10 calendar days~~] 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 **[cause]** **conduct** a predrilling or prealteration survey **[to be conducted]** in accordance with this section.

* * * * *

(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-[~~calendar~~] **BUSINESS** days of **receipt** **[being notified by the Department to submit a copy]** 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.**

* * * * *

§ 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 shall 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 SHALL 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

Sec.

CASING AND CEMENTING

OPERATING WELLS

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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 [~~blow-out prevention~~] PROPER WELL CONTROL equipment and** prevent blowouts, explosions, fires and casing failures during installation, completion and operation.

* * * * *

§ 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[when well head pressures or natural open flows are anticipated at the well site that may result in a blow-out or when the operator is drilling in an area where there is no prior knowledge of the pressures or natural open flows to be encountered.] in the following circumstances:**

(1) When drilling a well that is intended to produce natural gas from [the Marcellus Shale] AN UNCONVENTIONAL formation;

(2) WHEN DRILLING OUT SOLID CORE HYDRAULIC FRACTURING PLUGS TO COMPLETE A WELL;

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

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

(4) On wells regulated by the Oil and Gas Conservation Law (58 P.S. §§ 401 – [~~409~~] 419);

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

(b) Blow-out prevention equipment used shall 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 such that the blow-out preventer can be actuated if control of the well is lost.

[(c)] (d) * * * * *

[(d)] (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 shall not be used until it is repaired and passes the test.**

[(e)] (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 [~~that~~] 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 [~~shall be~~] repaired or replaced [~~immediately~~] and re-tested. [~~prior to the resumption of drilling.~~]**

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

[(f)] (h) [~~During drilling when conditions are such that the use of a blowout preventer can be anticipated~~] **WHEN A BLOWOUT PREVENTER IS INSTALLED OR REQUIRED PURSUANT TO SUBSECTION (A)**, there shall be present on the **[rig floor a certified] well site an** individual **[responsible to] [~~who the operator has determined is trained and competent in the use of the blow-out prevention equipment.~~** ~~Satisfactory completion of [a United States Geologic Survey (U.S.G.S.)] a[n approved]~~ **WITH A CURRENT CERTIFICATION FROM A** well control course **ACCREDITED by the [American Petroleum Institute,] [~~Independent~~] 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 SHALL MAINTAIN A LIST OF APPROVED**

ACCREDITING ORGANIZATIONS ON ITS WEBSITE. [~~or equivalent study shall be deemed adequate [certification] for purposes of this subsection.~~]

(I) WELL DRILLING AND COMPLETION OPERATIONS REQUIRING PRESSURE BARRIERS, AS IDENTIFIED BY THE OPERATOR PURSUANT TO 25 PA. CODE § 78. 55(B), 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 SHALL 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 CLEANOUT OPERATIONS IN HORIZONTAL UNCONVENTIONAL FORMATIONS.

[**(g)**] (**k**) The minimum amount of **INTERMEDIATE** [~~cemented~~] casing **THAT IS CEMENTED TO THE SURFACE** to which blow-out prevention equipment may be attached, shall be in accordance with the following:

Proposed Total ***VERTICAL*** *Depth (in feet)*	*Minimum Cemented Casing Required (in feet of casing cemented)*
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

[**(h)**] (**l**) * * * * *

§ 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.

[(a)] **(b)** The operator shall prevent gas **[and other fluids from lower formations from entering fresh groundwater.], 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.**

[(b)] **(c)** After a well has been completed, recompleted, reconditioned or altered the operator shall prevent **SURFACE** shut-in pressure **[or]** **and** **SURFACE** producing back pressure [at] **INSIDE** the surface casing [~~**seat,**~~]~~[**or**]~~ coal protective casing [~~**seat or intermediate casing seat when the intermediate casing is used in conjunction with the surface casing to isolate fresh groundwater**~~] from exceeding **THE FOLLOWING PRESSURE: 80 percent (80%)** [~~of the hydrostatic pressure of the surrounding fresh groundwater system in accordance with the following formula. The maximum allowable shut-in pressure [or] and producing back pressure to be exerted at the [surface casing seat, or coal protective] casing seat may not exceed the [hydrostatic] pressure calculated as follows: Maximum pressure = (0.8 x 0.433 psi/foot) multiplied by (casing length in feet).~~] **MULTIPLIED BY 0.433 PSI PER FOOT MULTIPLIED BY THE CASING LENGTH (IN FEET) OF THE APPLICABLE CASING.**

[(c)] **(d)** After a well has been completed, recompleted, reconditioned or altered, if the **SURFACE** shut-in pressure or **SURFACE** producing back pressure exceeds the **[hydrostatic]** pressure [~~**at the surface casing seat, coal protective casing**~~] as calculated in subsection **[(b)]** **(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 shall 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 shall publish a final designation of the area and required alternative methods in the P*ennsylvania Bulletin.*

(c) Wells drilled within an area of alternative methods established pursuant to 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.

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CASING AND CEMENTING

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[(c) Casing and cementing standards in § § 78.83—78.85 (relating to surface and coal protective casing and cementing procedures; casing standards; and cement standards) apply to surface casing and coal protective casing but do not apply to production casing.]

§ 78.82 Use of conductor pipe.

If the operator installs conductor pipe in the well, the **[operator may not remove the pipe]** **following provisions shall apply:**

- **(i)** **The operator may not remove the pipe;**
- **(ii)** **Conductor pipe shall be installed in a manner that prevents THE SUBSURFACE infiltration of surface water or fluids [~~from the operation into~~] [~~groundwater~~] BY EITHER DRIVING THE PIPE**

INTO PLACE OR CEMENTING THE PIPE FROM THE SEAT TO THE SURFACE;

(iii) **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 [effective date], surface casing or any casing functioning as a water protection casing must 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 [~~bore at the casing seat~~] is no greater than the pressure permitted by § 78.73(c), [~~and~~] 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.**

[(a)] **(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 tube]** **[~~centralizer band~~]** **CASING COUPLING**.

[(b)] **(c)** **[Except as provided in subsection (c), t]**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 SHALL 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 redrilling 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.**

[(c) If no fresh groundwater is being utilized as a source of drinking water within a 1,000-foot radius of the well, the operator may set and permanently cement a single string of surface casing through all water zones, including fresh, brackish and salt

water zones. Prior to penetrating zones known to contain, or likely containing, oil or gas, the operator shall install and permanently cement the string of casing in a manner that segregates the various waters.]

* * * * *

(f) If additional fresh groundwater is encountered in drilling below the permanently cemented surface casing, the operator shall **DOCUMENT THE DEPTH OF THE FRESH GROUND WATER 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 **[~~at least 20 feet into the permanently cemented surface 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), [W]w**hen 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 shall 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 **[~~at least 20 feet into the surface or coal protective 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 can not be circulated to the surface a cement basket may be installed immediately above the depth of the **anticipated [last] 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 PURSUANT TO 25 PA. CODE § 78.83B.**

§ 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, [~~and~~] anticipated fresh groundwater zones AND THE METHOD OR INFORMATION BY WHICH THE DEPTH OF THE DEEPEST FRESH GROUNDWATER WAS DETERMINED;

(2) Diameter of the [~~well bore~~] 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) Estimated location of centralizers;

(6) PROPOSED BOREHOLE CONDITIONING PROCEDURES.

[~~(6)~~](7) Alternative methods or materials as required by the Department as a condition of the well permit.

(b) The plan must 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) Any revisions to the plan made as a result of on-site modification shall be documented in the plan [~~by the operator~~] 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 [~~surface casing~~] and cement the [~~second~~] ADDITIONAL string of casing back to the seat of the [~~surface or coal protective casing~~] 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 [~~second~~] ADDITIONAL string of casing must not exceed the requirements of section 78.73(c).

(2) [~~If the additional string of casing is the~~] RUN production casing[~~, the operator shall~~] AND set the production casing on a packer in a competent formation below the [~~surface casing seat,~~] 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.

[~~(4)~~] (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.

[~~(b) If cement used to permanently cement the surface or coal protective casing is not circulated to the surface, the Department may require the operator to determine the amount of casing that was cemented by logging or other suitable method.~~]

§ 78.83c. Intermediate and production casing.

[~~(a) Except as provided in § 78.72 (relating to Use of safety devices—blow-out prevention equipment), intermediate and production casing must be cemented according to this section.~~]

(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 must be cemented TO THE SURFACE BY THE DISPLACEMENT METHOD. [~~from the casing seat to a point at least 500 feet above the seat. If any producing horizon is open to the wellbore above the casing seat, the casing must be cemented from the casing seat up to a point at least 500 feet above the top of the shallowest productive horizon, or to a point at least 200 feet above the shoe of the next shallower casing string that was set and cemented in the well.~~] GAS MAY BE PRODUCED OFF [~~The~~] THE intermediate casing [~~may be perforated to produce gas or oil~~ if a shoe test demonstrates THAT ALL GAS WILL BE CONTAINED WITHIN THE WELL [~~a pressure gradient greater than 0.465 psi/ft multiplied by casing length in feet~~] 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 for 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 must be placed by the displacement method with sufficient cement to fill the annular space [~~to the surface or~~] to a point at least 500 feet above [~~the production casing seat~~] 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) [~~Surface~~] EXCEPT AS PROVIDED IN SUBSECTION (C), ALL casing must be a string of new pipe with [~~a~~] AN INTERNAL pressure rating that is at least 20 percent greater than the anticipated maximum pressure to which the [~~surface~~] casing will be exposed.

(c) Used casing may be approved for use as surface, intermediate or production casing but must 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 percent decrease in pressure.

(d) New or used plain end casing, except when being used as [~~drive pipe,~~] conductor PIPE, [~~or as a casing string prior to setting and cementing surface casing,~~] that is welded together for use must meet the following requirements:

(1) It 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 percent decrease in pressure. The operator shall notify the Department at least 24 hours before conducting the test. The test results shall be entered on the drilling log.

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

(3) It shall be welded by a person trained and certified in the applicable American Petroleum Institute['s], 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 [INSERT DATE – 6 MONTHS AFTER THE EFFECTIVE DATE]. A person with 10 or more years of experience welding casing as of [effective date] who registers with the Department within nine months of the effective date of this subsection is deemed to be certified.

[(b) The operator shall equip the casing string with appropriate equipment to center the casing through the hole in fresh groundwater zones. This equipment is

not required when existing hole conditions such as caving or crookedness might cause loss of the well or result in a defective cement job.]

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

(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 [~~120 percent of the highest expected working pressure of the casing string being tested,~~] THE ANTICIPATED MAXIMUM PRESSURE TO WHICH THE CASING WILL BE EXPOSED for 30 minutes with not more than a 10 percent 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 [~~and intermediate casing when the intermediate casing is used in conjunction with the surface casing to isolate fresh groundwater~~].** [T]**t**he operator shall use cement that **[will resist degradation by chemical and physical conditions in the well.] 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;~~

~~(5) Resist degradation by the chemical and physical conditions in the well;~~]

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.

[~~(6)~~] (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) **[The operator shall permit the cement to set to a minimum compressive strength of 350 pounds per square inch (psi) in accordance with the American Petroleum Institute's API Specification 10. The operator shall permit the cement to set for a minimum period of 8 hours prior to the resumption of actual drilling.]** **After the casing cement is placed behind surface casing [~~and intermediate casing when the intermediate casing is used in conjunction with the surface casing to isolate fresh groundwater~~], 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 SHALL CONSTITUTE A ZONE OF CRITCAL CEMENT AND SHALL ACHIEVE A 72 HOUR COMPRESSIVE STRENGTH OF 1,200 PSI AND THE FREE WATER SEPARATION SHALL BE NO MORE THAN SIX MILLILITERS PER 250 MILLILITERS OF CEMENT. IF THE SURFACE CASING IS LESS THAN 300 FEET, THE ENTIRE CEMENTED STRING SHALL CONSTITUTE A ZONE OF CRITICAL CEMENT.**

(c) After [~~the~~] ANY casing cement is placed and cementing operations are complete, the casing may not be disturbed for a minimum of eight (8) hours by:

> **(1) Releasing pressure on the cement head WITHIN FOUR HOURS OF CEMENTING if [~~float~~] CASING equipment check valves did not hold or [~~float~~] CASING equipment was not equipped with check valves. AFTER FOUR 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; or**
>
> **(4) Running drill pipe[~~, wireline,~~] or other mechanical devices into or out of the wellbore WITH THE EXCEPTION OF A WIRELINE USED TO DETERMINE THE TOP OF CEMENT.**

[(c)] **(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 **[(b)]** **(d)**.

(e) The operator shall notify the Department a minimum of one 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 must 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 five 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 five years and shall 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), 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 [~~or intermediate casing seat when the intermediate casing is used in conjunction with the surface casing to isolate fresh groundwater~~] 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 seven 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 [~~notify the Department and, if so directed by the Department,~~] 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 hazard posed by [~~the levels of natural gas~~] THE CONCENTRATIONS OF STRAY NATURAL GAS. [~~The operator, in conjunction with the Department and local emergency response agencies, shall take measures necessary to ensure public health and safety.~~]

(b) The investigation undertaken by the operator pursuant to subsection (a) shall include, but not be limited to:

(1) [~~An~~] A SITE VISIT AND interview with the complainant to obtain information about the complaint and to assess the reported [~~problem~~] 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; and

(3) If necessary, [~~Establishment of~~] establish monitoring locations at potential sources, in potentially impacted structures, and the subsurface [~~if necessary~~].

~~(c) If the level of natural gas is greater than 10 percent of the lower explosive limit of natural gas, the operator shall:~~

~~(1) Immediately notify the local emergency response agency, police and fire departments and the Department;~~

~~(2) Conduct an immediate field survey of the operator's adjacent oil or gas wells to assess the wells for mechanical integrity, defective casing or cementing, and excess pressures within any part of the well. The initial area of assessment shall include wells within 2,500 feet and expanded to a greater distance if necessary as determined by the Department;~~

~~(3) Initiate mitigation controls, which may include remedial measures, access control, advisories, evacuation, signs and other actions;~~

~~(d) The operator shall take action to correct any defect in the oil and gas wells to mitigate the stray gas incident.~~

~~(e) The operator and owner shall report to the Department by phone within 12 hours after the interview with the complainant and field survey of the natural gas levels. A follow-up report shall be filed in writing with the Department within three days of the complaint. This follow-up report must include the results of the investigation, monitoring results and measures taken by the operator to repair any defects at any of the adjacent oil and gas wells.]~~

(C) IF COMBUSTIBLE GAS IS DETECTED INSIDE A BUILDING OR STRUCTURE AT CONCENTRATIONS EQUAL TO OR GREATER THAN 10% OF THE LOWER EXPLOSIVE LIMIT (L.E.L.), THE OPERATOR SHALL:

(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; OR

(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 AND/OR WATER 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 SHALL 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 SUBSECTIONS (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) *REPORTING REQUIREMENTS* - 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.

(D) 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 TIMEFRAME OTHERWISE APPROVED BY THE DEPARTMENT. THE FINAL REPORT SHALL INCLUDE THE FOLLOWING

(1) DOCUMENTATION OF ALL RESULTS OF THE INVESTIGATION, INCLUDING ANALYTICAL DATA, MONITORING RESULTS
(2) OPERATIONAL CHANGES ESTABLSIHED AT THE OPERATOR'S OIL AND GAS WELLS IN PENNSYLVANIA
(3) MEASURES TAKEN BY THE OPERATOR TO REPAIR ANY DEFECTS AT ANY OF THE INVESTIGATED OIL AND GAS WELLS.

(E) ALL REPORTS SUBMITTED IN ACCORDANCE WITH THIS SECTION THAT CONTAIN AN ANALYSIS OF GEOLOGICAL OR ENGINEERING DATA SHALL BE PREPARED AND SEALED BY A PENNSYLVANIA LICENSED GEOLOGIST OR ENGINEER.

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 5000 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 percent of the casing weight, whichever is greater.** **[and the]** **The** well shall be filled with nonporous material from the total depth or attainable bottom of the well, to a point **50 feet** below **[20 feet above the top of]** 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** **[that point].** **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.** **[Between this sealing plug and a point 20 feet above the next higher stratum bearing or having borne oil, gas or water, the hole shall be filled with nonporous material and at that point there shall be placed another 50-foot plug of cement which]** **The cement plugs shall be placed in a manner that** will completely seal the hole. **[In like manner, the hole shall be filled and plugged, with reference to each of the strata bearing or 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. Where the production casing is not retrievable, the operator shall plug that portion of the well under § 78.91(d) (relating to general provisions).

* * * * *

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

* * * * *

(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 5000 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 percent 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).

§ 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 5000 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 percent of the casing weight, whichever is greater.**

[and the] **The** well shall be filled with nonporous material from the total depth or attainable bottom of the well, to a point **50 feet below** **[20 feet above the top of]** 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** **[that point]**. **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.** **[Between this sealing plug and a point 20 feet above the next higher stratum bearing or having borne oil, gas or water, the hole shall be filled with nonporous material and at that point there shall be placed another 50-foot plug of cement which]** **The cement plugs shall be placed in a manner that** will completely seal the hole. **[In this manner, the hole shall be filled and plugged, with reference to each of the strata bearing or 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 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 5000 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 percent of the casing weight, whichever is greater. **[and a]** **A** string of casing with an outside diameter of not less than 4 1/2 inches for gas wells, or not less than 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.

* * * * *

§ 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 5000 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 percent 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** **[20 feet above the top of]** 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** **[that point].** **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.** **[Between this sealing plug and a point 20 feet above the next higher stratum bearing or having borne oil, gas or water, the hole shall be filled with nonporous material and at that point there shall be placed another 50-foot plug of cement which]** **The cement plugs shall be placed in a manner that** will completely seal the hole. **[The hole shall be filled and plugged, with reference to each of the strata bearing or having borne oil, gas or water.]** 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 5000 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 percent of the casing weight, whichever is greater. **[and the]** **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.

* * * * *

§ 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 5000 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 percent of the casing weight, whichever is greater.** **[and]** **T[t]**he well shall be filled with nonporous material from the total depth or attainable bottom of the well, to a point **50 feet below** **[20 feet above the top of]** 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** **[that point]**. **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.** **[Between this sealing plug and a point 20 feet above the next higher stratum bearing or having borne oil, gas or water, the hole shall be filled with nonporous material and at that point there shall be placed another 50-foot plug of cement]** **The cement plugs shall be placed in a manner that will completely seal the hole**. **[The hole shall be filled and plugged, with reference to each of the strata bearing or 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 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).

* * * * *

§ 78.96. Marking the location of a plugged well.

(a) 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** **[or metal and concrete]**. The marker shall 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

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SUBCHAPTER E. WELL REPORTING

78.121. **[Annual]** **P**[p]roduction report**ing**.
78.122. Well record and completion report.
78.123. Logs and additional data.
78.124. Certificate of plugging.
78.125. Disposal and enhanced recovery well reports.

§ 78.121. **[Annual]** **P**[p]roduction report**ing.**

(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 **[March 31] February 15** of each year. **The operator of a well [~~which produces gas~~] 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 six 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 **[~~shall~~] 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 **[~~shall~~] IS DEEMED TO** satisfy the residual waste biennial reporting requirements of § 287.52 (relating to biennial report).

(b) The **[~~annual~~]** production report shall be submitted **ELECTRONICALLY TO THE DEPARMENT THROUGH ITS WEBSITE.[on forms prescribed by, and available from, the Department or in a similar manner approved by the Department.]**

§ 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:

* * * * *

(6) Size and depth of conductor pipe, surface casing, coal protective casing, **INTERMEDIATE CASING,** production casing and borehole.

* * * * *

[~~(9)~~] (10) A certification by the operator that the well has been constructed in accordance with this chapter and any permit conditions imposed by the Department.

[(10)] 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:** [~~including pump rates, pressure, total volume and list of hydraulic fracturing chemicals used, the volume of water used, and identification of water sources used pursuant to an approved water management plan.~~]

(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 PURSUANT TO AN APPROVED WATER MANAGEMENT PLAN AND THE VOLUME OF WATER USED FROM EACH SOURCE;

(VII) THE TOTAL VOLUME OF RECYCLED WATER USED; AND

(VIII) THE PUMP RATE AND PRESSURE USED IN THE WELL.

(7) Actual open flow production and **[rock]** [~~**reservoir**~~] **SHUT IN SURFACE** pressure.

(8) Open flow production and **[rock]** [~~**reservoir**~~] **SHUT IN SURFACE** pressure, measured 24 hours after **[treatment]** **completion**.

(c) [~~No information described in subsection (b)(5)—(8) will be required as part of the report unless the operator has had the information compiled in the ordinary course of business. No interpretation of the data is to be filed.~~] **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 SHALL PREVENT DISCLOSURE OF SUCH DESIGNATED CONFIDENTIAL INFORMATION TO THE EXTENT PERMITTED BY THE RIGHT TO KNOW LAW, 65 P.S. 67.101 ET SEQ.**

(D) IN ADDITION TO SUBMITTING A STIMULATION RECORD TO THE DEPARTMENT PURSUANT TO SUBSECTION (B), AND SUBJECT TO THE PROTECTIONS AFFORDED FOR TRADE SECRETS AND CONFIDENTIAL PROPRIETARY INFORMATION UNDER THE RIGHT TO KNOW LAW, 65 P.S. 67.101 ET SEQ., 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 SUCH A NUMBER, TO THE DEPARTMENT UPON WRITTEN REQUEST BY THE DEPARTMENT.

* * * * *

PENNSYLVANIA
Oil and Gas Casing and Cementing Standards
25 *Pa. Code* Chapter 78 (relating to Oil and Gas Wells)
See 40 *Pa.B.* 3845 (July 10, 2010)
Environmental Quality Board Regulation #7-459
(Independent Regulatory Review Commission #2857)

Comment/Response Document

Pennsylvania Oil and Gas Cementing and Casing Regulations

On July 10, 2010, the Environmental Quality Board (Board or EQB) published a notice of public hearings and comment period on a proposed rulemaking concerning amendments to 25 *Pa. Code* Chapter 78 (relating to Oil and Gas Wells). (40 *Pa.B.* 3845)

The proposed amendments include: the addition of a provision that requires operators to have a pressure barriers plan to minimize well control events; the addition of a provision that requires operators to keep a list of emergency contact phone numbers at the well site; amended provisions that clarify how and when blow-out prevention equipment is to be installed and operated; the addition of a provision that requires operators to condition the wellbore to ensure an adequate bond between the 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; and the addition of provisions that specify the actions an operator must take in the event of a gas migration incident. On July 24, 2010, the Board published notice of an additional public hearing that was held in Pittsburgh on July 26, 2010 (40 Pa.B. 4151).

The Board held five public hearings on the proposed rulemaking at the following locations:

July 19, 2010 7:00 p.m.	Tunkhannock Area High School Auditorium 120 West Tioga Street Tunkhannock, PA 18657
July 21, 2010 7:00 p.m.	Lycoming College Heim Science Center Building Room G-11 700 College Place Williamsport, PA 17701
July 22, 2010 7:00 p.m.	Department of Environmental Protection Northwest Regional Office 1st Floor Conference Room 230 Chestnut Street Meadville, PA 16335
July 22, 2010 7:00 p.m.	Department of Environmental Protection Southwest Regional Office Waterfront Conference Room A and B 400 Waterfront Drive Pittsburgh, PA 15222-4745
July 26, 2010 7:00 p.m.	Department of Environmental Protection Southwest Regional Office Waterfront Conference Room A and B 400 Waterfront Drive Pittsburgh, PA 15222-4745

The Board received written submittals from approximately 2,000 commentators regarding the proposed Oil and Gas Cementing and Casing regulations during the public hearings and public comment period.

This document summarizes the testimony received during the public hearings and the written comments received during the public comment period. An identifying number has been assigned to each commentator. A list of the commentators, including name, affiliation (if any), and city/state/country, can be found beginning on page 93 of this document. In addition, the comments received from the Senate Environmental Resources and Energy Committee and the Independent Regulatory Review Commission (IRRC) are summarized and responses provided.

§ 78.1 Definitions

Comment: The following terms are used in the regulation but are not defined: "anticipated fresh groundwater zones;" "blow-out prevention equipment;" "shallowest productive horizon;" "area of alternative methods;" "natural gas migration incident;" "centralizers;" "agricultural water supplies;" "shoe test;" "operating well;" and "'pressure rating." We recommend that the Board include definitions for these terms in the final-form regulation. (1989)

Response: The Board does not believe these terms need to be defined in this rulemaking. The terms listed in the comment are either generally accepted terms in the industry or the terms are further delineated with within their respective regulatory section.

Comment: "Casing seat" — This definition is somewhat confusing. Any casing string (conductor, surface, intermediate, production) technically has a "casing seat". It is not necessary to specify "surface casing or coal protection casing or intermediate casing". The definition should read: "The depth to which casing is set. In wells without surface casing, the casing seat shall be considered to be equal to 50 feet below the deepest fresh groundwater." (1841) (1844)

Response: The Board has revised the definition of "casing seat" and the references to specific casing strings have been removed.

Comment: In the Casing seat definition the last sentence, "In wells without surface casing, the surface casing seat shall be considered to be equal to 50 feet below the deepest fresh groundwater." This seems erroneous as all gas wells should have surface casing. The definition of surface casing in these regulations is- *(this is the casing used to isolate the wellbore from fresh groundwater and to prevent escape or migration of gas, oil and other fluids from the well bore into fresh water).* However, the casing mentioned above suggests that since it is going 50 feet below the groundwater, it is the casing or part of the string of casing also protecting the groundwater and therefore is a surface casing by definition so this is confusing. (1822)

Response: The Board agrees with the commentator and has clarified the definition of "casing seat"

Comment: The proposed Surface casing definition reads: "Casing used to isolate the wellbore from fresh groundwater and to prevent the escape or migration of gas, oil and other fluids from the wellbore into fresh groundwater. The surface casing is also commonly referred to as the water string or water casing." This definition is problematic because it conflicts with other sections. It appears that the new definition is trying to re-define surface casing as a water string, as opposed to a pressure-containing casing string. Under existing regulations, the surface casing string could isolate the water intervals and serve as the first pressure containing casing string.
See § 78.83(b) (proposed as 78.83(c), amended), which states that the "operator shall drill 50 feet below the deepest fresh groundwater or at least 50 feet into consolidated rock, whichever is deeper, and immediately set a string of surface casing to that depth." (1843) (1844) (1989)

Response: The Board disagree that the definition creates a conflict. The definition describes the surface casing and section 78.83 describes how deep it must be set.

Comment: In the Surface casing definition the sentence in the definition, "Casing used to isolate the wellbore from fresh groundwater and to prevent the escape or migration of gas, oil and other fluids from

the well bore into fresh groundwater." It might be more accurate to say "migration of gas, oil or other fluids" (1822)

Comment: Delete the second sentence of the proposed casing seat definition. (924)

Response: The Board has revised the definition of *casing seat* to "the depth to which casing is set".

Response: The Board believes the revised definition reflects the comment.

Comment: The surface casing definition should clarify that the surface casing also provides the structural support required to install blowout prevention equipment and provides a conduit for drilling fluids when drilling the subsequent section of the well. (924)

Response: The Board has declined to modify the definition of *surface casing* to reflect these recommendations. §78.84(a) (relating to Casing standards) requires all casing to be able to withstand the effects of tension, and prevent leaks, burst and collapse during its installation, cementing and subsequent drilling and producing operations. The Board interprets this subsection to require that the surface casing provide adequate structural support during drilling and producing operations, which includes the installation of blowout prevention equipment.

The Board also considers the attribute of surface casing providing a conduit for drilling fluids to be an inherent function of the casing string and believes no additional modification is required to specifically include this provision in the rulemaking.

Comment: Expand the cement ticket definition to include: (a) a requirement for the operator to test the mixing water pH and temperature and note it on the cement ticket (this is standard industry practice and aides in determining cement quality); (b) a record of the Waiting on Cement [WOC] time, which is the time required to achieve the calculated compressive strength standard before the casing is disturbed in any way [described in the cement definition comments above]; and (c) a certification statement that requires the operator to certify, under penalty of law, that the cement job was completed in compliance with Pennsylvania regulatory requirements. (924)

Response: The Board has removed the definition of a *cement job log* from Section §78.1 (relating to Definitions) and its provisions have been added to Section §78.85 (relating to Cement standards). The cement job log has been revised to now additionally require the mix water temperature and pH. Cement on any casing string must be allowed to properly set by not disturbing the casing for a minimum of eight hours according to the requirements of subsection §78.85(c). This section also has been revised to require a zone of critical cement for the surface casing, which must achieve a 72-hour compressive strength standard of 1200 psi with a free-water separation standard of no more than six milliliters per 250 milliliters of cement. In addition, the Board has revised Section §78.122 (relating to Well record and completion report) to require a certification by the operator that the well was constructed in accordance with Chapter 78 and any permit conditions imposed by the Department.

Comment: In the Cement job log definition this sentence is in the definition, "The record must include the type of cement with additives, the volume, yield and density in pounds per gallon of the cement and the amount of cement returned to the surface, if any. It would provide better information as to the appropriate quality of the cement for the job at hand if the above definition included in the second sentence "The record must include the type of cement and the names and percentages of other added materials or chemicals. (1822)

Response: The Board agrees and has revised the requirements of the cement job log to include the mix water temperature and a listing and quantity of additive types. The requirement for the cement job and its specific components have been removed from §78.1 (relating to Definitions) and relocated to §78.85 (relating to Cement standards).

Comment: Revise the cement definition to include a 72-hour compressive strength standard of 1,200 psi for cement mixtures in the zone of critical cement. Also, require conformance with the API free water separation standard of no more than six milliliters per 250 milliliters of cement tested in accordance with the current API RP 10B. Provide a provision for the commission to set more stringent local standards if needed for pollution prevention, and establish quantitative temperature limits for water used in cement mixing. The cement definition should clarify that it applies to cement used for surface, intermediate and production casing. (924)

Response: The Board agrees and has revised Section §78.85 (relating to Cement standards) to require a 72-hour compressive strength standard of 1200 psi for a zone of critical cement which requires conformance with a free-water separation standard of no more than six milliliters per 250 milliliters of cement. Provisions for more stringent standards are afforded under Section §78.75a (relating to Area of alternate methods), which allows the Department to designate areas where well drilling requirements beyond those provided in Chapter 78 are necessary to drill, operate or plug a well in a safe and environmentally-protective manner.

Comment: The definition of "cement" includes the requirement of "a 24-hour compressive strength of at least 500 psi". We believe a greater compressive strength is appropriate for all Marcellus shale wells, especially due the huge pressures placed on the wells by hydraulic fracturing, and suggest as a minimum the 1,200 psi value recommended by the Harvey Report. (1867)

Response: The Board has incorporated the 1,200 psi value recommended by the Harvey Report.

Comment: Cement Job Log – The well operator should also record the temperature and pH of the cement water. (1820)

Response: The Board agrees and has incorporated this comment.

Comment: The definition of "deepest fresh groundwater" which is defined as "the deepest fresh groundwater bearing formation penetrated by the wellbore as determined from drillers logs from the well or from other wells in the area surrounding the well or from historical records of the normal surface casing seat depths in the area surrounding the well, whichever is deeper." Ascertaining the deepest fresh groundwater zone is important because this is the depth to which surface casing must be set. If research guidance is not reliable or available, a traditionally safe distance with a margin for error should be chosen. In any case surface casing should be at least 100 feet below the deepest fresh water zone and at least 100 feet into bedrock. (1822)

Response: For the purposes of setting surface casing, it is critical that the casing be set deep enough but not so deep that brine be permitted to co-mingle with fresh groundwater. It is also important to recognize that testing water produced during drilling will not yield accurate test results. For these reasons, the regulations have been revised to require the operator to identify how the deepest fresh groundwater was determined and record the information in the casing and cementing plan.

Comment: Under Pennsylvania Code, fresh groundwater is defined as "Water in that portion of the generally recognized hydrologic cycle which occupies the pore spaces and fractures of saturated subsurface materials." The term "fresh groundwater" should be amended to include fresh and useable water that would encompass a larger water table. This would protect waters with low, but some specified salinity. Depending on the reference source, this concentration can range from 500 parts per million (ppm) of dissolved salts to 3000 ppm. The Department of Environmental Protection needs to extend protection to water that may be needed in the future but that is not technically termed "fresh" today. (93)

Response: The Board disagrees that numerical criteria should be used to define deepest fresh groundwater. The drinking water criterion is 500 mg/l for total dissolves solids and EPA defines the criterion as 10,000 mg/l for the purposes of the Underground Injection Control program. For the purposes of setting surface casing, it is critical that the casing be set deep enough but not so deep that brine be permitted to co-mingle with fresh groundwater. It is also important to recognize that testing water produced during drilling will not yield accurate test results. For these reasons, the regulations have been revised to require the operator to identify how the deepest fresh groundwater was determined and record the information in the casing and cementing plan.

Comment: § 78.1: The Board specifically requested comments on the definition of "deepest fresh groundwater." The proposed definition uses the term within its own definition. We suggest that the term "fresh groundwater" be defined with reference to numerical water quality standards and technical practicability of producing a sufficient quality and quantity of water for its intended use. Also, in the definition for "Surface casing" change "...migration of gas..." to "...migration of natural gas..." (1841)

Response: The Board disagrees that numerical criteria should be used to define deepest fresh groundwater. The drinking water criterion is 500 mg/l for total dissolves solids and EPA defines the criterion as 10,000 mg/l for the purposes of the Underground Injection Control program. For the purposes of setting surface casing, it is critical that the casing be set deep enough but not so deep that brine be permitted to co-mingle with fresh groundwater. It is also important to recognize that testing water produced during drilling will not yield accurate test results. For these reasons, the regulations have been revised to require the operator to identify how the deepest fresh groundwater was determined and record the information in the casing and cementing plan.

Comment: Operators should be required to determine, through a test well, the depth of "deepest fresh groundwater" for a given area. How else would an operator know the depth of the deepest fresh groundwater in a particular area? (1829)

Response: The Board agrees that the determination of the deepest fresh groundwater is sometimes problematic when there is little groundwater use in the area. The operator is making the determination based on available well information and typically other wells in the area as water well data is of questionable accuracy in making this determination. The Department is continuing to collect casing depths and working toward providing this data to the public electronically. Currently, if the first estimate is too shallow, the operator must set additional surface casing to achieve this requirement. The Board disagrees with the concept of requiring a test well just to make this determination. As the commentator should be aware, any drilling through the aquifer causes some degree of disturbance whether the well is for water or oil and gas. Fewer disruptions are preferable.

Comment: The definition of fresh groundwater should include some reference to potability, eg:. total dissolved solids less than 500 mg/l. (1829)

Response: The Board received and considered many comments ranging from 500 -10,000 TDS, to groundwater that could be treated to drinking water standards. While frac flowback can be treated to drinking water standards or above, the Board does not believe this is feasible or necessary for PA. The Board protects the fresh water that is typically in that portion of the groundwater that is in the normal hydrologic cycle in Pennsylvania. Deeper formations and groundwater that is not "fresh" must be excluded from commingling with the fresh water zones. However, the lower formation waters may be considered a suitable source in certain situations and in other jurisdictions.

Comment: The reference to "deepest fresh groundwater" is problematic. There are no water well construction standards for the Commonwealth, and the operators have no reliable way of determining the "deepest fresh groundwater" in many areas. We also understand that records of approximately 300,000 water wells drilled between 1990-2004 are missing. These missing data include the surface elevation, water well depth, and geographical location coordinates of water wells. The few other states which have a requirement similar to this have established regional water boards that aggregate data and develop maps to assist operators and landowners in determining the base of fresh groundwater. If Pennsylvania is going to link the standards of Chapter 78 to deepest fresh groundwater, then regional water boards *and* water well construction standards should first be established and reliable data regarding depth of groundwater should be available. It seems more prudent to go back to the-earlier verbiage of setting casing below the base of known fresh groundwater or the depth of casing which is normal for the area.

We recommend that a single string of surface casing be used to isolate down to a depth which is customary for the area, below all known or estimated regional water zones, and set in competent rock as a pressure containing string with a Formation Integrity Test, (FIT) shoe test to confirm shoe integrity. This will protect all present and future fresh ground water intervals (1844) (1843)

Response: The Board appreciates the commentator's candid remark that it is unable to readily determine where the deepest fresh groundwater is in Pennsylvania. Given the need to isolate fresh groundwater from gas, oil and brine producing zones, it is imperative that the surface casing be set deep enough but not so deep that pollution can occur. Therefore, the regulations have been revised to require operators to identify how the deepest fresh groundwater zone has been determined and recorded in the casing and cementing plan. Also, surface casing may not be set more than 200 feet below the deepest freshwater zone. Setting a maximum depth prevents co-mingling of brine and fresh groundwater.

The Board does not agree that a formation integrity test is necessary in all cases. Where cement is not returned to the surface or if the operator intends to use the surface casing as production casing, DEP can require a formation integrity test.

Comment: The reference to drillers log should be replaced by an IADC Daily Drilling Report form or a summary of operational activities that includes depths, time, sizes, and volumes. (1844) (1843) (1989)

Response: The Board disagrees that replacement of the term "drillers log" is needed as this is a widely understood term.

Comment: § 78.1: The Board specifically requested comments on the definition of "deepest fresh groundwater." The current definition uses the term within its own definition. The term "fresh groundwater" should be defined with reference to numerical water quality standards and the technical practicability of producing a sufficient quality and quantity of water for its intended use. (1918) (1989)

Response: The Board disagrees that numerical criteria should be used to define deepest fresh groundwater. The drinking water criterion is 500 mg/l for total dissolves solids and EPA defines the criterion as 10,000 mg/l for the purposes of the Underground Injection Control program. For the purposes of setting surface casing, it is critical that the casing be set deep enough but not so deep that brine be permitted to co-mingle with fresh groundwater. It is also important to recognize that testing water produced during drilling will not yield accurate test results. For these reasons, the regulations have been revised to require the operator to identify how the deepest fresh groundwater was determined and record the information in the casing and cementing plan.

Comment: In the definition for "Surface casing", change "migration of gas" to "migration of natural gas." (1918)

Response: The surface casing should be designed and constructed to prevent the escape or migration of gas, oil or other fluids from the wellbore into the fresh ground water.

Comment: "Casing seat" — This definition is somewhat confusing. Any casing string (conductor, surface, intermediate, production) technically has a "casing seat". It is not necessary to specify "surface casing or coal protection casing or intermediate casing." The definition should read: "The depth to which casing is set. In wells without surface casing, the casing seat shall be considered to be equal to 50 feet below the deepest fresh groundwater." (1918)

Response: The definition of "casing seat has been amended to state the follow, "The depth to which casing **is set**."

Comment: "Intermediate casing" — Change the definition to, "A string of casing set after the surface casing and before production casing, not to include coal protection casing. Where necessary, intermediate casing provides additional isolation, stabilization and well control." (1918)

Response: The Board agrees with the comment. The regulations have been revised accordingly.

Comment: The intermediate casing definition should clarify that intermediate casing also provides a very important additional protective barrier of pipe and cement across shallow freshwater aquifer zones, and provides a transition from the surface casing to the production casing for protection of oil, gas, and freshwater zones, and to seal off anomalous pressure zones, lost circulation zones, and other drilling hazards. (924)

Response: The Board has revised the definition of *intermediate casing* to indicate this casing is set after surface casing and before the production casing. The Board does not dispute the role of intermediate casing as provided in the other recommendations offered, but considers these to represent a fundamental component of any properly tested, installed intermediate casing string.

Comment: "Intermediate casing" — Change definition to: "A string of casing set after the surface casing and before production casing, not to include coal protection casing. Where necessary, intermediate casing provides additional isolation, stabilization and well control." (1841)

Response: The Board has revised the definition of "intermediate casing" to provide additional clarification to the function of this casing.

Comment: There is no definition for "blow-out prevention equipment."

Response: Board does not believe the term “"blow-out prevention equipment" needs to be defined. Section 78.72 outlines what the requirements for blow-out prevention equipment that operators must met.

Comment: You must include ALL shales, not just the Marcellus. In our area the proposed drill site play will be Devon shale. (67)

Response: The Board agrees with the commentator and has amended the final-form rulemaking to reflect the standards required for unconventional shale formations not just Marcellus Shale.

§ 78.51 Protection of water supply

Comment: Revise §78.51(c) to read: Within 24 hours of the receipt of the investigation request, the Department will send a technical team to the field site to examine the situation and determine whether immediate action is needed to shut down operations. The technical team will also collect the information, records, and evidence required to complete the investigation. If the technical team finds that there is any potential threat or impact to a water supply, the operator will be ordered to immediately cease operations, and the Department will immediately notify all potential affected users of the water supply and require the operator to provide alternative water supplies until the Department completes a final investigation and a final remedy is resolved with the non-compliant operator.

Within 45 days of receipt of the investigation request, the Department will issue a formal written determination. If the Department finds that pollution or diminution was caused by 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. (924)

Response: The Board has declined to make this revision. The response time is established in the Oil and Gas Act. While the Department strives to respond immediately to water supply complaints, assembling and sending a DEP technical team to a field site to conduct such an investigation within 24 hours of receipt of the investigation request may not allow an adequate amount of time to initiate and undertake this effort.

Comment: In Subsection (d)(l)(iii), what will be considered "excessive maintenance" and who makes that determination? The final-form regulation should clarify these issues. (1989)

Response: The Department will make this determination on a case by case basis.

Comment: Revise §78.51(e)(2) and §78.51(d) to meet this stated intent: All ***restored*** water supplies must be at least equal to the quality of the water supply before it was affected by the operator. If the quality of the water supply, before it was affected by the operator, cannot be affirmatively established, the operator shall demonstrate that the concentrations of substances in the restored water supply meet the Pennsylvania Safe Drinking Water Act standards. Any new, ***replacement*** water supply must meet the Pennsylvania Safe Drinking Water Act standards. (924)

Response: The Board has declined to incorporate this suggestion into the rulemaking. The purpose of the requirement is to make the land owner whole when their water supply has been degraded as a result of drilling activity. However, if public water is the replacement water supply, it must meet safe drinking water act standards.

Comment: In Subsection (d)(2), This subsection states: "the quality of a restored or replaced water supply will be deemed adequate if it meets the standards established pursuant to the Pennsylvania Safe Drinking Water Act (35 P.S. §§ 721.1 - 721.17) [Act] or is comparable to the unaffected water supply if that water supply did not meet these standards." We raise two issues.

First, commentators question whether Subsection (d)(2) conflicts with Section 208 of the Oil and Gas Act (58 P.S. §§601.208(a)), which states that "any 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 in quantity or quality for the purposes served by the supply." The Preamble to the final-form regulation should explain how Subsection (d)(2) is consistent with provisions contained in the Oil and Gas Act.

Second, Section 206 of the Oil and Gas Act states that: "restoration activities required by this act or in regulations promulgated hereunder shall also comply with all applicable provisions of the Clean Streams Law." § 601.206(e). However, Subsection (d)(2) makes no reference to this section of the Oil and Gas Act. The Preamble to the final-form regulation should also clarify how this subsection is properly conformed with the Clean Streams Law. (1989)

Response: This section reflects current caselaw on water supply replacement. The purpose of the requirement is to make the land owner whole when their water supply has been degraded as a result of drilling activity. Section 206 of the Oil and Gas Act pertains to restoration of the well site. Section 208 of the Act pertains to water supply protection which forms the basis of these regulations. Therefore, it is not appropriate to reference section 206 of the Act.

Comment: In Subsection (d)(3)(ii), this subsection defines "reasonably foreseeable uses." Who will determine what meets the definition of "reasonably foreseeable uses?" The Board needs to clarify whether it is the duty of the operator or the Department to determine compliance with this definition. Also, what is considered the "reasonable expansion of use" and who makes that determination? (1989)

Response: The regulation states that it is the duty of the Department to determine if the operator is in compliance with this subsection. This section reflects current caselaw on water supply replacement. The purpose of the requirement is to make the land owner whole when their water supply has been degraded as a result of drilling activity.

Comment: In Subsection (h), this subsection requires a well operator who receives notice of pollution in a water supply to notify the Department within 10 calendar days. Several commentators object that this is too long for the Department to be alerted about a possible threat to public health, safety and welfare, and suggest that the timeframe for notification be one day. We share the concern that the 10- day period may not be protective of public health and safety, and recommend that the final-form regulation either include a shorter timeframe, or an explanation of why the 10-day timeframe is appropriate. (1989)

Response: The Board agrees and has revised Section §78.51(h) (relating to Protection of water supplies) to change the operator's receipt of notice reporting obligation to the Department from 10 calendar days to 24 hours.

Comment: The regulations should make it easier for those affected by contaminated water to seek a remedy. It is unconscionable that a drilling operation can supply water which does not meet drinking water standards. At a minimum, water should meet drinking water standards. We support the rule that requires an operator to report any complaints to DEP within 10 days. (75)

Response: The purpose of the regulation is to make the water user whole. If the water user's supply did not meet drinking water standards before being impacted, the regulations only require the operator to restore the supply to the same quality. The final-form rulemaking has amended 78.51(h) to require well operators to notify the Department with 24 hours of receiving a notice a drinking well has been affected.

Comment: DEP should leave §78.51 (c) in place and add (h) If an affected person loses their water or finds it unusable, given sections (c) and (h) it appears just to move through the well operator notification and the DEP receipt of notification, it could add 20 days to the affected land owners lack of adequate water. In the meantime if the water is affected, the situation could be made worse by additional drilling. An investigation should start within 24 hours. Evidence of problems at the site is more likely to be discerned if an investigation team arrives on the scene sooner rather than later. (8) (42) (43) (1822) (1867)

Response: The Board agrees and has revised Section §78.51(h) (relating to Protection of water supplies) to change the operator's receipt of notice reporting obligation to the Department from 10 calendar days to 24 hours.

Comment: The subsection giving drillers 10 days to contact DEP after they have been notified that their actions have disturbed a water supply is irresponsible. It should not be incumbent upon residents to contact the driller if their well is or they suspect it to be effected by gas/wastewater migration. (86)

Response: The Board agrees and has revised Section §78.51(h) (relating to Protection of water supplies) to change the operator's receipt of notice reporting obligation to the Department from 10 calendar days to 24 hours.

Comment: Is 78.51 B (ii) an accurate outline number? It seems out of place. (1822)

Response: The outline numbering will be corrected.

Comment: From talking to individuals who have lost their water, it appears that in order to receive new water through the company responsible for the loss of their water, the individuals are asked by the drilling company to agree to certain conditions in order to receive water. This should not be permitted. Language specifying that water provisions that come from the responsible drilling entity should come without further requirements from the landowner. (1822)

Response: This comment is beyond the scope of this rulemaking.

Comment: Revise the notification period in §78.51(i) to 24 hours. (924)

Response: The Board agrees and has revised this notification period from 10 calendar days to 24 hours.

Comment: We have a concern regarding timeliness and consistency in notification of potential contamination in protecting our water supplies. (93) (887) (1816) (1853)

Response: The Board understands the commentator's concern regarding timeliness and consistency in notification of potential contamination in protecting our water supplies. The final-form regulation has been revised to following:

78.51(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 such notice to the Department within [10 calendar days] 24 HOURS of receiving the notice.

Comment: DEP has proposed a number of important revisions to the Chapter 78 regulations to clarify what constitutes an adequately restored or replacement water supply. However, DEP did not recommend any revisions to set a timeframe for acting upon a complaint filed for pollution or diminution of a water supply as a result of drilling or operating a gas well. Experience tells us that folks without water are often ignored for weeks, as gas-drilling companies deny responsibility for polluting drinking water supplies and tie things up in court. The Gas Companies should also be responsible for taking samples of all water prior to drilling and when accidents occur, then test the before and after. (10) (874) (879-880)

Response: Gas Companies are not required to take samples prior to drilling. §78.52 outlines what well operators need to do to preserve their defense under section 208(d)(1) of the act (58 P. S. § 601.208(d)(1)) for potential pollution events. The Board agrees with the commentator's concern regarding a timely response for an affected water supply. The final-form regulation has been revised to following:

78.51(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 such notice to the Department within [10 calendar days] 24 HOURS of receiving the notice.

Comment: §78.51. Protection of water supplies. Extraction of oil or gas, just like extraction of coal, has the potential to cause disruptions to the hydrologic balance of local areas and entire watersheds. Protection of water supplies, therefore, should not be limited to individual water supplies, but should extend to the broader source(s) of the water supplies. When one or more landowners experience a problem with their water supply as a result of gas exploration/extraction activities, it is simply an indication, one notable symptom, of a larger problem that has been caused to the local hydrologic system. Whether the problem is diminution or pollution, if the solution is to provide individual landowners with a water buffalo, to tie them into the public water supply system, or some other "fix", that solution does nothing to address the larger problem of damage to the surface or groundwater system. To address the larger issue, see comments under §78.52, below. (881)

Response: Section 78.51 is not intended to address remediation of the groundwater system but is instead limited to water supply restoration. If a gas well is impacting fresh groundwater, the operator must cease the unlawful discharge of gas to the aquifer in addition to restoring the water supply.

Comment: Proposed rule reads, "The quality of a restored or replaced water supply will be deemed adequate if it meets the standards established pursuant to the Pennsylvania Safe Drinking Water Act (35 P. S. §§ 721.1721.17), or is comparable to the unaffected water supply it that water supply did not meet these standards." Please remove, "or is comparable to the unaffected water supply if that water supply did not meet these standards." Any restored or replaced water supply should meet the standards of the Safe Drinking Water Act. There is more than methane in your drinking water after the blow-out of a deep high pressure well. (1897)

Response: Any impacted water supplies or any replacement water supplies must be adequate in quantity and quality for the purposes served by the supply. The quality of a restored or replaced water supply will be deemed adequate if it meets the standards established pursuant to the Pennsylvania Safe Drinking Water Act (35 P. S. § § 721.1—721.17), or is comparable to the unaffected water supply if

that water supply did not meet these standards. The purpose of the regulation is to make the water user whole. If the water user's supply did not meet drinking water standards before being impacted, the regulations only require the operator to restore the supply to the same quality.

Comment: All restored water supplies and replacement water supplies under §78.51 should meet Pennsylvania Safe Drinking Water Standards. (42) (43) (1815)

Response: Any impacted water supplies or any replacement water supplies must be adequate in quantity and quality for the purposes served by the supply. The quality of a restored or replaced water supply will be deemed adequate if it meets the standards established pursuant to the Pennsylvania Safe Drinking Water Act (35 P. S. § § 721.1—721.17), or is comparable to the unaffected water supply if that water supply did not meet these standards. The purpose of the regulation is to make the water user whole. If the water user's supply did not meet drinking water standards before being impacted, the regulations only require the operator to restore the supply to the same quality.

Comment: Concerning the Ch 78 regulations, as a professional water quality biologist, I endorse the proposal entirely and urge the Independent Regulatory Review Commission to approve it for adoption. Before doing so however, I would suggest one small change inserting a "time limit of 24 hours" as the requirement for follow-up investigations after a formal complaint is lodged with either the DEP/drilling company concerning any water quality issues which arise.(21) (1816)

Response: The Board agrees with the commentator's concern regarding a timely response for an affected water supply. The final-form regulation has been revised to following:

78.51(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 such notice to the Department within [10 calendar days] 24 HOURS of receiving the notice.

Comment: Will these regulations affect individuals who have already lost their water? (1879)

Response: Yes. The final-form regulations further details the procedures for when a water well maybe impacted by an oil and gas operator. Section 208 of the Oil and Gas Act would pertain to anyone who has lost their water supply as a result of oil and gas activities.

Comment: Once a water supply has been affected by drilling, the regulations should make it easier to remedy affected surface owners' or occupiers' complaints of contaminated water from drilling and extraction operations. Section 208 of the Oil and Gas Act states that: "Any 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 in quantity or quality for the purposes served by the supply." If a water supply has been affected by the well drilling operation, the proposed rules do not necessarily require the operator to supply water meeting drinking quality standards. Proposed Section 78.51(d)(2) states: "The quality of a restored or replaced water supply will be deemed adequate if it meets the standards established pursuant to the Pennsylvania Safe Drinking Water Act (35 P.S. 721.1-721.1&), or is comparable to the unaffected water supply if that water supply did not meet these standards." It is unconscionable that a gas driller can supply someone with drinking water that does not meet drink water standards. Replacement water should meet drinking water standards at a minimum. It is important that the DEP know when a complaint about water supply has been lodged with the operator. We support the requirement that the operator notify the department within 10 days, if not sooner, of a receipt of a complaint. (1836)

Response: Any impacted water supplies or any replacement water supplies must be adequate in quantity and quality for the purposes served by the supply. The quality of a restored or replaced water supply will be deemed adequate if it meets the standards established pursuant to the Pennsylvania Safe Drinking Water Act (35 P. S. § § 721.1—721.17), or is comparable to the unaffected water supply if that water supply did not meet these standards. The Board agrees with the Commentator it is important that the DEP know when a complaint about water supply has been lodged with the operator. The final-form regulation has been amended to state:

78.51(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 such notice to the Department within [10 calendar days] 24 HOURS of receiving the notice.

Comment: § 78.51(d)(3)(B): Change "system which" to "system that". (1841) (1918)

Response: The Board agrees and has revised this subsection to reflect this change.

Comment: § 78.51(d)(3)(B)(ii): Add parentheses, as shown, to the term "reasonably foreseeable uses"(1841) (1918)

Response: The Board has declined to make this change. The Board does not see the rationale of putting this term in quotations, nor was a justification provided.

Comment: If a driller is contacted by a resident instead of a DEP hotline, the driller should be required to report to DEP within 24 hours - not 10 days. Regulations should specify DEP's reaction time to complaints and codify a set of "immediate environmental concern" procedures to address situations in which the DEP confirms potable well impacts. (86)

Response: The Board agrees with the Commentator and has amended the final-form regulation to state:

78.51(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 such notice to the Department within [10 calendar days] 24 HOURS of receiving the notice.

Comment: The Pennsylvania Department of Environmental Protection (DEP) must clarify the regulations regarding bonding for the preservation or replacement of water supplies. Bonding must cover assurance that there will be a water supply permanently available to an affected property owner. If DEP concludes that it does not have the authority then a legislative initiative should be undertaken for that authority (note: bonding authority does exist for plugging wells). (1857)

Response: An operator's bond covers all aspects of well drilling and can be forfeited for failure to restore or replace a polluted water supply. Increasing the bond amounts is currently being considered by the legislature. The Board agrees that the current bonding provisions are inadequate.

Comment: In the context of Limited Liability Companies (11c) what assurance can the department give that the following means anything?: "An increase in operating and maintenance costs shall be provided by the operator in perpetuity. If the supply was reasonably intended to provide a greater quantity than was currently used (and was capable of doing so), the operator shall provide a supply to meet the anticipated need." (1857)

Response: The fact that an operator is a limited liability company has no bearing on its financial obligation to pay for increased operation and maintenance costs. The Department will order the operator to pay for these costs regardless of what kind of legal entity the operator happens to be.

Comment: The commentator recommends that §78.51 be amended to include a provision that requires a well operator, who has received notice from a landowner, water purveyor or affected person that a water supply has been affected by pollution or diminution, to provide a temporary water supply within 24 hours of being notified by the affected party. Further, if after investigation DEP determines that the drilling, alteration or operation activities of the well operator is the cause of pollution to the water supply, then such operator should be required to permanently restore or replace the water supply within ten days of such determination. Neither the existing regulations, nor the proposed regulations, prescribe that the affected party be supplied with either a temporary or permanent water supply within a specified timeframe. (1851) (1899)

Response: The Board agrees that 10 days is too long for the operator to wait to notify DEP of a water supply complaint. The regulation will be amended to require notification within 24 hours. The Board disagrees with the comment that temporary water must be ordered immediately. DEP does not have the statutory authority to establish a regulation requiring operators to provide temporary replacement water based solely on receipt of a complaint. The Oil and Gas Act requires DEP to investigate all water supply complaints and make a determination as to whether well drilling caused the contamination. Nothing in the act authorizes DEP to order operators to provide temporary water without first making a determination as to causation.

Comment: The commentator supports the EQB's intent to clarify the requirements for operators to restore or replace a water supply that has been polluted or diminished as a result of oil or gas drilling under §78.51 (d). Ensuring that the replaced or restored water supply is reliable and does not require excess operation or maintenance costs by the affected parties is an appropriate burden for a polluter to bear. Section §78.51(d)(2) reads: "The quality of a restored or replaced water supply will be deemed adequate if it meets the standards established pursuant to the Pennsylvania Safe Drinking Water Act (35 P.S. §§ 721.1721.17), *or is comparable to the unaffected water supply* (emphasis added) if that water supply did not meet those standards." In the introduction of this proposed rulemaking, the EQB states that the additional requirements imposed by these regulations will provide an increased degree of protection for both public and private water supplies. Allowing a well operator to replace a water supply with a source that does not meet drinking water standards is unjust and will not provide increased levels of protection for Pennsylvania's water supplies. The commentator recommends that any replacement of a water supply should meet standards established pursuant to the Pennsylvania Safe Drinking Water Act, regardless of whether the water supply prior to contamination met those standards. (1851) (1899)

Response: The Board disagrees that an operator must provide a permanent water supply that is of superior quality to the supply that existed before drilling. The purpose of the water supply provisions is to make the affected owner whole again. Any additional remedies are to be obtained through appropriate legal channels such as county courts.

Comment: § 78.51(d)(1)(v): This section would allow a landowner to receive additional benefits if a well is upgraded, as any increased maintenance and operating costs would have to be paid by the operator on a permanent basis. The value of a new well, however, may exceed the value of an old well, because of new or improved equipment. Increased operating costs associated with new or improved equipment

should be borne by the landowner in recognition of the value received for the increased quality of the water source.(1843) (1844)

Response: The Board disagrees with this comment. This section reflects current caselaw on water supply replacement. The purpose of the requirement is to make the land owner whole when their water supply has been degraded as a result of drilling activity. If additional equipment is needed to operate the water supply, the land owner should not be responsible for these increased costs.

Comment: § 78.51(d)(3)(i)(A) and (B): The determination of adequate quantity of a restored or replaced water supply should depend upon documented prior uses, not "any reasonably foreseeable uses." The phrase "reasonably foreseeable uses" is arbitrary and very subjective. A replacement water supply should be based on documented prior uses (e.g., based on size of residence or family).(1843) (1844)

Response: The Board disagrees with this comment. This section reflects current caselaw on water supply replacement. If a land owner demonstrates that the full volume of the water supply was going to be used in a reasonable time period for a reasonable use, the operator must provide a water supply capable of meeting that need.

Comment: § 78.51(d)(3)(ii): The provision is ambiguous and subjective. Operators should be obligated to restore or replace water based on historic use, not based on someone's prediction of "foreseeable" future use.(1843) (1844)

Response: The Board disagrees with this comment. This section reflects current caselaw on water supply replacement.

Comment: What will be "...reasonably foreseeable uses..." and who will determine this? With respect to property not zoned for construction purposes a 60 gallon per day water supply for a residential dwelling could become the 60,000 gallon per day water supply for a car wash in the future. Would this scenario qualify as "...reasonably foreseeable uses..." for which an operator should be liable? This term is too ambiguous and will lead to unnecessary debate and litigation. (1818)

Response: The regulation codifies existing caselaw on the subject. DEP will determine whether a claimed foreseeable use of the water supply is reasonable on a case by case basis. In no case will a well operator be ordered to provide a water supply that provides more water than the affected supply was capable of delivering for the purposes of satisfying a claim of future use.

Comment: The commentator proposes the following revision: The Department shall cause the information required under §78.51 (b)(1)-(5) to be reduced to writing in the form of an affidavit which shall be signed by the landowner, water purveyor, water supply owner or affected person purporting the pollution or diminution of a water supply which affidavit shall subsequently be attested to under oath before a notary public and notarized by a notary public as prescribed by law.

The affiant, with respect to the information as set forth in the affidavit, shall be subject to the penalties of 18 Pa. C.S. § 4904, relating to unsworn falsification to authorities, which include fine and imprisonment and notice thereof shall be provided by the Department to affiant.

Within three days of the receipt of an investigation request the Department shall notify the well operator by certified mail of the name and address of the landowner, water purveyor, water supply owner or affected person requesting the investigation which notification shall contain a copy of the affidavit filed

by the person requesting the investigation and copies of all notes and information gathered by the Department until such time of the notice.

The Department shall notify the well operator of any and all dates and times of the investigation to be performed by the Department. The Department, within 10 days of the compilation of any reports, the preparation of any documentation or notes, the receipt of any testing results, the taking of any statements or otherwise obtaining any material information relating to the complaint as a result of the Department's investigation, shall forward copies of the same to the well operator. (1818)

Response: The Board does not believe a written and sworn affidavit is need for a landowner, water purveyor, water supply owner or affected person to notify and request the Department to conduct an investigation. Adoption of this comment has the potential to inhibit citizens from contacting DEP with concerns about their water supply. Requiring the Department to notify the operator of the identity of a complainant is not in keeping with policies of the Department. In addition, it is the duty of Department to diligently investigate all complaints of potentially impacted water supplies and to render decisions within 45 days as to whether the supply has been affected. Section 601.201(b) of the Act establishes the required timeframes for the Department's response to the initial inquiry as well as the 45 day determination requirement.

Comment: The commentator suggested the establishment of a bond program or other financial mechanism to ensure that adequate funds will be present to replace a water supply should it be needed. (1829)

Response: The Oil and Gas Act already has a penal bonding provision that is to address water supply replacement. In some instances the Department has required a performance bond as the situation warrants.

Comment: Require a study of the availability of replacement source(s) be completed PRIOR TO a permit being issued in a sensitive watershed where water quantity and / or good water quality issue. The Well operator, in conjunction with the regional DEP Water Supply office, should identify replacement sources, the degree of treatment required to meet all primary and secondary drinking water standards, and identify the availability of water to meet all water quantity demands for the consumer(s). The information, along with a proposed replacement schedule, can then be used by the DEP to have the well operator provide a financial commitment to the DEP as part of the permit process to ensure that money will be available to restore an affected source. It is critical that a proactive plan be in place to identify how a source can be replaced if it can be replaced at all. A direct notification mechanism should be created to notify public water suppliers and the 'Regional DEP Bureau of Water Supply (BWS) when a permit is being sought in watershed areas of surface water supplies used for drinking water or within groundwater influence zones. The public water supplier and the DEP BWS can offer assistance to the Oil and Gas personnel to identify possible impacts on drinking water sources. (1829)

Response: The Oil and Gas Program and Water Supply Program have been working on just such a process to be implemented prior to receipt of a permit application that would require the operator of the well and the water supply operator to work out similar details to identify potential issues and plan how they will be addressed to minimize any impacts on public water supplies. This is beyond the scope of this final rulemaking.

Comment: The latency period from when a water supply source is deemed contaminated and is no longer allowed by DEP to be used as a water source to the period where the replacement source is in service must

be addressed. It may take several years to engineer a replacement source, obtain all of the proper permits and water allocations if necessary, and construct the well or treatment plant.

DEP should address how the affected customers will receive potable water in ample quantities during this period. Tank trucks and bottled water can be used to supply water to a small number of affected customers. Special consideration will need to be given to a system that supplies a large number of customers that cannot be realistically served by tank trucks of water or by delivery of bottled water. (1829)

Response: This is beyond the scope of this final rulemaking and is considered in a case by case basis which may be addressed by permit conditions.

Comment: Section 1, V, provides for reimbursement of Operation and Maintenance costs to the affected water user by the well operator if the costs for delivering water from the replacement source exceed the amounts from the previous source operation. There is no designated period established for this reimbursement. The commentator suggests that the language be added to require reimbursement on a monthly basis as a minimum. (1829)

Response: This would be established as part of the restoration order issued by the Department. It could be a lump sum, annual, or monthly.

Comment: Clarification on the method to determine loss of quantity is needed. The commentator recommends the Department consider a reduction in specific capacity as a determining factor for groundwater and a loss of safe yield for a surface supply. (1829)

Response: This is beyond the scope of this rulemaking. The Department makes this determination on a case by case basis.

Comment: The reference to the Department should be defined to include both the Bureau of Oil and Gas and the regional Bureau of Water Supply. (1829)

Response: This Department includes both Bureaus.

§ 78.52 Predrilling or prealteration survey

Comment: Predrilling surveys of water quality conducted by the drilling operator must be reported to the DEP and surface owner. (75) (1815)

Response: Any predrilling survey that an operator conducts to their defense under section 208(d)(1) of the act (58 P. S. § 601.208(d)(1)) must be submitted to the Department and the landowner or water purveyor within tens business days of receipt of the results.

Comment: §78.52. Predrilling or prealteration survey. Prior to any surface disturbance, all oil and gas operators should be required to compile and provide to PADEP a baseline inventory of the quantity and quality of all surface waters and groundwaters within one-half mile of any surface drilling site. If a problem arises, the operator should be required to restore the quantity and quality of all surface waters and groundwaters to predrilling conditions. The baseline inventory will be used to A) document the nature and extent of the problem, and B) provide a yardstick against which to measure restoration. If full restoration cannot be achieved within a reasonable period of time (measured in months, not years), the operator should be required to shut down that facility. If water problems occur at multiple facilities

controlled by a single operator, that operator should be prohibited from all drilling operations in the Commonwealth until all of the problems have been fully corrected. (881)

Response: Gas Companies are not required to take samples prior to drilling. Failure to take a pre-drilling survey results in a presumption of liability. §78.52 outlines what well operators need to do to preserve their defense under section 208(d)(1) of the act (58 P. S. § 601.208(d)(1)) for potential pollution events.

Comment: There should also be requirements that the industry test all water wells in the area of the drilling prior to even moving into that area to drill, and continue to test water regularly. (36)

Response: Gas Companies are not required to take samples prior to drilling. Failure to take a pre-drilling survey results in a presumption of liability. §78.52 outlines what well operators need to do to preserve their defense under section 208(d)(1) of the act (58 P. S. § 601.208(d)(1)) for potential pollution events.

Comment: You must include a variety of testing and monitoring requirements. Pressure testing of the well before fracking, monitoring of the immediate groundwater for increases in water conductivity as a surrogate for salt leaks, Real time monitoring of downgradient streams for conductivity along with temperature, water level, dissolved oxygen, turbidity and pH as the Susquehanna River Basin Commission is doing. Promote predrilling water quality survey of wells within 2000' for a baseline salinity. (67)

Response: The final-form regulations include additional testing requirements for wells that will be subjected to higher pressures. The Department in conjunction with other local and federal agencies currently monitored many of the Pennsylvania's streams. The Department always promotes predrilling surveys however, under the Oil and Gas Act operators are not required to conduct those surveys.

Comment: Given the amount of fluid forced down a well at pressure and later exported and stored, a 1,000 foot area is not nearly enough. I would suggest that a quarter-mile perimeter from the outside boundaries of the work site should be protected. (1815)

Response: The 1,000 foot distance to a water supply is established by the Oil and Gas Act (58 P. S. § 601.208(d)(1)) and can not be amended through the regulatory process.

Comment: Section 78.52 should include specific standards that describe the types of tests that need to be conducted, over what time frame and during what season. DEP should establish a minimum set of water quality tests and procedures for the pre-drilling survey, including, but not limited to: baseline testing over full hydrologic cycle (in various seasons); general quality assurance/quality control protocols; testing for chemicals used in oil and gas activities; identification of pre-existing industrial contaminants; and if contamination is found, the extent to which the contamination exceeds Pennsylvania's SDWA standards. This information should be made available to all relevant agencies and to the public prior to the issuance of any drilling permit. (1851) (1899)

Response: The Board does not agree with this recommendation. The Oil and Gas Act does not require operators to test for certain parameters throughout the hydrologic cycle in order to rebut the presumption of liability. A single test result is sufficient to satisfy the law.

Comment: The commentator supports the proposed revision to § 78.52, which requires a well operator to complete a pre-drilling survey to collect baseline information about the quality of water before drilling and any known impacts, in order to overcome the presumption of liability if a water source is contaminated in the future. However, we do not agree with § 78.52 as written, which makes the pre-drilling survey optional rather than mandatory. In order to protect water supplies and to understand how drilling can impact water resources, DEP and the public need baseline information about the quality of the water supply prior to any drilling. The pre-drilling survey requirement can protect the well operator from liability by providing a defense under §208(d)(1) of the Oil and Gas Act, but the pre-drilling survey should above all other purposes, be designed to protect the public health, safety and welfare — which is the stated purpose of these proposed amendments. As such, TU recommends that a pre-drilling survey be required prior to the issuance of any drilling permit and the survey results be made available to the public before drilling begins. (1851)

Response: The Oil and Gas Act establishes the structure under which pre-drilling water samples are to be conducted and the consequences for failure to conduct such testing. Under the Act, taking a water supply sample before well drilling is optional. The consequence of failing to test is a presumption of liability. Where a statute speaks directly to a requirement, DEP cannot alter the statutory mandate through regulation.

Comment: Regulations should require testing of household and relevant water supplies sufficient to establish a consistent baseline of water quantity and quality before drilling, during drilling and 2 years after the last drilling operation is completed. (1980)

Response: The Oil and Gas Act establishes the structure under which pre-drilling water samples are to be conducted and the consequences for failure to conduct such testing. Under the Act, taking a water supply sample before well drilling is optional. The consequence of failing to test is a presumption of liability. Where a statute speaks directly to a requirement, DEP cannot alter the statutory mandate through regulation.

Comment: Section 78.52(d): We suggest that the requirement to provide survey results within 10 days be extended to 30 days. This is a more reasonable timeframe. Additionally, the provision should be clarified to confirm that requirement to provide the results within specified days "of receipt of the results" applies to the "receipt of the final results." Receipt of preliminary, interim or partial results, often without QA/QC, should not be subject to this requirement. (1843) (1844)

Response: The Board disagrees with this comment. The operator must use a laboratory accredited by DEP to perform water supply testing. Therefore it is not clear how testing done without QA/QC could be used to comply with Chapter 78. Additionally, the operator is under no obligation to provide a copy of preliminary results. If the results are not provided in a timely fashion, they may not be used to preserve the operator's defense against presumptive liability. If the operator intends to take a series of tests to demonstrate fluctuations in groundwater quality over time, it should submit the results as they receive them. This section has been revised to require test results used to establish pre-drilling conditions to be submitted within 10 business days of the results.

Comment: We believe a collection of pre-drilling (baseline) tests from SURFACE WATER (SPRINGS & STREAMS), PRIVATE WATER WELLS and PUBLIC WATER SUPPLIES within at least 2,500 feet of a deep high pressure well should be mandatory. Compulsory follow-up testing at the same locations three (3) months after the conclusion of any drilling activities and operations should be completed. In the case of deep high pressure wells with directional drilling, testing should extend 2,500 feet from

the end or ends of the planned horizontal section(s). The parameters of these tests should include the following: pH; alkalinity; specific conductance; major cations/anions (chloride, fluoride, sulfate, sodium); total dissolved solids; BTEX/GRO/DRO; TRH; PAH's, benzo(a)pyrene); and metals (arsenic, barium, calcium, chromium, iron, magnesium, selenium). Testing expense must be accepted by the drilling companies before approval of any application for permit to drill in Pennsylvania. Objecting to such testing will not be permitted to drill in Pennsylvania. These large international drilling companies should be eager to demonstrate the safety of their operations! (1879)

Response: The Oil and Gas Act establishes the structure under which pre-drilling water samples are to be conducted and the consequences for failure to conduct such testing. Under the Act, taking a water supply sample before well drilling is optional. The consequence of failing to test is a presumption of liability. Where a statute speaks directly to a requirement, DEP cannot alter the statutory mandate through regulation.

Comment: Mandate the use of chemical tracers to determine whether drilling fluids have contaminated the fresh groundwater zone. (1879)

Response: The Board disagrees with this comment. The type and quantity of tracers could impact a facilities ability to properly treat the wastewater.

Comment: The commentator proposes the following revision to the regulation: A well operator shall be deemed by the Department to have been refused access by a landowner, water-purveyor or water supply owner for the purposes of conducting a predrilling or prealteration survey in accordance with this section and Section 601.208 (d) (2) of the Act when the well operator can demonstrate to the Department that it has provided two separate notices by certified mail in accordance with Section 601.201(b) of the Act and containing the information required pursuant to §78.52 (f) (1),(2),(4) and such notices have been returned to the well operator as being refused, unclaimed or undeliverable, or the equivalent thereof as determined by the United States Postal Service.

If such notice as provided in Section 601.201(b) of the Act are delivered, claimed or accepted by the landowner, water supply owner or water purveyor and subsequently the well operator or agents thereof are refused access to conduct a predrilling or prealteration survey the well operator may notify the Department in writing of such refusal. Upon notice the Department shall, within 15 days of receipt of notice from the well operator, attempt to contact the landowner, water supply owner or water purveyor and shall document such refusal in writing which shall then be deemed as a refusal pursuant to Section 601.208 (d) of the Act. In the event the Department cannot contact the landowner, water supply owner or water purveyor within 30 days of receipt of the notice as provided by the well operator to document such refusal the assertion by the well operator of the original refusal shall be deemed final and conclusive upon the well operator providing an affidavit to the Department attesting to the same. (1818)

Response: The Board disagrees with this comment. If an owner or purveyor receives notice of the predrilling survey request and subsequently refuses to grant the operator access to conduct the survey, the operator may notify the Department in writing of such refusal in accordance with §78.52 (f). Simply supplying two separate notices by certified mail and having them refused, unclaimed or undeliverable is not sufficient to then be deemed as a refusal pursuant to Section 601.208 (d) of the Act. There are many reasons why a certified letter is not accepted or returned. If an operator wishes to rebut the presumption of liability, the applicant may need to take additional steps such as visiting the property.

Comment: The commentator proposes the following revision to the regulation: A well operator deemed by the Department to have been refused access by a landowner, water purveyor or water supply owner in accordance with § 78.52 (g) and Section 601.208(d) (2) of the Act for the purposes of conducting a predrilling or prealteration survey may petition the Department to request the landowner, water purveyor or water supply owner that access be provided to the well operator or the Department to conduct a predrilling or prealteration survey. The request shall be issued by the Department within 15 days of receipt of the petition from the well operator. The request shall require that the landowner, water purveyor or water supply owner shall, within 30 days following the receipt of the request, make arrangements with the Department or the well operator to conduct a predrilling or prealteration survey during the 30 day period following the receipt of the request. Failure by the landowner, water purveyor or water supply owner to respond to the Department or the well operator during the 30 day period following the receipt of the request shall be deemed by the Department as a refusal and the Department shall document such refusal in a report. A copy of the report shall be sent to the landowner, water purveyor or water supply owner and the well operator. (1818)

Response: The Board disagrees with this comment. The legal remedy for an operator that has been refused access to conduct a water supply test is outlined in Section 601.208(d)(2) of the Act - the operator is not presumed to have caused contamination of the water supply. The proposed amendment is not necessary. If a surface owner or water purveyor refuses access to the well operator, the surface owner or water purveyor would no longer be able to use the presumption of liability as established in Section 601.208(c) of the Act.

§ 78.55 Control and Disposal

Comment: Revise §78.55 to require well operators to submit a copy of their control and disposal plan for DEP review and approval prior to commencing operations to ensure compliance with Pennsylvania Environmental Protection Standards. (924)

Response: The control and disposal plan is required to be implemented prior to any operations that would generate waste at the well site. This plan must be consistent with all Commonwealth environmental protection standards. This plan must be available to the Department upon request. The Board has revised this subsection to add that the control and disposal plan must be available at the well site during drilling and completion activities for review.

Comment: §78.55.Control and disposal plan. If the disposal location for wastewater and other fluids is not within the one-half mile radius of the surface activity site as inventoried in §78.52 above, the quantity and quality of all surface waters and groundwaters within one-half mile of the disposal site should be inventoried, and the inventory data provided to PADEP during the application review process. Furthermore, this "plan" should be <u>required</u> to be provided to PADEP as part of the approval process, and not "upon request" as is currently stated at §78.55(d). (881)

Response: Any facility utilized in the Control and Disposal Plan must be consistent with all the Oil and Gas 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 regulation has been revised to require the plan to be onsite during operations.

Comment: The waste water from these wells, high in total dissolved solids, must be properly handled. This can only be assured with proper oversight from the State, as <u>companies cannot be trusted to do this</u>

on their own. Part of the severance tax revenues could be used to hire more personnel to oversee drilling operations. (92)

Response: Any disposal facility utilized in the Control and Disposal Plan must be consistent with all the Oil and Gas 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. In 2008, DEP raised fees substantially to apply for a drilling permit. The application fee was raised from $100 to now $5,000, $10,000, or more for deep Marcellus wells. All revenue was invested to increase monitoring and oversight of the oil and gas industry.

Comment: Revise § 78.55 to require well operators to submit a copy of their control and disposal plan for DEP review and approval prior to commencing operations to ensure compliance with Pennsylvania Environmental Protection Standards. (42) (43)

Response: A copy of the control and disposal plan shall be provided to the Department upon request and a copy shall be available at the well site during drilling and completion activities for review.

§ 78.71 Use of safety devices

Comment: Amend § 78.71(a) to clearly state that sufficient casing and cement must be installed in the well to prevent contamination of all ground water resources, in addition to the other purposes already listed. (42) (43) (924) (1816)

Response: The regulations clearly prohibit well drilling operators from contaminating fresh groundwater. This comment appears to be misplaced. A blow-out preventer is not a tool intended to be used as way to prevent groundwater contamination. The purpose of a blow-out preventer is to contain unanticipated pressures at the well head.

Comment: It is not clear that the recommended added text at (a) or any item in 78.71 needs to have an approval or certification of acceptability from DEP. All directives while important, at least in this section appear to be left to the operator's determination. Because cementing, casing design and blow out preventers are the heart of the well design, DEP should be required to certify that the plan is actually in agreement with (b) 1-7 given the site conditions. (1822)

Response: The Department has the ability to require an operator to submit their well design for approval when it deems a pre-approval necessary.

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

Comment: It is recommended that DEP improve the safety device regulations at §78.72 to the following diverter system specifications.

A diverter system should be at least as large as the diameter of the hole that will be drilled, and the system should include a remotely operated annular pack-off device, a full-opening vent line valve, and a diverter vent line with a diameter appropriately sized for geological conditions, rig layout, and surface facility constraints.

The diverter vent line outlet should be located below the annular pack-off device, either as an integral part of the annular pack-off device or as a vent-line outlet spool immediately below it. The actuating

mechanism for the vent line valve should be integrated with the actuating mechanism for the annular pack-off device in a fail-safe manner so that the vent line valve automatically opens before full closure of the annular pack-off device. The diverter system vent line should extend at least 100 feet away from any potential sources of ignition and the drilling rig substructure, and should be secured. The diverter system area should be well marked as a "warning zone" at the vent line tip, prohibiting ignition sources, equipment, or personnel in this area. (924)

Response: This recommendation was evaluated in conjunction with the Technical Advisory Board. The specifications described by the commentator are not achievable by many shallow well drillers who have successfully diverted shallow gas from the rig using alternative diversion equipment and techniques for many years.

Comment: Revise §78.72 to require all wells to be drilled with a BOP once surface casing is installed and cemented. Only allow exceptions to that rule if the operator submits a sufficient technical and safety justification to warrant drilling without a BOP.

The operator should be required to submit a copy of its blowout preventer (BOP), diverter, and related equipment plans, along with its proposed casing and cementing design plan, to DEP for review and approval, as part of permit to drill applications. (924)

Response: While substantial revisions to the blowout preventer regulations have been made, the Board disagrees with the proposal to mandate a BOP on every well. Hundreds of thousands of wells have been drilled in Pennsylvania and reservoir pressure in many parts of the Commonwealth has been substantially depleted. Shall gas and oil production in well known areas simply do not require the use of a BOP.

The Board has revised Section §78.72 to require the use of blow-out prevention equipment after setting casing with a competent casing seat. The Board has also added a requirement that blow-out prevention equipment must be used when drilling out hydraulic fracturing plugs to complete a well. The Board believes that this subsection adequately the scenarios where BOP equipment is required.

In addition, the Board has revised Section §78.55 (relating to Control and disposal plan) to require the plan include the operator's pressure barrier policy that identifies barriers to be used during identified operations.

The requirements for specific combinations of blowout prevention equipment and their respective specifications will be addressed in the Department's barrier policy. These subsequently will be integrated into the site-specific PPC plan for the well site.

The Board has also revised Section §78.72 (relating to Use of safety devices- blow-out prevention equipment) by specifying a minimum distance that additional BOP controls must be located from the drilling rig, and that an individual must be present at the well site who has a current certification from a well control course accredited by the International Association of Drilling Contractors or other organization approved by the Department.

Comment: Revise §78.72 to provide specific BOP type and pressure rating criteria. (924)

Response: The Board has revised the BOP criteria to require additional controls, not associated with the rig hydraulic system, to be located at least 50 feet away from the drilling rig so that the BOP may be

activated during a well control incident. Additional requirements will be developed and incorporated into the operator's barrier policy. Barriers to be used during operations must be identified and included in the control and disposal plan as required in Section §78.55.

Comment: DEP regulations at §78.72 (c) should be revised to clarify that BOP controls are also needed on the rig. (924)

Response: The Board has clarified Section §78.72 (relating to Use of safety devices- blow-out prevention equipment) by adding new subsection (c), requiring *additional* BOP actuator controls, not associated with the rig hydraulic system, to be located at least 50 feet away from the drilling rig. The Board believes this additional language clearly differentiates between controls on the rig and controls located some distance from the rig.

Comment: The citation to the Oil and Gas Conservation Law (Law) in Subsection (a) (4) appears incorrect, as it only references a portion of the Law. In the final-form regulation, the citation should be changed to (58 P.S. §§401—419). (1989)

Response: The Board has made the correction.

Comment: This section (a) requires a Blow Out Preventor (BOP) in four circumstances including on a Marcellus well which is good. However there are wells that might not be covered at least by regulation. In addition, what type or combination of BOPs (pipe rams, blind rams and or shear rams) for what type of well is not indicated. On the positive side there is much emphasis on making sure BOPs are working as they should in requirements at all subsections. It appears that BOPs are essential but far from perfect. That being the case, gas wells without a BOP should be rare and only with DEP analysis and approval. There should be a required *combination* of blowout prevention equipment on each BOP and each BOP should be required to be appropriate to the expected pressure of the well with a margin of safety. Even if all of the above is accomplished there should be a rigorous written back up plan in case there is a failure of the BOP. Emergency Management in the local area should be aware of BOP functions and the back up plan. (1822)

Response: The requirements for specific combinations of blowout prevention equipment and their respective specifications will be addressed in the operator's barrier policy. These subsequently will be integrated into the site-specific PPC plan for the well site.

Comment: The language in (c) appears to be appropriate and timely given the recent well explosion/fire in Indiana Township. Though not a Marcellus well, it points out in this quote, "Officials say crews are still working to put out the fire and a gas valve needs to be shut off, but the flames and smoke are causing a problem in getting to it." The importance of being able to reach equipment necessary to control an accident. This may or may not have been a blow out preventor, but the principal is the same. If there is fire, heat and smoke in an accident, any valves that need to be shut off should be remotely accessible at a distance from the well. Remote access should not only apply to blow out preventers with a rating greater than 3,000 psi (as mentioned in the proposed language), but to all possibly critical well shut down valves or blow out preventers. Will this regulation be retroactive to existing wells for critical valves? It should be to the extent of reasonable practicality. (1822)

Response: The requirements for specific combinations of blowout prevention equipment and their respective specifications will be addressed in the operator's barrier policy. These subsequently will be integrated into the site-specific PPC plan for the well site.

Comment: DEP regulations at §78.72 (d) and (e) should be revised to clearly state that drilling operations must cease if a BOP fails a test. The BOP must be repaired or replaced, and successfully retested, prior to resuming drilling. (924)

Response: The Board has amended Section §78.72(f) (relating to Use of safety devices- blow-out prevention equipment) to state that BOP equipment that is not in good working order must be repaired or replaced immediately and re-tested prior to the resumption of drilling.

The requirements for specific combinations of blowout prevention equipment and their respective specifications and testing will be addressed in the operator's barrier policy. These subsequently will be integrated into the site-specific PPC plan for the well site.

Comment: § 78.72(a): Add the underlined "The operator shall use blow-out prevention equipment after setting surface casing with a competent casing seat". (1841)

Response: The Board agrees and has revised this section accordingly.

Comment: § 78.72(c): States that "...additional controls for a blow-out preventer...not associated with the rig hydraulic system must be located away from the drilling rig..." Is this referring to actuation from the accumulator unit? (1841) (1918)

Response: The use of an accumulator unit would satisfy the regulation.

Comment: § 78.72[(f)](h): The rig floor is where the crew conducts drilling operations such as adding or removing drill pipe. It is a small area, and not safe for an individual who is not an integral part of the physical work. Proper control of the process can be maintained by having the responsible person on the well site and participating in the drilling activities, i.e., on duty. (1841)

Response: The Board notes that the proposed rulemaking had removed the term "rig floor" and added the term "well site", which is consistent with this suggestion on this subsection.

Comment: § 78.72(a): The statement as written does not clarify if blowout prevention equipment is required to be used from spud of the well. It is not prudent to use blowout prevention equipment when drilling weak, shallow formations. In a shallow formation, it is better to be able to divert flow away from the rig and not shut in flow. Many small air rigs do not have adequate substructure height to be able to install a blowout preventer. A Marcellus Shale well has extremely low formation permeability and will not produce commercially until the well has been fracture stimulated. Other more permeable formations appear to be somewhat exempted from this requirement. (1843) (1844)

Response: The Board has revised this section to indicate that blow-out prevention equipment is to be used under the relevant scenarios after casing with a competent casing seat has been set in the well. The Board has also clarified the BOP requirement for well drilling to include unconventional formations, rather than the Marcellus Shale, to include other applicable formations. In addition, the Board has revised the circumstances when BOP equipment is to be used.

Comment: § 78.72(h): The reference to "Independent Association of Drilling Contractors" instead should refer to "International Association of Drilling Contractors" (IADC). In addition, the regulation should require the IADC WellCAP certification at the Supervisor Level, as there are various levels of

training based on the job description and responsibility. Supervisor Level is the highest level of well control training. (1843) (1844) (1989)

Response: The Board agrees with the corrected reference to the appropriate association but does not agree that supervisory level certification is necessary but is instead a best management practice. The Board also believes that well control certification is required during post completion workover operations. The regulations have been revised accordingly.

Comment: § 78.72(a): Add the underlined "The operator shall use blow-out prevention equipment after setting surface casing with a competent casing seat in the following circumstances:" (1918)

Response: The Board agrees with the comment. The regulations have been revised accordingly.

Comment: With respect to the individual in charge of the blow out preventer, The DEP should require presentation of proof that the individual in charge of the blow out equipment has completed adequate training such as the suggested "Independent Association of Drilling Contractors" well control course as well as the allowable "equivalent study". (1822)

Response: The Board agrees and has added a requirement that an individual at the well site must have a current certification from a well control course accredited by the International Association of Drilling Contractors (IADC) or other organization approved by the DEP.

Comment: Someone knowledgeable at DEP should verify an acceptable list of "equivalent training" (wording from subsection) that is adequate to the responsibility. (1822) (1989)

Response: In addition to accreditation by the IADC, the Board has revised this subsection to indicate the Department will recognize other organizations for well control certification that have been approved by DEP. The Board has also amended subsection §78.72(h) (relating to use of safety devices- blow-out prevention equipment) to require the Department of Environmental Protection to maintain a list of accrediting organizations on its website.

Comment: The regulations should also provide for proper installation and testing of blowout equipment. The BP oil spill in the Gulf of Mexico and the EOG Resources blowout incident in Clearfield County are reminders that properly functioning safety equipment are necessary to prevent catastrophes. In both cases, blowout preventer devices failed because they were not properly installed and tested. Backup systems to prevent blowouts should be required. (75) (1815) (1816) (1836)

Response: The Board has revised Section §78.72 (relating to Use of safety devices- blow-out prevention equipment) by specifying a minimum distance that additional BOP controls must be located from the drilling rig, and that an individual must be present at the well site who has a current certification from a well control course accredited by the International Association of Drilling Contractors or other organization approved by the Department. In addition, blow-out prevention requirements will be specified in greater detail in the operator's well barrier policy. Finally, BOP's must be tested prior to use.

Comment: Blowout preventers should be required for every well once the surface casing has been installed. Controls for the blowout preventer should be on the drilling rig and a secondary location, in case the rig is inaccessible during an event. (8) (10) (42) (43) (50) (874) (896) (1837) (1845) (1853)

Response: The Board has revised Section §78.72 (relating to Use of safety devices- blow-out prevention equipment) by specifying a minimum distance that additional BOP controls must be located from the drilling rig, and that an individual must be present at the well site who has a current certification from a well control course accredited by the International Association of Drilling Contractors or other organization approved by the Department. In addition, blow-out prevention requirements will be specified in greater detail in the Department's upcoming well barrier policy.

Comment: The surface casing should provide support for blowout prevention and contain drilling fluids for subsequent sections. (42) (43) (1816)

Response: The regulations have been revised to permit BOP's to be attached to surface casing.

Comment: Specify all casing pressure testing at quantifiable 50% of the working pressure of the Blow Out Preventer. (42) (43)

Response: The pressure testing requirements specify that the casing shall be tested up to the highest anticipated working pressure that the casing will be exposed to.

Comment: DEP should have the authority to require certain blow-out prevention equipment in certain situations. (1879)

Response: The Department does have this authority. The requirements for specific combinations of blowout prevention equipment and their respective specifications will be addressed in the operator's barrier policy. These subsequently will be integrated into the site-specific PPC plan for the well site.

§ 78.73 General Provisions for well construction and operation

Comment: DEP regulations at §78.73 (c) should be revised to make it clear that the pressure limit will apply to all well activities after the casing is cemented in place. (924)

Response: The Board disagrees with this recommendation. The regulations apply to allowable pressure limits after the well has been completed. Higher pressures will necessarily be applied if the well is drilled using mud to remove the drill cuttings.

Comment: DEP regulations at §78.73 (c) should be revised to require the operator to notify DEP of any pressure exceedance within 24 hours, followed by a written plan of action to be submitted to DEP for review and approval. The regulations should also include a requirement for the operator to work with DEP to notify any potential affected parties. (924)

Response: Proposed subsection §78.88 (relating to Mechanical integrity of operating wells) clearly states the requirement for quarterly pressure testing at each well and the notification and procedures to follow if the prescribed pressure requirements in subsection §78.73(c) have been exceeded. This section requires immediate notification to the Department if the pressure limits in §78.73(c) have been exceeded.

Comment: DEP should develop regulations to restrict flaring, venting, and fugitive emissions to the lowest level technically feasible, and require the use of Reduced Emission Completions ("green completions") whenever technically feasible. (924)

Response: Addressing air quality issues is beyond the scope of the proposed regulations.

Comment: In Subsection (e), how does the Board intend for excess gas to be diverted away from a drilling rig "in a manner that does not create a hazard to the public health or safety?" This phrase is vague and should be clarified in the final form regulation. (1989)

Response: The wide variety of diversion equipment used or capable of being used by different rigs necessitates a narrative description of the process rather than a prescriptive requirement that may not be achievable for all drilling rigs.

Comment: DEP regulations at §78.73 (f) should be revised to require pressure testing of all casing at a surface pressure of 50% of the required working pressure of the BOP. (924)

Response: Pressure testing requirements for casing are provided in §78.84 (relating to Casing standards). This section has been significantly revised. Specific pressure-testing requirements for casing attached to a BOP with a pressure rating of greater than 3000 psi are found in subsection 78.84(f).

Comment: The statement as written does not clarify if blowout prevention equipment is required to be used from spud of the well. It is not prudent to use blowout prevention equipment when drilling weak, shallow formations. In a shallow formation, it is better to be able to divert flow away from the rig and not shut in flow. Many small air rigs do not have adequate substructure height to be able to install a blowout preventer. A Marcellus Shale well has extremely low formation permeability and will not produce commercially until the well has been fracture stimulated. Other formations appear to be somewhat exempted from this requirement and DEP should be clear in its intent. (1833) (1843)

Response: The Board has revised this section to indicate that blow-out prevention equipment is to be used under the relevant scenarios after casing with a competent casing seat has been set in the well. The Board has also clarified the BOP requirement for well drilling to include unconventional formations, rather than the Marcellus Shale, to include other applicable formations. In addition, the Board has revised the circumstances when BOP equipment is to be used.

Comment: It is not clear in the Proposed language for 78.73 that the operator would need to report increased pressure beyond the requirement at (c) but this could be a serious situation. DEP should be notified. (1822)

Response: Subsection §78.88 (relating to Mechanical integrity of operating wells) clearly states the requirement for quarterly pressure testing at each well and the notification and procedures to follow if the prescribed pressure requirements in subsection §78.73(c) have been exceeded.

Comment: Language at 78.73(e) states, "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." Typical well completions in the Barnett Shale area can release approximately 5000 Mcf of natural gas/well. Cost effective control strategies are available that can substantially reduce emissions, and in some cases, reduce costs for oil and gas operators. These options include the use of "green completions" to capture methane and VOC compounds during well completions."' Green Completion could capture significant air pollutant emissions and valuable gases at well completion after the first completion where connection to pipeline for transmission of gas has been set up. Equipment would be necessary but payback from gas capture would likely cover the cost. (1822)

Response: This comment is beyond the scope of the proposed regulations.

Comment: The subsection language should change to include "reduced emissions completion known as green completions should be applied whenever possible as determined by DEP" "in order to minimize air pollution. (1822)

Response: This comment is beyond the scope of the proposed regulations.

Comment: Drilling operations should be designed to maintain air quality in compliance with EPA ozone standards. This will require monitoring of ozone and ozone forming substances before and during drilling and hydrofracturing stages. (1980)

Response: This comment is beyond the scope of this rulemaking.

Comment: Flaring should be permitted only where there is no other choice and venting would be the last choice. Best practices to reduce emissions should be incorporated at all areas of the drilling process. If flaring is used, inspection and workability of the igniters and other equipment pieces should have a regular rotation of inspection. Redundancy of critical pieces such as igniters should be included. (1822)

Response: This comment is beyond the scope of the proposed regulations.

Comment: Regulations should specify circumstances when venting of gas wells is allowed and when it is prohibited. (1980)

Response: The regulations only allow gas to vent in a manner that does not create a hazard to the public health or safety.

Comment: The Board also should re-examine its blowout prevention requirements as they apply to both drilling and well work and ensure that Pennsylvania has sufficient on-site inspectors to ensure compliance. On July 12, 2010, the O&G Bureau explained in a letter to gas well operators the lessons learned from its investigation of the EOG Resources loss of well control at the Punxsutawney Hunting Club 36H well in Clearfield County. (A copy of the letter is attached hereto as Exhibit B.) We recommended that the six specific instructions included in the letter be codified in Chapter 78. (1820)

Response: The Board has incorporated these provisions.

Comment: The regulations should provide for proper installation and testing of blowout equipment. The BP oil spill in the Gulf of Mexico and EOG Resources blowout incident in Clearfield County are reminders that properly functioning safety equipment is necessary to prevent catastrophes. In both cases blowout preventer devices failed because they were not properly installed and tested. Redundant systems to prevent blowouts should be required. DEP has requested that operators install certain equipment and follow certain procedures, but not yet incorporated into regulation. These include:

A snubbing unit, which prevents pipes from ejecting uncontrollably from a well, must be used to clean out the composite frac plugs and sand during post-fracturing (post-frac) if coil tubing is not an option;
A minimum of two pressure barriers must be in place during all post-frac cleanout operations;
Any blowout preventer equipment must be tested immediately after its installation and before its use. Records of these tests must be kept on file at the well site or with the well site supervisor;

At least one well site supervisor who has a current well control certification from a recognized institution must be on location during post-frac cleanout operations; and 5. A remote-controlled, independently powered blowout preventer unit, which allows workers to control what's happening on the rig at a safe distance, must be located a minimum of 100 feet from the well and operational during all post-•ac cleanout operations.

These requirements should be included in the proposed regulations to ensure state-of-the-art best management practices. (1899)

Response: The Board agrees with this comment. It has been incorporated into the regulation accordingly.

§78.73 General provision for well construction and operation

Comment: We also suggest adding a provision whereby an operator could conduct a Formation Integrity Test (FIT) shoe test of the casing seat while drilling. In addition to verifying that the casing shoe did not have a cement channel, the FIT test would also establish the formation strength at the casing seat. It is recommended that the operator be allowed to maintain 80% of the FIT test gradient. For example, if the FIT was successful at 0.8 psi/ft, then the maximum allowable pressure would be (0.80 x 0.80 psi/ft) multiplied by the casing length (in feet) of the applicable casing. (1833) (1843)

Response: The use of a Formation Integrity Test (FIT) is not prohibited to test the integrity of the casing seat when drilling a well. This is a very short-term testing procedure. However, using the results of this test to determine an acceptable long term, sustained casing pressure at the seat is not appropriate. Many instances of casing seat degradation and gas migration occurrences have been attributed to elevated, sustained pressure on the casing seat. For long-term protection of casing seat integrity, the Board believes the hydrostatic pressure requirements of §78.73(c) (relating to General provision for well construction and operation) are appropriate, and limit pressures at the casing seat to such levels that ensure its long-term integrity. In addition, the Board notes that this particular provision of this Section was suggested by the Department's Technical Advisory Board, and was subsequently incorporated into the proposed rulemaking.

Comment: § 78.73(b): Change to clarify terminology (bold terms in original) "...and **prevent pollution or diminution of...**" to **"...and prevent diminishing of quantity and/or quality of..."** (1841) (1918)

Response: The Board has declined to incorporate this change. This is not acceptable regulation writing format.

Comment: § 78.73[(c)](d): Change "recom- pleted" to "recompleted". (1841) (1918)

Response: This typographical error will be corrected.

Comment: We suggest further strengthening regulations to protect air quality and public health. Tons of smog forming emissions (Nitrogen Oxides and Volatile Organic Compounds) are released by gas production. Because flaring and diversion away from the well site do not diminish the quantities released or significantly reduce the potential impact of such emissions on public health. The following section needs to be changed:

(e) Excess gas encountered during drilling, completion, or production 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.

A revised, more protective regulation should read: Excess gas encountered during drilling, completion, or production shall primarily be captured to minimize hazards to public health and safety.
In addition to dealing with the excess gas, further regulations need to be added to reduce these emissions. Monitoring and quantifying air quality are areas that we believe also require further consideration by DEP. (93) (1821)

Response: Addressing air quality issues associated with well drilling is beyond the scope of the regulations. Excess gas encountered may need to be vented to prevent a hazard. § 78.74 (referencing venting of gas) does not allow for the venting of gas if it creates a hazard to the public health and safety.

Comment: § 78.73(f): Please reconsider the requirement for a check valve to prevent backflow from the pipeline. In the event of a pressure change, it would be preferable for gas to flow back into the well than cause a pressure problem in surface equipment with the resultant potential for safety or release issues. Excessive turbulence can promote valve erosion and cause loss of containment (gas and water). In addition, flowing gas through a check valve creates an obstruction and disrupts flow. (1841)(1918)

Response: The Board disagrees with the comment. Excessive backpressure on the casing or formations can cause gas migration.

Comment: Agree that no natural gas, methane, carbon dioxide, or other greenhouse gas (GHG) emissions will be released into the atmosphere; agree to report any such releases immediately upon discovery; (1425)

Response: Addressing air quality issues associated with well drilling is beyond the scope of the regulations. Excess gas encountered may need to be vented to prevent a hazard. § 78.74 (referencing venting of gas) does not allow for the venting of gas if it creates a hazard to the public health and safety.

Comment: DEP should prohibit flaring, venting and all fugitive emissions. (42) (43)

Response: Addressing air quality issues associated with well drilling is beyond the scope of the regulations. Excess gas encountered may need to be vented to prevent a hazard. § 78.74 (referencing venting of gas) does not allow for the venting of gas if it creates a hazard to the public health and safety.

Comment: We support the explicit language of §78.73, requiring operators to maintain the integrity of a well throughout construction and operation to protect public health and safety from gas migration and other pollution to fresh groundwater supplies. Specific methods for meeting the requirements of this section are suggested in subsections (c) and (d). Yet, section 78.73 does not require the operator to notify DEP of problems identified, or of its solution, or to notify anyone whose water supply may be impacted. Thus, the operators remain accountable only to themselves and not to the DEP or the public. The current language and requirements of this section do not meet the EQB's stated goal of protecting public health-, safety, environment and property. To protect public health, DEP should be notified within 24 hours so that prompt notification can be given to the affected members of the public. In the event of pollution or diminution of a water supply, the well operator should be required to develop a plan for the remediation of its contamination and that plan should ultimately be subject to DEP approval. A

transparent process that allows the public access to information about the quality of their drinking water is a key component to protecting public and private water supplies and stemming threats to public health and safety. (1851)

Response: The Board disagrees that the proposed regulation does not meet the stated goals. Operators must report any spill or release of pollutional substances that threaten waters of the Commonwealth immediately to DEP pursuant to 25 Pa. Code § 91.33. Operators must also report all water supply complaints and gas migration complaints to DEP as part of the revisions to chapter 78. 25 Pa. Code § 78.86 requires operators to notify DEP if they have defective casing or cement. Finally, the operator must develop and have on site a Prevention, Preparedness and Contingency plan that identifies all potential sources of pollution and describes how the operator will respond in the event of an accident. These plans have been reviewed by DEP.

Comment: § 78.73(b): This provision could be read to require an operator to prevent events unrelated to its drilling operations. We suggest replacing the term "prevent" with "not cause" in both locations in the paragraph. (1843) (1844)

Response: The Board disagrees with this comment. The term "prevent" is consistent with the phrase "not cause".

Comment: 78.73(c) & (d): In an effort to clarify this section we propose the following:
(c) After a well has been completed, recompleted, reconditioned or altered the operator shall prevent the annular surface shut-in pressure and annular surface producing back pressure inside each and every surface casing, coal protective casing and intermediate casing (when the intermediate casing is used in conjunction with the surface, or coal protective, casing to isolate fresh groundwater) from exceeding the following pressure: Eighty percent (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 annular surface shut-in pressure and annular 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. (The rest of subsection (d) to remain as proposed.) (1843) (1844)

Response: The Board agrees with this comment. The regulation has been revised accordingly.

Comment: We also suggest adding a provision whereby an operator could conduct a Formation Integrity Test (FIT) shoe test of the casing seat while drilling. In addition to verifying that the casing shoe did not have a cement channel, the FIT test would also establish the formation strength at the casing seat. It is recommended that the operator be allowed to maintain 80% of the FIT test gradient. For example, if the FIT was successful at 0.8 psi/ft, then the maximum allowable pressure would be (0.80 x 0.80 psi/ft) multiplied by the casing length (in feet) of the applicable casing. (1843) (1844)

Response: The use of a Formation Integrity Test (FIT) is not prohibited to test the integrity of the casing seat when drilling a well. This is a very short-term testing procedure. However, using the results of this test to determine an acceptable long term, sustained casing pressure at the seat is not appropriate. Many instances of casing seat degradation and gas migration occurrences have been attributed to elevated, sustained pressure on the casing seat. For long-term protection of casing seat integrity, the Board believes the hydrostatic pressure requirements of §78.73(c) (relating to General provision for well construction and operation) are appropriate, and limit pressures at the casing seat to such levels that ensure its long-term integrity. In addition, the Board notes that this particular revision to

this Section was suggested by the Department's Technical Advisory Board, and was subsequently incorporated into the proposed rulemaking.

§ 78.75 Alternative methods

Comment: Subsection (a) permits the Department to unilaterally designate an area of alternative methods. However, Section 211 of the Oil and Gas Act states that a "well operator may request the authority to use an alternative method." 58 P.S. §601.211. What is the Department's statutory authority for making this designation without an initial request from a well operator? (1989)

Response: Both Section 211 and Section 201(e) of the Oil and Gas Act provide the Department with the authority to permit or require methods that deviate from the regulations. The area of alternative methods would not be a regulation but would instead establish the process by which well permits would be appropriately conditioned to address the unique circumstances of the defined area. Operators would still be able to proposed alternative methods to the standards established in the area of alternative methods.

Comment: The commentator would like to commend the DEP's inclusion of an opportunity for public comment prior to the approval of these revised regulations. Such public comment is particularly laudable when specifically included in section **78.75a Area of alternative methods** as may be required to drill, operate or plug a well in a safe and environmentally protective manner. (93)

Response: The Board would like to thank the commentator for their support for the requirements associated with the § 78.75a Area of alternative methods.

Comment: Should there be areas designated as "unsuitable for drilling" based on the chemistry of the groundwater the well may encounter in mined areas. Be advised that acid polluted aquifers may not be directly associated with previously mined lands and may be very long distances away from the actual mined areas. (91)

Response: This comment is beyond the scope of this rulemaking.

§78.81 General Provisions

Comment: The commentator supports the additional requirements in this section of the proposed rulemaking that incorporate the best management practices used by the industry. We urge the EQB to further explore and incorporate additional appropriate best management practices, as identified by the American Petroleum Institute (API) and other states, into this proposed rulemaking. Regulations in §78.81, *et seq.* must be stringent and must reflect the best management practices that assure proper casing and cementing of an oil or gas well to protect fresh groundwater supplies and the public health, safety, and welfare. (1851)

Response: API standards and other state regulations were considered as part of the development of these regulations. Incorporation by reference of API standards is not always useful as these standards must be purchased and are not readily available for public reference. The Board believes that specifying the substantive requirements in the regulations rather than referencing proprietary material is a better way of writing regulations.

Comment: The regulations should follow the lead of other jurisdictions and articulate the guiding principles of casing and cement regulation. We recommend adoption of the following language, which is

consistent with the proposed rules and would effectively guide well operators and regulators in unanticipated situations:

The casing and cementing programs for any well shall be designed and executed to maintain the integrity of the well throughout its life; to effectively control any hydrocarbons or water encountered and to prevent blowouts, explosions, fires, and casing failures as well as the pollution of all freshwater resources. In developing an appropriate casing and cementing program, a well operator shall consider successful local practices for similar wells, maximum anticipated surface pressure, the chemical environment, the potential for mechanical damage, and any site-specific geological factors, including the presence of water or hydrocarbons. At all times, the well operator shall use the best available technologies to protect groundwater and employ the best professional judgment as to sound engineering practices. (1820)

Response: The regulations do contain many of the principles articulated by the commentator. However, several of the statements are better suited to a policy statement rather than a regulation as the phrases are unenforceable.

The Board notes that typical wells in other jurisdictions are not similar to the depths, geology, and environments encountered in producing formations in Pennsylvania. Pennsylvania's Oil and Gas industry is now very diverse in the types of operational requirements needed to safely produce the resources. The Board has taken those recommendations from other jurisdictions that have addressed an issue that can work across Pennsylvania's operations and has specified certain situations where Pennsylvania operations are unique and incorporated them into these requirements.

§ 78.82 Use of conductor pipe

Comment: DEP regulations at §78.82 should include specific instructions on how an operator should install conductor pipe to prevent infiltration of surface water or fluids from the operation into groundwater. DEP should specify that conductor pipe should be cemented from top to bottom and firmly affixed in a central location in the wellbore with a continuous, equally thick layer of cement around the pipe. A mechanical or cement seal should be installed at the surface to prevent the downward migration of surface pollutants. Drilling fluids should be limited to air, fresh water or water-based mud. (924)

Response: The Board has revised section §78.82 (relating to Use of Conductor pipe)) to clarify conductor pipe must be driven into place of cemented to the surface.

Comment: §78.82 should specify that all conductor pipes prevent infiltration of surface water or fluids into groundwater. (42) (43)

Response: Section §78.82 has been amended to specify that all conductor pipe shall be installed in a manner that prevents the subsurface infiltration of surface water or fluids

Comment: § 78.82(2): Definition of conductor pipe under 78.1 Definitions states that it is "used to stabilize the top of the wellbore in shallow unconsolidated formations". This definition seems consistent with standard industry practice. Section 78.82 Part (2), however, states that "conductor pipe shall be installed in a manner that prevents infiltration of surface water or fluids from the operation into groundwater". As stated in definition section, conductor is primarily for stabilization of shallow unconsolidated formations, and not necessarily for any groundwater isolation. Please clarify. (1841) (1918)

Response: The definition has been amended to remove the phrase "conductor pipe shall be installed in a manner that prevents infiltration of surface water or fluids from the operation into groundwater".

Comment: § 78.82(2): This best practice should also apply to water wells drilled in the state, as there are 20,000 water wells drilled each year in PA (to a similar or deeper depth as the conductor pipe). (1843) (1844)

Response: This comment is beyond the scope of the regulation.

Comment: Conductor casing shall be cemented from top to bottom and firmly affixed in the wellbore with a continuous, equally thick layer of cement around the pipe. A mechanical or cement seal of at least three square feet shall be installed at the surface to prevent the downward migration of surface pollutants. (1820)

Response: The Board has revised section §78.82 (relating to Use of Conductor pipe)) to clarify conductor pipe must be driven into place of cemented to the surface.

Comment: For a public water supply well, the grouted surface casing annulus is meant to protect the fresh groundwater from surface water infiltration as well as other contaminants that could migrate down the annulus. The oil/gas well surface protective casing cemented annulus is meant to do the same thing with the additional task of protecting the fresh groundwater from contaminants that could migrate up the annulus. Therefore, operators should provide the same level of protection with the oil/gas well surface protective casing annulus by requiring the same minimum 1.5-inch cemented annulus that is required in a public water supply well. (1829)

Response: The Board has revised section §78.82 (relating to Use of Conductor pipe)) to clarify conductor pipe must be driven into place of cemented to the surface.

Comment: The conductor pipe should have a cemented or otherwise sealed annulus. (1829)

Response: The Board agrees and has reworded and incorporated the requirement

Comment: Section 78.82 (2) is ambiguous, and as written protects infiltration of only that surface water or fluids emanating from the operation. The conductor pipe should protect groundwater from any infiltration, regardless of the source. (1867)

Response: The Board has changed the requirement to preclude any subsurface infiltration.

Comment: In Paragraph (3), the final-form regulation should clarify under what circumstances the Department would approve material other than steel to make a conductor pipe. (1989)

Response: The Department may approve alternative materials in the permit process. The determination would be based on the specific site conditions.

§ 78.83 Surface and coal protective casing and cementing procedures

Comment: DEP regulations at §78.83 (a) should be revised to read: Surface casing or any casing functioning as a water protection casing shall not be utilized as production casing.

Exemptions proposed at §78.83 (a)(1-2) should be deleted or further technical justification should be provided by DEP to explain why these proposed requirements are more protective of human health and the environment. (924)

Response: The Board has declined to make this change. The use of surface casing functioning as production casing is restricted to only limited scenarios, primarily shallow oil wells using rod and tubing assemblies within the casing that do not produce gas and subsequently have very low pressures, if any, on the surface casing. The annulus between casing and production tubing must be left open to vent to surface rather than shutting in and building pressure.

The operator must still ensure that the well casing is centered, and cemented with higher strength in the zone of critical cement. Quarterly mechanical integrity testing is also required, and if pressure would exceed the limit as prescribed in §78.73(c) another string would be required or appropriate remedial activity implemented.

Also, since a BOP requires a minimum amount of intermediate cemented casing, deeper wells will require another casing string besides surface casing, since any well drilled deeper than shallow oil wells typically require a BOP which is attached to intermediate casing.

The Board notes that the rulemaking has significantly revised the casing and cement requirements, as well as added a new section requiring mechanical integrity testing of all existing wells testing, which are more protective of human health and the environment.

Comment: DEP regulations at §78.83 (c) should be revised to increase the surface casing setting depth to 100' below the deepest fresh water zone and at least 100' into bedrock. Correspondingly, DEP's proposed regulation at §78.83 (f) needs to be adjusted to increase the 50' criteria to 100'. (924)

The Board believes the current requirement that the surface casing be set 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 is sufficiently protective. The maximum depth requirement will minimize the potential for the commingling of fresh and salt water. There are additional provisions for installing another water protective string if fresh ground water is found beneath this casing string. The Board has amended the rulemaking to require the surface casing may not be more 200 feet below the deepest fresh ground water. This maximum depth requirement will minimize the potential for the commingling of fresh and salt water, and also eliminate the practice of using a two-string design, which generally uses one long surface casing string to 1000 feet. Minimum and maximum prescribed depths for surface casing will prohibit this practice.

The Board disagrees that adding an additional 50 feet onto the groundwater protective zone is necessary. This additional depth is arbitrary. The most crucial aspect of setting surface casing is knowledge of where the deepest fresh groundwater zone is. The revised regulations require operators to document how they determined where the surface casing should be set in the casing and cementing log.

Comment: Section 78.83(c) If no fresh groundwater is being utilized as a source of drinking water within a 1,000-foot radius of the well, the operator may set and permanently cement a single string of surface casing through all water zones, including fresh, brackish and salt water zones. I don't believe that the cementing requirements should be based on the presence or absence of a current drinking water source at any distance from a well. The regulations should protect all present and future users of the

property without any exception. I'd like to see this statement stricken. If the statement is to stand, I think the distance should be 2500 feet, to allow for more reasonable future development of adjacent land with respect to utilization of the ground water for drinking, without possible well contamination. (880)

Response: The Board agrees. This subsection will be eliminated.

Comment: Increase surface casing depth § 78.83 to 100 feet below the deepest fresh water zone and at least 100 feet into bedrock. (42) (43) (1822)

Response: The Board believes that the requirement that surface casing be set 50 feet below the deepest fresh groundwater or at least 50 feet into consolidated rock, whichever is deeper, is adequate. The regulations have been strengthened by requiring the operator to identify how the depth of the deepest fresh groundwater was determined. The regulations have also been amended to require that surface casing may not be more 200 feet below the deepest fresh ground water. The maximum depth requirement will minimize the potential for the commingling of fresh and salt water.

Comment: Surface casing should be cemented continuously from top to bottom and centered in the bore hole with an equal layer of cement all around and specified in the cement bond log. (42) (43)

Response: Surface casing should be cemented to the surface. If the operator is unable to return cement to the surface the final-form regulations require additional steps to ensure the protection of the groundwater.

Comment: Surface casing should be all new material 20% stronger than anticipated pressure. (42) (43)

Response: Any new casing shall be casing must be a string of new pipe with an internal pressure rating that is at least 20 percent greater than the anticipated maximum pressure to which the casing will be exposed. Used casing may be approved for use as surface, intermediate or production casing but must be pressure tested before cementing. 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 percent decrease in pressure.

Comment: In recognizing the critical importance of casing and cementing procedures in preventing the degradation of our water, we encourage you to treat all wells the same with bottom to top cementing. In creating what could be perceived as case-by-case regulations of section 78.83, misinterpretation and noncompliance can result. Exceptions to the proposed regulations should be addressed through the process for "alternative methods" found in section 78.75. (93)

Response: The regulations permit production of gas off the intermediate casing if the operator demonstrates that the pressures in the well will be contained. In this case, cementing the string to the surface will not be required. The alternative methods section is intended to set standards over a geographic area. The Department still needs to maintain the ability to approve alternative methods on an individual well basis.

Comment: Casings protecting the environment shall not be used for production. (42) (43)

Response: The only time a surface casing maybe used for production is for 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 or when the operator demonstrates that the pressure in the well is no greater than the pressure permitted by § 78.73(c) and demonstrates through a pressure test or other method

approved by the Department that all gas and fluids will be contained within the well. In either case the well pressure is less then the pressure from the surrounding geological formation.

Comment: This final sentence should be altered to read from 1 inch to 2 inches This would allow for a stronger 1-inch cement sheath around the casing rather than the ½-inch required by the hole currently specified in the current document to be 1 inch greater than the outside diameter of the centralizer band. (93)

Response: The critical point in cementing a string of casing is the cement's interface with the geologic formation and a uniformed cement thickness around the casing. The final-form regulations emphasis the use and placement of centralizes in addition to cement quality.

Comment: Attending the announced public comment meetings is extremely inconvenient for me so I thank you for the opportunity to air at least one concern: I read some time ago that the cement around the gas well casings would be 500 feet deep. My water well driller told me when my water well was drilled that my water well is 500 feet deep. Is the 500 foot depth for gas well protection really deep enough to protect those of us who have similarly deep water wells? (30)

Response: The surface casing should be set 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. The surface casing may not be more 200 feet below the deepest fresh ground water. The maximum depth requirement will minimize the potential for the commingling of fresh and salt water.

Comment: If a test indicates all gas and fluids will be contained at that moment, it may not be the same in the future, additional casing is there to protect at least in part from an unforeseen event-to provide an extra barrier of protection to ground water. How would the requested testing assure the ongoing safety? Should not best preventative practices be for all wells? This section 78.83(a) (2) should be dropped. (1822)

Response: The Board has determined that the requirements of this subsection adequately address the preventative testing practices for all wells on an ongoing basis. All operating wells are subject to the requirements of proposed subsection §78.88 (relating to Mechanical integrity of operating wells). In addition, pressure within the well bore will only decline over time.

Comment: The following language should be added to DEP regulations at §78.83 (f): Surface casing must be cemented from top to bottom and firmly affixed in a central location in the wellbore with a continuous, equally thick layer of cement around the pipe. Cement must be placed behind surface casing by the pump and plug or displacement method and a sufficient amount of cement (at least 25% excess) must be used to ensure a protective cement bond is achieved from the bottom of the casing to the top of the hole. If the excess cement does not return at the surface, the operator must take steps to remedy the failed cement job, including pumping cement down the annulus from the surface to fill any void spaces. A cement bond log must be run to verify cement integrity prior to proceeding further in the wellbore. If the cement bond long does not verify placement of a continuous, solid layer of cement behind the surface casing from the bottom of the casing to the top of the hole, an additional string of casing must be set pursuant to §78.83b (a)(1). (924)

Response: The Board agrees with the general recommendations and concepts of this suggestion and notes that the rulemaking has incorporated many of the above concepts in several subsections. §78.83 provides new requirements for the placement and spacing of centralizers on all casing strings to ensure

the casing string is properly centered in the borehole and the cement sheath surrounding the casing exhibits a uniform thickness. Surface casing must be permanently cemented to the surface. The Board has also added a requirement that the wellbore be conditioned prior to cementing the casing to ensure an adequate cement bond exists between the casing and formation.

Also, 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 or greater to 120% of the calculated annular volume, new Section §78.83b (relating to...) requires additional the operator to run an appropriate logging or other method to determine the top of cement, and subsequently must remedy the lost circulation of cement, which could include installing an additional string of casing. In addition, the Board has revised section §78.85 (relating to Cement standards) to require a zone of critical cement of cement at the casing seat extending up a prescribed length from that point.

Comment: In 78.83(f) the length of cement for cementing the additional casing into the surface casing is suggested at twenty feet, this does not seem long enough. As much as possible casing going through water of any kind should be entirely cemented in place. (1822)

Response: The regulation has been amended to require the second string to be cemented to the surface.

Comment: First, in considering that the bottom of the casing string is the most critical in terms of getting the best possible cement coverage to provide isolation of fresh water zones, Federal Onshore Order No. 2 requires closer spacing of centralizers at the bottom of the surface casing. The language from Onshore Order No. 2, §III.B.1.f is: "Surface casing shall have centralizers on the bottom 3 joints of the casing (a minimum of 1 centralizer per joint, starting with the shoe joint)." (1831)

Response: The Board has determined that the centralizer requirements, as proposed in Section §78.83 (relating to Surface and coal protective casing and cementing procedures) and recommended by the Department's Technical Advisory Board, are sufficient to ensure adequate casing centralization. The Board appreciates the suggestion as well as relaying the Federal Onshore Order requirements. These provisions may be considered into relevant Best Management Practices currently being considered by the Department.

Comment: In deviated wellbores, additional centralizers would be needed to provide adequate standoff throughout the deviated section. While it is preferable to have the surface casing section a straight hole, there may be instances where a shallow kickoff point is necessary to meet drilling objectives. A statement in the regulation to alert operators of the need could simply read: "In deviated holes, the operator shall use additional centralization." (1831)

Response: The Board has amended Section §78.83c (relating to Intermediate and production casing) to require the use of centralizers for all wells equipped with intermediate and production casing. The Board has also determined that the centralizer requirements, as proposed in Section §78.83 (relating to Surface and coal protective casing and cementing procedures) and recommended by the Department's Technical Advisory Board, are sufficient to ensure adequate casing centralization.

Comment: We suggest the regulation state that all centralizers shall meet API Spec 10D specifications. (1831) (924)

Response: The Board believes that referencing proprietary standards that are not available to the public should be minimized. Operators are encouraged to consider and utilize the applicable

centralizer requirements as specified in API Spec 10D. However, the Board believes that the spacing of centralizers has been appropriately addressed in these regulations.

Comment: §78.83(c). The section allows drilling beyond fresh groundwater into brackish and salt water zones prior to running and cementing surface casing if there are no current drinking water sources within 1000' of the well. Given a regulatory responsibility to protect sources of drinking water, we don't believe the qualifier that there should be a current utilization of a drinking water source is appropriate. If the purpose of the section is to provide a situation for considering surface casing setting depths notably deeper than the lowest freshwater zone, we suggest a case-by-case approval. There may be valid reasons (e.g., well control, geologic considerations) where surface casing setting depths need to be deeper, but the reasons can be considered on an individual well or local field basis. Example language could be: "In no case is surface casing to be set deeper than 200 feet below the deepest freshwater zone without prior approval." (1831)

Response: The Board agrees and subsection (c) has been deleted from the rulemaking. The Board also amended new subsection (c) has been amended to require the surface casing 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. The amendment is the surface casing may not be more 200 feet below the deepest fresh ground water. The maximum depth requirement will minimize the potential for the commingling of fresh and salt water.

Comment: §78.83(f). We assume that "20 feet" is a typographical error. "200 feet" makes more sense. (1831)

Response: The regulation has been amended to require the second string to be cemented to the surface.

Comment: Placement of Casing Centralizers (§78.83(c)). The proposed requirement for centralizers (i.e., 1 centralizer every 150 feet) should provide good pipe centralization in non-deviated wellbores. (1831)

Response: The Board agrees and thanks the commentator for this comment.

Comment: § 78.83[(b)](c): Change (bold terms in original) "...freshwater **based...**" to **"...freshwater-based..."** and change **"...redrilling..." to "...re-drilling..."** (1841) (1918)

Response: The Board has revised the first term to read "freshwater-based." The Board has declined to make the suggested revision to the term "redrilling" since this is how this term is incorporated into the Oil and Gas Act.

Comment: Revise §78.83 (f) to read:
Where potential oil or gas zones are anticipated at depths within 100 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, to provide a protective barrier to prevent hydrocarbons from contaminating the fresh water aquifers when the well is drilled deeper. A blowout preventer must be installed prior to drilling into a pressured zone or hydrocarbons, unless waived by the Department. (924)

Response: The Board has declined to revise this subsection. Section §78.72 specifies the circumstances when blow-out prevention equipment is required. Revised Section §78.73 requires the operator to

prevent gas, oil, brine and other fluids from below the casing seat from entering fresh groundwater. This generally requires surface casing to be installed and cemented before oil and/or gas-bearing strata are drilled through. In addition, existing subsection §78.83(e) requires an operator to set and permanently cement surface casing prior to drilling into a stratum known to contain or likely to contain oil or gas.

Comment: DEP regulation at §78.83 (g) should be revised to remove the last line and replace it with a requirement to install cement behind the entire section of the intermediate casing string (from the casing seat to the surface), unless the operator can demonstrate it is not technically feasible to circulate cement all the way to the surface due to the depth of intermediate casing. In which case, a minimum of 600' of cement must be placed behind the casing, above the casing shoe. In all cases, the cement must be firmly affixed in the wellbore in a central location with a continuous, equally thick layer of cement around the pipe.

Inconsistencies between regulations at §78.83 (g) and §78.83c should be remedied, because both seem to be addressing intermediate casing. (924)

Response: The Board has declined to make this revision. The casing string described under §78.83(g) refers to the coal protective casing within the surface casing string. This is a separate string of casing. In wells that require coal protective casing, the intermediate casing string (see §78.83c) would be a smaller diameter string extending inside of, and deeper than, the coal string. For intermediate casing, the Board noted that it has revised this section to require the intermediate casing string be cemented to the surface.

Comment: § 78.83(f): Can the "subsequent string of casing" used to isolate additional fresh groundwater zones also be used as production casing? Please clarify. Does "fresh water" in this instance refer to "deepest fresh groundwater" that is yet to be clearly defined, and should consider both quantity and quality. (1841) (1918)

Response: The additional string of casing used to isolate deeper fresh groundwater may be used as production casing if the requirements in Section §78.83(a) (relating to Surface and coal protective casing and cementing procedures) are met. The fresh groundwater isolated with this additional casing string would be the deepest fresh groundwater, since the initial water-protection casing string did not adequately isolated the deepest fresh groundwater initially.

Comment: § 78.83(a): This section should allow for situations where (i) venting is required for safety reasons and (ii) pockets of naturally occurring gas from nonproducing zones are released through a casing and vented to the surface. Also need clarification on whether casing or borehole diameter is being referred to ("diameter of the wellbore") in Section 78.83(a)(2). (1843) (1844)

Response: Issues related to venting are addressed in other sections of the regulations. Section 78.73(e) states: 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. In addition, section 78.74 permits venting of gas provided the venting does not pose a threat to public safety. Finally, the regulation has been changed to specify that the diameter of the borehole must be included in the casing and cementing plan.

Comment: § 78.83(c): Existing section (c) should be retained. Where no fresh groundwater is being used as drinking water source within 1000 foot radius of the well, a single string of surface casing is adequate. (1843) (1844)

Response: The Board disagrees with this comment. Fresh groundwater must be protected regardless of whether it is currently being used as a source of drinking water nearby. In addition, permitting lengthy surface casing strings to be run can contribute to gas migration where the cement behind the production casing fails to adequately cement off shallow gas producing zones.

Comment: § 78.83(f): The language utilized in new section 78.83(c) regarding installation of centralizers should be added to this section as well (i.e., when the intermediate casing string is being utilized to protect fresh groundwater). (1843) (1844)

Response: The Board agrees with this comment. The regulations have been revised accordingly.

Comment: Subsections 78.83(b) and (c) should be clear that the diameter of the drilled hole must be large enough (i) to run centralizers between each casing string, (ii) to allow complete circulation of cement, and (iii) to obtain a uniformly concentric cement bond in the annulus of at least one inch in thickness. The centralizers must be spaced sufficiently to ensure adequate room for cement to pass evenly throughout the cased interval. We recommend that casing be centralized in accordance with API RP Spec 10D Specification for Bow-Spring Casing Centralizers and API RP 10D-2 Recommended Practice for Centralizer Placement and Stop Collar Testing, standards that already have been adopted in Texas. If the Board elects not to adopt to API standards, the regulations should require placement of centralizers at least at the top of the casing, at the bottom, and in between at intervals of no more than 120 feet. (1820)

Response: The Board has incorporated centralizers and specified their spacing on all casing strings.

Comment: The existing 50-foot buffer in subsection 78.83(c) is insufficient to ensure the complete isolation of vulnerable underground aquifers. In order to properly protect groundwater sources from contamination, the surface casing must be set and permanently cemented into an impervious formation or consolidated zone that is at least 110 feet below the deepest freshwater aquifer. If an unanticipated freshwater aquifer is encountered after setting the surface casing, the regulations should require the well operator to isolate the aquifer by stage cementing the intermediate and/or production string with a solid cement plug extending from 50 feet below each fresh water aquifer to 50 feet above said fresh water aquifer. The well operator also should notify DEP of the problem within 24 hours, see 165 Okla. Admin. Code 10-3-4(c)(7)(1), and should cease drilling until it receives DEP approval to continue. (1820)

Response: The Board believes the 50' isolation is sufficient and has provisions if deeper fresh water zones are encountered. Determining where the deepest fresh groundwater is critical. The manner by which the operator makes this determination must be included in the casing and cementing plan.

Comment: More stringent casing and cementing regulations are necessary to the public health, safety, and welfare. The quality of a cement job is a critical factor in the prevention of gas or fluid movement from deeper zones into groundwater. To effectively seal off all production horizons and isolate freshwater aquifers, the cement must be set continuously and evenly throughout the annular space to preclude the formation of any gaps, channels or other malformations. As DEP points out, "A properly cased and cemented oil and gas well is critical to protecting fresh groundwater and public safety." In conjunction with EarthJustice, Sierra Club submitted comments on the advanced notice of proposed rulemaking and noted that best management practices have not yet been incorporated into the proposed regulations. These protective practices have been adopted in other states; there is no reason the industry cannot follow them in Pennsylvania.

Casing regulations should reflect state-of-the-art technology in the oil and gas industry. Much has been learned about casing and cementing of oil and gas wells in the past several decades. All surface and intermediate casing should be new pipe. Pipe standards should explicitly require that all casing be of sufficient quality to prevent any migration of oil, gas or water from one geological horizon to another throughout installation, cementing, drilling, 1,11(1 production. Cement needs time to cure before it is disturbed. DEP proposes an eight- hour period during which no activity is to occur at the well pad which may disturb the cement. A longer wait time may be necessary to ensure that the cement has set. Cement standards should be tightened. The industry needs to impose quality assurance standards on the cement used. (1899)

Response: The regulations have been amended to address these comments.

Comment: The regulations should be targeted at preventing gas migration into drinking water supplies. Poor casing and cementing can cause contamination of fresh water aquifers. The existing 50-foot buffer in subsection 78.83(c) is insufficient to ensure the complete isolation of vulnerable underground aquifers. DEP previously rejected our suggestion that the minimum buffer distance be at 100 feet. Other states, Michigan and Wyoming, have adopted a 110 foot buffer. In order to properly protect groundwater sources from contamination, the surface casing must be set and permanently cemented into an impervious formation or consolidated zone that is at least 110 feet below the deepest freshwater aquifer. (1899)

Response: The Board disagrees that adding an additional 50 feet onto the groundwater protective zone is necessary. This additional depth is arbitrary. The most crucial aspect of setting surface casing is knowing were the deepest fresh groundwater zone is. The revised regulations require operators to document how they determined where the surface casing should be set in the casing and cementing log.

Comment: How will an operator distinguish between a location where the coal has not been removed and a coal pillar? (1829)

Response: The Department requires the applicant for a well in a coal area evaluate mine maps and coal area maps to make that determination.

Comment: If cement is not circulated to the surface, the operator should be required to demonstrate that the annulus is properly cemented by logging or other suitable method. (1829)

Response: The Board has incorporated this suggestion.

Comment: 78.83 (2) (c) The requirement for protecting fresh groundwater with surface casing should be that the operator shall drill to approximately 100 feet below the deepest fresh groundwater or at least 100 feet into consolidated rock, whichever is deeper, and immediately set and permanently cement a string of surface casing to that depth. The proposed regulation currently shows a requirement of 50 feet below the groundwater or 50 feet into consolidated rock. The 100 foot requirement was part of the proposal reviewed at the March 25th TAB meeting. I do not know why it is now shown as having reverted back to the original 50 feet requirement. This additional protection for water supplies is justified by the need of the people of PA to protect their pre-existing and lawful private drinking water supplies, and was supported as a needed change by the DEP. (1863)

Response: The Board disagrees that adding an additional 50 feet onto the groundwater protective zone is necessary. The most crucial aspect of setting surface casing is identifying where the deepest fresh

groundwater zone is. The revised regulations require operators to document how they determined where the surface casing should be set in the casing and cementing plan.

§ 78.83a Casing and cementing plan

Comment: Revise the §78.83a, §78.83b, and §78.83c numbering scheme for consistency with existing DEP regulation format. DEP should clarify that these new standards apply to surface and coal protective casing and cementing procedures. (924)

Response: the Board has declined to make this revision. This numbering format follows the established, conventional numbering protocol for the addition of new sections intended to reside near existing sections featuring the same general topics. The Board notes that §78.83a, §78.83b, and §78.83c do not all apply to surface and coal protective casing. §78.83a refers to the casing and cementing plan for all casing strings, §78.83b refers to lost circulation during surface and coal protective casing cementing operations, and §78.83c refers to standards for intermediate and production casing.

Comment: Revise §78.83a (a) to require the operator to prepare and submit a casing and cementing plan to DEP for review and approval as part of the well permit. (924)

Expand §78.83a (a)(3) to include information on the casing's collapse resistance and tensile strength. Also require information on casing age, condition, location of prior use, and prior service history. (924)

Response: The Board declines to adopt this recommendation. Recording the burst pressure rating and wall thickness is sufficient. For used casing, this casing must be pressure tested in all cases.

Comment: The casing and cementing plan should include a quality control and quality assurance section and should demonstrate conformance with the objectives of §78.71, and procedures and standards of §§78.81-87. (924)

Response: Subsection §78.83a(a) of the plan requires the casing and cementing plan to demonstrate compliance with Subchapter D of Chapter 78, which includes the procedures and standards listed by the commentator.

Comment: The well permit application should contain a complete casing and cementing plan, including casing history and strength. (42) (43)

Response: The Board does not agree that the casing and cementing plan needs to be submitted with every well permit application. An operator is required to develop and maintain a casing and cementing plan that must be available at the well site during operations for the Department to review. The Department can also require the operator to submit the plan prior to drilling when necessary.

Comment: The surface casing and the intermediate casing should be required in all well bores and provide total containment of all drilling fluids. (42) (43)

Response: All wells are required to have a surface casing. The final-form regulations outline when additional strings of casing would be necessary. Surface casing may function as production casing in extremely limited circumstances where the well is an oil well or the gas well is producing under very low pressures that have been proven to be contained in the well.

Comment: There should be a 25% excess cement return to ensure complete protection. (42) (43)

Response: The regulations require 20% excess cement to be used. The issue is not the amount of cement return to the surface, but when cement fails to return the surface. The final-form regulations include detailed requirements for a situation when there is lost circulation of cement.

Comment: Particularly I am concerned that the well bore should be totally and completely isolated from any and all groundwater and any aquifers through which the well is drilled using only the best practices. (42) (43)

Response: The Board agrees with the commentator. The Final-form rulemaking mandates that fresh groundwater be protected from surface and subsurface infiltration of contaminants.

Comment: The other proposals put forth concerning cement/casing guidelines-requirements, etc seem prudent, however, I understand that some states such as Texas have adopted even higher standards than the ones proposed to afford the highest possible level of protection from stray gas intrusions/water supply problems. The board/DEP might wish to revisit this matter. (21)

Response: The updated casing and cementing requirements will provide an increased degree of protection for homeowners and both public and private water supplies. The proposed construction standards will align Pennsylvania's regulations with other states' rules as well as current industry standards. Casing and cement testing 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 for operating wells will be a vital tool for operators to use in detecting potential safety or environmental impacts before they may become a public health or safety issue.

Comment: In 78.83a(a)(3) even if one knows the particulars of a casing history, this casing will be in the ground and in use possibly for decades with additional fracturing episodes. The casing and cement need to be of the best quality for everyone's ongoing safety. Only new pipe fitting the other requirements should be acceptable. (1822)

Response: 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 requirements of subsection §78.84(a), as well as new requirements for pressure testing in §78.84(c). In addition, all operating wells utilizing used casing are subject to the periodic mechanical integrity pressure testing requirements of section §78.88 (relating to Mechanical integrity of operating wells).

Comment: In 78.83a (a)(c) the proposal states, "Upon request, the operator shall provide a copy of the well specific casing and cementing plan to the Department for review and approval." It would be best to approve the Casing and Cementing Plan before starting. This should be explicitly stated as a part of DEP procedures so that well activities do not get underway before DEP approval is received. (1822) (1989)

Response: The Board does not agree that the casing and cementing plan needs to be submitted with every well permit application. An operator is required to develop and maintain a casing and cementing plan that must be available at the well site during operations for the Department to review. The Department can also require the operator to submit the plan prior to drilling when necessary.

Comment: Highland Sewer and Water Authority suggests that the plan be sealed by an expert. Has the Department considered such a requirement? (1989)

Response: The Board does believe a casing and cementing plan need to "sealed." The key aspect of the plan is that it is able to demonstrate compliance with section §78.83a. An operator is required to develop and maintain a casing and cementing plan that must be available at the well site during operations for the Department to review. The Department can also require the operator to submit the plan prior to drilling when necessary.

Comment: Several commentators note that the regulation does not address how to revise a casing and cementing plan. We agree and recommend that the final-form regulation provide a process for revision, including whether Department approval is necessary and when drilling can begin subsequent to a change in the plan. (1989)

Response: The regulations have been revised to require the person who makes changes to the plan to initial the changes made.

Comment: Cementing quality of casing strings referenced in §78.83b(b) should be quality tested by bond logging or other equivalent methods whenever possible with appropriate remediation should problems be indicated. (1822)

Response: The logging or other suitable methods to determine the amount of casing that was cemented, as provided in subsection §78.83b(c), may include the utilization of logging tools to determine the quality and integrity of the cement, as required by the Department.

Comment: We believe that casing regulations should reflect state-of-the-art technology in the oil and gas industry. Much has been learned about casing and cementing of oil and gas wells in the past several decades. The drilling industry should be required to impose quality assurance standards on the cement used and take steps to prevent migration of gas into fresh water zones. (1836)

Response: The Board agrees with this general statement.

Comment: §78.83a Casing and Cementing Plan. Recognizing there are procedures that are part of a casing and cementing program that are proven and accepted practices for achieving a quality surface casing and cementing program for the protection of fresh water zones, the NPS suggests an additional item to the list of plan requirements entitled "Wellbore conditioning and cementing procedures" that would list the following:

Lost Circulation. Operators should provide the hole conditioning steps taken prior to and after running casing. Lost circulation can be defined as loss of whole mud in quantity to the formation. Lost circulation zones, if not taken care of, can seriously compromise the ability to achieve a quality cement job.

Hole and mud conditioning prior to cementing. Operators should provide the proposed steps taken to ensure a properly conditioned and stable hole is evidenced by a clean shaker, stable pump pressure and strokes at a constant throttle, and stable drag trends. This requirement recognizes that in order to ensure that the entire annulus space is filled with cement, the cement must totally displace the drilling mud, which previously occupied the space. Good hole and mud conditioning are central to achieving high mud displacement efficiency. It may be advisable to include a separate trip for

conditioning the hole and mud prior to running casing. Once casing is in place, include additional hole and mud conditioning. We suggest defining a conditioned hole using hole stability rather than a predetermined circulation volume.

Pipe movement (reciprocation) during hole conditioning and cementing. We suggest including provisions to reciprocate surface casing during conditioning and cementing provided conditions allow. This is due to the fact that casing reciprocation during hole conditioning and cementing is a commonly used method to considerably improve removal of gelled mud from the hole prior to and during cementing. It is a relatively easy undertaking in most single stage cementing jobs.

Preflush design. This item is important because, in addition to providing a spacer between the mud and cement, preflushes can be designed to considerably improve mud removal ahead of the cement. Contact time (the time it takes for the preflush to pass any point in the annulus) and flow regime are important considerations in designing a good preflush. Turbulent flow is best for mud removal. A ten-minute contact time is recommended. Pre-flushes may need to be weighted to ensure well control. (1831)

Response: The Board agrees and thanks the commentator for this comment. The Board also has revised Section §78.83 (relating to Surface and coal protective casing and cementing procedures) to require the operator to condition the hole prior to cementing to ensure an adequate cement bond between the casing and the formation. In addition, the Board has added a requirement to Section §78.83a (relating to Casing and cementing plan) for the operator to include the proposed well bore conditioning procedures in this plan. The Department's Technical Advisory Board advised that reciprocating casing may not be possible for most shallow gas and oil well drillers. The Advisory Board also noted issues with reciprocating casing where cement may prohibit the casing from being re-set at the bottom of the borehole.

Comment: § 78.83a(c): Change (bold terms in original) "...well **specific..." to "...well-specific..."** (1841) (1918)

Response: The Board has made this correction.

Comment: In the "Background of the Proposed Rulemaking" section of this proposed rulemaking, published on Saturday, July 10, 2010 [40 Pa.B. 3845], the EQB unambiguously acknowledges that if a well is not properly constructed or operated, there could be potential for fire or explosion posing a threat to public health, safety and welfare. The newly proposed §78.83a requires the operator to prepare and maintain a casing and cementing plan including details on how the well will be drilled and completed. The operators are merely required to make the plan <u>available for review</u> by the DEP. Since the casing and cementing plan defines the processes that **DEP** has acknowledged are most likely to impact public and private water supplies, it should be <u>subject to DEP approval</u> as part of the well permit application. A well should not be permitted to be drilled until DEP approves of and signs off on the cementing and casing plan. (1851)

Response: The Board disagrees that the casing and cementing plan must be reviewed and approved in all cases. Tens of thousands of wells have been drilled in Pennsylvania without incident. The revisions to Chapter 78 improve upon many of the satisfactory practices that have occurred in the past. It is only in limited cases that additional oversight is needed. In these cases, DEP may require submittal of the casing and cementing plan. In other cases, it will only be necessary for the plan to be available for review at the site.

Comment: 78.83a(a)(1): See our comments above regarding the definition of "deepest fresh groundwater." The same uncertainties apply with respect to "anticipated fresh groundwater zones" as used in this section. 78.83a(d): Clarification should be provided as to what constitutes a revision to the Casing and Cementing Plan and what format is acceptable for making changes. (1843) (1844)

Response: Any change to the plan must be noted. Documentation of changes to the plan is flexible and can include hand written changes. The regulations have been revised to require the person making the changes to initial the changes.

Comment: Casing must be rotated or reciprocated during mud conditioning and cementing, unless the well is very deep or directionally drilled and pipe rotation subjects the casing to unacceptable stresses. (1820)

Response: The Board would recommend this as a Best Management Practice for rigs that have the capability to rotate the cemented casing. However, this is not within the capability of most top drive shallow rigs in the basin which are typically used on less critical shallow wells drilled on air. This change would require retrofitting many of the smaller rig that would take a period of time and would necessitate this be phased in with a delayed implementation date. The Department's Technical Advisory Board advised that reciprocating casing may not be possible for most shallow gas and oil well drillers. The Advisory Board also noted issues with reciprocating casing where cement may prohibit the casing from being re-set at the bottom of the borehole.

Comment: An effective casing and cementing plan requires the well operator to submit a narrative explanation detailing the rationale for the casing and cementing program that is submitted to DEP. See British Columbia Petroleum & Natural Gas Act, B.C. Reg. 362/98, Drilling and Production Regulation 35(1)(e). The regulations should specifically require that the plan, together with all supporting data, be submitted to DEP for approval, maintained for public review in DEP files, and be available on-,site for any authorized inspector to review at all times. (1820)

Response: The Board disagrees that the casing and cementing plan must be reviewed and approved in all cases. Tens of thousands of wells have been drilled in Pennsylvania without incident. The revisions to Chapter 78 improve upon many of the satisfactory practices that have occurred in the past. It is only in limited cases that additional oversight is needed. In these cases, DEP may require submittal of the casing and cementing plan. In other cases, it will only be necessary for the plan to be available for review at the site.

Comment: The casing and cementing plan should include size of the proposed annulus for all protective casings that are to be cemented in place. The annulus for protective casings that are to be cemented in place should be a minimum of 1.5 inches. (1829)

Response: The Board agrees with the critical importance of the surface casing and subsequent casing strings providing protection from migration. However, the Board believes the positive displacement of the cement, specific cement requirements, return to surface or other depths, measures to take when that does not occur, use of centralizers, WOC time meet and exceed the requirement of additional cement. Different casings that are not near surface have other manufacturer recommended cement thicknesses than the commentator's suggestion.

§ 78.83b Casing and cementing – lost circulation

Comment: Revise §78.83b (a) to include the recommendations made at §78.83(f) regarding a minimum 25% excess cement return. (924)

Response: Section §78.83(f) refers to surface casing to be permanently cemented to the surface. This is defined as cement circulated to the surface or pumping a volume of cement equal or greater to 120% of the calculated annular volume. However, if cement is not circulated to the surface despite pumping 120% of the calculated volume, then additional remedial activities are required under Section 78.83b.

Comment: Revise §78.83b to clearly state that if surface casing is not properly cemented in place with at least 25% excess cement returns at the surface, intermediate casing must be run and cemented in place following the recommendations made above at §78.83. Cement bond logs should be run to verify cement quality. The proposal to allow an operator to continue drilling into a hydrocarbon bearing zone to set production casing, in the presence of a known failed surface casing cement job, is technically unsound and environmentally hazardous, and should be deleted. (924)

Response: In cases where cement on surface or coal protective casing is not circulated to the surface, pursuant to section §78.83b, the operator may be required to install an additional string of casing 50 feet deeper than the string where circulation was lost. This second string is not considered intermediate casing, but rather a second surface casing string. In all cases involving lost circulation, the Department is required to approve the specific method the operator proposes to remedy the lost circulation scenario. Since Revised Section §78.73 requires the operator to prevent gas, oil, brine and other fluids from below the casing seat from entering fresh groundwater, this requires the operator to remediate and subsequently provide surface casing to be installed and cemented before oil and/or gas-bearing strata are drilled through.

Comment: § 78.83b(a)(1-4): Existing rules and experience dictate that additional alternatives to address situations in which cement is not circulated to, the surface during the drilling of wells should be added to the proposed §78.83b. §78.83(j) already provides that "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 last anticipated lost circulation zone." The existing regulation further provides that "The casing should 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." The method described in §78.83(j) is the most effective method of filling voids in the event that cement is not permanently circulated to the surface and should be added as an option under §78.83(b). The four alternative methods in proposed §78.83b will not as effectively address a situation where there is an issue with cementing at a location somewhere other than the casing shoe. That situation can only be addressed by running baskets and cementing down the backside or venting as contemplated by §78.83(j). Additionally, to address the circumstance of lost circulation occurring while cementing the surface or coal protective string, there should be a provision for the operator to run an additional string and cement it back to surface as provided for production casing in §78.83b(a)(2)-(4). (1843) (1844) (1989)

Response: This section has been revised to permit operators to cement the casing by filling the annular space from the surface as well as permitting operator to cement production and intermediate casing to the surface. This section has also been revised to require operators to determine the top of the cement in the uncemented casing. DEP must be notified and will determine which casing and cementing option is permissible – if any.

Comment: Subsection (a) also states that the operator must notify the Department of lost circulation. Within what timeframe must the operator provide such notification? The final-form regulation should provide a specific timeframe. (1989)

Response: This section has been revised to require operators to determine the top of the cement in the uncemented casing. DEP must be notified and will determine which casing and cementing option is permissible – if any.

Comment: Subsection (b) states that the Department may require the operator to determine the amount of casing cemented by logging "or other suitable method." This phrase is vague and should be defined further in the final-form regulation. (1989)

Response: This section has been revised to require operators to determine the top of the cement in the uncemented casing. DEP must be notified and will determine which casing and cementing option is permissible – if any.

Comment: Any lost circulation shall be eliminated or significantly reduced using sound engineering techniques and the best professional judgment of qualified engineers. Cement volume calculations must include excess cement volume to account for any cement that may be lost during cementing. (1820)

Response: The Board believes that this is taken into account by the requirement of 120% of the calculated volume as well. This is typically sufficient in properly designed cement jobs to return cement to surface. The Board has also incorporated additional provisions that must be done when there is not complete cement return.

Comment: If cement used to permanently cement the surface or coal protective casing is not circulated to the surface, the Department will require the operator to determine the amount of casing that was cemented by logging or other suitable method. (1829)

Response: The Board agrees and has incorporated the suggestion.

§ 78.83c Intermediate and production casing

Comment: Consistent with the recommendations of industry trade groups operating in Pennsylvania, DEP regulations should require the use of ***surface*** casing ***and intermediate*** casing in areas where freshwater resource protection is of critical importance. Casing and cement barriers also provide a sound structural barrier that contains stimulation fluids when conducting large slickwater fracture treatments. (924)

Response: The Board believes that this rulemaking adequately fortifies the casing and cementing standards and requirements, and subsequently provides increased protection for freshwater resource protection. In situations where additional measures are required, the Board has added new Section §78.75a (relating to Area of alternate methods) to designate areas where well drilling requirements beyond those already prescribed in Chapter 78 are necessary to drill, operate or plug a well in a safe and environmentally-protective manner.

All casing must be rated or pressure tested to demonstrate it is able to withstand the maximum pressure to which the casing will be exposed, and must be able to maintain its ability to function as a sound structural barrier during installation, cementing, and subsequent drilling and producing operations.

Comment: Intermediate casing string should be entirely cemented. (42) (43)

Response: The Board disagrees with the commentator. It is not always necessary to cement the entire length of the intermediate string.

Comment: § 78.83c(c): It is unnecessary to specify that the cement may be pumped to surface if it is only required that it be pumped at least 500 feet above the production casing seat. (1841) (1918)

Response: The Board agrees and has revised this subsection to remove the term "to the surface or".

Comment: 78.83c(b): The reference to "...500 feet above the seat" should be specified as true vertical depth. (1843) (1844)

Response: The Board agrees with this comment. The regulations have been revised accordingly.

Comment: §78.83c(b): The term "shallowest productive horizon" is undefined. Therefore it is not clear whether this term is meant to refer to formations that have been used for producing gas wells historically or any formation where a show of gas is encountered while drilling. (1918)

Response: This phrase has been deleted from the final form rule making.

Comment: Intermediate casing provides an additional protective barrier when a well passes through a freshwater aquifer, abnormally pressured zone, or a thief zone. The proposed regulations do not specify when intermediate casing is necessary. They should require the installation of intermediate casing as a transition from surface casing to production casing if freshwater aquifers, abnormally pressured zones or lost circulation zones are located below the surface casing and above the hydrocarbon zones. Such intermediate casing should be run from the surface of the well to a depth above the hydrocarbon zone intended for production. The integrity of the casing shoe should be validated by a Formation Integrity Test before drilling out the production interval. (1820)

Response: The Board believes the requirement is specified in §78.72

Comment: The intermediate casing must be cemented with sufficient cement to fill the annular space from the casing shoe to the surface, unless the operator can demonstrate that the depth of intermediate casing makes it technically infeasible to circulate cement all the way to the surface. In that event, the casing shall be cemented from the shoe to a point at least 600 feet above all significant hydrocarbon and abnormal pressure zones. (1820)

Response: The regulation has been revised to require intermediate casing to be cemented to the surface.

Comment: Because production casing is used to isolate hydrocarbon zones and contain formation pressures, well operators must ensure that its integrity is maintained against the fracture pressure and stimulation treatments to which it is exposed. Accordingly, the regulations should prohibit the use of surface or intermediate casing as production casing. Further, production casing most effectively protects groundwater when it is cemented to a point at least 600 feet above the uppermost producible

hydrocarbon zone. When production casing is not run to the surface, there should be at least 100 feet of overlap and tested. (1820)

Response: The Board believes the requirement as specified is narrowly limited to the appropriate cases where surface casing is allowed to be used as production casing.

Comment: New surface casing must be set in all wells. (1820)

Response: Some used casing maybe appropriate to use when the used casing is demonstrated to meet current standards the Board does not believe there is a need to require new when reuse of the casing meets the same performance standard as new casing.

Comment: The surface casing must be set and permanently cemented into an impervious formation or consolidated zone. All surface casing shall be cemented with sufficient cement to fill the annular space from the casing shoe to the surface. (1820)

Response: The surface casing must be set and permanently cemented into consolidated rock and be cemented to the surface. The regulations specify what actions must be taken where cement is not returned to the surface.

Comment: The minimum cement thicknesses should be verified by logging or other suitable method, e.g., ". . . , the casing must be cemented from the casing seat up to a point at least 500 feet above the seat." (1829)

Response: The intermediate casing must be cemented to the surface. The use of centralizers is also required and will ensure uniform placement of cement.

§ 78.84 Casing standards

Comment: Revise §78.84 (a) to include a requirement to install casing that can withstand the effects of corrosion and erosion. (924)

Response: The Board agrees with this recommendation. The regulations have been revised accordingly.

Comment: Revise §78.84 (a) to correctly reference the ASTM International Standard for Portland Cement. Revise §78.85 (a)(6) to read: prevent migration of fluids and hydrocarbons [including gas] from one stratum to another. (924)

Response: The Board believes the commentator is referring to §78.85 (a) in the first comment, and has revised the standard to read "ASTM International Standard C 150, type I, II or III". Regarding the second comment, there are several regulatory provisions that requires the operator to prevent gas, oil, brine and other fluids from below the casing seat from entering fresh groundwater, and requires an operator to set and permanently cement surface casing prior to drilling into a stratum known to contain or likely to contain oil or gas. When the stratigraphic sequence containing the producing formations is far below the deepest fresh groundwater, and if the above requirements relative to preventing migration of oil, gas or other fluids have been achieved, there are instances where a borehole may intersect several hydrocarbon-producing formations without specific zonal isolation completion techniques between each zone. This is typical for shallow oil-producing areas of the Commonwealth targeting multiple producing strata in the Bradford and Venango Group sands.

Comment: DEP regulation at §78.84(b) should be revised to read:
(b) Surface and intermediate casing shall be a string of new casing with a pressure rating that is at least 20 percent greater than the anticipated maximum pressure. (924)

Response: The Board has revised this subsection to require that all new casing, not just surface 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.

Comment: Subsections (b) and (c) refer to the "anticipated maximum pressure" to which the surface casing can be exposed. However, Subsection (f) refers to the "highest expected working pressure." To improve clarity, the final-form regulation should use one term consistently throughout the section. (1989)

Response: These subsections have been revised to use consistent language.

Comment: Subsection (c) relates to the requirements for used casing. Both the US National Park Service and Group Against Smog and Pollution express concerns with wells constructed with used casing. We request that the Board explain how it determined the standard for a passing pressure test for used casing. (1989)

Response: 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 requirements of subsection §78.84(a), as well as new requirements for pressure testing in §78.84(c). In addition, all operating wells utilizing used casing are subject to the periodic mechanical integrity pressure testing requirements of section §78.88 (relating to Mechanical integrity of operating wells).

Comment: The Lycoming Audubon Society points out that once the used casing is tested in Subsection (c), there is no requirement for repairs or notification to the Department. Has the Board considered including such requirements? (1989)

Response: If used casing fails the pressure test, it can not be used.

Comment: Revise §78.84(c) to require new welded piping for surface and intermediate casing strings and API welders certification. Alternatively, consider substitution of the API certification with an equivalent state welding certification training program. Allow a reasonable transition period to allow welders time to obtain this new certification. (924)

Response: The Board agrees with this recommendation. The regulations have been revised accordingly.

Comment: A valid Formation Integrity Test must be completed to validate the integrity of the casing shoe and must be completed at the equivalent mud weight, leak-off or fracture pressure specified in the permit to drill. (1820)

Response: The Board believes that a Formation Integrity Test is not needed on every well as it has the potential to jeopardize the integrity to the surface casing shoe.

Comment: In §78.84 Surface casing should be new pipe as (b) states but that seems to be contradicted at (c) In (b)"Surface casing must be a string of new pipe with a pressure rating that is at least 20% greater than the anticipated maximum pressure to which the surface casing will be exposed." In (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."(1822)

Response: The Board has revised the wording in this subsection to clarify the requirement.

Comment: Despite various tests at these subsections, using any form of used pipe for casing is ill advised. Even if adequate testing is achieved on used pipe, that test is specific to the testing time. It is not going to be as long lasting as similar new pipe. Only new pipe capable of testing requirements with a margin of safety as specified in this section should be used as stated previously. Drilling especially involving fracking chemicals, sand at high pressure, flowback water with a variety of chemicals and ongoing use of these casings in refracturing and production require casing that at least starts out new and robust. Exterior cement requires at 78.85(a) considerable resistant qualities to degradation but some areas of pipe may have no exterior cement and therefore should be as sturdy and corrosion resistant as possible. (1822)

Response: 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 requirements of subsection §78.84(a), as well as new requirements for pressure testing in §78.84(c). In addition, all operating wells utilizing used casing are subject to the periodic mechanical integrity pressure testing requirements of section §78.88 (relating to Mechanical integrity of operating wells).

Comment: §78.84(a-c). This comment relates to used casing. The objective is that used casing meet the same service requirements as new casing. We suggest that it is better to ensure used casing will meet the minimum specifications for new casing prior to running and cementing it in the hole. Tests that are conducted on the casing once it is cement should be the same for new or used since the objective is to make sure the service requirements are accomplished. The NPS suggests the Department considers a requirement for testing of used casing prior to installation. The following are examples of proposed regulatory text:
From Onshore Order No. 2, §III.B.1.a: All casing, except the conductor casing, shall be new or reconditioned and tested casing. All casing shall meet or exceed API standards for new casing. The use of reconditioned and tested used casing shall be subject to approval by the authorized officer: approval will be contingent upon the wall thickness of any such casing being verified to be at least 87 1/2 perrPnt of the nominal wall thickness of new casing. From Texas Railroad Commission Statewide Rule 3.13, (b)(1)(A): All casing cemented in any well shall be steel casing that has been hydrostatically pressure tested with an applied pressure at least equal maximum pressure to which the pipe will be subjected in the well. For new pipe, the mill test pressure may be used to fulfill this requirement. As an alternative to hydrostatic testing, a full length electromagnet, ultrasonic, radiation thickness gauging, or magnetic particle inspection may be used. (1831)

Response: The Board thanks the commentator for the examples provided. The Board considers reconditioned casing to be equal to used casing relative to pressure testing requirements. The Board notes that the proposed casing standards are similar to those provided for Texas relative to all casing being tested to hold the maximum anticipated pressure to which it will be exposed, or, for new pipe, having an internal pressure rating at least equal to the maximum anticipated pressure. Pennsylvania would exceed the mill test pressure requirement for Texas for new pipe, by requiring the rated pressure to be able to hold 120% of the maximum anticipated pressure.

Comment: § 78.84(b) and (c): Part (b) states "surface casing must be a string of new pipe". Part (c) states "used casing may be approved for use as surface, intermediate, or production casing." Part (b) should be reworded if used casing can indeed be used for surface casing if certain conditions are met. (1841)

Response: The Board has revised these subsections to clarify these provisions.

Comment: § 78.84(f): Casing is selected such that failure theoretically occurs at a pressure no less than the maximum anticipated working pressure plus a certain design factor, say 20%. To actually pressure test at that design pressure would pose a safety risk to workers during the pressure test. After all, by design, the casing has a potential to fail at that higher than expected pressure. Please restate the requirement to: "Casing which is attached to a blow= out preventer with a pressure rating of greater than 3,000 psi must have a pressure rating that is at least 20% greater than the anticipated maximum pressure to which it will be exposed and shall be pressure tested. A passing pressure test must be holding the anticipated maximum pressure to which it will be exposed for 30 minutes with not more than a 10% decrease in pressure. Certification of the pressure test shall be confirmed by entry and signature of the person performing the test on the driller's log." (1841) (1989)

Response: The Board has revised this subsection to indicate that the passing pressure test must hold the maximum pressure to which the casing will be exposed.

Comment: It is absolutely necessary that casing and cementing regulations protect the public health, safety, and welfare. Casing requirements must reflect technology which is state-of-the art in the oil and gas industry. Because poor casing and cementing can cause contamination of fresh water aquifers, regulations must be targeted to prevent migration into these aquifers. (3) (34) (70) (75) (73) (76) (79) (81) (87) (97) (1809) (1810) (1814)

Response: The updated casing and cementing requirements will provide an increased degree of protection for homeowners and both public and private water supplies. The proposed construction standards will align Pennsylvania's regulations with other states' rules as well as current industry standards. Casing and cement testing 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 for operating wells will be a vital tool for operators to use in detecting potential safety or environmental impacts before they may become a public health or safety issue.

Comment: § 78.84(b): The words "a pressure rating" should be replaced with "an internal pressure rating." (1843) (1844)

Response: The Board agrees with this comment. The regulations have been revised accordingly.

Comment: § 78.84(d)(3): DEP should confirm that API has a welder certification program; typically, this certification is provided by American Society of Mechanical Engineers (ASME) or American Welding Society (AWS), which would be better references in this section. (1843) (1844)

Response: The Board agrees with this comment. The regulations have been revised accordingly.

Comment: § 78.84(f): The casing should never be tested to more than 100% of rated internal yield pressure. The operator should be able to operate the casing at pressures up to 100% of the rated pressure. Standard practice is to test to 80-85% of rated internal yield pressure (or higher, up to 100% of rated internal yield

pressure if well conditions dictate). Then use casing that is rated 20% greater than anticipated pressure. (1843) (1844)

Response: The Board has amended this subsection to require the casing to be tested to 100% of the anticipated maximum pressure.

Comment: §78.84 (b), (c) and (f): The phrase "anticipated maximum pressure" is used in (b) and (c) where in (f), the phrase used is "highest expected working pressure". This is probably intended to mean the same thing and, if so, the same words should be used to avoid confusion. (1918)

Response: The Board agrees with the comment. The regulations have been revised accordingly.

Comment: § 78.84(b) and (c): Subsection (b) states "surface casing must be a string of new pipe". Subsection (c) states "used casing may be approved for use as surface, intermediate, or production casing." Subsection (b) should be reworded if used casing can indeed be used for surface casing when certain conditions are met. (1918)

Response: The Board agrees with the comment. The regulations have been revised accordingly.

Comment: § 78.84(f): Casing is selected such that failure theoretically occurs at a pressure no less than the maximum anticipated working pressure plus a certain design factor, say 20%. To actually pressure test at that design pressure would pose a safety risk to workers during the pressure test. By design, the casing has a potential to fail at that higher-than-expected pressure. Please restate the requirement to say, "Casing which is attached to a blow-out preventer with a pressure rating of greater than 3,000 psi must have a pressure rating that is at least 20% greater than the anticipated maximum pressure to which it will be exposed and shall be pressure tested. A passing pressure test is holding the anticipated maximum pressure to which the casing will be exposed for 30 minutes with not more than a 10% decrease in pressure. Certification of the pressure test shall be confirmed by entry and signature of the person performing the test on the driller's log." (1918)

Response: The Board agrees with the comment. The regulations have been revised accordingly.

Comment: Proposed rule reads, 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 Department at least 24 hours before conducting the test. The test results shall be entered on the drilling log." However we believe a DEP representative should be present to witness the pressure testing of the casing and verify the integrity of the deep high pressure well. (1879)

Response: The board does not believe a Department representatives need to be present to witness the pressure testing of the casing and verify the integrity of the deep high pressure well.

Comment: The casing strings in oil and gas wells are subject to elevated temperatures, pressures, erosion, corrosion, and other stresses that reduce the capacity of the casing to protect fresh groundwater from contaminants. Accordingly, The Board should remove provision § 78.84(c) and replace it with a requirement that all surface and intermediate casing be new pipe. **(1820)**

Response: 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 requirements of subsection §78.84(a), as well as new requirements for pressure testing in §78.84(c). In addition, all operating wells utilizing used casing are subject to the periodic mechanical integrity pressure testing requirements of section §78.88 (relating to Mechanical integrity of operating wells).

Comment: The regulations also should explicitly require that all casing be of sufficient quality to prevent any migration of oil, gas or water from one geological horizon to another throughout installation, cementing, drilling, and production. Specifically, in addition to the proposed revisions of this section, the regulations should provide:

1) All casing materials shall be designed and tested to ensure that they have tensile strength and other properties sufficient to withstand collapse, bursting, bending, buckling, corrosion, erosion, and all other stresses expected during the entire lifetime of the well. Providing this level of protection may require the use of coated piping or thicker-walled or other higher-grade piping with a sufficient corrosive allowance for local conditions. See API Spec 5CT Specification for Casing and Tubing [hereinafter API Spec 5CT].

2) All casing and couplers shall be manufactured, labeled, inspected and tested at least to the minimum specifications defined in API Spec 5CT; API Spec 5B Specification for Threading, Gauging and Thread Inspection of Casing, Tubing and Line Pipe Threads; API RP 5C5 Recommended Practice on Procedures for Testing Casing and Tubing Connections.

3) Casing shall be transported, stored, and handled in accordance with API RP 5C1 Recommended Practice for Care and Use of Casing and Tubing.

4) The performance properties of all casing used shall meet or exceed the standards in API TR 5C3 Technical Report On Equations And Calculations For Casing, Tubing, And Line Pipe Used As Casing Or Tubing; And Performance Properties Tables For Casing And Tubing. **(1820)**

Response: The Board agrees with the general statement of purpose but not that each string and operation be in accordance with a specific API recommended practice. The Board has established the performance standard that the casing must meet.

Comment: The term "new" needs defined. "New" as in never previously purchased from a supplier for installation in a well? "New" as in purchased from one operator by another but never having been installed in a well? "New" as in installed in a well for a few hours for a particular operation then removed to be immediately reinstalled? "New" as in never installed in a well but has weathered from storage to a point of more or less being "used." Conversely the term "used" should be defined as well. (1818)

Response: The Board disagrees with this comment. The terms "new" and "used" are commonly used terms in the English language. New refers to casing that has never been used in a well previously. "Used" refers to casing that has been used in a well previously.

Comment: Section 78.84 (c) requires testing of used casing after cementing and before continuation of drilling, but this section does not require notification of the Department or repairs of the failing casing string. This is odd, in that very specific testing and repair requirements (when the tests are failed) are provided for blow-out preventers and related equipment in Section 78.72. (1867)

Response: If used casing fails the pressure test, the casing could not be used.

§ 78.85 Cement standards

Comment: Revise §78.85 (b) to increase the compressive strength standard, consistent with the recommendations made at §78.81. (924)

Response: The Board has revised this subsection to require a zone of critical cement at the surface casing seat placed at the seat extending upward 300 from this point. The cement in this critical zone must achieve a 72-hour compressive strength of 1,200 psi and must achieve a free-water separation (remember to add the hyphen in the annex) of no more than six milliliters per 250 milliliters of cement.

Comment: Subsection (c) requires that after cementing operations are complete, the casing cannot be disturbed for a minimum of 8 hours. Several commentators question whether the 8-hour requirement is necessary. The Preamble to the final-form regulation should explain how the Board determined this was an appropriate timeframe. (1989)

Response: The 8 hour timeframe was selected based on the ability of the cement to achieve the compressive strength standard specified in the regulation.

Comment: Subsection (f) requires an operator to maintain a copy of a cement job log for at least 5 years. How did the Board determine this was an appropriate timeframe? (1989)

Response: The five year timeframe was selected based on a the timeframe in which a compromised cement job may contribute to a gas migration event.

Comment: I am writing to express my concern for long-term integrity of Marcellus gas wells regarding those drilled in areas where groundwater has been contaminated by prior coal mining activities. It is my understanding that the gas wells are cased with concrete in order to preserve their integrity and prevent migration to adjacent aquifers and porous rock formations. My concern is that previously mined areas often cause groundwater to become very acidic, which pH sometimes ranging in the 2.5 to 3.5 pH scale to neutral. These acidic waters chemically react with concrete and there is a distinct possibility that the cement will completely dissolve the casing over time. This is not only a problem with cement casings but also with steel casings. Evidence of such actions can be readily observed at above ground culverts and other water conveyance devices throughout Pennsylvania's mining regions. Often the bottoms of culverts and pipes in contact with acidic water are completely eaten away over time. In addition, the acidic water that is in contact with the cement and metal culverts is often much less acidic than what could be encountered underground, in some instances, because it mixes with less acidic or net alkaline surface water and yet the destruction of the material still occurs over time. I would like to know what kind of pretesting for acidic groundwater conditions are part of the permit requirements, what is done to assure that drilling/testing, which sometimes contacts alkaline material that could skew the results of groundwater contamination if not done properly, is being conducted with those considerations in mind, and how these concerns are being addressed in the proposed regulations. I am also concerned that gas and drilling companies may not even be aware of this extremely acid contaminated groundwater they might be drilling through to reach the Marcellus shale. What experience do gas companies possess in regarding to drilling in areas where they may encounter very acidic contaminated groundwater aquifers that we have here in the Pennsylvania coal region? Are there measures that can be put in place that

guarantees the integrity of wells passing through acidic aquifers over the long term, perhaps hundreds of years? (91)

Response: The regulations have been revised to require operators to select cement slurries that resist degradation in an acidic environment. The quarterly inspection requirements will help ensure that the integrity of the well is not compromised over time.

Comment: We support the eight hour rule proposed by DEP which requires that there be no activity at the well pad which could disturb the curing of the cement. DEP should be notified of the beginning and ending of this period of time. (75)

Response: The Board requires the well operator to contact the Department 72 hours prior to commencing cementing the surface casing.

Comment: Given the geology of Pennsylvania and the potential for seismic activity, the inclusion of new language to 78.85 Cement standards should be considered. In addition to assessing compressive strength, tests to access the susceptibility of cement to tensile forces should be required. Such protection may be figuratively and literally "ground-breaking" in the field.(93)

Response: The cement and casing standards in the regulations account for the both the potential chemical and physical conditions a wellbore may encounter.

Comment: Cement. The commission should require a better quality of cement mixture be used to prevent pollution and provide safer conditions. For example, compared to PA law, Texas requires 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. By comparison, PA DEP's definition for cement sets a 24-hour compressive strength standard of at least 500 psi. States like Texas have found that standard insufficient to prevent vertical migration of fluids or gas behind pipe. Protection of Water Supplies and other concerns. (8) (10) (20) (42) (43) (874) (885) (887) (896) (1845) (1853)

Response: The Board agrees with the comment. The regulations have been revised accordingly.

Comment: Expand the Cement Ticket to include testing of pH and temperature, record Waiting On Cement Time and penalty of law certification that the drilling cement job was completed in compliance with Pennsylvania regulatory requirements. (8) (42) (43) (874) (885) (887) (1817)

Response: The Board agrees with the comment. The regulations have been revised accordingly.

Comment: Documentation of the chemical composition of cement mixtures is a reasonable standard to afford long-term assessments of impacts. Expand the "cement ticket" definition to include a requirement for operator tests of water ph and temperature, maintain these records at ONE location within the DEP for future reference. (885)

Response: This requirement is currently in place. This information is required in the well record.

Comment: The cement should use the cleanest water available and placed in accordance with the cement manufacture's instruction or the regulations. Which ever is more restrictive? (1817)

Response: The quality of the mix water must be documented in the cement job log.

Comment: We applaud the adoption of the ASTM International standards for cement quality. In response to the Board's request for comments on DEP's authority to set more stringent standards if needed for pollution prevention, we recommend that the regulations empower DEP to require a better quality cement when local conditions warrant.

The regulations should require that the cement type selected be appropriate for the well conditions encountered, including temperature, pressure, fluids, and geologic conditions. The cement must be designed to maintain required compressive and bonding strength throughout the life of the well in order to prevent the propagation of fluids through the cement. In designing and testing the slurry, the well operator should follow sound engineering practices as defined in API Spec 10A Specifications for Cements and Materials for Well Cementing, API Spec 10B-2 Recommended Practice for Testing Well Cements, and API 65-2 Recommended Practice for Isolating Potential Flow Zones During Well Construction, § 4.7 and the documents referred to therein.

The cement must be prepared in the way that best minimizes free water content. The water used in the slurry must be of adequate quality so as not to degrade its setting properties. (1820)

Response: The Board has incorporated the substance of these comments into the regulations. The Board disagrees that incorporation of proprietary standards is appropriate. These standards are not readily available for the public to review.

Comment: A wait time of eight hours and a compressive strength of 350 psi are insufficient thresholds for permitting the cement to be disturbed. Instead, best management practices require the operator to allow the cement to harden for at least 24 hours and to achieve a compressive strength of at least 500 psi before drilling out the cement. Additionally, a Formation Integrity Test must be completed and a Cement Evaluation Tool and/or Cement Bond Log should also be run to verify the integrity of the bond around the cemented casing before perforating the casing, commencing further drilling or otherwise disturbing the cement. The operator should be required to collect- and submit to DEP, in addition to the data identified for collection in the Proposed Rulemaking: caliper log data; cement evaluation tool and cement bond log data; and the results of any casing pressure tests or casing-annulus pressure tests, including date, duration, pressure and percent bleed-off. The recorded data should be submitted to the DEP electronically with industry appropriate software. (1820)

Response: The Board has incorporated several of these into this final version. However, the Board believes the 350 psi strength after 8 hours is sufficient.

Comment: In §78.85(b) the last sentence, "After the casing cement is placed behind surface casing and intermediate casing when the intermediate casing is used in conjunction with the surface casing to isolate fresh groundwater, 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 minimum designed strength of 350 psi at the casing seat does not follow recommendations from an API Guidance document which specifies "the cement surrounding the casing shoe should have a compressive strength of at least 500 psi and should achieve 1200 psi in 48 hours at the bottomhole conditions."' This subsection and (c) should be changed to reflect this more protective standard. (1822)

Response: The Board has revised subsection §78.85(b) (relating to Cement standards) to require a zone of critical cement at the surface casing seat and extending upward a prescribed distance from the casing

seat. The cement in the critical zone must achieve a 72-hour compressive strength of 1200 psi and have a free-water separation of no more than six milliliters per 250 milliliters of cement. The Board believes that the true 8 hour wait on cement time in the final regulations provides superior protection. By the time drilling resumes, the cement will exceed the 500 psi standard.

Comment: §78.85(f) should be amended. A well in Marcellus may be refractured and last for many years, the operator should always have a copy of the cement job log. It is not clear, since the operator is maintaining a copy if the original is held by DEP. It should be. (1822)

Response: §78.85(b) (relating to Cement standards) requires the operator to maintain the cement job log for at least five years and be made available to the Department upon request. The Department will maintain any records in its possession in accordance with its records retention policy.

Comment: The regulations should be targeted at preventing gas migration into drinking water supplies. Poor casing and cementing can cause contamination of fresh water aquifers. DEP proposes an eight-hour period during which no activity is to occur at the well pad which may disturb the cement. DEP should be notified at the beginning and end of the eight-hour period to ensure that the minimum eight-hour period is not breached. (1836)

Response: The Department is required to be notified a minimum of one day before cementing of surface casing begins, unless cementing operations begin within 72 hours of commencement of drilling. This notification will provide the Department with the ability to inspect the cementing operations as appropriate. The sequence of events in the cementing operation, including the wait-on-cement sequence times, must be recorded in the cement job log required under subsection §78.85(f) (relating to Cement standards).

Comment: §78.1 defines "cement" as having a 24-hour compressive strength of at least 500 psi in accordance with applicable standards and specification. Texas has required a much stronger standard (1,200 psi over a 72- hour period) for critical zones. Pennsylvania would be wise to learn from Texas' experience with shale wells and their unique requirements. (1837)

Response: The Board has revised subsection §78.85(b) (relating to Cement standards) to require a zone of critical cement at the surface casing seat and extending upward a prescribed distance from the casing seat. The cement in the critical zone must achieve a 72-hour compressive strength of 1200 psi and have a free-water separation of no more than six milliliters per 250 milliliters of cement.

Comment: § 78.85(b): Rather than one overall minimum 8 hour setting time, would it be possible to specify various mixes with different minimum setting times in this section. These options may avoid having to obtain Department approval for reduced setting times. (1841)

Response: The Board has declined to make this change. Specifying various mixes with different setting times is overly prescriptive, subject to frequent modification, and beyond the scope of the proposed rulemaking.

Comment: § 78.85(c): Does the EQB consider "cementing operations" to include a green cement pressure test after bumping plug? Please clarify. (1841)

Response: The Board does not consider a green cement pressure test part of the "cementing operations" that can occur within the eight-hour period required for allowing the cement to properly set. Any such test must occur after the eight-hour set time.

Comment: § 78.85(c)(2): Does "nippling up on or in conjunction to the casing" include wellhead nipple up / cutting casing? (1841) (1918)

Response: Yes, the Board considers nippling up on or in conjunction to the casing to be included wellhead nipple up / cutting casing.

Comment: § 78.85(c)(4): Would this apply to an inner string cement job? Please clarify? (1841) (1918)

Response: This would apply to an inner string cement operation. The Board has amended this subsection to indicate it applies to any casing cement.

Comment: § 78.85[(c)](d): Under what circumstances would a reduced cement setting time be allowed, i.e., what requirements define a special cement or additives? Could the 8-hour waiting time be changed to 8 hours or a certain amount of compressive strength, whichever occurs sooner? Can the first sentence be changed to include the underlined: "Where special cement or additives <u>or operating practices</u> are used..." (1841) (1918)

Response: The Board has declined to incorporate general circumstances, including requirements defining special cement and/or additives, into the rulemaking. This is beyond the scope of the rulemaking. Subsection (d) continues to provide the operator an opportunity to request approval from the Department to reduce the cement setting time on a case-by-case basis. Additional alternative methods or materials used to case or equip a well are also provided under §78.75 (relating to Alternative methods). The Board has also declined to add the term "operating practices" as it is unclear as to what this term entails, and no justification was provided to support its addition.

Comment: There is no reason why the general standard for the strength of setting cement should be less stringent in Pennsylvania than in other states, or why that standard should be less stringent for oil and gas wells that are not subject to the Oil and Gas Conservation Law. Accordingly, the Board should modify proposed section 78.85(b) so that well operators are required to permit cement to set to a minimum compressive strength of 500 psi before undertaking further drilling activity at the well, and so that in the critical cement zone, cement shall be required to have a compressive strength of at least 1,200 psi. (1840)

Response: The Board has revised subsection §78.85(b) (relating to Cement standards) to require a zone of critical cement at the surface casing seat and extending upward a prescribed distance from the casing seat. The cement in the critical zone must achieve a 72-hour compressive strength of 1200 psi and have a free-water separation of no more than six milliliters per 250 milliliters of cement.

Comment: § 78.85(c)(1): Holding full pressure on the casing for 8 hours if the floats do not hold can create an undesirable micro-annulus in the cement. We recommend re-wording this provision to state that the pressure should be gradually released after 2-4 hours, once the floats are holding. (1843) (1844)

Response: The Board agrees with this comment. The regulations have been revised accordingly.

Comment: § 78.85(c)(1): The word "float" throughout the sentence should be replaced with the word "casing".(1843) (1844)

Response: The Board agrees with this comment. The regulations have been revised accordingly.

Comment: Cement Float Equipment must be tested in accordance with API RP 1OF Recommended the Practice for Performance Testing of Cementing Float Equipment. (1820)

Response: The regulation takes into account situations in which the latch down cement float fails to latch.

Comment: § 78.85(c)(4): This provision precludes running a wireline temperature log, which is a common diagnostic tool to determine top of cement. The temperature log is typically run within the first 8 hours after conclusion of the cement job, if there is a question about the location of the top of cement. We recommend that "wireline" be deleted. (1843) (1844)

Response: The Board agrees with this comment. The regulations have been revised accordingly.

Comment: § 78.85(c)(4): Please clarify whether this section applies to surface casing or an inner string cement job. (1918)

Response: The regulation has been clarified to include all strings of casing

Comment: The proposed amendments do not identify a protocol for preparing a well prior to cementing. (1820)

Response: The Board has incorporated a performance requirement to condition the borehole prior to cementing has been incorporated.

Comment: Every effort shall be made to limit the time between completion of the hole interval and cementing. (1820)

Response: The Board believes the completed with due diligence time frame as elucidated in the Act is adequate to require timely cementing of the casing.

Comment: Prior to any cementing, all gas flows must be killed. (1820)

Response: The Board believes that "all gas flows" is un-attainable and un-enforceable requirement. The amount of flow is the critical component and must be such that it is precluded from having an effect on the cementing operation. While this is typically addressed by attempting to kill the flow of fluids into the wellbore with heavy liquids, smaller gas flows may still occur during the cementing operation that are addressed by proper cement slurry design and additives to the cement.
Comment: The hole size and volume of the annular space must be accurately calculated, by running a caliper tool, in order to determine the appropriate volume of cement slurry plus 25 percent. (1820)

Response: The Board believes that this is taken into account by the requirement of 120% of the calculated volume as well. This is typically sufficient in properly designed cement jobs to return cement to surface. The Board has also incorporated additional provisions that must be done when there is not complete cement return.

Comment: The drilling mud, to be displaced by the cement, must be conditioned in order to ensure good mobility and smooth evacuation according to established guidelines. (1820)

Response: The Board incorporated a requirement that the borehole be conditioned to achieve a good bond between the formations and the casing.

Comment: Will the Department allow the use of cement additives within the fresh -groundwater zone in the vicinity of drinking water wells? If so, what additives will be allowed and will they meet NSF Standard 60 referenced by the Safe Drinking Water Act? (1829) (1989)

Response: The Department may approve use of additives specifically in the area of drinking water wells if conditions warrant modification of the cement slurry to address a specific localized condition where use of the additive would prevent impact to the water supply. As the additive would not be in direct contact with the water supply NSF Standard 60 would not be applicable.

Comment: The type of cement, additives and temperature should be considered when determining the minimum cure time. (1829)

Response: The Board agrees and has incorporated the temperature and Ph of the mix water in this requirement.

Comment: Section 78.85 (c) prohibits certain activities that may damage the casing cement for a period of time. We believe the words "may not be disturbed for a period of ____ hours by any activity including, but not limited to the following:" and where the blank space above refers to the time required by the cement to reach a fully set stage. (1867)

Response: The time period is eight hours.

§ 78.88 mechanical integrity of operating wells

Comment: Subsection (d)(2) requires the operator to notify the Department at least 7 days prior to initiating a corrective measure on a well. Will the Department approve that measure during this timeframe and must the operator obtain Department approval prior to initiating the corrective measure? (1989)

Response: The Department may disapprove the selected corrective measure but approval by the Department is not required.

Comment: In Subsection (e), what does the Board consider to be a "similar manner approved by the Department?" This phrase is vague and should be clarified in the final-form regulation. (1989)

Response: The various reporting forms that an operator may propose will be evaluated on a case by case basis. This provision provides operators with flexibility in reporting.

Comment: A well in Marcellus may be refractured and last for many years, the operator should always have a complete history of well inspections not just for 5 years. (1822)

Response: The Department will maintain the annual reports. Maintaining the quarterly reports for five years is sufficient.

Comment: If a problem was developing such as leaking gas or increasing well-head pressure, serious problems could develop in three months (one quarter). Operator inspections should be more frequent. Is inspection by DEP and follow up to operator inspections going to be adequate to the increasing numbers of wells? It is not clear how often DEP will inspect wells. If DEP can not feel comfortable with their inspection

schedule, number and training of qualified inspectors, then the number of permitted wells should only match the ability of DEP to effectively monitor and enforce regulations. (1822)

Response: The Department inspects operating wells on an annual basis.

Comment: In subsection (d) the word "effectively" should be added before mitigate. As written, there could be a lot of investigation and mitigation measures but unless there are results that indicate the problem is resolved, it could simply continue without violating any directives in this section. There should be an effective stoppage of leaking gas. (1822)

Response: The Board disagrees with the comment. As written the regulations requires the operator to completely remedy any excess pressure on the surface or coal casing.

Comment: Add language to in subsection (e) to include the complainant in the information that is being produced for DEP concerning gas migration in as timely a manner as possible including written reports. (1822)

Response: The suggestion proposed by the commentator is not sufficiently clear to evaluate.

Comment: The regulations should ensure the long-term integrity of the well. Production wells might be operated for decades. The proposed regulations (Section 78.88) require operators to test wells quarterly and report signs of problems or degradation. We support these inspection requirements. (1836)

Response: The Board thanks the commentator for this supportive comment.

Comment: § 78.88(a): The need for quarterly mechanical integrity inspections is excessive. Experience justifies mechanical integrity testing on one to two year intervals. In practice, operators visit sites multiple times per year and check the equipment without performing the detailed requirements of a well integrity test. Please present the justification for requiring this level of testing, and the subsequent increase in staffing that will be required by industry and regulatory bodies to manage the additional testing and reporting.

Also, the term "operating well", needs definition here. Does it mean a well currently producing gas? Also, this section does not call for a report while § 78.88(e) calls for an annual report to the Department. The wording of this section should clearly state that obtaining this information does not involve shutting in and entering the well. (1841)(1918)

Response: The Board does not consider quarterly mechanical integrity testing to be excessive, and it provides the operator an opportunity to correct problems at the well before such problems create a condition that will require significant time and expense to address. Since the commentator indicates the operators visit the well site multiple times per year, the additional testing required under this section should not be an overly-burdensome task for the operator.

The Board has clarified that the mechanical testing requirements do not apply to wells that have been granted inactive status, since those wells are subject to other periodic testing requirements. The Board has declined to define the term "operating well" in the rulemaking. This term is defined in the Oil and Gas Act.

Comment: § 78.88(b)(4): Change the sentence to read: "If there is above ground level visual evidence of progressive corrosion, rusting or other signs of equipment deterioration." (1841) (1918)

Response: The Board has declined to make this change.

Comment: PennFuture commends the Board for adding this section, which will require well operators to inspect wells on a quarterly basis to ensure compliance with the Oil and Gas Act and Chapter 78 regulations. The proposed section 78.88 would require well operators to record the results of those inspections, maintain them for five years, and make them available to DEP for its inspection, but not submit them to DEP on a rolling basis. The proposed section 78.88 should be modified to require well operators to submit reports of their well inspections to DEP as the reports are generated. Such a requirement will help DEP ensure that the quarterly inspections are being performed as required, and also that well operators are addressing any problems discovered during the inspections. Additionally, after they are received by DEP, operators' quarterly inspection reports should be made available to the public for review. Making operators' quarterly inspection reports available to the public for review will help promote public confidence in well operators' compliance with the applicable laws and regulations, and, in cases where such compliance may be lacking, will give members of the public a tool to require compliance in cases where DEP is unable or unwilling to do so itself. (1840) (1989)

Response: Annual submittal of information obtained on quarterly inspections is required only for structurally-sound wells in compliance with the provisions of this section and also Section §78.73(c) (relating to General provision for well construction and operation). For wells not in compliance, the operator must notify the Department immediately after the inspection has been performed.

Comment: TU supports the addition of section 78.88(a) which requires operators to conduct inspections and verify the operating condition of a well. This section also requires operators to identify maintenance and repair needs and take action, if needed, to remedy promise in the integrity of the well. To ensure protection of public health and routine inspections must be conducted to ensure that the well itself is operating properly and reliably. According to § 78.88(a), inspections must occur at least quarterly. TU recommends that inspections be mandated more frequently, at least on a monthly basis, if not weekly. Requiring well inspections to be conducted only on a quarterly basis will provide neither the operator, nor DEP, adequate time to respond to warning signs that could compromise the integrity of the well and consequently threaten public health and safety. (1851)

Response: The Board has declined to make this revision and believes that daily or weekly inspections of all permitted wells by a particular operator for the requirements stated in this section are overly prescriptive. The Board has determined that quarterly monitoring is sufficient to ascertain the general physical and operational parameters of a particular well.

Comment: Revise §78.88 (a) to increase the operating well inspection frequency to daily, or at least weekly. (924)

Response: The Board has declined to make this revision and believes that daily or weekly inspections of all permitted wells by a particular operator for the requirements stated in this section are overly prescriptive. The Board has determined that quarterly monitoring is sufficient to ascertain the general physical and operational parameters of a particular well.

Comment: Revise §78.88 to require wells with mechanical integrity problems to be repaired, shut-in, or plugged and abandoned, as appropriate and safe to protect human health and the environment. The annual mechanical integrity report required at §78.88 (e) should summarize the compliance status of each well, and summarize what action was taken to remedy non-compliant wells. (924)

Response: The Department must be immediately notified if the well is in non-compliance with this Section. If the well cannot be repaired through corrective action or by replacing equipment, as required

by this section, to meet the requirements of the applicable regulations, the well may require proper plugging and abandonment. In many cases, wells that do not pass the integrity test due to an over-pressured condition, as determined by Section §78.73(c) should not be shut-in, as this may continue to increase the build-up of pressure in the well.

Comment: § 78.88(a): Quarterly inspection of each well seems excessive. The proposed requirement would make operators perform wellhead tests on every well on a quarterly basis. We suggest yearly inspections unless there is a problem identified that needs corrective action. If a problem is identified during an annual inspection, then semi-annual inspections could be required after corrective action is implemented until no problems are identified with that well for one year. (1843) (1844) (1918) (1989)

Response: The Board disagrees with this comment. Quarterly inspections are not excessive and the required evaluation of the well does not include invasive procedures.

Comment: The regulations should ensure the long-term integrity of the well. Production wells can be operated for decades. The proposed regulations (Section 78.88) require operators to test wells quarterly and report signs of problems or degradation. We support these inspection requirements. (1899)

Response: The Board thanks the commentator for their support for the final-form inspection requirements.

§78.89 Gas migration response

Comment: Revise §78.89 [throughout] to address potential leaks and/or contamination from "stray gas," "oil," and/or "other fluids" [including but not limited to chemicals and well stimulation fluids].(924)

Response: The Board has declined to add the terms "oil and other fluids" in this new section. Stray gas cases involving methane migration are specific to the provisions of this section due to the numerous instances of documented cases of methane migration both in the dissolved phase in groundwater and also in the free phase when its solubility in water has been exceeded. The Board believes that this overwhelming caseload of incidents strictly related to methane migration requires the focus of this section to singularly address stray gas methane. Oil and chemicals such as well stimulation fluids do not exhibit the migrational dynamics of methane gas, have not been similarly documented as explosion hazards, and with respect to well stimulation fluids, there have been no documented cases of well stimulation fluids migrating a significant upward vertical distance where it has resulted in a documented degradation of an underground source of drinking water.

Comment: Revise the last sentence of §78.89 (b) to read: The operator, in conjunction with the Department and local emergency response agencies, shall **immediately** take measures to ensure public health, safety, and welfare. The requirements proposed at §78.89 (b) should be extended to oil and other chemicals. (924)

Response: the Board agrees and has revised this section to require that the operator must immediately notify the Department and, in conjunction with the Department and local emergency response agencies, take measures to ensure public health and safety. The Board does not believe these requirements should be extended to oil and other chemicals. Stray gas cases involving methane migration are specific to the provisions of this section due to the numerous instances of documented cases of methane migration both in the dissolved phase in groundwater and also in the free phase when its solubility in water has been

exceeded. Oil and chemicals such as well stimulation fluids do not exhibit the migrational dynamics of methane gas, have not been similarly documented as explosion hazards, and with respect to well stimulation fluids, there have been no documented cases of well stimulation fluids migrating a significant upward vertical distance where it has resulted in a documented degradation of an underground source of drinking water.

Comment: In Subsection (e), the Board should explain why the 12-hour reporting requirement for a phone call to the Department and the 3-day timeframe for filing the follow-up report with the Department are appropriate timeframes. (1989)

Response: This section has been deleted and replaced with detailed instruction for conducting a gas mitigation investigation. The regulations allow for modified timeframes for submitting follow up reports .

Comment: § 78.89(a): With the extensive presence of significant shallow coal and carbonaceous shale formations in Pennsylvania, opportunities exist for naturally occurring gas migration totally unrelated to deep oil & gas drilling and production. PADEP must consider this when developing regulations and evaluating alleged incidents. This provision could cause unintended consequences of excessive reporting of gas migration unrelated to oil & gas drilling and production, resulting in wasted industry and PADEP resources investigating such incidents. Clarification of roles and responsibilities in the investigation would be helpful, e.g., who will interview the complainant. Also, consideration should be given to potential measures to discourage malicious misuse of the complaint procedure. (1841) (1918)

Response: The Board acknowledges that the operator may not be responsible for specific gas migration incidents, and opportunities exist for naturally-occurring gas migration that are totally unrelated to deep oil and gas drilling and production. However, given the potentially lethal consequences of gas migration all reports of migration must be responded to by both the operator and the Department.

Comment: PennFuture also commends the Board for adding this section, which imposes a requirement that well operators immediately investigate, report, and if necessary mitigate incidents of gas migration. The January 1, 2009 gas well explosion in Dimock Township, Susquehanna County underscored the risks posed by gas migration; by imposing a duty to immediately investigate, report, and remediate gas migration on well operators, proposed section 78.89 will help ensure that incidents of gas migration are addressed quickly and that public safety and natural resources are protected. (1840)

Response: The Board thanks the commentator for this comment.

Comment: To insure maximum protection, a sense of urgency needs to be incorporated with notification to DEP. Under 78.89 Gas migration response, when an owner or operator is notified or made aware of an incident, their obligation is for *immediate* notification to the DEP. We recommend substituting the term *immediately* for within10 day calendar days of receiving this notice. (93) (1989)

Response: The Board agrees with the commentator and has amended this final-form rulemaking to require the operator to immediately conduct an investigation and contact the Department.
Comment: In § 78.89 we recommend substituting the word "progress" for "follow-up report" throughout this section. It needs to be clear that the investigation could still be ongoing. Also, three days should be changed to seven days and "initial field investigation" should be added in front of "monitoring results." (It is difficult to get a 3-day turnaround on sampling and analysis.)

We request that the Department consider the following changes to this section:

(a)When an operator or owner is notified of, or otherwise made aware of a potential natural gas migration incident after drilling the well, which is confirmed by the results of an initial response action and is unrelated to background conditions, the operator shall notify the Department, and if so directed by the Department, conduct further investigation of the incident. The purpose of the initial response action and subsequent investigation is 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 and/or structures.

(b)The initial response action undertaken pursuant to subsection (a) shall include, but not limited to an initial site visit and interview With the complainant to obtain information about the complaint and to assess the reported natural gas migration incident. If combustible gas is detected inside a building or structure at concentrations equal to or greater than 10% of the lower explosive limit (L.E.L.), at the earliest practicable moment following discovery, the operator shall:

Notify the Department, local-emergency response agency, utility companies, police and fire departments and, in conjunction with the Department and local emergency response agencies, shall take measures necessary to ensure public health and safety.

Initiate mitigation measures necessary to control and prevent further migration.

(3) Implement additional investigation and mitigation measures as defined below in subsection (c).

(c) If sustained concentrations of stray natural gas are detected inside a building or structure, water well head space or soils above a background level, or if dissolved methane is detected in water above a background level, the operator shall notify the Department and utility companies and, in conjunction with the Department, shall take measures necessary to ensure public health and safety, define the extent and migration pathway, and the identify source(s). Such measures may include:

A field survey to assess the presence and concentrations of natural gas and the areal extent of the stray natural gas in the soils, surface water bodies, water wells, and other potential migration pathways;

Collection of gas and/or water samples for molecular and stable carbon and hydrogen isotope analyses from the impacted locations (e.g., water wells, soil gas), and from potential sources of the migration (e.g., gas wells);

(3) A field survey of the operator's adjacent oil or gas wells to assess the wells for pressures of all casing intervals, defective casing or cement, and mechanical integrity. Additional investigative methods of well cement and casing integrity including, but not limited to cement bond logs, ultrasonic imaging tools, mechanical integrity tests, and geophysical logs, may be appropriate to determine the mechanism of migration. The initial area of assessment shall include wells within 2,500 feet and be expanded to a greater distance if necessary as determined by the Department;

Establishment of monitoring locations and monitoring frequency at potential sources, in potentially impacted structures, and the subsurface.

Action to correct any defect in the oil and gas wells to mitigate the stray gas incident.

If conditions described in (b) and (c) above are not discovered, then the operator shall notify the Department and, in consultation with the Department, document findings and submit a final report.

Reporting Requirements — 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 e-mail within 24 hours after the interview with the complainant and field survey of the extent of stray natural gas. Depending on the .dynamics and severity of the incident, daily or weekly reports submitted by e-mail may also be required at the Department's request.

(f) For all natural gas migration incidents, a final written Report shall be submitted to the Department for approval within 30 days o f the close of the incident, documenting the results of the investigation, or in a timeframe otherwise approved by the Department. The Final Report shall include but not be limited to, documentation of all results of the investigation, including analytical data, monitoring results, operational changes at area oil and gas wells, and measures taken by the operator to repair any defects at any of the

investigated oil and gas wells. All reports with analysis of geological and geochemical data shall be prepared and sealed by a Pennsylvania licensed geologist. (1843) (1844)

Response: This section has been revised substantially and largely follows the commentator's proposed revisions. The revisions also require continued monitoring of gas migration complaints where the levels of dissolved methane in the water supply exceed 7 milligrams per liter. This level is based on 25% of the capacity of water to contain dissolved methane under one atmosphere of pressure. This number is much more certain and scientifically based than the unknown "background" level proposed by the commentator.

Comment: § 78.89(a) The phrase "natural gas migration incident" should be defined. Also, the phrase "after drilling the well" should be added immediately after "migration incident". An operator should not be responsible for investigation of a migration incident unless it has drilled a nearby well. (1843) (1844)

Response: The phrase "natural gas migration incident" does not need to be defined as it references receipt of a complaint of gas migration. The regulation is intended to provoke an investigation by the operator into every complaint received regarding gas migration. Gas migrations have traversed several miles. Therefore it is not appropriate to allow operators to dismiss gas migration complaints because the compliant is not "nearby."

Comment: Regulations should "clearly define a drilling company's responsibility for responding to gas migration issues" and the movement of substances introduced by the company (e.g. fracturing additives) and substances released from natural deposits as a result of gas extraction activities. Regulations must specify methods and the use of independent testing companies for monitoring methane, introduced chemicals (e.g., fracturing additives) and potentially released substances (e.g., radionucleotides, heavy metals and salts) in drilling wastewater, surrounding soils and streams and citizen water supplies, homes and workplaces before, during and 2 years after drilling operations have ended. (1980)

Response: The final-form regulations detail what responsibilities a well operator has in a gas mitigation incident. They must respond to every complaint received. The extent of the investigation is also specified in the regulations and varies based on site specific conditions.

Comment: The regulation should affirm generally that a well operator shall not continue drilling into a hydrocarbon-bearing zone or running production casing after receiving any indication that there is a defect in any casing or in the primary cement job until the defect is repaired. (1820)

Response: The Board believes this is addressed by the prohibition of gas migration requirements in prior sections.

Comment: The term "natural gas migration incident" is too broad and ambiguous and needs further definition. An operator would be placed under the undue duress of unilaterally defining what this term means for proper compliance with this section. In addition an operator could deem that no notification of such an "incident" would qualify as a "natural gas migration incident". Without a clear definition the DEP would have no definition on which to rely to enforce compliance with this section therefore rendering this section useless.

An operator could be notified by a complainant of a "natural gas migration incident" at an area several miles from the location of any facilities owned, operated or controlled by the owner or operator. Language should be included such as "owner is notified of or otherwise made aware of a natural gas

migration incident (occurring within 2500 feet of the location of any wells or facilities owned, operated or under the control of the operator), the operator...". (1818)

Response: This section has been revised substantially and makes clear that an operator must respond to every complaint it receives pertaining to gas migration. The regulation specifies the level of investigation and action required. Ignoring a complaint of gas migration is not an acceptable option. The Board disagrees that a limit on the area in which a response is required should be included in the regulations. Recent gas migration incidents have occurred where the nearest gas well is several miles away from the impacted water supply. Given the distances gas can migrate and the serious threat such events pose to public safety, well operators must make every effort to quickly and thoroughly respond to these complaints.

Comment: This commentator is not aware of any other situation where a complainant and an operator or owner must confront each other concerning a complaint. The DEP has historically vigorously defended the confidentiality of the identity of a complainant. The policy proposed her is inherently flawed and irresponsible to the general public. An unsuspecting complainant, without knowledge of their civil rights, could be subject to possible vigorous and intimidating interrogation by an operator including but not limited to an entourage of investigators and legal counsel. An operator may be pulled into a fraudulent complaint and ill intentioned, yielding a situation risking harm, bodily injury or death. Conversely an individual posing as an agent for an operator could use this regulation as a premise for ill intentioned activities (burglary, robbery, assault, rape, etc.) which has happened many times in the past in like situations. If the DEP wants this regulation then it should perform the police function of the same. (1818)

Response: The Board disagrees with this comment. The regulation describes a situation where the operator – not DEP – receives a complaint of possible gas migration. If DEP receives such a complaint, it will respond in accordance with the law. DEP will also participate in the gas migration investigation.

Comment: Section 78.89 (a) states that an operator must "immediately" notify the Department of a gas migration incident. What is "immediately"? Is this an hour or 24 hours? We believe a specific time requirement is needed. (1867)

Response: The Board's interpretation of "immediately" is when the operator finds out about an incident. This interpretation is clear and consistent with the requirement to report similar emergency or spill related occurrences. The Board believes to do otherwise unduly jeopardize public safety and the environment.

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

Comment: Revise the regulations at §78.91-98 to include the following:

Plugging a wellbore must be performed in a manner that ensures that all hydrocarbons and freshwater are confined to their respective indigenous strata and are prevented from migrating into other strata or to the surface.
All hydrocarbon-bearing strata should be permanently sealed off by installing a cement barrier at least 100 feet below the base to 100 feet above the top of all hydrocarbon-bearing strata.

Plugging of well must include effective segregation of uncased and cased portions of the wellbore to prevent vertical movement of fluid within the wellbore. A continuous cement plug must be placed from at least 100 feet below to 100 feet above the casing shoe.

The operator is required to submit records to DEP to demonstrate the well was plugged in compliance with DEP regulations. (924)

Response: The Board thanks the commentator for this comment. The plugging regulations will be more thoroughly revised in a subsequent rulemaking and suggestions such as this will be considered at that time.

Comment: In all of these sections, nonporous material is required for areas of the wellbore. The definition of nonporous material in 25 PA Code Chapter 78 includes the use of drill cuttings, yet not all drill cuttings have the same porosity. It appears that Marcellus Shale has considerably higher porosity and permeability than some other common shales. Consideration of other physical and chemical qualities may also be important. No specificity is assigned to the size of drill cutting pieces which could also affect gas migration. Would there be a requirement that drill cuttings be mixed with cement? It would seem that some of the other "nonporous" materials might make a more robust choice and drill cuttings be removed from choices in plugging gas wells. (1822)

Response: The Board has determined that no revisions to the rulemaking are required. Comprehensive revisions to the plugging requirements will be forthcoming. Subsection §78.91(e) (relating to General provisions) of the plugging regulations requires the operator to ensure no gases are present in the well that would interfere with cementing the well.

Comment: This must not be limited to just natural gas migration, but must also include the byproducts of the drilling, hydro-fracturing, and production process such as methane; and to the substances created by the interaction of oil and gas development and the natural and human environment. (1857) (1989)

Response: The purpose of this new section is to mandate an immediate investigative and remedial response by the operator in the event of a leaking gas well. All operators are required to notify DEP if they receive a water supply complaint or if they have a spill or release of a pollutional substance that can harm waters of the Commonwealth.

Comment: The DEP must address the fact of horizontal well drilling in which wells are drilled up to a mile in multiple directions from the vertical well bore. The investigation should include the entire longitudinal distance of the horizontal well and then add an additional distance for investigation (determined by the specific geology of the well location and the fracturing techniques used) that is at least 2,500 ft from the end of the horizontal well. (1857)

Response: The Board disagrees with this comment. There have been no documented cases where hydraulic fracturing has caused a direct communication with fresh groundwater. Regardless, this section has been revised to require an investigation into all complaints of gas migration.

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

Comment: Subsection (a)(l) refers to methods for separating casing and "other method approved by the Department." This term is vague and we recommend that the final-form regulation include "other method approved **in writing** by the Department." (Emphasis added.) The same phrase is used in Subsections 78.93 (a)(3), 78.94(a)(l), 78.94 (a)(3), and 78.95 (a)(l). (1989)

Response: The Board disagrees with this comment. Written approval by the Department will unduly delay operations where consultation with the inspector would suffice.

§78.96 Marking the location of a plugged well

Comment: Burying a marker for a gas well below ground even with a detectable amount of metal seems risky. Land can pass from one generation to the next, documents get lost, fire happens. (1822)

Response: The Board disagrees with the suggestion to not mark the location of the well in this manner. Marking the well is a long-standing practice, and the locations may be recorded precisely with GPS latitude/longitude coordinates. The Department will also receive a copy of the well plugging certificate that records this information.

§78.121 Production reporting

Comment: On August 4, 2010, Representative Phyllis Mundy introduced House Bill 381 ("HB 381") to the Pennsylvania House of Representatives. HB 381 would amend section 212 of the Oil and Gas Act to require well operators to report the amounts of wastewater they generate from wells drilled into the Marcellus Shale, as well as how they dispose of and treat such wastewater to DEP on a semi-annual basis, and would also require DEP to make those reports available to the public. This amendment would allow wastewater generated at Marcellus Shale wells to be tracked by the public from "cradle to grave" as with other industrial wastes under the RCRA, and would thus either promote public confidence that well operators are following the laws and regulations that govern wastewater treatment and disposal or give the public a tool to help DEP bring operators who are breaking the law into compliance. In anticipation of HB 381 being enacted, section 78.121 should be modified to provide that DEP shall disclose or make publicly available well operators' production reports (including information on wastewater generation and treatment) to the extent permitted by the Oil and Gas Act and other applicable laws. (1840)

Response: Wastewater and production reports currently are required to be submitted to the Department on an annual basis. The Board has revised §78.121 to require Marcellus well operators to submit production for each well on an individual basis semi-annually. Production reporting records are considered public information and this will be made available by the Department.

Comment: This section requires well operators to submit production reports. Are these reports confidential or are they available to the public? The final-form regulation should clarify this issue. (1857)

Response: Act 15 of 2010 eliminated the confidentiality provisions in the Oil and Gas Act for all wells.

Comment: DEP should propose legislation to remove the confidentiality requirement of production reports. Is it not simply a matter of knowing what resources are being depleted? Other States only withhold production reports for 6 months. (1857)

Response: Act 15 of 2010 eliminated the confidentiality provisions in the Oil and Gas Act for all wells.

§ 78.122Well record and completion report

Comment: Revise the regulations at §78.122(a)(6) to include intermediate casing.(924)

Response: The Board agrees with this comment. The regulation has been revised accordingly.

Comment: Revise the regulations at §78.122(a)(7) to require the cement bond log. (924)

Response: The Board does not agree with this comment. A cement bond log is not required to be run in all cases

Comment: 78.122(a) should require a list of waste generated during drilling and workover operations and a description of the waste handling and disposal methods with their locations. (42) (43) (924)

Response: The waste produced during these operations must be reported to the Department. The waste handling and disposal methods are included in §78.55 (reference control and disposal plan).

Comment: One improvement that I believe could be made to the proposed changes is more language pertaining to the processing of drilling mud. I have heard varying information regarding the water-based drilling mud used in hydraulic fracture operations. I support the language requiring all chemicals to be made public, but the capture and treatment of the drilling mud should be a priority for operators, and they should be required to pay the entire cost for treatment. If treating the drilling mud ends up being particularly taxing on, or even impossible for, local water treatment facilities, the operators should be required to pay for any expansion of water treatment capacity in the area. (31)

Response: This comment is beyond the scope of the regulations. Payment for waste treatment is a contractual matter between the parties.

Comment: Test results entered on the drilling log is pathetic. The "honor system" fails to protect our drinking water supplies in Pennsylvania. (1879)

Response: The documentation received by the Department is the actually chemicals used in the fracing process. Analysis of the chemicals is not necessary.

Comment: The Well Record and Completion Report subsection refers to a record for the stimulation process, *Stimulation Record.* Among other recordings, it requires that the "fracturing chemicals used" be identified. This should be more specific to insure that each chemical and its quantity is identified. Groups of chemicals should not be listed under one trade or generic name. Further an understanding of the safety to health and environment of each chemical during the Marcellus drilling and follow up on procedures should be noted for each chemical alone or in combination and its possible reaction in the Marcellus Environment should be noted. If DEP or EPA determines any of these chemicals are hazardous to health or environment as used in the stimulation process, DEP should require that chemical be eliminated from the procedure. To know this information may mean waiting for the EPA study of hydro fracturing (1822)
Response: The Board has expanded the stimulation record requirements in subsection §78.122(b)(6) to include the Chemical Abstract Number for each Material Safety Data Sheet-listed hydraulic fracturing chemical used, as well as the percent (by volume) of each listed chemical used.

Comment: Revise the regulations at § 78.122(b)(6) to include information on the chemical additives, including all chemical components. Reported information should include biodegradability,

bioaccumulation potential, toxicity, and any detrimental mutagenic or reproductive effects. Best practices would include a requirement to forbid chemicals that have low biodegradability, high bioaccumulation potential, high acute toxicity, or detrimental mutagenic or reproductive effects. (42) (43) (924)

Response: The Board has expanded the stimulation record requirements in subsection §78.122(b)(6) to include the Chemical Abstract Number for each Material Safety Data Sheet-listed hydraulic fracturing chemical used, as well as the percent (by volume) of each listed chemical used. The toxicity of the chemicals must be included in the material safety data sheets which are included in the PPC plan.

Comment: We believe the well reporting requirements should be improved to offer full transparency to DEP and the general public of the chemicals used during hydraulic fracturing. The proposed regulations specify that a well operator must submit to DEP a well record and completion report within 30 calendar days of completion of drilling or altering a well, and the report's stimulation record must include "pump rates, pressure, total volume and list of hydraulic fracturing chemicals used, and the volume of water used and identification of water sources used pursuant of an approved water management plan," (78.122). We support these reporting requirements. However, we believe it is important for operators to also be required to list the Chemical Abstract Service registry number for each hydraulic fracturing constituent chemical, the concentration of each constituent chemical and the formula for each chemical compound. These reports should also be posted on DEP's website for the general public to access. (1836)

Response: The Board has expanded the stimulation record requirements in subsection §78.122(b)(6) to include the Chemical Abstract Number for each Material Safety Data Sheet-listed hydraulic fracturing chemical used, as well as the percent (by volume) of each listed chemical used. Also, the Department is currently working towards its goal of upgrading its computer systems to facilitate well record and production reporting access capabilities.

Comment: § 78.122(a) and § 78.122(b): These two sections call for individual reports. Is it possible to incorporate these into one report to streamline the process and eliminate some administrative burden? (1841)

Response: This information currently is incorporated into one form.

Comment: § 78.122 (b)(6): This section is about the stimulation record and includes a request for chemicals used. Shell supports Pennsylvania's efforts to clarify existing regulations concerning chemical disclosure. We suggest that the issue of confidentiality be addressed in this section. For example through the following: "Notwithstanding anything contained in these rules to the contrary, any "confidential proprietary information", as defined by 65 Pa. Stat. § 67.102, and/or any "trade secret" information, as defined by 65 Pa. C.S.A. § 67.102, disclosed in accordance with these rules shall be maintained as confidential and shall be exempt from a request for disclosure under Pennsylvania's "Right-to-Know Law as required by 65 Pa. C.S.A. § 67.708(b)(11). In addition, any party disclosing a trade secret pursuant to these rules shall be entitled to the protections and remedies of the Uniform Trade Secrets, as codified at 53 Pa. C.S.A. § 5301 et *seq."* (1841)

Response: The Board has expanded the stimulation record requirements in subsection §78.122(b)(6) to include the Chemical Abstract Number for each Material Safety Data Sheet-listed hydraulic fracturing chemical used, as well as the percent (by volume) of each listed chemical used. The Board has also amended this subsection allowing the designation of confidential or trade secret information. The Department shall prevent disclosure of such designated confidential information to the extent permitted by the Right To Know Law, 65 P.S. 67.101 et seq.

Comment: Fully and publicly disclose every chemical and compound used in drilling, hydraulic fracturing ('fracking'), and related operations, including quantities used; (1425)

Response: The Board has expanded the stimulation record requirements in subsection §78.122(b)(6) to include the Chemical Abstract Number for each Material Safety Data Sheet-listed hydraulic fracturing chemical used, as well as the percent (by volume) of each listed chemical used.

Comment: Under **Subchapter E. Well Reporting**, there is a need to clarify and specify the both the names and quantities of hydraulic fracturing chemicals used.

78.122 Well record and completion report.
(6) Stimulation record, including pump rates, pressure, total volume and list of hydraulic fracturing chemicals used, the volume of water used and identification of water sources used pursuant to the approved water management plan.

Knowing the hydraulic fracturing chemicals used for each well is important. However, given the evolving nature of the industry, it is also important for them to be identified by their scientific name as well as a trade name. Further, the volume of each chemical used as well as the total volume of all the chemicals and total volume of water need to be specified. It is therefore suggested to change the words "total volume and list of hydraulic fracturing chemical used" to "list of hydraulic fracturing chemicals (by scientific and trade name), the concentration and quantity of each, and the total volume of hydraulic fracturing chemicals used." The right to know this information is important for testing, treatment, and public health. (93)

Response: The Board has expanded the stimulation record requirements in subsection §78.122(b)(6) to include the Chemical Abstract Number for each Material Safety Data Sheet-listed hydraulic fracturing chemical used, as well as the percent (by volume) of each listed chemical used.

Comment: TU strongly supports the additional language added to § 78.122(b)(6), requiring a well operator to describe in its well record and completion report, the total volume and list of hydraulic fracturing chemicals used. As DEP is aware, the federal Energy Policy Act of 2005 exempted hydraulic fracturing from regulation under the Safe Drinking Water Act, leaving the responsibility to protect groundwater resources during natural gas drilling activities to the individual states. In order to understand the synergistic and cumulative impacts of using different toxic chemicals in the extraction of gas from the Marcellus Shale in Pennsylvania, these regulations must require disclosure of the concentration of chemicals used, in addition to the type and volume of chemicals, to provide DEP with a comprehensive picture of potential impacts. (1851)

Response: The Board agrees. The complete list of additives and hazardous chemicals as well as concentrations will be required. Any information claimed to be confidential information will managed in accordance with the Right to Know Law.

Comment: § 78.122(b)(7&8): The word "reservoir" should be replaced with "shut-in surface".(1843) (1844)

Response: The Board agrees with this comment. The regulations have been revised accordingly.

Comment: The preamble to the proposed amendments discusses the incremental cost of setting an additional casing string if cement is not returned to the surface or when excessive pressure is placed on

the surface casing seat. "The construction cost for the additional string is about $10,000 per well." 40 Pa. Bulletin at 3848. 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. If the additional string of casing is justified from a technical standpoint, then it is the correct course of action. But nowhere do the proposed regulations provide a technical justification for an additional casing string. The Summary of Comments and Responses states: "It is the Department's experience that poorly cemented casing is the reason for may gas migration issues." Nowhere, however, is there given any technical justification for an additional casing string. (1843) (1844) (1989)

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

Comment: Section 78.122 should include a prohibition in any aspect of well drilling, stimulation or production of the use of any chemical for which effective treatment and / or disposal cannot be guaranteed by the operator. (1867)

Response: This is addressed by other requirements of the Department related to treatment, discharge, and disposal requirements and is outside the scope of this rulemaking.

Comment: It would be very helpful if DEP were to provide forms when any new reporting requirements are promulgated, and to clarify that any new forms should only be applied to newly gathered data. (1843) (1844)

Response: The Board agrees with this comment.

Comment: § 78.122(a) and § 78.122(b): These two sections call for individual reports. If possible, these should be incorporated into one report to streamline the process and eliminate some administrative burden. (1918)

Response: The reporting requirement is specified by law. If drilling and completion occur within the timeframes specified by the Oil and Gas Act, then the two reports may be submitted at the same time. The form used by the Department includes both reports.

Comment: Disclosure of all chemicals used per well - Disclosure of all chemicals used in the fracking of every well should be done at the county level and annually within local newspapers. Total of each chemical pumped into the well for the year would be disclosed and reported per well to the county the well resides. If contaminated drinking water is found within a certain radius of the well it should also be disclosed. Significant impact to local drinking water would allow local county boards or commissioners to shut down a well. (1868)

Response: The Board has incorporated provision for disclosure of the list of chemicals that would be available from the Department. The authority to shut down a well resides with the Department. The Department has not experienced any situation where the subsurface frac operations have caused contamination of any surface resources.

Comment: The commentator suggests that the completion report be sealed by an expert. Has the Board considered this option? (1871)(1989)

Response: The information provided in the completion report does not need to be sealed by a licensed professional. The regulations will require operators to certify that the well has been constructed according to the regulations under penalty of law.

Comment: Commentator suggests that §78.122(b)(6) be revised to require a operator to submit in its stimulation report the total volume and list of hydraulic fracturing additives based on information from applicable material safety data sheets rather than the total volume and list of hydraulic fracturing chemicals used that proposed § 78.122(b)(6) now requires. Commentator states that this recommendation harmonizes with the practices and procedures that are already in place. Commentator asserts that proposed § 78.122(b)(6) intrudes into the area of trade secrets and proprietary information. Commentator opposes any disclosure requirements mandating the release of valuable trade secret information such as the identity of specific proprietary chemicals used in highly specialized hydraulic fracturing fluids or the formulaic composition of such fluids. Additionally, the Commentator believes that such routine disclosure of trade secret information is neither necessary nor appropriate. (1829) (1989)

Response: Section 212(b) of the Oil and Gas Act requires well operators to keep records of any well drilled or altered and to file a completion report with the Department within thirty days after the completion of the well to be kept on file by the Department. Additionally, § 212(b) grants the Department the power to promulgate regulations regarding the information a well operator is required to include in its completion report. The existing regulations require the operator to include its stimulation record in its completion report. The final regulation clarifies the information that the operator must include in its stimulation record. The Department disagrees with Commentator's assertion that the required information is unnecessary and inappropriate.

The Department has amended § 78.122(b) to require the operator to include the following in its stimulation record: (i) a descriptive list of the chemical additives; (ii) the percent by volume of the chemical additives; (iii) a list of all the chemicals in the operator's Material Safety Data Sheets (MSDS); (iv) the percent by volume of each MSDS-listed chemical; (v) the base fluid's total volume; (vi) a list of water sources; (vii) the total volume of recycled water; and (viii) the pump rates and pressures used at the well. Additionally, § 78.122(d) provides that an operator must maintain records of every chemical used to hydraulically fracture a well by chemical name and must provide this list to the Department upon request.

Additionally, the Department has added new § 78.122(c) which provides that an operator may designate specific portions of its stimulation records as containing a trade secret or confidential proprietary information (CPI) and that the Department shall prevent disclosure of such designated trade secrets or CPI to the extent permitted by the Right To Know Law, 65 P.S. 67.101 *et seq.*

Comment: Ensure public has access to all technical standards and criteria referenced in DEP's regulations. A public access version should be made available on the DEP website.

Response: Copies of certain standards, such as API specifications for cement testing, are available for review in the central office but DEP can not violate copyright law by providing copies or by posting copyrighted material on its public web site. (924)

General Comments:

Comment: The *Pennsylvania Bulletin* is the official gazette of the Commonwealth of Pennsylvania as set forth therein. At 40 Pa B. 4154, Saturday, July 24, 2010, (Pa. B. Doc. No. 10-1324. Filed for inspection July 23, 2010 9:00a.m.) the EQB announced the scheduling of an additional hearing with respect to the proposed rulemaking. The hearing was scheduled for July 26, 2010 at 7:00p.m. at the Department of Environmental Protection, Southwest Regional Office, Waterfront Conference Rooms A and B, 400 Waterfront Drive, Pittsburgh, PA 15222-4745. It would be impossible for the general public, and not privy to the printer's press or inside information, to be in possession of a hard copy of the bulletin dated Saturday, July 26, 2010 to be made aware of the said additional public hearing occurring Monday, July 26, 2010. Such an action by the EQB is unscrupulous and unduly spontaneous at best. (1818)

Response: The Board regrets that the notice of the additional hearing regarding these regulations was not published with sufficient advance notice. However, it should be noted that the meeting previously scheduled was in fact held at the scheduled date and time. The meeting referred to by the commentator was a separate and new meeting held to accommodate additional interested members of the public.

Comment: Regulations should be based on scientific publications and evaluated using scientific studies. (1980)

Response: The Board agrees with the commentator and believes the final-form regulations are based on sound science and engineering practices.

Comment: For the protection of public health, safety and the environment, I urge the Environmental Quality Board to approve new proposed well-construction regulations (25 Pa Code Ch. 78) that require gas drilling operators to build stronger and safer wells, disclose the toxic chemicals used in the gas extraction process, and require the Pennsylvania Department of Environmental Protection to conduct more and better inspections of these wells. (98 to 873) (884) (1114-1808)

Response: The Board appreciates the commentators' support for the proposed amendments to 25 Pa. Code Ch. 78 regulations. The proposed rulemaking will amend the current oil and gas well regulations as well as add additional controls to their construction and operation. The residents of the Commonwealth and the regulated community will benefit from this rulemaking since it further defines the necessary standards needed to safely construct and operate oil and gas wells. The proposed regulation will give the citizens of Pennsylvania additional safety measures that will continue to aid in the protection of the health, safety, environment and property of the Commonwealth while still allowing for the development of the state's oil and gas resources.

The updated casing and cementing requirements will provide an increased degree of protection for homeowners and both public and private water supplies. The proposed construction standards will align Pennsylvania's regulations with other states' rules as well as current industry standards. Casing and cement testing 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 for operating wells will be a vital tool for operators to use in detecting potential safety or environmental impacts before they may become a public health or safety issue.

Comment: The following commentators urge the Board to adopt stronger regulations improve the safety of gas and oil wells in Pennsylvania. Please take strong action to thoroughly investigate and oversee the oil and gas industry by updating the existing requirements regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. (32) (33) (40) (45) (50) (85) (87) (93) (94) (96) (1925-1933) (874) (882) (890) (891) (892) (893-895) (899) (901) (1809-1811) (1814-1816) (1819) (1820) (1822-1824) (1830) (1836) (1842) (1845) (1846) (1849) (1852) (1855) (1856) (1859) (1862) (1864-1866) (1874-1876) (1878) (1881-1883) (1887) (1889-1896) (1904) (1906) (1912-1913) (1916-1918) (1921-1924)

Response: The final-form rulemaking includes updated material specifications and performance testing and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. With this proposed rulemaking, the Department is adding additional measures that will further minimize the concerns associated with gas migration.

Comment: The U.S. Army Corps of Engineers, Pittsburgh District, agrees with the recommendations by the EQB to update the existing requirements regarding the drilling, casing, cementing, testing, monitoring, and plugging of oil and gas wells, and the protection of water supplies.

The Pittsburgh District operates eleven multi-purpose reservoirs in western Pennsylvania within the Upper Ohio River basin, and five additional reservoirs within our area of responsibility in eastern Ohio and northern West Virginia. Among the authorized purposes of these reservoirs are releases to improve water quality in the rivers downstream. The capacity of the reservoirs to achieve this purpose is limited, especially during extended periods of low precipitation.

The prevention of spills from activities associated with gas well drilling and on-site storage of returned hydraulic fracturing wastewater, through stricter standards, monitoring, and enforcement as covered by these proposed amendments, is essential to protect nearby wetlands, groundwater, tributary streams and creeks, and downstream bodies of water from being impaired. (1908)

Response: The Board appreciates the ACOE support in the rulemaking.

Comment: The protection of our water supply is vital to the good of the Commonwealth and the country. It is incredible to me that water is anything but an utmost priority to us all. We drink water, and we rely on the ecosystem services provided by biota that also rely on clean water. (31) (26) (44)

Response: The Board agrees that protection of our water supply is vital. The updated casing and cementing requirements will provide an increased degree of protection for homeowners and both public and private water supplies. The proposed construction standards will align Pennsylvania's regulations with other states' rules as well as current industry standards. Casing and cement testing 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 for operating wells will be a vital tool for operators to use in detecting potential safety or environmental impacts before they may become a public health or safety issue.

Comment: Our technical review of casing and cementing requirements was based on an industry recognized standard that a quality casing and cementing program will aim to place a properly designed cement slurry around a centered casing in a borehole of adequate size from which mud and mud cake has been removed. (1831)

Response: The Board agrees and thanks the commentator for this comment. The Board also has revised Section §78.83 (relating to Surface and coal protective casing and cementing procedures) to require the operator to condition the hole prior to cementing to ensure an adequate cement bond between the casing and the formation. In addition, the Board has added a requirement to Section §78.83a (relating to Casing and cementing plan) for the operator to include the proposed well bore conditioning procedures in this plan.

Comment: The PFC (Pennsylvania Forest Coalition) wishes to go on record as supporting the proposed DEP CH 78 regulations along with the even stronger suggestions on well casing, blowout protection, cementing , welding and as outlined in the Harvey Consulting Report, dated 3/01/2010 : (5)

Response: The Board has reviewed the Harvey Report and has included the report's comments in this document.

Comment: Please include the language proposed by the Harvey Consulting report in the new Chapter 78 regulations. (9) (11-20) (22-25) (27-29) (34) (35) (39) (41-43) (50) (875) (897) (923-1113) (1819) (1821) (1825) (1827) (1828) (1832) (1834) (1839) (1861) (1858) (1869) (1860) (1934-1939) (1980)

Response: The Board has reviewed the Harvey Report and has included the report's comments in this document.

Comment: Regarding the above issue, this is a bad proposition for our area. We are Against any Drilling, no matter what the so called protections would be, we do not believe they will be enforced. (53) (903) (906-911) (920-922) (1854) (1870) (1898) (1900) (1902) (1903) (1905) (1907) (1909-1910)

Response: The Board does not have the statutory authority to prohibit all well drilling. The proposed rulemaking would incorporate and update existing requirements, with modifications regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The proposed modifications include updated material specifications and performance testing, and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. With this proposed rulemaking, the Department is adding additional measures that will further minimize the concerns associated with gas migration. It is the Department's duty to faithfully enforce these new regulations.

Comment: Regulations should require companies with current permits and drilling operations in an early stage to upgrade to the new DEP standards if they are not already at those standards. (1980)

Response: The revised construction standards contained within this final-form regulation would apply to any well drilled, altered, reconditioned or recompleted after the effective date of the rulemaking. The revised requirements pertaining to a pollution event would apply any current or future well.

Comment: Existing oil and gas operations—that is, any oil or gas operation in place prior to adoption of the new regulations—should have no more than 24 months to come into compliance. To enforce this requirement, the EHB should mandate that, within one year of the date of adoption, each operator certify to DEP that all of its new and existing oil and gas operations comply fully with Chapter 78, as amended. For each oil or gas operation that is not in full compliance, the operator should be required to submit a compliance plan for DEP review and approval, showing how the operator plans to reach full compliance within the 24-month deadline. Each non-compliant well must be examined by a qualified engineer, geologist, and hydrologist (certified by DEP and not affiliated with a drilling company) to verify that

continued operation of the well does not propose a health, safety, or environmental risk. If the well does propose any such risk, it must be immediately repaired to meet the new standards, or plugged and abandoned. (1820)

Response: The revised construction standards contained within this final-form regulation would apply to any well drilled, altered, reconditioned or recompleted after the effective date of the rulemaking. The revised requirements pertaining to gas migration and well inspection would apply any current or future well.

Comment: The regulations attempt to cover the very different types of oil and gas wells presently being constructed in Pennsylvania. We think a separate section should be provided in the regulations for those different types of wells, such as shallow gas wells, oil wells, and Marcellus shale wells. Some repetition would result, but overall the regulations would be more clear to both the regulated community and other interested parties. (1867)

Response: The suggestion was considered but deferred so as to expedite this critical rulemaking.

Comment: I am, of course, in favor of increasing the standards for oil and gas well protections. As a property owner in areas that are being drilled, I am very concerned about water quality and contaminant migration. I cannot imagine that anyone could oppose standards that would protect tax paying PA residents and their water supplies. Please stop wasting time and pass this legislation so that folks largest investments, their homes, are not devastated by oil and gas drilling accidents. (1)

Response: The Board acknowledges the commentator's support for the rulemaking.

Comment: My family is in the process of negotiating a lease with a gas company. One of our biggest concerns is the lack of accountability for the gas companies and the critical need for stricter regulations. Too much damage has been done to our environment already. Please create oversight and regulations that protect the environment. (68)

Response: The Board acknowledges the commentator's support for the rulemaking.
The proposed rulemaking would incorporate and update existing requirements, with modifications regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The new or amended sections are §§78.1, .51, .52, .71-.73, .76, .81-.85, .88, .89, .91-.96, .121 and .122. The proposed modifications include updated material specifications and performance testing, and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. With this proposed rulemaking, the Department is adding additional measures that will further minimize the concerns associated with gas migration.

Comment: The Marcellus shale drilling is a frightening set of developments in our state. We are the latest state in the search for natural gas to be confronted with an industry that is involved with highly invasive techniques for getting its product. It is ABSOLUTELY NECESSARY for there to be strict and highly enforced regulations before, during and after exploratory drilling, as well as the placement of wells and the running of those wells. and drilling is not our only concern: infrastructure needed for this industry, roadwork and ecosystem disruption, noise and air pollution, hydrofracturing chemicals and techniques, potential poisoning of our vastly interconnected waterways systems and underground aquifers all contribute to our concern about the short term and long term effects of this industry on all of us, including the ones without voices or votes: animals, birds, plants, trees, etc. regulations and the strict enforcement of those regulations, along with very strict permitting, demand for transparency at all times

and public involvement are the ONLY WAYS for this state to continue with marcellus shale drilling in our opinion. (87)

Response: The Board acknowledges the commentator's support for the rulemaking. The proposed rulemaking would incorporate and update existing requirements, with modifications regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The new or amended sections are §§78.1, .51, .52, .71-.73, .76, .81-.85, .88, .89, .91-.96, .121 and .122. The proposed modifications include updated material specifications and performance testing, and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. With this proposed rulemaking, the Department is adding additional measures that will further minimize the concerns associated with gas migration.

Comment: I am writing because I am very concerned about the increase of water pollution that will undoubtedly occur in PA as the natural gas drilling boom expands. More rigorous standards and routine inspections by all companies in the drilling process, as well as by the PA DEP, need to be in place immediately. Without governance under the Clean Water Act and other protective federal legislation, it is crucial that regulations and enforcement at the state level of all drilling processes be effectively administered. (65)

Response: The Board acknowledges the commentator's support for the rulemaking. It is the duty of the Department to faithfully uphold these regulations. The proposed rulemaking would incorporate and update existing requirements, with modifications regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The new or amended sections are §§78.1, .51, .52, .71-.73, .76, .81-.85, .88, .89, .91-.96, .121 and .122. The proposed modifications include updated material specifications and performance testing, and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. With this proposed rulemaking, the Department is adding additional measures that will further minimize the concerns associated with gas migration.

Comment: When drilling for gas in Marcellus Shale, existing wells should be subject to the toughest new regulations for casing & cementing wells and be pressure tested and use blow-out preventers. If an existing well does not meet the new standards all drilling operations must cease until the well is remediated, inspected and approved by independent state inspectors. All functioning wells must be inspected regularly – by independent state inspectors and not by the well operators who cannot be trusted to do an impartial analysis of their own operations. (69) (876) (877)

Response: The Board acknowledges the commentator's support for the rulemaking. It is the duty of the Department to faithfully uphold these regulations. The proposed rulemaking would incorporate and update existing requirements, with modifications regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The new or amended sections are §§78.1, .51, .52, .71-.73, .76, .81-.85, .88, .89, .91-.96, .121 and .122. The proposed modifications include updated material specifications and performance testing, and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. With this proposed rulemaking, the Department is adding additional measures that will further minimize the concerns associated with gas migration.

Comment: Let me start by pointing out how disappointed I am that these standards are not already in place. Are the events in Dimock and the Gulf of Mexico not enough incentive to move this process along? Needless to say, I certainly support the proposals to increase standards for oil and gas well

casing and cementing. However, I think it is fair to point our how ridiculous it is that these standards were not in place already. It really gives credence to the folks that insist we need to slow down and assess the impact of all of these wells. Basically, it is proof that you, our government, were and are not prepared for what has and will happen. That is incredibly scary and disappointing. Stop talking, taking comments, negotiating, compromising, and TAKE ACTION!! (1)

Response: The Board acknowledges the commentator's support for the rulemaking. It is the duty of the Department to faithfully uphold these regulations. The proposed rulemaking would incorporate and update existing requirements, with modifications regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The new or amended sections are §§78.1, .51, .52, .71-.73, .76, .81-.85, .88, .89, .91-.96, .121 and .122. The proposed modifications include updated material specifications and performance testing, and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. With this proposed rulemaking, the Department is adding additional measures that will further minimize the concerns associated with gas migration.

Comment: We recommend that the Board follow the practice of other states that have incorporated API standards into their regulations, which is to make copies of the documents publicly available to promote government transparency and accountability without lowering its health and environmental standards." (1820)

Response: Copies are available in the central office but DEP can not violate copyright law by providing copies or by posting copyrighted material to our public web site.

Comment: I agree with the recommendation by the EQB to update the existing requirements regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The benefits of updating the existing rules are as follows:
a) Homes and property owners will be provided more protection
b) Better and more protection of water sources, both public and private
c) Early detection of construction problems and more reporting will increase safety and protection of human health and the environment
d) Less chance of natural gas escaping the well (gas migration)
e) Provide specific steps for responding to an emergency (80) (72)

Response: The Board acknowledges the commentator's support for the rulemaking. It is the duty of the Department to faithfully uphold these regulations. The proposed rulemaking would incorporate and update existing requirements, with modifications regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The new or amended sections are §§78.1, .51, .52, .71-.73, .76, .81-.85, .88, .89, .91-.96, .121 and .122. The proposed modifications include updated material specifications and performance testing, and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. With this proposed rulemaking, the Department is adding additional measures that will further minimize the concerns associated with gas migration.

Comment: Thank goodness the Department is proposing tougher standards and oversight for the drilling of oil and gas wells in PA. I support the tightest restrictions possible on the management and operation of such drilling. It is obscene what has happened in other states. And don't forget safety issues for the workers on these wells either. (82) (92) (47)

Response: The Board acknowledges the commentator's support for the rulemaking. It is the duty of the Department to faithfully uphold these regulations. The proposed rulemaking would incorporate and update existing requirements, with modifications regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The new or amended sections are §§78.1, .51, .52, .71-.73, .76, .81-.85, .88, .89, .91-.96, .121 and .122. The proposed modifications include updated material specifications and performance testing, and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. With this proposed rulemaking, the Department is adding additional measures that will further minimize the concerns associated with gas migration.

Comment: I FAVOR the IRRC taking strong action to thoroughly investigate and oversee the oil and gas industry. Marcellus depths and pressures are far beyond what was "normal" when the previous regulations were enacted. I FAVOR DEP's efforts in upgrading Oil & Gas regulations to ensure safety. (6)

Response: The Board acknowledges the commentator's support for the rulemaking. It is the duty of the Department to faithfully uphold these regulations. The proposed rulemaking would incorporate and update existing requirements, with modifications regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The new or amended sections are §§78.1, .51, .52, .71-.73, .76, .81-.85, .88, .89, .91-.96, .121 and .122. The proposed modifications include updated material specifications and performance testing, and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. With this proposed rulemaking, the Department is adding additional measures that will further minimize the concerns associated with gas migration.

Comment: We need to have these resources (gas), but we also need to maintain the integrity of our states natural resources. Love Canal and other areas have proved beyond a shadow of a doubt that people will leave the pollution and that it takes decades to restore the damage that can be done by chemicals. BP has shown us that men do make mistakes. Let's do the best we can to give us the best chance we have to keep our environment pristine. (10)

Response: The Board acknowledges the commentator's support for the rulemaking. It is the duty of the Department to faithfully uphold these regulations. The proposed rulemaking would incorporate and update existing requirements, with modifications regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The new or amended sections are §§78.1, .51, .52, .71-.73, .76, .81-.85, .88, .89, .91-.96, .121 and .122. The proposed modifications include updated material specifications and performance testing, and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. With this proposed rulemaking, the Department is adding additional measures that will further minimize the concerns associated with gas migration.

Comment: I agree with the recommendation by the EQB to update the existing requirements regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. (2) (4) (7) (31) (1811)

Response: The Board acknowledges the commentator's support for the rulemaking. It is the duty of the Department to faithfully uphold these regulations. The proposed rulemaking would incorporate and update existing requirements, with modifications regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The new or amended sections are

§§78.1, .51, .52, .71-.73, .76, .81-.85, .88, .89, .91-.96, .121 and .122. The proposed modifications include updated material specifications and performance testing, and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. With this proposed rulemaking, the Department is adding additional measures that will further minimize the concerns associated with gas migration.

Comment: Please ensure the safety of operating, maintaining and decomissioning of oil and gas wells across Pennsylvania. Rules and regulations should be given ample public review BEFORE any commercial activity begins. (66)

Response: The Board acknowledges the commentator's support for the rulemaking. It is the duty of the Department to faithfully uphold these regulations. The proposed rulemaking would incorporate and update existing requirements, with modifications regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The new or amended sections are §§78.1, .51, .52, .71-.73, .76, .81-.85, .88, .89, .91-.96, .121 and .122. The proposed modifications include updated material specifications and performance testing, and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. With this proposed rulemaking, the Department is adding additional measures that will further minimize the concerns associated with gas migration.

Comment: As for the newest proposals to tighten drilling and well requirements in the state, I am all for it .....any regulations that ensure the safety and sustainability of our natural resources is a move in the right direction. (54)

Response: The Board acknowledges the commentator's support for the rulemaking. It is the duty of the Department to faithfully uphold these regulations. The proposed rulemaking would incorporate and update existing requirements, with modifications regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The new or amended sections are §§78.1, .51, .52, .71-.73, .76, .81-.85, .88, .89, .91-.96, .121 and .122. The proposed modifications include updated material specifications and performance testing, and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. With this proposed rulemaking, the Department is adding additional measures that will further minimize the concerns associated with gas migration.

Comment: Just wanted to make a general comment on Shale Drilling for natural gas. I think we should review the impact to the Delaware River and drinking water. We live a couple miles from the River and it would be a shame to pollute a river that provides so much for the area. We do not want to light our drinking water on fire. We want to make sure there is checks and balances with drilling. I am for an energy independence but not if the unintended consequences are to sacrifice our most precious resource. We can do better. Lay out the facts and let people decide. I live in Doylestown PA. (77)

Response: The proposed rulemaking would incorporate and update existing requirements, with modifications regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The new or amended sections are §§78.1, .51, .52, .71-.73, .76, .81-.85, .88, .89, .91-.96, .121 and .122. The proposed modifications include updated material specifications and performance testing, and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. With this proposed rulemaking, the Department is adding additional measures that will further minimize the concerns associated with gas migration.

Comment: I believe that we were told prior to the Gulf oil spill by BP that their safety/environmental programs were above normal standards. Utility companies will tell the people what they want to hear then go about their business of profit making at expense of the public. I know people who are thrilled about getting rich because of the potential of drilling for gas on their properties and are not concerned about the environmental impact it can have on the land. Let us proceed with extreme caution to prevent an environmental disaster. (95)

Response: The proposed rulemaking would incorporate and update existing requirements, with modifications regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The new or amended sections are §§78.1, .51, .52, .71-.73, .76, .81-.85, .88, .89, .91-.96, .121 and .122. The proposed modifications include updated material specifications and performance testing, and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. With this proposed rulemaking, the Department is adding additional measures that will further minimize the concerns associated with gas migration.

Comment: Why would some oil and gas underground waste disposal activities (such as hydrofracturing fluids and wastewater which are not retrieved from the subsurface) not be subject to UNDERGROUND DISPOSAL regulations § 91.51. Potential pollution resulting from underground disposal. (1857)

Response: Hydraulic fracturing does not constitute waste disposal. In addition, there have been no documented cases where hydraulic fracturing has caused a direct communication with fresh groundwater.

Comment: The Department of Environmental Protection (DEP) seems to take the position that neither Permit Applications or Permits be published in the PA Bulletin. There must be an affirmative obligation on the DEP to publish Applications and Permits. (1857)

Response: This comment is beyond the scope of the proposed regulations. The notification requirements for well permits are specified in the Oil and Gas Act. Members of the public can sign up for DEP's e-notice service which provides them with an email notification when DEP receives a permit application in an area they designate. This is a superior method of notification compared to publication in the Bulletin.

Comment: Drilling operations already completed must provide details regarding how their materials and processes diverged from the new standards, if such details are not' already recorded in the permits and previously submitted reports. (1980)

Response: The revised construction standards contained within this final-form regulation would apply to any well drilled, altered, reconditioned or recompleted after the effective date of the rulemaking. The revised requirements pertaining to a pollution event would apply any current or future well.

Comment: Regulations should be worded to require companies to continually upgrade well materials to the best technology available in the industry, as determined by qualified scientific review. (1980)

Response: The revised construction standards contained within this final-form regulation would apply to any well drilled, altered, reconditioned or recompleted after the effective date of the rulemaking. The revised requirements pertaining to a pollution event would apply any current or future well.

Comment: The current regulations are adequate in most cases to protect the environment and the health and welfare of PA residents. To analyze current regulations is would seem prudent to hire a full-time, experienced petroleum engineer to provide the necessary science and engineering expertise to support drilling and well construction regulations. (878)

Response: The Department has the expertise to analyze current regulations as well as develop future regulations and policy. The regulatory development process, including receiving comments from the Technical Advisory Board, provides additional expert review.

Comment: Because production wells can be operated for decades, regulations should make certain that the long-term integrity of the well is protected. We support the requirement that required operators to test wells quarterly and report and signs of degradation or other problems. (75)

Response: The Board acknowledges the commentator's support for the rulemaking.

Comment: Natural is the most environmentally responsible energy source currently available. If we wish to decrease CO2, NOx, Mercury and SO2 emissions, more natural gas is essential for our nation. Despite the well publicized fear mongering by many in our State, natural gas drilling is incredibly safe. Hydraulic fracturing is done a mile beneath the water table. Above ground spill containment is necessary and well done. When considers the huge number of gas wells completed over the years in Pennsylvania, it boggles the mind that we have had so few accidents or environmental incidents. No other industry can claim to have such a stellar safety or environmental record. Please work to further encourage gas drilling in the Marcellus Shale of Pennsylvania, not to discourage it. (1914)

Response: The Board acknowledges the commentator's support for the rulemaking.

Comment: The lawmakers need to give the Department of Environmental Protection the authority to fine oil and gas companies many millions of dollars, instead of the few thousand as of now. Perhaps they might regulate themselves. (1988)

Response: This comment is beyond the scope of the regulation.

Comment: Currently, there is no regulatory requirement to provide notice to the general public for a new well, nor an opportunity for the general public to comment on an application for a new well. Only the surface landowner, those with water supplies within 1000 feet of the proposed well, and the owner of any affected coal seam need to be notified. While the Department may choose to keep the general public advised of activities on its website, there is no legal obligation for the Department to do so. Recently, Cabot Oil and Gas failed to prevent gas from migrating and impacting water supplies within a 9 square mile area in Susquehanna Township due to its drilling activities. EOG recently lost control of a well located in Clearfield County which resulted in gas and hydraulic fracturing wastewater flowing into the environment and nearby waters. Since the impacts from a defective well can affect the general public, the regulations should include a provision that requires the DEP to provide public notice of an application for a new well. The general public should also be given a reasonable time period to comment prior to DEP making a final decision on the application. (898)

Response: This comment is beyond the scope of the proposed regulations. Members of the public can sign up for DEP's e-notice service which provides them with an email notification when DEP receives a permit application in an area they designate.

Comment: The Oil and Gas Act allows the Department to deny a permit if the applicant is not in compliance with all Department requirements. Essentially, the Department can react once violations have occurred, but it has no ability to be proactive when a "bad actor" submits an application. The Department has limited resources to inspect and insure compliance at all wells on a continuous basis. Therefore, the regulations should include a provision that will allow the DEP to deny an application based on the poor performance history of an applicant, a partner, parent or subsidiary corporation of the applicant, on a national basis, unless the lack of intention or inability to comply is being addressed to the satisfaction of DEP. There are comparable provisions in other DEP programs such as Air Quality and Waste Management. (898)

Response: This comment is beyond the scope of the proposed regulations and would require an amendment to the Oil and Gas Act to accomplish.

Comment: I support new regulatory requirements that impose the most protective standards for drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells. However, even the most modern standards become dated over time. As DEP has correctly noted, many of its existing regulations on the matter were created in 1989 and the requirements have not kept pace with changing industry practices and new technology. Therefore, the regulations should include a provision that requires the applicant for a new well to meet the best available technology for protecting public health and the environment as part of the permitting process for a new well. By including a best available technology provision, DEP has the ability to require the latest standards for regulating wells without the need to continually revise its regulations. Requiring the best available technology via the permitting process has been very successful in the Air program. It has allowed the program to require more stringent requirements as technology improves without the need to revise its regulations, a very time consuming process. (898)

Response: This comment is beyond the scope of the proposed regulations and would require an amendment to the Oil and Gas Act to implement.

Comment: I back this ruling on the oil wells and gas drillings. I also back drilling for oil in the USA. Any where it is safe to drill in the USA, as long as it is safe for the wild animals or wild life, trees etc. (83)

Response: The Board acknowledges the support for this rulemaking. The proposed rulemaking would incorporate and update existing requirements, with modifications regarding the drilling, casing, cementing, testing, monitoring and plugging of oil and gas wells, and the protection of water supplies. The new or amended sections are §§78.1, .51, .52, .71-.73, .76, .81-.85, .88, .89, .91-.96, .121 and .122. The proposed modifications include updated material specifications and performance testing, and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements. With this proposed rulemaking, the Department is adding additional measures that will further minimize the concerns associated with gas migration.

Comment: Drilling fluids should be limited to air, fresh water, or water-based muds and totally exclude oil based muds or other chemical lubricants. **(42) (43)**

Response: Synthetic drilling muds can reduce waste volumes and drilling time – thereby improving environmental performance. The regulations expressly prohibit non-water based fluids when drilling through fresh water.

Comment: Drilling permit fees should be used to establish a toll free DEP "Marcellus Shale Environmental Hotline" that is well publicized and operated 24/7, so that people can speak to people who are there to protect them, not their profits. (86)

Response: A "Report an Incident" link is prominently featured on the Department's website. This site provides contact information for each regional office.

Comment: To whom it may concern: In my opinion well drillers should be required to notify property owners within/adjacent to projected extraction effect areas prior to any issuance of any drilling permits. Evidence of the notification should be required as a deliverable for final permit issuance. Putting residents on notice ahead of time may increase diligence for disturbance of their private potable water supplies. (86)

Response: This comment is beyond the scope of the proposed regulations. Notice requirements are specified in the Oil and Gas Act. Members of the public can sign up for DEP's e-notice service which provides them with an email notification when DEP receives a permit application in an area they designate.

Comment: Develop and publish comprehensive and detailed environmental impact statement and health impact assessment for each proposed drilling site, using a process that includes multiple public hearings open to participation by all stakeholders and DEP approval, which is to be granted only if the plan proves that the proposed operations will not damage people's health, environment, or property. (1425)

Response: This comment is beyond the scope of the proposed regulations.

Comment: Develop, publish, and follow a comprehensive and detailed plan to track and control fluids used in mining, including documentation of quantities used and recovered, for preventing releases from stored fluids and chemicals, and prompt detection of any releases that do occur; agree to report any releases immediately upon discovery; Develop, publish, and follow a comprehensive and detailed plan for decontamination and safe disposal of all recovered fluids from drilling, fracking, and related operations, by a facility that is approved for the treatment of the toxic substances that are or may be present; (1425)

Response: The final-form regulation requires an operator to develop and implement a detailed Control and Disposal Plan. This plan will be available at the well site for the Department's review.

Comment: Install, prior to any fracking operations, a monitoring well with appropriate equipment, including seismological sensors, and ensure that fracturing does not go beyond the shale layer; (1425)

Response: The Board disagrees with this comment. Hydraulic fracturing has been commonplace in Pennsylvania for decades. The Department has never found that fracing has directly contaminated fresh water.

Comment: A DEP representative should be present to witness the type of stimulation, the amounts and types of materials used, stimulation pressures applied, and the flow and pressure results before and after stimulation. The drilling contractor should determine the amount of fracking solution left in the borehole. (1879)

Response: The board does not believe a Department representatives need to be present to witness the stimulation of the well. The stimulation of the well will be documented in the well record.

Comment: Agree to test, prior to any fracking operations, all casings and seals at pressures that are likely to be encountered in operation (no less than 10,000 psi); (1425)

Response: The regulations specify when casing must be pressure tested.

Comment: Agree that any natural gas or chemicals used in the permit holder's operations found in water supplies or the environment within a five-mile radius are presumed to come from the permit holder's operations unless they can prove otherwise including independent test results showing the chemicals were present prior to drilling and related work; (1425)

Response: The presumption of liability is included in the Oil and Gas Act and is limited to 1,000 feet from the well.

Comment: Well operators should not do an annual inspection of their own wells and report the results to the DEP. The inspections should be carried out by an outside, objective party. (78)

Response: The Department will continue to inspect operating wells. It is appropriate for operators to inspect their wells on a routine basis.

Comment: In maintaining objectivity, it is essential that the DEP verify the inspection of equipment and procedures at critical points and conduct on-going basis field visits at each site during various phases of the drilling process. Of particular importance are those readings and assessments required with the surface casing and the fracturing process. Frequent, periodic DEP inspections are also required for operational and maintenance issues that evolve with time. (93)

Response: The Department currently conducts unannounced inspection at active oil and gas well sites.

Comment: My comments are that what you are proposing does not go nearly far enough to protect the citizens of PA from damages caused by the oil and gas industry. Of the very limited amount of information you gave in the release, I have a problem with leaving it up the industry to do the inspections of their wells themselves and report to DEP. I am sorry that I do not trust them enough to allow them this freedom. DEP should be doing these quarterly inspections and reports themselves. (36)

Response: The Department will continue to inspect operating wells. It is appropriate for operators to inspect their wells on a routine basis.

Comment: Pressure limit applies to all well activities under §78.73. Operator will notify DEP of pressure exceedance within 24 hours, submit a written plan for approval and aid DEP to notify potentially affected parties. (42) (43)

Response: The inspection and notification requirements are specified in the regulations.

Comment: Increase well inspection frequency to daily or a minimum of weekly. (42) (43)

Response: The Board believes that quarterly inspections are appropriate.

Comment: We also ask for complete remuneration to the land owners from all gas companies responsible if any negative changes occur in our water supplies, air quality or soil quality. I would see this in action for at least five years after drilling... high quality water tests to be conducted every six months. Besides financial damages, we ask for instatement of legal action toward gas companies or whoever is responsible for FIXING THE PROBLEMS in any given area of disturbance. (882)

Response: Water supply restoration requirements are specified in the Oil and Gas Act. The regulations describe the financial obligation of the operator where a supply has been impacted. It is the duty of the Department to enforce the water supply replacement requirements.

Comment: Section 78.91 through 78.98 refer to "nonporous material" for filling wells as part of a plugging operation. This fairly non-specific term should be made more definitive with a scientifically described value used to describe what is meant by "nonporous". (1867)

Response: This comment is beyond the scope of the regulation. The well plugging sections will be subject to future rulemakings.

Beyond the Scope of the Rulemaking

Comment: What has more value natural gas or water? Hands down, it is water. Water is in short supply locally and we can NOT afford to have it poisoned by natural gas, and toxic mixtures being plumbed into the ground. The natural gas companies should not be allowed to plumb ANYTHING into the ground. I have to pay for water, and I have to pay for sewer. The natural gas companies should to pay on the same scale as a home owner for using water and paying for water removal. We have had water shortage almost every year for the last 15 years. Each natural gas well will take close to 5 million gallons of water. WATER IS THE ISSUE. (48) (89)

Response: This comment is beyond the scope of this rulemaking.

Comment: I am also concerned about local reservoir supplies. Our Community is selling large portions of our water supply to Marcellus shale drillers. If at some point there is a drought condition, like we have had many hot dry summers, and the residents are required to restrict their water use, will the drilling companies be forced to restrict their use also? Who would have the power in our small community to halt a multimillion dollar drilling process? Once the process of fracking starts it goes 24 hours a day until it is complete. The water reservoirs could be sucked dry to supply their operations. Our community will suffer because of it. Our water quality could also be jeopardized if the reservoirs ran too low. I believe there should be language in the regulations that defines the trigger point, or cut off danger level, that protects local water supplies from being pre-maturely depleted from drilling operations. When this point is reached, the available water to drillers is gradually reduced or stopped. This seems like it may involve hydrology engineering language and analysis so it is difficult for me to give an example of a possible solution. Language such as "When reservoirs reach 50% capacity, water sold to drillers is reduced by 50%," or something like that. It should be fair and reasonable but protective of the public. Furthermore, there should be an additional regulation which prevents all the water from being sucked out of the earth by the drillers, on a site, under a drilling pad, if they decide to drill wells for frack water on site. This would deplete the water supply of all the adjacent land owners. (97)

Response: This comment is beyond the scope of this rulemaking.

Comment: I encourage strict financial penalties for drilling companies that violate state law. Extreme penalties should be administered to companies with repeat offenses, even loss of licensure to drill. (92)

Response: This comment is beyond the scope of this rulemaking.

Comment: The bonding procedures need to be adequate enough to protect the homeowner. (1815)

Response: This comment is beyond the scope of this rulemaking.

Comment: Get the fracking process under some kind of federal regulation. I understand that Casey's FRAC ACT will close the so called "Halliburton Loophole." Let's get that done and get this whole process under the Safe Drinking Water Act. This industry must be very tightly regulated with heavy heavy fines that make it economically punitive for any of accident or abuse of the environment. (1920)

Response: This comment is beyond the scope of this rulemaking

Comment: Hi: I am glad you are making some regulatory changes, on behalf of health issues on oil and gas wells. I was wondering while you are concerned about health issues, if you would consider some health issues changes on Quarry's. I know they are grandfathered in and can operate under old laws. Have you heard of Silicosis, or as OSHA calls it grinding disease. It is an untreatable disease that causes crystallization of the lungs. Ground stone and cement is the number 1 cause of this disease. I live within 400 feet of a quarry and the grinder that is permitted to grind cement, to recycle it and sell it to contractors. . I have been in touch with the EPA and nothing can be done since you have grandfathered the quarry in. The dust is in the air and on the ground at all times. There is a school about 1000 feet from the grinder, with approx. 600 students that are exposed to this dust also. It is in my house on my deck and you can smell it and see it in the air. I am told nothing can be done, unless the EPA person see it coming off the machinery and going into the air. Of Course by the time they get here the dust has settled or they are not grinding. I do suggest that you consider the health issues involved in having a quarry allowed to grind cement, especially near homes and a school with small children. I am sure when you grandfathered this quarry in you did not know about the disease of Silicosis. Please consider this as a health issue to protect the people of Pa. (88)

Response: This comment is beyond the scope of this rulemaking.

Comment: It is so bizarre and so senseless, too, that DEP will issue gas drilling permits in such close proximity to this lake in nearby Lake, Noxen and Lehman Townships! These are our neighboring and bordering townships. They have a permit issued for a well pad that is less than 1/8 of a mile from this lake! This means they can potentially drill under this glacier formed, spring fed lake. I am so frightened by the potential for this lake to become destroyed. It is a natural wonder, a pristine lake, and may very well be destroyed. So too will our water wells. (46)

Response: This comment is beyond the scope of this rulemaking.

Comment: Regulations should specify all aspects of waste water handing as follows:
protect from leakage using a liner and a secondary impermeable layer and prevent access with a secure cover over the pond fully document all hazardous substance concentrations for haulers fully document radioactivity and concentrations of all substances for treatment facilities. (1980)

Response: This comment is beyond the scope of this rulemaking.

Comment: There is a fracturing site in Westmoreland County right next to the Beaver Run Dam being prepared. I would like to see the EPA monitor this Dam-take some water samples before the fracturing begins and periodically during the drilling!! Many of us have wells here and we are VERY concerned that we will loose our wells!! Not only our wells are in jeopardy! This is a public water source for many in Westmoreland County including Mamont Elementary School!! I am a school nurse and am very concern about the health and well being of our children. If we do not monitor this water our children could be placed in harms way if this dam becomes polluted!! Please Please start at the Beaver Run Dam to monitor the progress of this well!! (49)

Response: This comment is beyond the scope of this rulemaking.

Comment: Well documents (Permit Applications, Reports, Waivers, etc.) should be posted on the DEP webpage, in a database easily used by the public. (1980)

Response: This comment is beyond the scope of this rulemaking.

Comment: We are off of 286 and our roads cannot withstand that kind of traffic! (I don't understand where people think this is bringing jobs to our state when they are bringing outsiders to drill!) (49)

Response: This comment is beyond the scope of this rulemaking.

Comment: I am surrounded by smaller rural acreages all of which are owned by non-resident, short term landowners and all of whom are leased as far as I know. I have recently learned that a new proposal by gas companies called "fair pooling" would require me to lease if more than half of my neighbors are leased. This proposal is not fair to landowners like my family who have nurtured their lands for many years and who now must submit to the dictates of people who have never cared for the land and whose only ambitions are for the short term financial gain. Once leased these people frequently put their land up for sale and wash their hands of the environmental desecration they have wrought. (54)

Response: This comment is beyond the scope of this rulemaking.

Comment: State revenue in the form of a tax on natural gas drilling should not be a part of the state budget now or in the future until the safety of PA's environment, particularly the water supply, public and private, is guaranteed. In addition to the protection of the water supply, I am concerned about many of negative impacts that natural gas drilling has been documented to have on public health, including air and noise pollution, wildlife, and destruction of our beautiful environment. Please evaluate and weigh the benefits and the potential negative impacts of expanding natural gas drilling in PA and make wise decisions before it's too late. Thank you for allowing me to voice my opinion. (65) (85)

Response: This comment is beyond the scope of this rulemaking.

Comment: All wells & operations should be taxed on their output and pay mandatory quarterly charges for the quarterly inspections – no exceptions, the operators should also have annual licenses that are dependant on the results of the quarterly inspections. If the well fails two inspections in one year, no further renewal of the license is possible as the well is judged unsafe and the operator not in compliance as it is obvious that they did not remedy the problems with their well when they were given a chance. The inspection program is to be funded by the annual license fee, the inspection fee and the taxes. (69)

Response: This comment is beyond the scope of this rulemaking.

Comment: Did you ever just sit back and just think that maybe you should not impose an extraction tax and let the companies use those monies to improve on what you are asking them to accomplish. The state and the US government collect enough monies from all the people who have had jobs thanks to the newly found gas. Stop being so greedy and trying to gouge everyone who is making a dollar from this. It just seems that those who don't make anything are the biggest cry babies and those who can impose a tax just because they want to are the biggest rip offs. The government is of the people and for the people, I think. Well, you get the message. Stop trying to make your pockets fatter than what they are. It's about time that you, the politicians, stop stealing from everyone. You know who you are and you know that someday you will be paid back for all that you do wrong. I believe in Karma and it will take care of all the wrong doers in our government. I was asked if I had a "Don't tread on me flag" in my front yard. Well, I think I'll get one. It's time to put a stop to all the crookedness and fix what's really wrong in our state. He'll be gone soon but not soon enough. If you don't like what I have to say or don't agree with me then prove me wrong and I'll keep my opinion quiet. Until then I will continue to show my dislikes of all that you have tried to do or have done. If there is something that can make the well drilling a even a little safer than it already is then I approve of it. Just stop making people lose money for your gains. YOU KNOW WHO YOU ARE!!! (73)

Response: This comment is beyond the scope of this rulemaking.

Comment: We must have a severance tax on this production. These companies have come pouring into Pennsylvania to take advantage of the fact that we are foolish enough to not have a severance tax. (92) (1850) (1872) (1877)

Response: This comment is beyond the scope of this rulemaking.

Comment: Large trucks used in this endeavor ruin roads. The gas well operators should be taxed heavily enough to repair / replace any road damage that occurs due to their heavy usage. (33)

Response: This comment is beyond the scope of this rulemaking.

Comment: The money any tax can generate is considerable and should not be a token-tax. Thank you for considering my comments and for pete's sake, don't let the 2005 Cheney Loophole destroy our Commonwealth! I really like living here. (37)

Response: This comment is beyond the scope of this rulemaking.

Comment: I am opposed to any further drilling permits until the environmental impact of hydraulic fracturing be FULLY studied and decisions made regarding its risks to the health of citizens and to the environment. We certainly need stronger, updated regulations, and to keep them away from our water supplies. I am also opposed to all drilling on state lands. These lands have been set aside for the enjoyment of our citizens, present and future, and should be protected from business interests. (38) (46) (65) (66) (92) (889) (904) (905) (914) (1850) (1885) (1886) (1897) (1901) (1822)

Response: This comment is beyond the scope of this rulemaking.

Comment: No new gas wells should be permitted for 5 or more years until the effects of the new and stringent regulations of gas wells can be evaluated to make sure that there are no negative impacts on the environment, water contamination and possible explosions as we are dealing with now.(69) (888)

Response: This comment is beyond the scope of this rulemaking.

Comment: There should be no drilling in the Delaware River Water Basin. The permits for exploratory wells, previously granted, should be suspended until such time as safeguards can ensure that there will be no threat to the groundwater. Scientists tell us that there is no guarantee that contaminated groundwater cannot travel upward and contaminate our water source. (902) (915-919)

Response: This comment is beyond the scope of this rulemaking.

Comment: I believe the new regulations for gas extraction for the Marcellus shale is a positive step, but would urge the state to stop the practice of "fracking" altogether, until a legitimate impact assessment can be completed. There is too much at stake in the Delaware River watershed to allow for this type of intensive gas extraction. (90) (1847)

Response: This comment is beyond the scope of this rulemaking.

Comment: Finally, in terms of omission, the League would like to suggest inclusion of noise regulation in terms of drilling and mining operations. On the DEP website noise is listed as a hazard and problem of mining. It states:
Noise can also be a nuisance to nearby residents. There are several noise-reducing strategies that the operator can take advantage of to lessen the effect. Often noise complaints are brought up during public meetings. While the DEP does not have very specific regulations on noise, we cooperate in helping the operator satisfy the surrounding residents.
Noise, created by natural gas production, is an issue. Statewide standards need to be developed and apply in all stages of the process from exploratory work to transportation. Special emphasis must be put on noise in close proximity of homes, businesses, schools, hospitals, nursing homes, and places of worship. Noise complaints, particularly those of low frequencies, need to be documented and mitigated. (93)

Response: This comment is beyond the scope of this rulemaking.

Comment: Agree that no 'non-disclosure agreements' will be required of landowners or residents and that any such agreements already signed on behalf of permit holder or its contractors are null and void; (1425)

Response: This comment is beyond the scope of this rulemaking.

Comment: Would the state provide insurance (similar to federal flood insurance) that shale drilling or fracking activity will not endanger my well water and if, in the remote case it does degrade my water supply, provide for city water hookup and cover the difference in cost between what it costs me to use my well (well maintenance, well pump depreciation and electric usage) and the cost of delivery of city water. (52)

Response: This comment is beyond the scope of this rulemaking.

Comment: Pitless or closed loop drilling systems should be required when the operations at deep high pressure well sites are within 1,000 feet of SURFACE WATER, PRIVATE WATER WELLS and PUBLIC WATER SUPPLIES. (1879)

Response: This comment is beyond the scope of this rulemaking.

Comment: Flowback and stimulation fluids should be contained within tanks that are placed on a well pad or in an area with perimeter berm construction. Pit level indicators should be required. (1879)

Response: This comment is beyond the scope of this rulemaking.

Comment: If a deep high pressure well falls within a high density area all pumps, pits, wellheads and production facilities should be adequately fenced to restrict access by unauthorized persons. (1879)

Response: This comment is beyond the scope of this rulemaking.

Comment: For security purposes, all equipment used in the operation of a completed well should be surrounded by a fence six *(6)* feet in height, constructed to conform with local written standards. (1879)

Response: This comment is beyond the scope of this rulemaking.

Comment: Cost for repair of local roads would be shared by companies with wells in the area. Repair and upkeep of roads would be shared based on proportion of use. Proportion of use would be determined by Penn Dot engineers and would be paid annually directly to Penn Dot as a prerequisite for operating a well. (1868)

Response: The suggestion is outside the scope of this rulemaking.

Comment: Significantly large bonds should be issued before wells are drilled that would cover cleanup of local issues as well as contamination. Liability for bonds should be issued by the owning companies, not the small development company, so liability for problems can be remedied at the owning company level. In my opinion, a bond should be issued based on the local population density or location of the drill near to safe drinking water, reservoirs, or local tributaries. I also think oversight of bonds should be held at the local county level. To require more local oversight and accountability bonds would be held by a series of trustees or an board of oversight at the county level. A board of oversite per county would be established that oversees administration of the bonds, operation of the wells, and testing that refunding of the bond based on milestones and cleanup targets set at the state level. Bonds would not be returned to the extraction company until a set number of years after the well is capped/completed or for a set number of years without accidents. (1868)

Response: The suggestion is outside the scope of this rulemaking.

Comment: Local property owners should benefit. Taxes and standards should be set by the state. Minimizing local tax boards additional taxes and standards will make the entire state an even playing field. It will minimize pressure by local municipalities to 'compete' by 'dumbing down' laws and standards. Taxes should not be so high that the local landowner gets little-to-nothing but that they also

benefit in the leases. Local taxing municipalities should be limited in adding additional extraction taxes so that the local state focus can remain on hitting a state-level tax or clean water standard and not get improperly focused on competing between municipalities to increase local tax revenue. (1868)

Response: The suggestion is outside the scope of this rulemaking.

Comment: Drilling in the area of an abandoned orphan well or a well plugged using procedures and standards less protective than those detailed in this revision of 78.9~, 78.93, 78.94, and 78.95.

An operator proposing to drill a well within one mile of an abandoned or orphan well or a well plugged using procedures less protective than those detailed in this revision of 78.92-78.95, shall forward by certified mail a copy of the well location plat showing the location of the abandoned, orphan, or previously plugged well, the drilling, casing and cementing plan for the new well and the anticipated date drilling will commence to the Department and shall submit proof of notification to the Department with the well permit application. The operator will be subsequently required to provide to the Department the well record of the abandoned or orphan well or previously plugged well. Upon request of the Department, the operator will be required to assess the orphan, abandoned, or previously plugged well for mechanical integrity, defective casing or cementing, and excess pressures and provide this assessment to the Department. The Department will determine the appropriate prerequisites to drilling the new well, which may include the plugging of the orphan or abandoned well utilizing current standards as specified in 78.92-78.95, or may specify repair/re-plugging requirements for the previously plugged well which must occur prior to the drilling of the new well.

I previously submitted the above proposal for 78.77 in my comments to advance rulemaking. I am resubmitting it now because I feel that the Department's response to my concern about communication with a legacy gas well is insufficient to protect the fresh water supplies of the Commonwealth from gas migration. Basically, the Department's plan to deal with communication with an old gas well causing gas migration is to shut down the new well after the gas migration happens. This strategy is totally reactive, not proactive. It is the proverbial closing of the barn door after the cows get out. We, the people of PA need a proactive stance to the issue of gas migration caused by communication with older, legacy wells. We are not willing to accept the approach proposed by the Department which will cause our private water supplies to be contaminated by methane, and our houses to be uninhabitable. The Department has reviewed page after page of case studies indicating that these legacy wells are an issue. The Department should not permit the drilling of new Marcellus wells in the vicinity of legacy wells if it is not willing to issue regulations requiring the assessment, plugging, repair or other followup actions on legacy wells.

Based on my review of the data on the DEP's website, Bradford County PA has 23 inactive, previously plugged wells. In addition, there are three abandoned or orphan wells which need to be plugged in Bradford County. In some areas of the states, the number of inactive, previously plugged wells and abandoned or orphan wells is even higher. These wells create a serious gas migration risk to the rural private water supplies, and safety~ of Bradford County and PA residents as new Marcellus wells are drilled in the vicinity of these legacy wells. An example of this is the Harold W. Lundy 1 OG Well (13413) last inspected/plugged in 1991. In my comments to advance rulemaking I discussed this legacy well and the very nearby Lundy 2H well which was at that time permitted. Five months have passed, and the Lundy 2H well has now been drilled, spud as of 5/13/10 API # 015-20556. It has not yet been hydrofractured. I am hoping for the best, but fear the worst. There are no regulations in place to minimize the chance of a communication event happening when the Lundy 2H is fraced. If gas migration happens in the vicinity of this well, I will consider both Chesapeake and the DEP responsible,

since the DEP had advance knowledge of the concern provided to them on multiple occasions in writing, and has chosen to refrain from promulgating regulations restricting gas drilling near legacy wells, or proactively requiring conditional assessments of said legacy wells first. We urgently need a regulation concerning drilling and fracing near legacy wells. (1863)

Response: The Board understands the commentator's concern about drilling in close proximity to abandoned or orphan wells. The focus of this rulemaking is revising the cementing and casing standards. As the Department moves forward with other rulemakings associated with the Oil and Gas program, the well plugging program as a whole will be examined and revised as necessary.

Table of Commentators for the Environmental Quality Board Rulemaking #7-459

1. William MacLuckie
2. Leslie Meeder, Muncy, PA
3. Carol Rubin, Media, PA
4. Joan Mosey, Pittsburgh, PA
5. Richard Martin, Boiling Springs, PA
6. Henry Frank, Philadelphia, PA
7. James Moritz
8. Jeanette MacNeille, Millbourne, PA
9. Lucy Goshow, Forksville, PA
10. Cindy Craddock, Muncy, PA
11. Elizabeth Young, Benton, PA
12. Nancy Cleaver, Lewisburg, PA
13. Erin Roush, Williamsport, PA
14. Lauren Litwa Holden, Trout Run, PA
15. Louisa Stone, Williamsport, PA
16. Les Bacsujlaky
17. Marilyn Kepner, Hughesville, PA
18. Steve Szoke
19. Rich Bowers, Millerton, PA
20. Megan Huntington, Benton, PA
21. Kenneth Meyer, Wellsboro, PA
22. Sara Welshans, Linden, PA
23. Judith Marvin, Lewisburg, PA
24. Terry Wright, Williamsport, PA
25. Robert Myers, Lock Haven, PA
26. Dodie Lovett, Dalmatia, PA
27. Betsy Morgan, Burr Oak, MI
28. Thom Holden
29. James Nevins, Renovo, PA
30. Sandra Lloyd, Boyertown, PA
31. William Epting, Pittsburgh, PA
32. Marcia Bonta, Tyrone, PA
33. Bill Moutz, Verona, PA
34. Richard Rupert, Hughesville, PA
35. Karen Scarince, Benton, PA
36. Karen Kosheba, Sharon, PA
37. Eleanor Haws, Transfer, PA
38. Pete Largey
39. Joe Graff, Williamsport, PA
40. Susan Norris, Harrisburg, PA
41. Jere Rentzel, Williamsport, PA
42. Nancy McCaughey, Wellsboro, PA
43. Sam McCaughey, Wellsboro, PA
44. Bridget Sinneway, Pittsburgh, PA
45. Nancy Page, Pittsburgh, PA
46. Michell'e Boice, Harveys Lake, PA
47. Rosemary Hennessy, Pittsburgh, PA
48. Nancy Russell
49. Janice Walter
50. Rudolph Kafer, Montoursville, PA
51. Joseph DuPont, Towanda, PA
52. John Daukas, Doylestown, PA
53. Rich Bowren
54. Greg
55. Richard Liebert, Eagles Mere, PA
56. Catherine Noreika, Falls, PA
57. Bernard Survil, Greensburg, PA
58. Len Lichvar, Somerset, PA
59. Walter Sanders, Mansfield, PA
60. Carol Kafer, Montoursville, PA
61. John Rothschild, Harveys Lake, PA
62. Branden Diehl, Alexandria, PA
63. R. John Dawes, Alexandria, PA
64. Todd Oiler, Doylestown, PA
65. Cora Jean Zbozien, Stewartstown, PA
66. Douglas Quint, Pittsburgh, PA
67. Robert Stanfield, Pipersville, PA
68. Irene Cavatore
69. Maria Fell
70. Elsa Petersen
71. Tom Howland, Pipersville, PA
72. Marjorie Priceman, Lewisburg, PA
73. RESERVED
74. William Mann, Doylestown, PA
75. Jack Miller, Middleburg, PA
76. Betty Orlemann, Pipersville, PA
77. Michael Braun, Doylestown, PA
78. Karen Budd, Erwinna, PA
79. Jerry Orbino
80. Ted Trostle
81. RESERVED
82. Nancy Morrill, Newtown, PA
83. Howard McGoldrick, Bristol, PA
84. RESERVED
85. Judy Shock, Pittsburgh, PA
86. Michael McCann
87. Park Furlong
88. Marge Calvanese
89. David Sooy, Pipersville, PA
90. Matt Balitsaris, Pipersville, PA
91. Mark Killar, Blairsville, PA
92. James Menegazzi, PhD, Pittsburgh, PA
93. Sue Broughton, Harrisburg, PA
94. Dawn Cervellino
95. Nick Domiano
96. Kevin Green, PHA, Doylestown, PA

97. Patrick Baechle, Hollidaysburg, PA
98. L. Reder, Pittsburgh, PA
99. Stephen Kelly, Morrisville, PA
100. Cosette Cornelius-Bates, Pittsburgh, PA
101. Karen Vasily, Audobon, PA
102. Juanita Jobst, Mansfield, PA
103. Linda Hurlock, West Chester, PA
104. Abby Resnick, Pittsburgh, PA
105. Harriette Carlisle, Pittsburgh, PA
106. John Moyer, Pittsburgh, PA
107. Brenda Rydstrom, Bryn Alhyn, PA
108. Judie Much, Ottsville, PA
109. Julia White, Bala Cynwyd, PA
110. Larry Heidenreich, Pittsburgh, PA
111. Kathleen Dunlap, Bradfordwoods, PA
112. Darcie Sinsiline, Oakdale, PA
113. John Gavazzi, Mechanicsburg, PA
114. Charles Smith, Pittsburgh, PA
115. Teri Dignazio, Oxford, PA
116. Nicole Green, Philadelphia, PA
117. Martha Loerke, Yardley, PA
118. Nancy Bernard, Dingmans Ferry, PA
119. Emma Reuschel, Philadelphia, PA
120. Leslie Goldsmith, Media, PA
121. Rachel Corey, West Grove, PA
122. Garrett Albanesius, Philadelphia, PA
123. RESERVED
124. James Burks, Wyndmoor, PA
125. Patricia Hansel, Oreland, PA
126. Chris Belinda, Port Matilda, PA
127. Phyllis Reinhardt, Scranton, PA
128. Ian Finch, Pittsburgh, PA
129. Moshe Sherman, Pittsburgh, PA
130. Michael Lebron, New York City, NY
131. Carl Mozeleski, Scott Township, PA
132. Nils Stannik, Doylestown, PA
133. Joy Boonin, Swarthmore, PA
134. Julie Krug, Philadelphia, PA
135. Jacqueline Owens, Palmyra, PA
136. Rich Seymour, Montrose, PA
137. Susan Miller, Ambler, PA
138. Dennis McMichael, State College, PA
139. Amelia Ni, Philadelphia, PA
140. C A Dougherty, Media, PA
141. Wayne Michael, Nescopeck, PA
142. Erica Middleton, Pinedale, PA
143. Kim Fickes, Lemoyne, PA
144. Susan Warren, Morris, PA
145. John Feissel, Philadelphia, PA
146. Boyd Maits, Radnor, PA
147. Sidne Baglini, Newtown Square, PA
148. Yuri Rozman, Yardley, PA
149. Elizabeth Matlock, Swarthmore, PA
150. Christine Pilotti, Phoenixville, PA
151. Christopher Stewart, New Ringgold, PA
152. Leah Zerbe, Pine Grove, PA
153. Tammy Razzano, Reading, PA
154. Max Leake, Verona, PA
155. Charles Younger, Dushore, PA
156. Tom Simpson, Lancaster, PA
157. Lori Martino, Pittsburgh, PA
158. Adam Zion, Philadelphia, PA
159. Michael Belshe, Pittsburgh, PA
160. Troy High, Reading, PA
161. Patricia McBee, Philadelphia, PA
162. Juliana Flower, Swarthmore, PA
163. Mark Mishkin, Philadelphia, PA
164. Jamaal Frazier, Philadelphia, PA
165. Marion Yoder, Mechanicsburg, PA
166. Emily Petrucci, Media, PA
167. Alex Camara, Philadelphia, PA
168. Barbara Fleming, Belle Vernon, PA
169. Vincent Campanaro, Philadelphia, PA
170. Steve Root, Milan, PA
171. Cathy Cremona, Philadelphia, PA
172. Robert Sroufe, Blawnox, PA
173. Ric Jkl, Leeds Point, NJ
174. Lilian Benedict, Huntingdon Valley, PA
175. Lyn Desilets, Wayne, PA
176. Stacey Lane, Mechanicsburg, PA
177. Chryslene Rebeiro, Philadelphia, PA
178. Marilyn Doan, Hummelstown, PA
179. Robin Dillman, Plymouth Meeting, PA
180. Robert Gelfand, Philadelphia, PA
181. Thomas Reel, Oil City, PA
182. Grace Tan, Haddonfield, NJ
183. Steve Karas, Forest Hills, PA
184. John Hallenburg, North East, PA
185. Louise De Simone, Damascus, PA
186. Emily Lubahn, Erie, PA
187. John Leitel, Pittsburgh, PA
188. Jason Berteotti, Canonsburg, PA
189. Elizabeth Ploran, Pittsburgh, PA
190. Greg Stoever, Pittsburgh, PA
191. Susan Hartman, Germansville, PA
192. Nancy Dart, Mansfield, PA
193. Cathie Forman, Southampton, PA
194. Brian Breczinski, Lewisburg, PA
195. Linda Bien, Philadelphia, PA
196. Mary Knudson, Venetia, PA
197. Patrick Johnson, Philadelphia, PA
198. Carlee Hashagen, Bethlehem, PA
199. Karen Mcloskey, Philadelphia, PA
200. Amanda Rylan, Wayne, PA
201. Azadeh Block, Pittsburgh, PA
202. Mary Ann Ahearn, King of Prussia, PA

203. John Golden, Slippery Rock, PA
204. Linda Hansell, Philadelphia, PA
205. Katrina Brink, Pittsburgh, PA
206. Stanley Pendze, Philadelphia, PA
207. Katherina Lopez, Lansdowne, PA
208. Justine Jacobs, West Chester, PA
209. Samuel Martin, Philadelphia, PA
210. Charles Leiden, Altoona, PA
211. Olivia Brubaker, Philadelphia, PA
212. Scott Deardorff, Philadelphia, PA
213. Parker Trow, Oakmont, PA
214. Pat Lupo, OSB, Erie, PA
215. Diana Husanu, Philadelphia, PA
216. Sharon Armstrong, Fort Washington, PA
217. John Garrison, New Wilmington, PA
218. Dayna Peters, Princeton, NJ
219. John Linscheid, Philadelphia, PA
220. Gabriel Farrell, Philadelphia, PA
221. Mary Cellucci, Broomall, PA
222. Richard Whiteford, Downingtown, PA
223. Randall Steen, Media, PA
224. John Skibinski, Kintnersville, PA
225. Chase Parnell, Philadelphia, PA
226. Sean McGuinness, North Huntingdon, PA
227. Connie Freeman, Philadelphia, PA
228. Dorn Hetzel, State College, PA
229. Patricia Valle Muhilly, Media, PA
230. Christine Troutman, Erie, PA
231. Bill Weinheimer, Pittsburgh, PA
232. Diane McManus, Wyncote, PA
233. Michael Miller, Jr., Philadelphia, PA
234. Ai Mahoney, Wilkinsburg, PA
235. Pete Cooper, Honey Brook, PA
236. Margarita Rose, Kingston, PA
237. Scott Spencer, Philadelphia, PA
238. Geraldine Buck, Langhorne, PA
239. Jennifer Tober, Pittsburgh, PA
240. Gregory Pais, Trout Run, PA
241. Anny Ewing, Chester Springs, PA
242. Gayle Shisler, Doylestown, PA
243. Rodrica Tilley, Montrose, PA
244. Harry Leonard, Philadelphia, PA
245. Brenda Grove, West Chester, PA
246. Joel Platt, Pittsburgh, PA
247. Harris Fishkin, Doylestown, PA
248. Shawn Sweeney, Philadelphia, PA
249. Thomas Frantz, Lancaster, PA
250. Leslie Wolman, Oxford, PA
251. Brian Cox, Audubon, PA
252. Marjorie Rathbone, Bryn Mawr, PA
253. Geoffrey Patterson, Media, PA
254. Susan Patrone, Philadelphia, PA
255. Milly Gallick, Ruffs Dale, PA
256. Jacqui Delario, Philadelphia, PA
257. Daniel Shively, Indiana, PA
258. Stephanie Hawkins, Carlisle, PA
259. Kelly Riley, Hatfield, PA
260. Aubrey Bellezza, Lebanon, PA
261. Janice Caputo, Pittsburgh, PA
262. Ed McDade, Port Matilda, PA
263. Sondra Cholach, Bensalem, PA
264. Donna Klaput, Ford City, PA
265. MJ HawkSpirit Everhart, New Providence, PA
266. Eleanor Aversa, Philadelphia, PA
267. Jeanne Held-Warmkessel, North Wales, PA
268. Lana Fishkin, Bala Cynwyd, PA
269. Joyce Durkin, Mountville, PA
270. Marianna Sokol, Benton, PA
271. Alan Keenan, Philadelphia, PA
272. James Keenan, Lansdowne, PA
273. Nancy McCaughey, Wellsboro, PA
274. Nancy Rovin, Wynnewood, PA
275. Steven Schartup, Morrisville, PA
276. Kristy Warren, Morris, PA
277. Ellen Morton, New Kensington, PA
278. Laura Thiede, Lewisburg, PA
279. Philip Jones, Orefield, PA
280. Brian Gillin, Lafayette Hill, PA
281. Ellie Hyde, Dalton, PA
282. Lisa Daly, West Chester, PA
283. Mike Clarke, Pittsburgh, PA
284. Beatriz Kanterewicz, Pittsburgh, PA
285. Cynthia Jones, Warminster, PA
286. Tim Pearce, Pittsburgh, PA
287. Dave Schwartz, Drexel Hill, PA
288. Dorothy Cardlin, Yardley, PA
289. Joseph Mudd, Merion Station, PA
290. Charley Wittman, Allentown, PA
291. Neville Kallenbach, Philadelphia, PA
292. Beverly Maisey, Wyncote, PA
293. Jamie Caito, Pittsburgh, PA
294. Martha Christine, Bethlehem, PA
295. Kris Azzarello, Greensburg, PA
296. Gretchen Myers, Kittanning, PA
297. Sam Simon, Philadelphia, PA
298. Robert Brobst, Pottstown, PA
299. Cadence Anderson, Philadelphia, PA
300. Rena Liubelshe, Pittsburgh, PA
301. Scott Tyler, West Chester, PA
302. Bret Boyer, Philadelphia, PA
303. Roberta Kostick, New Britain, PA
304. Jeanine Vermillion, State College, PA
305. Cinzia Sevignani, Philadelphia, PA

306. Randy Moore, Beaver, PA
307. Gabrielle Casella, Lansdowne, PA
308. Michelle Robinson, Malvern, PA
309. Leigh Ann Jennings, Meshoppen, PA
310. Kathleen Tyner, Grove City, PA
311. Tanya Seaman, Philadelphia, PA
312. Cassie Paoli, Glenside, PA
313. Ruth Cary, Wallingford, PA
314. Lorraine Poore, Muncy Valley, PA
315. Stephanie McKenna, Glenside, PA
316. Thomas Nelson, Lansdowne, PA
317. Karl Hubert, Courtdale, PA
318. Joan Sage, Philadelphia, PA
319. Naomi Mindlin, Langhorne, PA
320. Vicki Eibner, Pocono Manor, PA
321. Daryl Dow, Hunlock Creek, PA
322. Christopher Selena, Stroudsburg, PA
323. Bryn Hammarstrom, Middlebury Center, PA
324. Kevin Ryan, Yardley, PA
325. Dale Kashner, Seven Valleys, PA
326. Barton Levenson, Pittsburgh, PA
327. Diane Pilch, Ambler, PA
328. Anil Venkatesh, Philadelphia, PA
329. Rodney Martin, Lititz, PA
330. Greg Pasquarello, Phoenixville, PA
331. Alice Seidel, Malvern, PA
332. Barbara Clutter, Prosperity, PA
333. Robyn Pennay, Kingsley, PA
334. KC Ellis, Apalachin, NY
335. Edith Naveh, Pittsburgh, PA
336. Jeanne Neylon, Gettysburg, PA
337. Patricia Robbins, Bryn Mawr, PA
338. Betty Cruz, Pittsburgh, PA
339. Kenneth Harper, Ridley Park, PA
340. Judy McAuley, Pittsburgh, PA
341. Mary Lowery, Norristown, PA
342. Lauren Randall, Winchester, MA
343. Judith Chiolo Pressman, Lafayette Hill, PA
344. Theodore Burger, Bethlehem, PA
345. Howard Pressman, Lafayette Hill, PA
346. Artemis Pappas, Phoenixville, PA
347. Kathy Morawski, Tyler Hill, PA
348. E. Robert Buzzell, DuBois, PA
349. Sherri Fryer, Clymer, PA
350. Peter Lynch, Berwyn, PA
351. Ralph Swanson, Maple Glen, PA
352. Donald Charles, Huntingdon Valley, PA
353. Wayne Robertson, Jones Mills, PA
354. Phyllis Anastasio Stackhouse, Dresher, PA
355. Philip Scranton, Philadelphia, PA
356. Jeffrey Campbell, Pittsburgh, PA
357. Kate Jamal, Philadelphia, PA
358. Massimo Cenciarini, Pittsburgh, PA
359. Schuyler Mclaughlin, State College, PA
360. Elliot Dale, Meadville, PA
361. Mark Garvin, Cheltenham, PA
362. Alan Peterson, Quarryville, PA
363. Flora Quevedo, Conshocken, PA
364. Bill Ridgeway, Scranton, PA
365. Anthony Capobianco, Bethel Park, PA
366. Gary Smith, Lancaster, PA
367. Stephen Nathan, Sellersville, PA
368. Margaret Hoos, Royersford, PA
369. George Benz, Wyndmoor, PA
370. Hilary Aquino, Lancaster, PA
371. Bryn Gahres, Cleona, PA
372. Charlotte Eckel, Avondale, PA
373. Boris Dirnbach, Philadelphia, PA
374. Edward Klevans, State College, PA
375. Nathan Russo, West Chester, PA
376. Judy Roberts, State College, PA
377. Gene Suski, Royersford, PA
378. Melissa Greenley, Harleysville, PA
379. Paul Parowski, Richfield, PA
380. Michael Carlin, Burgettstown, PA
381. Beverly Knoebel, Tamaqua, PA
382. Lea Stabinski, Blue Bell, PA
383. Debra Borowiec, New Kensington, PA
384. Francis Bertonaschi, Pittsburgh, PA
385. Ann Tilden, Doylestown, PA
386. Joseph Werzinski, New Hope, PA
387. Jonathan Nadle, Pittsburgh, PA
388. Helen Wachter, Pittsburgh, PA
389. Carol Schramke, Pittsburgh, PA
390. Nathan Long, Philadelphia, PA
391. Loreda Everett, Starrucca, PA
392. Freda Egnal, Philadelphia, PA
393. Diane Townsend, Milanville, PA
394. Vivianne Nachmias, Philadelphia, PA
395. N. Rosechild, Philadelphia, PA
396. Mary Pat Mengato, Pittsburgh, PA
397. Kristin Lorent, Philadelphia, PA
398. Joanne Kundrat, Philadelphia, PA
399. Edward Schultz, Elkins Park, PA
400. Jan Jack Milburn, Ligonier, PA
401. Phillip Thomson, Bethel Park, PA
402. Michael Peale, Aston, PA
403. Jane Eisenstein, Philadelphia, PA
404. Andrew Ciampa, Swarthmore, PA
405. Trudy Gerlach, Wyalusing, PA
406. John Hoover, Easton, PA
407. Gina Calfo, Pittsburgh, PA
408. Michele Thomas, Hunlock Creek, PA

409. Caitria Gunter, Philadelphia, PA
410. Greg McGarvey, Levittown, PA
411. Susan Carroll, Lake Ariel, PA
412. Zac Wuscher, Kempton, PA
413. Kathy Johnston-Keane, Pittsburgh, PA
414. Cheryl Graff Tumola, Wayne, PA
415. Ellen Perchonock, Haverford, PA
416. David Thomas, Hunlock Creek, PA
417. Mary Daub, Williamstown, PA
418. Frederick Rosen, Ambler, PA
419. Kathleen Hoover, Boothwyn, PA
420. Abigail Myers, Weatherly, PA
421. Mike Dellapenna, Malvern, PA
422. Cynthia Bauer, Pittsburgh, PA
423. Sophia Bender, Coraopolis, PA
424. Rebecca Obleski, Austin, PA
425. Byron Varvarigos, Wynnewood, PA
426. Iona Conner, Shade Gap, PA
427. Frank Polites, Aston, PA
428. David Plank, New Milford, PA
429. Barbara Koester, Philadelphia, PA
430. Jenni Tarner, Philadelphia, PA
431. Diana Hershberger, State College, PA
432. Shamita Gupta, Springfield, PA
433. Muzz Meyers, Pittsburgh, PA
434. Anne Ryan, Susquehanna, PA
435. Frank Ryan, Susquehanna, PA
436. Verlyn Hays, Mechanicsburg, PA
437. Naoni Lokoff, Dresher, PA
438. Ken Gish, Pipersville, PA
439. Linda Schmidt, Gibsonia, PA
440. Bernie Handler, Damascus, PA
441. Joanna Groebel, Reading, PA
442. Joan Book, Shrewsbury, PA
443. David Meiser, Pipersville, PA
444. Rolf Radicke, Bristol, PA
445. Deb Frederoski, Ridgway, PA
446. Karen Giles, Portage, PA
447. Kristin Groenveld, Philadelphia, PA
448. Lambros Theofanidis, Philadelphia, PA
449. John Leonard, Monaca, PA
450. Joanne Feldman, State College, PA
451. Debrin Goubert, Sewickley, PA
452. Eric Lauser, Quakertown, PA
453. Melissa Rohm, Pittsburgh, PA
454. Suzanne Staggenborg, Pittsburgh, PA
455. Sally Eisenberg, Philadelphia, PA
456. William Feldman, Gaithersburg, MD
457. Peter Ryan, Coudersport, PA
458. Laura Fake, Womelsdorf, PA
459. Devin Greco, Norristown, PA
460. Chris Cassidy, Bethlehem, PA
461. Elizabeth Williams, Susquehanna, PA
462. Jennifer Briggs, Pittsburgh, PA
463. Harry Hochheiser, Pittsburgh, PA
464. Stephen Ratko, Elkins Park, PA
465. Dieter Rollfinke, Carlisle, PA
466. Mark Hirschman, Gladwyne, PA
467. Jon Levin, Macungie, PA
468. Jeff Alper, Elkins Park, PA
469. Nancy Tashman, Pittsburgh, PA
470. Carolyn Auwaerter, Malvern, PA
471. Tina Kichline, Pen Argyl, PA
472. Debra Schaffer, Perkasie, PA
473. Nathaniel Smith, West Chester, PA
474. Linda Trevino, Port Matilda, PA
475. Scott Wentzel, Saint Clair, PA
476. Linda Murray, Mansfield, PA
477. Ben Mainwaring, Philadelphia, PA
478. Susan Plubell, Clearfield, PA
479. Barbara Brigham, Philadelphia, PA
480. Kristen Harkness, Pittsburgh, PA
481. Sarah Anderson, Imperial, PA
482. Beth Dennis, Howard, PA
483. Dorene Schutz, Wilkes-Barre, PA
484. Tim Bizzaro, Port Allegheny, PA
485. Michael Rhodes, Seven Valleys, PA
486. Molly Williams, Columbia Cross Roads, PA
487. BJ Novack, Easton, PA
488. Sabrina Kirby, Lewisburg, PA
489. Robert Kingsbury, Philadelphia, PA
490. Sandra Cundiff, Equinunk, PA
491. Don St. John, Bethlehem, PA
492. Jennifer Edison, Athens, PA
493. Lisa Leshinsky, Mars, PA
494. Deborah Gouge, Pittsburgh, PA
495. Anne O'Donnell, Philadelphia, PA
496. Charles Grant, Hatboro, PA
497. Jeanne Sheats, Pittsburgh, PA
498. Brian Kroener, Morgantown, PA
499. Poune Saberi, Philadelphia, PA
500. Fatima Rahman, Philadelphia, PA
501. Cindy Black, Easton, PA
502. Sherry Connor, Roulette, PA
503. Terry Sefcik, Pittsburgh, PA
504. Valerie Dorn, Folcroft, PA
505. Wayne Laubscher, Lock Haven, PA
506. Melissa Chisena, Philadelphia, PA
507. Lisa LaLena, Warminster, PA
508. Charron Parola, Stroudsburg, PA
509. Chris Hart, Bethlehem, PA
510. Lee Simerman, Philadelphia, PA
511. David Schogel, Philadelphia, PA
512. Tracy McCarron, Avondale, PA
513. Marian Nasuti, Philadelphia, PA

514. David Dunkleberger, Doylestown, PA
515. Alexander Denadai, West Chester, PA
516. Edward Thornton, Swarthmore, PA
517. George Keszeli, Ardmore, PA
518. Susan Mucha, Crafton, PA
519. Robert Campbell, Damascus, PA
520. Veronica Harris, Aspinwall, PA
521. Karen Donofrio, Philadelphia, PA
522. Anna Gallo, Bethany, PA
523. Susan Constantine, Dalton, PA
524. Peter Paulsen, West Chester, PA
525. Eric Wagner, Harleysville, PA
526. David Wasilewski, Hunlock Creek, PA
527. Bruce Fink de Beaufort, McKees Rocks, PA
528. Alexandria O'Neill, Wynnewood, PA
529. Jason Gulvas, DuBois, PA
530. Jean Lubonovich, Franklin, PA
531. Jane Branyan, Marysville, PA
532. Lisa Scherer, Marianna, PA
533. Dave Gaviglia, Cranberry Township, PA
534. Barbara Likens, Yardley, PA
535. Erika Long, Pittsburgh, PA
536. Rosemary Hally, Philadelphia, PA
537. Barbara Osada, Philadelphia, PA
538. Anita Behrman, Ambler, PA
539. Jean Forsberg, Julian, PA
540. Kate Shapero, Philadelphia, PA
541. William Hance, Media, PA
542. Stephen Mahle, North Wales, PA
543. James Costello, Montrose, PA
544. Lee Painter, West Chester, PA
545. Lillian Garfinkel, Merion Station, PA
546. Kelly Wong, Philadelphia, PA
547. Sue Taylor, Eagleville, PA
548. Dennis Mankin, Solebury, PA
549. Gregory Smith, Columbia Cross Roads, PA
550. Corrine Mangan, Carlisle, PA
551. Robert Hunberson, Jr., Swissvale, PA
552. RESERVED
553. Anne Hearn, Pottstown, PA
554. Craig Aurand, Lock Haven, PA
555. William Granche, Ridgway, PA
556. Wilson Bear, Austin, PA
557. Valeria Duran, Philadelphia, PA
558. Robert Parr, Doylestown, PA
559. Josephine Fitts, Rosemont, PA
560. Laurie Strong, Philadelphia, PA
561. Alison Letzkus, West Chester, PA
562. Brian Cope, Indiana, PA
563. Edwin Tyrrell, Willow Grove, PA
564. Shada Sullivan, Huntingdon Valley, PA
565. Cathy Romano, Washington Crossing, PA
566. Stefani Allegretti, Pittsburgh, PA
567. Clarke Blynn, Berwyn, PA
568. Kevin McLatchy, New Wilmington, PA
569. Esther Trovarelli, Philadelphia, PA
570. Melissa Tesauro, Havertown, PA
571. Otto Lehrbach, Alburtis, PA
572. Dianne Dillman, Merion, PA
573. Chad Shmukler, Philadelphia, PA
574. Hilary Auker, Denver, PA
575. Cynthia Bertrand Holub, Philadelphia, PA
576. Collette Plum, Rutledge, PA
577. Jane Al-mashat, Haverford, PA
578. Jillian Forschner, Murrysville, PA
579. Rachel Chaput, Dingmans Ferry, PA
580. Catey Burtness-Adams, Philadelphia, PA
581. Hillary Borzillo, Royersford, PA
582. Jay Sweeney, Dalton, PA
583. Karen Waltman, Millersville, PA
584. Janet Dougherty, West Chester, PA
585. Ian Springer, Elkins Park, PA
586. Helen Nadel, Swarthmore, PA
587. Robert Drummey, Collegeville, PA
588. Sara Nye, Philadelphia, PA
589. Joseph Schlener, Kingston, PA
590. Frank Weeks, Roulette, PA
591. Paul Smith, Lionville, PA
592. Holly Latterman, Pittsburgh, PA
593. Jack Thompson, Doylestown, PA
594. Brenda Byrne, Philadelphia, PA
595. Carolyn Freeman, Canonsburg, PA
596. Wayne Hansen, Julian, PA
597. Josh Zorich, Pittsburgh, PA
598. Ilona Meers, Phoenixville, PA
599. Kristin Karkut, Philadelphia, PA
600. Herb Engelsberg, Bala Cynwyd, PA
601. Ted Dillon, Philadelphia, PA
602. Andrea Groppe, Wayne, PA
603. Michael Cawley, Coatesville, PA
604. Therese Schumacher, Doylestown, PA
605. Chris Roche, Reading, PA
606. Mark DeWalt, Grove City, PA
607. Carole Kenney, King of Prussia, PA
608. Barbara Sonies, Narberth, PA
609. Eric Wolfe, Lebanon, PA
610. Scott Gilbert, North Wales, PA
611. J. Howard Cherry, Pittsburgh, PA
612. Sylvia Feldman, State College, PA
613. Kaitlin Clutter, Prosperity, PA
614. Arlene Strombert, Pittsburgh, PA
615. Barton Braun, Yardley, PA

616. Carol Adams, Langhorne, PA
617. Jessica Krow, Philadelphia, PA
618. Alex Balboa, Bel Air, MD
619. Ryan Dingman, Johnstown, PA
620. Diana Hulboy, Philadelphia, PA
621. Deb Wright, Kimberton, PA
622. Mary Fineran, Flourtown, PA
623. Linda Partridge, Scranton, PA
624. Natalie Simon, Wyncote, PA
625. Benjamin Baker, Philadelphia, PA
626. Ashley Nottingham, Altoona, PA
627. Ethan Boldt, Belmont Hills, PA
628. Miriam Parson, Pittsburgh, PA
629. Joe Veghts, Acme, PA
630. Shannon Quinn-Sheeran, South Abington Twp., PA
631. Frances Gilmore, Glenside, PA
632. Gean Bloss, West Chester, PA
633. Jack Hendricks, McConnellsburg, PA
634. Allison Saft, Melrose Park, PA
635. Sally Hammerman, West Chester, PA
636. Tara McFalls, Chester Springs, PA
637. Sky Pelletier, Kennett Square, PA
638. Susan Clarke-Mahoney, Thornton, PA
639. Dina Grasso, Philadelphia, PA
640. Carron Smith, Wilkes-Barre, PA
641. Stephanie English, Great Valley, PA
642. Bob Janusko, Bethlehem, PA
643. George Tartal, Pittsburgh, PA
644. Mary Lilja, Coudersport, PA
645. Barbara Clarke, Newtown Square, PA
646. Alex Bomstein, Philadelphia, PA
647. Robin Markle, Philadelphia, PA
648. Michelle Hoff, Kintnersville, PA
649. Christina Gubicza, Camp Hill, PA
650. Marge Opacki, Morrisville, PA
651. Daniel Estrada, King of Prussia, PA
652. Kathleen Horwatt, Hawley, PA
653. B De Bold, York, PA
654. Nancy Lutz, Pittsburgh, PA
655. Leslie Povich, Washington, PA
656. Rockwell Hoffman, Glenside, PA
657. Christopher Spencer, Philadelphia, PA
658. Jonathan Lubeck, Wynnewood, PA
659. Deborah Kogan, Philadelphia, PA
660. Paul Leitner, Philadelphia, PA
661. Sarah Caspar, Downingtown, PA
662. Tom Orlando, Altoona, PA
663. Linda Gundersen, Perkasie, PA
664. Christian Orduna, Miami, FL
665. Stephen Smith, Benton, PA
666. Kimberly Neely, Benton, PA
667. Diane Becker, Gillett, PA
668. Elizabeth Gladfelter, Bethlehem, PA
669. Alex Allen, Philadelphia, PA
670. John Rossi, Erie, PA
671. Diane Siegmund, Clarks Summit, PA
672. Graeme Thomson, Spring City, PA
673. Daniel Savini, Monaca, PA
674. Isabel Bohn, Philadelphia, PA
675. Priscilla Mattison, Bryn Mawr, PA
676. Peter Galloway, West Chester, PA
677. Joseph Mercurio, New Kensington, PA
678. David Allara, State College, PA
679. Stephanie Northrop, Pittsburgh, PA
680. Michael Lynn, Media, PA
681. Mark Langan, West Chester, PA
682. Bruce Freedman, Merion Station, PA
683. Bob Greenberg, Pittsburgh, PA
684. Jeannie Peake, Erdenheim, PA
685. Carol Braun, Rydal, PA
686. Elsa Russell Lichtenberg, Kennett Square, PA
687. Andrea Young, Muncy, PA
688. Kimberly Nelson, Doylestown, PA
689. Kimberly Clemens, Shillington, PA
690. Amy Golder-Cooper, Lewisburg, PA
691. Connie Conaway, Canonsburg, PA
692. Deanna Prine, Wexford, PA
693. Sheila Reilly, Berwyn, PA
694. Linda Koenigsberg, Philadelphia, PA
695. Emily McDonald, Scranton, PA
696. Mary Anne Rushlau, Jankintown, PA
697. Michael Eibner, Pocono Manor, PA
698. Jill Kirkstadt, Johnstown, PA
699. Mary Durando, Landenberg, PA
700. Michelle Warren, York, PA
701. Amanda Gleason-Mack, Philadelphia, PA
702. Ben Cohen, Philadelphia, PA
703. Jeff Cogshall, Doylestown, PA
704. Miriam Seidel, Pittsburgh, PA
705. Leslie Rolfe, Coudersport, PA
706. Jay Pressman, West Chester, PA
707. Rachel Ehrgood, Philadelphia, PA
708. Bettsy McCoubrey, Philadelphia, PA
709. David Minnich, Perkiomenville, PA
710. Brian Lively, Mt. Bethel, PA
711. Katy Kiefer, Allentown, PA
712. Linda Lester, Johnstown, PA
713. Elisa Pasles, Wayne, PA
714. Peter Tafuri, Fleetville, PA
715. Elizabeth Mednick, Philadelphia, PA
716. Erin Kling, New Cumberland, PA
717. Dennis Schaef, Meadville, PA
718. Michael Napolitano, Reading, PA

719. Michael Giacchino, Edgewater Park, NJ
720. Charles Hollister, Columbia Cross Roads, PA
721. Kris Rust, Pittsburgh, PA
722. Robert Waller, Philadelphia, PA
723. John Caulwell, Forksville, PA
724. Donna Klaput, Ford City, PA
725. Rachel Cohen, Abington, PA
726. Kelly Paine, Philadelphia, PA
727. Lisa Altman, Richboro, PA
728. Gladys Hunsinger, Austin, PA
729. Brenda Walsh, State College, PA
730. Ellis Baehr, Pittsburgh, PA
731. Jane Friedman, Philadelphia, PA
732. Sam Newbury, Pittsburgh, PA
733. Miriam Duff, Lansdale, PA
734. Donna McNamara, Pittsburgh, PA
735. Kate Angell, Pittsburgh, PA
736. George Claflen, Philadelphia, PA
737. Virginia McIntosh, Philadelphia, PA
738. Henry Frank, Philadelphia, PA
739. Robert Jenkinson, Brackney, PA
740. Claudia Rybski, West Chester, PA
741. Thomas Gerrity, Haverford, PA
742. Thomas MacKrell, Erie, PA
743. Doris Marsilio, Carnegie, PA
744. Juana Celia Djelal, State College, PA
745. Diana Kobus, Pittsburgh, PA
746. Irene Hill, Burgettstown, PA
747. Lindsay Repman, Williamsport, PA
748. Mary Polansky, Eighty Four, PA
749. Cindy Iberg, McAlisterville, PA
750. Ed Garrison, Susquehanna, PA
751. Martha Kirby, Philadelphia, PA
752. Fran Harkins, Munhall, PA
753. John Mayher, Mountainhome, PA
754. Allen Kroehler, Blacksburg, VA
755. Mark Schmerling, Bryn Athyn, PA
756. Brooke Shingler, Craftsbury, VT
757. Nancy Wells, Damascus, PA
758. Charles Yankel, Bridgeville, PA
759. James Kreider, Lititz, PA
760. Melissa Dougherty, Limerick, PA
761. Sherrill Franklin, West Grove, PA
762. Karen Kitabwalla, Allentown, PA
763. Tricia Satifka, Washington, PA
764. Joseph Rattman, Stroudsburg, PA
765. Anne Jackson, Morgantown, PA
766. Robert DuPlessis, Philadelphia, PA
767. Kimberly White, Pottstown, PA
768. Drew Hyman, State College, PA
769. Carol Gonzalez, Pittsburgh, PA
770. Jennifer LaMendola, Monongahela, PA
771. Ellen Smith, Montrose, PA
772. A. Brennan, Philadelphia, PA
773. Beate Salter, Wexford, PA
774. Denis Robitaille, Ligonier, PA
775. Judith Giddings, Wellsboro, PA
776. Rebecca Kondos, Pittsburgh, PA
777. John Carricato, Harrisburg, PA
778. Anne Caffee, Pittsburgh, PA
779. Katherine Thurston, Pittsburgh, PA
780. Ira Josephs, Rose Valley, PA
781. Heather Bracken, Bala Cynwyd, PA
782. Paul Brown, Pittsburgh, PA
783. Annette Gray, New Hope, PA
784. Lise Bauman, Philadelphia, PA
785. Alec Mento, Philadelphia, PA
786. Denise Dennis, Philadelphia, PA
787. CA Billett, Taylor, PA
788. Thomas Flynn III, Malvern, PA
789. Mary Beth Castillo, Steelton, PA
790. Janice McGrane, Flourtown, PA
791. L. Lawrence, Brackney, PA
792. Karen Swam, York, PA
793. Susan Davis, Bala Cynwyd, PA
794. Lauren Leonard, Philadelphia, PA
795. Allyson de Groat, Wayne, PA
796. Steve Sears, Hatboro, PA
797. Grace Watterson, Brookhaven, PA
798. T. Mitcham, Buellton, PA
799. Robert Snyder, Philadelphia, PA
800. Rebecca Golpe, Philadelphia, PA
801. Casey Aspin, Chester Springs, PA
802. May Ball, Gwynedd, PA
803. Betty Jo Critchfield, Pittsburgh, PA
804. Ann Wolf, San Francisco, CA
805. William Oswald, Chesterbrook, PA
806. Jamie Fredrick, West Homestead, PA
807. Diana Cerchio, Philadelphia, PA
808. M. Polanco, Swiftwater, PA
809. Victoria Gold, Philadelphia, PA
810. Caroline Cotugno, Croydon, PA
811. Marie Flynn, Collingdale, PA
812. Melinda Disque, Home, PA
813. Joleen Parker, State College, PA
814. Rochelle Fellman, Philadelphia, PA
815. Brynn Schmitt, Mansfield, PA
816. Ron Dolan, Doylestown, PA
817. Carole Sheesley, Southampton, PA
818. Paul Ferry, Milford, PA
819. Leonard Ferraro, Pittsburgh, PA
820. Travis Price, Wayne, PA
821. Philip Wirtz, Eldred, PA
822. Joan Mitchell, Bushkill, PA
823. Daniel Wolk, Narberth, PA

824. Andrea Botts, Downingtown, PA
825. Rhonda McClain, State College, PA
826. Jeffrey Bedrick, Newtown Square, PA
827. S. Rovin, Newtown Square, PA
828. Emily Pischke, Pittsburgh, PA
829. David Kronheim, King of Prussia, PA
830. Paco Verin, Media, PA
831. Jason Patent, Rutledge, PA
832. Marco Oviedo, Philadelphia, PA
833. Julia Dugan, Marysville, PA
834. Jay Harter, Susquehanna, PA
835. Christine Larson, Media, PA
836. Ilene Sternberg, West Chester, PA
837. Donna Leathers-Sonnenberg, Philadelphia, PA
838. Jon Brams, Exton, PA
839. J. Mitchell, New Castle, PA
840. Carl Bade, Pottstown, PA
841. Mark Leeson, Orwigsburg, PA
842. Emilie Allan, State College, PA
843. Joseph Dunleavy, Jersey Shore, PA
844. Kerry Stuparitz, Pittsburgh, PA
845. Linda Bean, Wernersville, PA
846. Emilie Allan, State College, PA
847. Joel Gehman, State College, PA
848. Amy Wilson, Philadelphia, PA
849. Peter Gottemoller, Glenside, PA
850. Stuart Beattie, Avondale, PA
851. Jessica Gutacker, Leola, PA
852. Jennifer Krouchick, Warminster, PA
853. Barbara Friedrich, Merion Station, PA
854. Jim Gagne, Phoenixville, PA
855. Kate Hughes, Allentown, PA
856. Barbara Knickerbocker, West Chester, PA
857. Eugene Aleci, Lancaster, PA
858. RESERVED
859. Jack Miller, Middleburg, PA
860. Celia Burns, Roslyn, PA
861. James Schrum, York, PA
862. Mary Corbett, Philadelphia, PA
863. Anne Keys, Collegeville, PA
864. Christina Campbell, Philadelphia, PA
865. Paula Kline, West Chester, PA
866. Ed Groff, Souderton, PA
867. Robert Cook, New Britain, PA
868. Stacey MacBride, Philadelphia, PA
869. Robert Emory, Bryn Mawr, PA
870. Leila Richards, Pittsburgh, PA
871. Dawn Keller, Salford, PA
872. Dixie White, Ashland, PA
873. Karin Spak, Yatesville, PA
874. James Beam, Lancaster, PA
875. Joan Strong, Coplay, PA
876. Elijah Tucker
877. David Trindle, New Hope, PA
878. James Wigal, Pittsburgh, PA
879. Diana Krantz, Bala Cynwyd, PA
880. John Palmer, Athens, PA
881. Stephen Kunz, Media, PA
882. Elizabeth Zeitlyn, Dalton, PA
883. Debra Siez, Deptford, NJ
884. Thomas Estilow, Philadelphia, PA
885. Deana Weaver, Dillsburg, PA
886. Jim Donovan
887. Christopher Daly, Rosemont, PA
888. John Nowak, Sr., Sweet Valley, PA
889. Gerald Kruth, Pittsburgh, PA
890. John Spiegel
891. Eve Marschark
892. Jim Biddick, Philadelphia, PA
893. Arlene Weeks, Doylestown, PA
894. Thomas Buser, Jr., Tidioute, PA
895. Donald Badorf, Mechanicsburg, PA
896. Florence Pyle, Downingtown, PA
897. Thomas Duck, Lewisburg, PA
898. Francine Carlini, Norristown, PA
899. Barbara VanHorn, Duncannon, PA
900. Rich Yanock
901. Kelly Bulko, Catawissa, PA
902. Norma Van Dyke, Philadelphia, PA
903. Richard Alliger, Wayne, PA
904. Janet Zweig
905. Cheri Brasseale
906. Jason Simon, Narrowsburg, PA
907. Frances Richard, Brooklyn, NY
908. Athena Kokoronis
909. J. Morgan Puett, Beach Lake, PA
910. Kara Dean-Assael, Beacon, NY
911. Susanne DesRoches, Brooklyn, NY
912. Mary Bingler, Doylestown, PA
913. RESERVED
914. Judah Catalan, Milanville, PA
915. Alyssa Greber, Brooklyn, NY
916. Moyra Davey, Narrowsburg, PA
917. William Keppel, Lakeview, NY
918. Jeremiah Clancy
919. Karen Smyth, Pond Eddy, NY
920. Carol Houser
921. Jack Haskell, Brooklyn, NY
922. Ines Love, Philadelphia, PA
923. Gary Thornbloom, Julian, PA
924. Deborah Goldberg, New York, NY
925. Mark Szybist, Esq., Williamsport, PA
926. Robert Heistand II
927. Shellie Northrop, Sayre, PA

928. Richard Torsell, Benton, PA
929. Lewis Leibowitz, Eagles Mere, PA
930. Kathleen Ann Scott, Williamsport, PA
931. Bill Albertini, Eagles Mere, PA
932. Nicole Karr, Benton, PA
933. Aaron Kolb, Williamsport, PA
934. Robert Liegel
935. Sherri Grasmuck
936. Joel Houser, Williamsport, PA
937. Thomas Lyman, Galeton, PA
938. Elizabeth Markevitch, Hoboken, NJ
939. Robert Esposito, Williamsport, PA
940. Jim Ely, Jersey Shore, PA
941. Sally Gross McLain, Woodbridge, VA
942. RESERVED
943. Alan Roberson, Media, PA
944. Charlie Gerlach
945. Craig Kaufman
946. Judy Roberson, Media, PA
947. Kate Albertini, Eagles Mere, PA
948. Tim Siftar, Philadelphia, PA
949. Hilary Long, Eagles Mere, PA
950. Glen Bannon, Newtown, PA
951. Kathy Scheible, Westfield, PA
952. Camille Orelli
953. Carol Ward, Ardmore, PA
954. Stephen Ryan, Wayne, PA
955. Robert Spahr, Eagles Mere, PA
956. Caleb Williams, Wellsboro, PA
957. John Eastlake, S. Williamsport, PA
958. Richard Rivers, Benton, PA
959. Anthony Cooper, Muncy Valley, PA
960. Eric Filipkowski, Williamsport, PA
961. Chad Stacks
962. Susan Faeder, Lewisburg, PA
963. Aaron Crist, Montoursville, PA
964. Cazella Goodall, State College, PA
965. Andrea Scarry, Eagles Mere, PA
966. John Slesinger, Windber, PA
967. Lindsey Howes, Trout Run, PA
968. Fred Weeman, Eagles Mere, PA
969. Jeff Porter, Williamsport, PA
970. Judith Trustone
971. Robert Lucas, Philadelphia, PA
972. Lauren Townsend, Philadelphia, PA
973. James Brown, Eagles Mere, PA
974. Daniel Fackler, Williamsport, PA
975. Sonya Chung, Tyler Hill, PA
976. John Woo, Tyler Hill, PA
977. Joyce Wilson, Montoursville, PA
978. Joan Gaul, Chevy Chase, MD
979. Joseph LeBlanc, Williamsport, PA
980. Mary Kalady, Exton, PA
981. Judith Marvin, Lewisburg, PA
982. Mick Piper-Smyer, Lewisburg, PA
983. Johnny Gaul, Chevy Chase, MD
984. Violet Gallagher, Lewisburg, PA
985. Ruth Ann Henry, New Columbia, PA
986. Thomas Shannon, Eagles Mere, PA
987. Jessamy James, Klingerstown, PA
988. Barbara Rost, Cogan Station, PA
989. Mary Jo Crowley, Easton, PA
990. Michael Shoup, Easton, PA
991. Allen Berfield, Coudersport, PA
992. Edwina Vauclain, Eagles Mere, PA
993. Holly Schadler, Eagles Mere, PA
994. Kevin Heatley, Hughesville, PA
995. Edward Pattock, Trout Run, PA
996. Mary Ann Pattock, Trout Run, PA
997. Judith Anderson, Lewisburg, PA
998. Amy Golahny, State College, PA
999. Susan Scott, Richmond, VA
1000. Richard Johnson, Wilmington, NC
1001. RESERVED
1002. Sandy Hannan, Troy, PA
1003. Karen Fry, Manheim, PA
1004. George Freeland, Eagles Mere, PA
1005. Rita Freeland, Eagles Mere, PA
1006. David Pulizzi, S. Williamsport, PA
1007. Susanne Hinrichs, Eagles Mere, PA
1008. Barbara Reeder, Eagles Mere, PA
1009. Leo Sewell, Eagles Mere, PA
1010. Adelaide Ferguson, Philadelphia, PA
1011. Vicki Solot, Eagles Mere, PA
1012. Evan Solot, Eagles Mere, PA
1013. Courtney Pinto, Eagles Mere, PA
1014. Connie McLaughlin, Williamsport, PA
1015. Richard James, Williamsport, PA
1016. Lina Abdul-Nabi
1017. Evangeline Krajewski
1018. Anne Rice, Williamsport, PA
1019. Maddie Dunlap, Williamsport, PA
1020. Gregory Pais, Williamsport, PA
1021. Joan Franco
1022. Meta Passannante, Picture Rocks, PA
1023. Sarah Ely, Jersey Shore, PA
1024. Larry Converse, Jersey Shore, PA
1025. Jeremy Kruger, Muncy Valley, PA
1026. Michael Orr, Knoxville, PA
1027. Wendy Griggs, Muncy, PA
1028. Alan Zuckerman, Philadelphia, PA
1029. Linda Kruger
1030. Richard Fletcher, Roaring Branch, PA
1031. Albert Preston, Laporte, PA
1032. Jane Preston, Laporte, PA
1033. Sheila Lunger, Unityville, PA

1034. Linda Orr, Knoxville, PA
1035. Kathleen Brownback, Eagles Mere, Pa
1036. Chris Bastress, Williamsport, PA
1037. Carol Durrwachter, Laporte, PA
1038. Jessica Ruhl
1039. Maureen Healy, Brooklyn, NY
1040. Karen Gardner, Lewisburg, PA
1041. Robert Taylor, Muncy, PA
1042. Eileen Downard, S. Abington Twp., PA
1043. Henry Long, III
1044. Priscilla Older, Gaines, PA
1045. Charlotte Weaver, Hughesville, PA
1046. Dean Baker, Eagles Mere, PA
1047. Elaine Mudrick, Eagles Mere, PA
1048. Susanne Wright, Williamsport, PA
1049. Elizabeth Cruse, Mill Hall, PA
1050. John Martin, Montoursville, PA
1051. Margaret Lauver
1052. Marc Lewis
1053. Gerald Arcuri, Benton, PA
1054. Cheryl Lee, South Park, PA
1055. Lucy Goshow, Forksville, PA
1056. Jon Bogle, Williamsport, PA
1057. Ned Roush, Williamsport, PA
1058. Jill Morrissey, Montoursville, PA
1059. Patricia Walls, Williamsport, PA
1060. Karen Hertzler, Montoursville, PA
1061. Josette Flannery, Williamsport, PA
1062. Jane Stahl, Cogan Station, PA
1063. Robyn Hannan
1064. Anne Rutledge, Eagles Mere, PA
1065. Donald Spector, Newtown, PA
1066. Thomas Mickle, Tyrone, PA
1067. Charles Staples, Ambler, PA
1068. Dana Setzer, Camp Hill, PA
1069. W. Scott Setzer, Camp Hill, PA
1070. Mike Rickels, Philadelphia, PA
1071. Anne Banse, Eagles Mere, PA
1072. Patti Phillips, Muncy, PA
1073. Elaine Lynah, Eagles Mere, PA
1074. Margarita Padin, Philadelphia, PA
1075. Susan Langmuir, Philadelphia, PA
1076. Caroline Estey King, Eagles Mere, PA
1077. David Leverenz, Eagles Mere, PA
1078. David Werner, Eagles Mere, PA
1079. Terry Wild
1080. Walter Conn, Villanova, PA
1081. Kathleen Sowiak, Newtown, PA
1082. Shawn Tracy, Villanova, PA
1083. John Landreau
1084. Peter Hodgson, Eagles Mere, PA
1085. Patrick Steinbacher
1086. Jonathan Butterfield, Williamsport, PA
1087. Elizabeth Graff, Eagles Mere, PA
1088. Anthony Ferro, Munch Valley, PA
1089. Susan Wells, Wyndmoor, PA
1090. Paul Clouser, Lancaster, PA
1091. Betsy Beaugard, West Chester, PA
1092. Larry Zutz, Eagles Mere, PA
1093. Deborah Reeder, Eagles Mere, PA
1094. Robert Klarsch, Eagles Mere, PA
1095. Susan Dahm, Eagles Mere, PA
1096. Jordan Scheff, Eagles Mere, PA
1097. Elizabeth Scheff, Eagles Mere, PA
1098. Nonie Baker, Eagles Mere, PA
1099. Carol Smith, Eagles Mere, PA
1100. Martina Rose, Philadelphia, PA
1101. Katrina Rogachevsky, Jamaica Plain, MA
1102. Richard Freeman, Philadelphia, PA
1103. Noreen Shanfelter, Philadelphia, PA
1104. Susan Olsen, Eagles Mere, PA
1105. George Olsen, Eagles Mere, PA
1106. Ellen Olsen, Eagles Mere, PA
1107. Bob Hosking
1108. Cindy Craddock, Muncy, PA
1109. Diane MacInnes, Deposit, NY
1110. Stephen Schneider, Deposit, NY
1111. Patricia MacDonald, Tioga, PA
1112. Bruce MacInnes, Deposit, NY
1113. Michelle Mirabello, Sonestown, PA
1114. Hilary Aquino, Lancaster, PA
1115. Cynthia Bower, Trout Run, PA
1116. Madeline Miller, Philadelphia, PA
1117. Sidne Baglini, Newtown Square, PA
1118. Stephen Wood, Media, PA
1119. Karl Wagner, Rosemont, PA
1120. Barbara Cropper, Philadelphia, PA
1121. Linda Murray, Mansfield, PA
1122. Walter Tsou, Philadelphia, PA
1123. Cindy Black, Easton, PA
1124. Lisa LaLena, Warminster, PA
1125. Susan Wright, Swarthmore, PA
1126. Meg Sellers, Kintnersville, PA
1127. Susan Carty, West Chester, PA
1128. Stanley Pendze, Philadelphia, PA
1129. Jeanne Neylon, Gettysburg, PA
1130. Jeffrey Brewster, Glenside, PA
1131. Arlene Kim, Bryn Mawr, PA
1132. Erin Suyehara, Philadelphia, PA
1133. Maggie Henry, Bessemer, PA
1134. Terry Tomei, Aliquippa, PA
1135. Maureen Fuchs, West Chester, PA
1136. Karen Good, Wyomissing, PA
1137. Kathleen McGrann, Philadelphia, PA
1138. John Hopkins, Wallingford, PA

1139. Barbara Blynn, Berwyn, PA
1140. Taryn Toma, Larksville, PA
1141. Gordon Fleming, State College, PA
1142. Sandra Fulton, Philadelphia, PA
1143. Hilary Entley, Erie, PA
1144. Shelley Costa, Swarthmore, PA
1145. Andrea Turner, Hanover, PA
1146. Charles Younger, Dushore, PA
1147. Sean Tapscott, Malvern, PA
1148. Bernadette Stillo, Narberth, PA
1149. Dona Dalton, Philadelphia, PA
1150. Darla Barnshaw, Morton, PA
1151. Steven Dytman, Pittsburgh, PA
1152. Richard Schaeffer, York, PA
1153. Joel Chinitz, Fort Washington, PA
1154. William Hooper, Philadelphia, PA
1155. Margaret Collins, Scranton, PA
1156. David Sobien, Pittsburgh, PA
1157. Azterrah Burkett, Glenside, PA
1158. Paul Komishock, Wilkes Barre, PA
1159. Patsy Stebbins, Coudersport, PA
1160. Boyd Kelly, King of Prussia, PA
1161. Barb Truitt, Roulette, PA
1162. Elaine Frost, Kennett Square, PA
1163. Harriett Weis, Pittsburgh, PA
1164. Linda Williard, Northumberland, PA
1165. Natalie Mendik, Claridge, PA
1166. Robin Dodson, Bethany, PA
1167. Jeanne Held-Warmkessel, North Wales, PA
1168. Joel Triglia, Pittsburgh, PA
1169. Julie Vitale, Bethlehem, PA
1170. Kay Gering, Morrisville, PA
1171. Randi Peters, Shoemakersville, PA
1172. Dahle Bingaman, Millmont, PA
1173. Lucia Kubik, Philadelphia, PA
1174. Donald Waltman, State College, PA
1175. Brian Gillin, Lafayette Hill, PA
1176. Jennifer Yeckel, Canonsburg, PA
1177. Lois Sellers, Springfield, PA
1178. Victoria Switzer, Dimock, PA
1179. Steve Irwin, Bryn Athyn, PA
1180. Frances Cicali, Delran, PA
1181. Ida Bebout, Washington, PA
1182. Stefania Gallucci, Philadelphia, PA
1183. Jean Goerth, Exton, PA
1184. William Heald, Spring Mills, PA
1185. Lorraine Edris, Camp Hill, PA
1186. Mike Moy, Easton, PA
1187. Teresa Geever, Glenshaw, PA
1188. Patricia Ihm, Kutztown, PA
1189. Gail Wolfberg, Ft. Washington, PA
1190. Alexandra Roma, Friendsville, PA
1191. Zandra Price, Philadelphia, PA
1192. Anita Bondi, Delaware Water Gap, PA
1193. Julia Rizzo, New Milford, PA
1194. Scott Zeiger, Coudersport, PA
1195. Robert Parr, Doylestown, PA
1196. George Keszeli, Ardmore, PA
1197. Sandra Krous, Coudersport, PA
1198. Jay Erb, Pottstown, PA
1199. Jeff Goldman, Philadelphia, PA
1200. Christiana Pollack, Lambertville, NJ
1201. Katelyn Walsh, Philadelphia, PA
1202. Rudy Lewis, Philadelphia, PA
1203. Steven Skaroff, Philadelphia, PA
1204. Sean Corcoran, Philadelphia, PA
1205. Glenn Ophoff, Easton, PA
1206. Tanya Goldberg, Pittsburgh, PA
1207. Joe Veghts, Acme, PA
1208. John Trallo, Sonestown, PA
1209. Bruce Columbus, Pittsburgh, PA
1210. Matt Calvetti, Pittsburgh, PA
1211. Kathy McQuarrie, Doylestown, PA
1212. Chrstine Corbelli, Allison Park, PA
1213. Raina Rippel, Washington, PA
1214. Brian Breczinski, Lewisburg, PA
1215. Paul Barsom, State College, PA
1216. Sally Purtell, North Wales, PA
1217. Debrin Goubert, Sewickey, PA
1218. Jessica Chung, Plymouth Meeting, PA
1219. Ann Seip, Trevose, PA
1220. Linda Blythe, Philadelphia, PA
1221. Nikki Loscalzo, Yardley, PA
1222. Margene Biedermann, Bala Cynwyd, PA
1223. Robert Brobst, Pottstown, PA
1224. Karen Tappenden, Perkasie, PA
1225. David Grossman, Roulette, PA
1226. John Leete, Coudersport, PA
1227. Leslie Trautman, Lancaster, PA
1228. F. Miller, Darby, PA
1229. Heather McKean, Smethport, PA
1230. Emil Costa, Newtown Square, PA
1231. Keith Parsons, Wayne, PA
1232. Debra D'Argenio, Laurys Station, PA
1233. Mathew Himmelein, Philadelphia, PA
1234. Judith Hendin, Easton, PA
1235. Elysa Weiss, Ardmore, PA
1236. David Snyder, Newtown Square, PA
1237. Jean Hayes, Wayne, PA
1238. Kerry Lamb, Willow Grove, PA
1239. Thomas Thomassen
1240. Mark Loughead, Glenside, PA
1241. Susan McCaughey, Morgantown, PA
1242. Brian Cox, Eagleville, PA

1243. Rita MacNeal, Jefferson Twp., PA
1244. Judith Bohler, Ephrata, PA
1245. Jim Black, Philadelphia, PA
1246. Jennifer Brackbill, Pine Grove Mills, PA
1247. Karla McNamara, Baden, PA
1248. Marsha Hyman, Havertown, PA
1249. Andrew Gall, Port Allegheny, PA
1250. Carol Gisselquist, Hershey, PA
1251. Trinity Dixon, Wynnewood, PA
1252. Matthew Smuts, Pittsburgh, PA
1253. Nancy Evoy, Villanova, PA
1254. Matthew Lysek, Chalfont, PA
1255. Merian Soto, Philadelphia, PA
1256. Tim Styborski, Venango, PA
1257. Genevieve Becker, Glenside, PA
1258. Helen Elkins, Coatesville, PA
1259. Jim Bove, Washington, PA
1260. Jane Kirk, Erie, PA
1261. David Shewmon, Harrisburg, PA
1262. Marcia Gordon, West Chester, PA
1263. Caroline Herr, Lancaster, PA
1264. Leah Haywiser, Pittsburgh, PA
1265. Mary Ellen Noonan, Doylestown, PA
1266. David Morrison, Willow Grove, PA
1267. Gerry Ellis, Trooper, PA
1268. John Modrzynski, Havertown, PA
1269. Ramona Sahni, Pittsburgh, PA
1270. Florence Moyer, Brookhaven, PA
1271. Margaret Hasbrouck, Swarthmore, PA
1272. Amy Lidle, West Chester, PA
1273. Christine LaMark, Pittsburgh, PA
1274. Catharine Williams, Philadelphia, PA
1275. Michael Peale, Aston, PA
1276. Renee Boulis, Wyomissing, PA
1277. Loretta Pietrangelo, Glen Mills, PA
1278. Michael Miller, Drexel Hill, PA
1279. Robert Hedden, Levittown, PA
1280. Jo Grieve, Meshoppen, PA
1281. Ellen Kenney, Philadelphia, PA
1282. Clarence Burgher, Linden, PA
1283. Anna Gerrity, Haverford, PA
1284. Brian Schultz, Philadelphia, PA
1285. Jason Stoller, Bala Cynwyd, PA
1286. Chris Howard, Pittsburgh, PA
1287. Jenni Tarner, Philadelphia, PA
1288. Frank Bartell, Philadelphia, PA
1289. Jon Levin, Macungie, PA
1290. Stacey Saleff, Bala Cynwyd, PA
1291. Barbara Frederici, Levittown, PA
1292. Janet Spahr, Carlisle, PA
1293. Sarah Libros, Melrose Park, PA
1294. Vivienne Spector, Jenkintown, PA
1295. Jeff Alper, Elkins Park, PA
1296. Melissa Hunt, Lancaster, PA
1297. Margery Butler, Erdenheim, PA
1298. Jerry Gere, South Montrose, PA
1299. Sharon Wushensky, West Chester, PA
1300. Georgann Kovacovsky, New Bethlehem, PA
1301. Jorge Arauz, Philadelphia, PA
1302. Doreen Shiavi, Media, PA
1303. Daniel Turner, Philadelphia, PA
1304. Christina Naugle, Quakertown, PA
1305. Michelle Boyle, Pittsburgh, PA
1306. Jeff Strouse, Frederick, PA
1307. Maria Kyriacopoulos, Pittsburgh, PA
1308. James Nelson, Roulette, PA
1309. Vincent DiLorenzo, Muncy Valley, PA
1310. William Moore, Philipsburg, PA
1311. Elizabeth Falconi, Newtown, PA
1312. Patricia Edelen, Philadelphia, PA
1313. Victoria Polinko, Pittsburgh, PA
1314. Steve Ostien, Berwyn, PA
1315. Laura Robinson, State College, PA
1316. Louise De Simone, Damascus, PA
1317. Phyllis Reinhardt, Scranton, PA
1318. Kathleen Saunders, Doylestown, PA
1319. Roland Harper, Philadelphia, PA
1320. Darcy Buendia, Erie, PA
1321. Diane Abell, Sewickley, PA
1322. Peter Folrz, Hershey, PA
1323. Marguerite Zuccarello, Oreland, PA
1324. Carolyn Miller, Coudersport, PA
1325. William Ferguson, Jersey Shore, PA
1326. Angela Bickel, Roulette, PA
1327. Gary Dukart, Ambler, PA
1328. Airlia Oroszvary, Yardley, PA
1329. Jeanne McCarthy, Media, PA
1330. Carol Schramke, Pittsburgh, PA
1331. Helen Walker, Gwynedd, PA
1332. Amanda Rose, Newtown, PA
1333. Lucas Fiore, Newtown Square, PA
1334. Scott Mann, York, PA
1335. Donna Weiler, Huntindon Valley, PA
1336. Dawn Gillespie, Pennsauken, NJ
1337. Joan Bechtel, Bloomsburg, PA
1338. Tina Stimmler, Fairview Village, PA
1339. Michael Parke, Springfield, PA
1340. Brittany Ballard, Philadelphia, PA
1341. Lisa Mayo, Churchville, PA
1342. Marylin Huff, Media, PA
1343. Adam Eyring, Philadelphia, PA
1344. Kristina Tregnan, Newtown, PA
1345. David Skellie, Erie, PA
1346. Paula Closson Buck, Lewisburg, PA

1347. Sandy Dowling, West Chester, PA
1348. Patricia Libengood, Erie, PA
1349. Elizabeth Thompson, Fawn Grove, PA
1350. Margaret van Naerssen, Wayne, PA
1351. William Granche, Ridgway, PA
1352. Abigail Thompson, Pittsburgh, PA
1353. Ian Everhart, Pittsburgh, PA
1354. Dale Henry, Bessemer, PA
1355. Amy Brazill, Pittsburgh, PA
1356. Joseph Judge, Easton, PA
1357. Ronald Adams, Smithfield, PA
1358. Amelia Ni, Philadelphia, PA
1359. E. Smith, Oakdale, PA
1360. Tess Gerould, Elkins Park, PA
1361. William Stichter, Philadelphia, PA
1362. Bruno Schremmer, Princeton, NJ
1363. Dale Kashner, Seven Valleys, PA
1364. Randy Davenport, Benton, PA
1365. Kathleen Clunk, Leola, PA
1366. E. Coblentz, Woodlyn, PA
1367. Shawna Raymond, Harrisburg, PA
1368. Alex Corr, Pittsburgh, PA
1369. Dorothy Eke, West Chester, PA
1370. Diane DiRocco, West Chester, PA
1371. Terry Corbett, Orrtanna, PA
1372. Chris Myer, Yardley, PA
1373. Gretchen Heacock, Philadelphia, PA
1374. Steven Weinberg, Elkins Park, PA
1375. John Corr, State College, PA
1376. Richard Stern, Philadelphia, PA
1377. Arthur Shelly, Thompson, PA
1378. Rachel Beck, Pittsburgh, PA
1379. Amy Kinzel, Cherry Hill, PA
1380. Shane Rielly, Scranton, PA
1381. Shirley Moore, Philipsburg, PA
1382. Linda Reis, Lancaster, PA
1383. Will Rutledge, West Chester, PA
1384. Sarah Ivey, Landenberg, PA
1385. Joseph Mudd, Merion Station, PA
1386. Alan Wright, West Chester, PA
1387. Vivian Schatz, Philadelphia, PA
1388. Laura Thiede, Lewisburg, PA
1389. Alan Hockstein, Phoenixville, PA
1390. Heather Musingo, Blossburg, PA
1391. Daniel Schmitt, Mansfield, PA
1392. Ron Mueller, Pittsburgh, PA
1393. A. Logan, Pittsburgh, PA
1394. Angela Rohacek, Philadelphia, PA
1395. Tricia Mahoney, North East, PA
1396. Ann Van Dyke, Harrisburg, PA
1397. Gordon Hargreaves, Pittsburgh, PA
1398. Theresa Reiff, Norristown, PA
1399. Monica Vaccaro, Lock Haven, PA
1400. David Allara, State College, PA
1401. Sheila Mayne, Philadelphia, PA
1402. Howie Shultz, State College, PA
1403. Keith Cochran, Pittsburgh, PA
1404. Ellen Smith, Montrose, PA
1405. Robin Schaef, Guys Mills, PA
1406. Edmund Weisberg, Philadelphia, PA
1407. Mary Leshan, Fort Washington, PA
1408. Erin Casey, Philadelphia, PA
1409. David Gibson, Lansdowne, PA
1410. Janet Horsch, Verona, PA
1411. Maria Duca, Philadelphia, PA
1412. Mike Peters, Pittsburgh, PA
1413. Helene Campbell, Orswon, PA
1414. Janet Regetta, Lower Gwynedd, PA
1415. Mark Northrop, Wellsboro, PA
1416. Daniel Shively, Indiana, PA
1417. Jeanne Sheats, Pittsburgh, PA
1418. Josh Zorich, Pittsburgh, PA
1419. Tina Brogan, West Chester, PA
1420. Emily Petrucci, Media, PA
1421. Gerard McDade, Newtown, PA
1422. RESERVED
1423. Richard Miller, Ardmore, PA
1424. Megan Miller, Womelsdorf, PA
1425. Peter Crownfield, Bethlehem, PA
1426. Anne Wnschel, Pittsburgh, PA
1427. Frank Friedman, Melrose Park, PA
1428. Frances Gilmore, Glenside, PA
1429. Maren Cook, Pittsburgh, PA
1430. Maunette Watson, Carlisle, PA
1431. Brian Cope, Indiana, PA
1432. John Murphy, Lewisburg, PA
1433. Jeanine Vermillion, State College, PA
1434. Nucole Muther, Lansdowne, PA
1435. Kimberley Byk, Kennett Square, PA
1436. Marge Opacki, Morrisville, PA
1437. William MacLuckie, Gilbertsville, PA
1438. Mary Corbett, Philadelphia, PA
1439. Randall Couch, Philadelphia, PA
1440. Sophia Bender, Coraopolis, PA
1441. Rosie Krammes, Coudersport, PA
1442. Kristin Pohaski, Pittsburgh, PA
1443. Gwynn Goldring, Pittsburgh, PA
1444. Nancy Rovin, Wynnewood, PA
1445. Barbara Silverstein, Mansfield, PA
1446. Blaze Streeter, Philadelphia, PA
1447. Greg McGarvey, Levittown, PA
1448. Sandra Foehl, Philadelphia, PA
1449. Barbara Clarke, Newtown Square, PA
1450. Nina Ward, Washington, PA
1451. Freda Egnal, Philadelphia, PA
1452. Linda Hansell, Philadelphia, PA

1453. David Dunkleberger, Doylestown, PA
1454. L. Lawrence, Brackney, PA
1455. Graeme Thomson, Spring City, PA
1456. Ann Fuchs, Chadds Ford, PA
1457. Robert Studebaker, Pittsburgh, PA
1458. Suzanne Staggenborg, Pittsburgh, PA
1459. Michael Guttman, Chadds Ford, PA
1460. Charley Wittman, Allentown, PA
1461. Sondra Cholach, Bensalem, PA
1462. Patricia Thomas, Wallingford, PA
1463. Megan Hess, Philadelphia, PA
1464. Ken Rosso, Philadelphia, PA
1465. Bill Clarke, Media, PA
1466. Isobel Sollenberger, Philadelphia, PA
1467. Barton Levenson, Pittsburgh, PA
1468. Russell Dennis, Lewisburg, PA
1469. Katie Shultz, Bernville, PA
1470. Tammy Gordon, Nazareth, PA
1471. Pat Stitzinger, Flourtown, PA
1472. Nicholas Gabinet, Swarthmore, PA
1473. Nancy Payne, Landenberg, PA
1474. Christina Gubicza, Camp Hill, PA
1475. Laurel Cooper, Philadelphia, PA
1476. Dave Sobal, Pittsburgh, PA
1477. Bill Ridgeway, Scranton, PA
1478. Jennifer Buehl, Bethel Park, PA
1479. Roxie Oberg, Brackney, PA
1480. Michael Lee, Morton, PA
1481. Robin Harper, Wallingford, PA
1482. Alan Keenan, Philadelphia, PA
1483. Ed Kwedar, Downingtown, PA
1484. Ai Mahoney, Pittsburgh, PA
1485. Greg Pasquarello, Phoenixville, PA
1486. Amy Guskin, Malvern, PA
1487. Christine Hormuth, Easton, PA
1488. Michelle MacLuckie, Gilbertsville, PA
1489. Edward Thornton, Swarthmore, PA
1490. Daniel Christ, McAlisterville, PA
1491. Paul Parowski, Richfield, PA
1492. Larissa Mogano, Philadelphia, PA
1493. Cassandra McCrae, Pittsburgh, PA
1494. J. Richard Lynch, Pittsburgh, PA
1495. Glenn Warren, Morris, PA
1496. John Turgeon, West Chester, PA
1497. Richard Payne, Wynnewood, PA
1498. Melissa Tesauro, Havertown, PA
1499. Cathryn Winghart, Pittsburgh, PA
1500. Susan Hartman, Germansville, PA
1501. Shada Sullivan, Huntingdon Valley, PA
1502. Paul Thompson, Washington Crossing, PA
1503. Betty Cruz, Pittsburgh, PA
1504. Susan Patrone, Philadelphia, PA
1505. Steven Karas, Forest Hills, PA
1506. Martha Kirby, Philadelphia, PA
1507. Molly Gabel, St. Clair, PA
1508. Thomas Flynn, Malvern, PA
1509. Clint Fowler, Austin, PA
1510. Stacey Lane, Mechanicsburg, PA
1511. Edith Naveh, Pittsburgh, PA
1512. Donna Chopyak, Pittston, PA
1513. John Feissel, Philadelphia, PA
1514. Joan Sage, Philadelphia, PA
1515. Truman Bullard, Carlisle, PA
1516. Robert Gumlock, Easton, PA
1517. Edward Thornton, Swarthmore, PA
1518. Emily Pischke, Pittsburgh, PA
1519. Aaron Birk, Philadelphia, PA
1520. Byron Varvarigos, Wynnewood, PA
1521. Thomas Schell, Pittsburgh, PA
1522. Michelena Wolf, Sewickley, PA
1523. Mary Daub, Williamstown, PA
1524. Joycelyn Damita, Philadelphia, PA
1525. John Angelini, Philadelphia, PA
1526. William Highfield, Akron, PA
1527. Jillian Forschner, Murrysville, PA
1528. Rachelle Berger, Philadelphia, PA
1529. Dina Grasso, Philadelphia, PA
1530. Mindi Baurer, Lansdale, PA
1531. Allyson de Groat, Wayne, PA
1532. Susan Carroll, Lake Ariel, PA
1533. Laurel Miner, McMurray, PA
1534. Judy McAuley, Pittsburgh, PA
1535. Elizabeth Schmidt, Philadelphia, PA
1536. Ken Weir, Pittsburgh, PA
1537. Mike Dellapenna, Malvern, PA
1538. Alan Gregory, Conyngham, PA
1539. Stephen Kislock, Beaver Falls, PA
1540. J. Howard Cherry, Pittsburgh, PA
1541. Mary Ciarrocchi, Exton, PA
1542. Barton Braun, Yardley, PA
1543. Joanne Feldman, State College, PA
1544. Jeffrey Cogshall, Doylestown, PA
1545. Deanna Prine, Wexford, PA
1546. Paul Eaken, Reading, PA
1547. Katherine Margo, Philadelphia, PA
1548. Cynthia Snyder, Biglerville, PA
1549. Robert Emory, Bryn Mawr, PA
1550. Sharon Brown, Wexford, PA
1551. Karen Thev, Swarthmore, PA
1552. Roseann Fricker, Havertown, PA
1553. Lisa Daly, West Chester, PA
1554. Mel Packer, Pittsburgh, PA
1555. Lishia Robertson, Coudersport, PA
1556. S. Rovin, Newtown Square, PA
1557. Rhonda Kampmeyer, Georgetown, PA

1558. Colleen Eisenberg, Langhorne, PA
1559. Eric Lightfoot, Aspinwall, PA
1560. Ed Donahue, Huntingdon Valley, PA
1561. Steve Sears, Hatboro, PA
1562. Frank Cooper, Pittsburgh, PA
1563. Amanda Valentine, State College, PA
1564. Susan Randle, West Chester, PA
1565. Ingrid Hyder, Philadelphia, PA
1566. Marion Kyde, Ottsville, PA
1567. Lea Stabinski, Blue Bell, PA
1568. Hillel Brandes, State College, PA
1569. Toni Price, Pittsburgh, PA
1570. Philip McGrath, Pittsburgh, PA
1571. Judy Roberts, State College, PA
1572. Patti Brooks, Mertztown, PA
1573. Susan Mucha, Crafton, PA
1574. Neil Leary, Carlisle, PA
1575. Gwyn Linsalata, Glenside, PA
1576. Lorraine Poore, Muncy Valley, PA
1577. Lee Roper, West Chester, PA
1578. Darlette Navrotski, Pittsburgh, PA
1579. Colin Hackett, Pittsburgh, PA
1580. Julia Sittig, Baden, PA
1581. Lars Cain, Pittsburgh, PA
1582. Esther Trovarelli, Philadelphia, PA
1583. Moshe Sherman, Pittsburgh, PA
1584. Clarke Blynn, Berwyn, PA
1585. Becky Billock, Pittsburgh, PA
1586. Ileana Betancourt, Bala Cynwyd, PA
1587. Julie Hontz, Philadelphia, PA
1588. Karen Hontz, Holland, PA
1589. Howard Rife, Reading, PA
1590. Andrew Beck, Philadelphia, PA
1591. Roger Hontz, Holland, PA
1592. Jane Waltman, Drexel Hill, PA
1593. Michael Webster, Bay Village, OH
1594. John Kurilla, Clifford, PA
1595. Kris Jenssen, State College, PA
1596. Daniel Piser, Philadelphia, PA
1597. BJ Novack, Easton, PA
1598. Patricia Dobosh, Mt. Lebanon, PA
1599. Ed Moore, Rosemont, PA
1600. Kathleen O'Connell, Glenside, PA
1601. Minhnoi Wroble Biglan, Pittsburgh, PA
1602. Janet Etzi, Philadelphia, PA
1603. Vera Mark, State College, PA
1604. Judith Parker, Philadelphia, PA
1605. Suanne Wright, Philadelphia, PA
1606. Thomas Brenner, Hollidaysburg, PA
1607. David Bursky, Wynnewood, PA
1608. Leo Szczesny, Coudersport, PA
1609. Thomas Ciaverelli, Ivyland, PA
1610. Dayl Jewell, Grove City, PA
1611. Carla Stull, Lititz, PA
1612. Carol Fern Culhane, Philadelphia, PA
1613. Elizabeth Gladfelter, Bethlehem, PA
1614. Sheila Stewart, Glenside, PA
1615. Thomas Cameron, Drexel Hill, PA
1616. Carol Rubin, Media, PA
1617. Margaret Baker, Wilkes-Barre, PA
1618. Daniel Sutton, Wynnewood, PA
1619. Alison Ladman, Landenberg, PA
1620. Marguerite Woelfel, Conyngham, PA
1621. Rebecca Obleski, Austin, PA
1622. Toni Price, Pittsburgh, PA
1623. Marian Nasuti, Philadelphia, PA
1624. Karen Donofrio, Philadelphia, PA
1625. Irvin Provost, Harrisburg, PA
1626. Joanna Groebel, Reading, PA
1627. Michael Gadomski, Sterling, PA
1628. Arlene Mercurio, New Kensington, PA
1629. Harry Hochheiser, Pittsburgh, PA
1630. Cynthia Hebestreit, Bethel Park, PA
1631. Jeremy Jonas, Saegertown, PA
1632. Paul Martin, Lower Merion, PA
1633. Charles Leiden, Altoona, PA
1634. Susan Brantley, State College, PA
1635. Stephen Wayland, West Chester, PA
1636. Sarah Anderson, Imperial, PA
1637. Joan Book, Shrewsbury, PA
1638. Jay Harter, Susquehanna, PA
1639. Catherine Roth, Yardley, PA
1640. Simone Adler, Glenside, PA
1641. Jacob Ziegler, Conshohocken, PA
1642. Charles King, Pittsburgh, PA
1643. Kathy Dabanian, Sellersville, PA
1644. Robert Gaynor, New Hope, PA
1645. Jennifer Lowans, Fayetteville, PA
1646. Peg Kucek, Pottstown, PA
1647. Robert Henry, West Chester, PA
1648. John Garrison, New Wilmington, PA
1649. Robert Snyder, Philadelphia, PA
1650. Emily Pischke, Pittsburgh, PA
1651. Denise Dennis, Philadelphia, PA
1652. Daniel Shapiro, Pittsburgh, PA
1653. Jennifer Clemens, Phoenixville, PA
1654. Lara Kelly, Philadelphia, PA
1655. Eric Lipsky, Pittsburgh, PA
1656. Eric Swetts, Sugar Notch, PA
1657. RESERVED
1658. Kevin McCafferty, Phoenixville, PA
1659. Sarah Sexton, Wallingford, PA
1660. Marian Freed, State College, PA
1661. Laura Betancourt, Bala Cynwyd, PA
1662. Andrew Dickinson, Devon, PA
1663. Andre Dominguez, Bloomsbrug, PA

1664. Roger Ford, State College, PA
1665. Sandra McDaniel, Clearville, PA
1666. Marianna Sokol, Benton, PA
1667. Karen Necelis, Bangor, PA
1668. Helga Garrelts, Allentown, PA
1669. Dorothy Cardlin, Yardley, PA
1670. Alan Reger, Christiana, PA
1671. Wendy Ward, Yardley, PA
1672. Chapin Storrar, Erie, PA
1673. Robert Buttel, Philadelphia, PA
1674. Lambros Theofanidis, Philadelphia, PA
1675. Jan Goodwin, Milanville, PA
1676. Brad Hartwell, South Park, PA
1677. Haldane Hilbish, Sewickley, PA
1678. Alana Balogh, Revere, PA
1679. Andrew Melman, Wynnewood, PA
1680. Lisa Leshinsky, Mars, PA
1681. Anne Zaphiris, North East, PA
1682. Jerry Bonanno, Harrisburg, PA
1683. Carol Dwyer, Linwood, PA
1684. Alberto Bressan, State College, PA
1685. Nancy Shiffrin, Wynnewood, PA
1686. Sigmund Finman, Canonsburg, PA
1687. Bonnie Alco, Waverly, PA
1688. Darcy Augello, Doylestown, PA
1689. Jean Forsberg, Julian, PA
1690. Margaret Swerdloff, Mansfield, PA
1691. Barbara Benson, Coopersburg, PA
1692. Christine Steigner, Bethel Park, PA
1693. Seth Bush, Pittsburgh, PA
1694. Jason Berteotti, Canonsburg, PA
1695. Joel Cohen, Lower Gwynedd, PA
1696. David Kirkland, Hallton, PA
1697. T. Foster, Philadelphia, PA
1698. Kelsey Gibbons, Philadelphia, PA
1699. CD Nash, Milanville, PA
1700. Leslie Gottschalk, Pittsburgh, PA
1701. Kevin Mccafferty, Phoenixville, PA
1702. Janet Thiel, Aston, PA
1703. Isabel Bohn, Philadelphia, PA
1704. J. Cherry, Pittsburgh, PA
1705. David Allara, State College, PA
1706. Celia Burns, Roslyn, PA
1707. Karen Szollosky, Harrisburg, PA
1708. Chase Parnell, Philadelphia, PA
1709. Robert Snyder, Philadelphia, PA
1710. Michael Cuccaro, Pittsburgh, PA
1711. Emma Reuschel, Philadelphia, PA
1712. Jonathan Lubeck, Wynnewood, PA
1713. Jake Baechle, Pittsburgh, PA
1714. Troy High, Reading, PA
1715. Peg Kucek, Pottstown, PA
1716. Robert Hansen, Upper Black Eddy, PA
1717. Craig Aurand, Lock Haven, PA
1718. Rose Ruhl, Willow Street, PA
1719. Michael Dillon, Plains, PA
1720. Heather Makar, Pittsburgh, PA
1721. Derek Luke, Worthington, PA
1722. Emily McDonald, Scranton, PA
1723. Robert Mitchell, State College, PA
1724. Molly Williams, Columbia Cross Roads, PA
1725. Michael Pappas, Wilmington, DE
1726. Rebecca Roter, Ottsville, PA
1727. James Jones, Roulette, PA
1728. Frank Koshere, Philadelphia, PA
1729. Eileen Weiner, Pittsburgh, PA
1730. Consilia Karli, Allentown, PA
1731. Cara Costello, Pittsburgh, PA
1732. Gaston de los Reyes, Philadelphia, PA
1733. Silvia Kolbowski, Beach Lake, PA
1734. Colleen Brenneman, Wellsboro, PA
1735. Marilyn O'Boyle, Shavertown, PA
1736. Victoria Todd, Williamsport, PA
1737. Ronald Gulla, Hickory, PA
1738. Anthony Capobianco, Bethel Park, PA
1739. Suzanne Flynn, Pittsburgh, PA
1740. Ellie Hyde, Dalton, PA
1741. Wayne Laubscher, Lock Haven, PA
1742. Gregory Johnson, Pittsburgh, PA
1743. Ellis Baehr, Pittsburgh, PA
1744. Adelaide Pearson, Ambler, PA
1745. Susan Plubell, Clearfield, PA
1746. Katrinka Moore, Poyntelle, PA
1747. Kenneth Meyer, Wellsboro, PA
1748. John Stolz, Glenshaw, PA
1749. Harriette Carlisle, Pittsburgh, PA
1750. Kostas Avgiris, North Wales, PA
1751. Douglas Stewart, Pittsburgh, PA
1752. Linda Nealon, Clarks Summit, PA
1753. Alex Balboa, Bel Air, MD
1754. Ron MacDonald, Wexford, PA
1755. Frank Polites, Aston, PA
1756. James Hosley, Coudersport, PA
1757. Michaelene Alston, Malvern, PA
1758. Marolyn Buchanan, Narberth, PA
1759. Cathy Cremona, Philadelphia, PA
1760. Trudy Heller, Swarthmore, PA
1761. Karen Vasily, Audubon, PA
1762. Thomas Krell, Erie, PA
1763. Alex Showers, Pottstown, PA
1764. Victoria Morales, Clifford, PA
1765. Todd Nixon, Croydon, PA
1766. A. Kelly, Media, PA
1767. Naomi Mindlin, Langhorne, PA
1768. Anne Ream, Philadelphia, PA

1769. Rhea Richardson, Wayne, PA
1770. D. A., Gibsonia, PA
1771. William Boteler, Takoma Park, MD
1772. Chris Cassidy, Bethlehem, PA
1773. Leigh Ann Jennings, Meshoppen, PA
1774. N. Mulligan, Philadelphia, PA
1775. Joan Bradley, Pipersville, PA
1776. Joy Catania, Erie, PA
1777. RESERVED
1778. Michael Babtich, Kimberton, PA
1779. Marjorie Rathbone, Bryn Mawr, PA
1780. Carrie Burdy, Pittsburgh, PA
1781. Edda Katz, Philadelphia, PA
1782. Stephen Patterson, Radnor, PA
1783. Pam Jones, Waverly, PA
1784. Linda Bien, Philadelphia, PA
1785. Michael Carlin, Burgettstown, PA
1786. Marco Oviedo, Philadelphia, PA
1787. Muzz Meyers, Pittsburgh, PA
1788. Sandy Tucker, Doylestown, PA
1789. Dawn Tanseco, Collegeville, PA
1790. Doug O'Malley, Philadelphia, PA
1791. Blair Hontz, Philadelphia, PA
1792. Anthony Jones, Philadelphia, PA
1793. Juana Celia Djelal, State College, PA
1794. Alison Anderson, Philadelphia, PA
1795. Cathy Schweiger, Downingtown, PA
1796. Milly Gallik, Ruffs Dale, PA
1797. Daniel Fortier, Pittsburgh, PA
1798. Lisa Guerico, Philadelphia, PA
1799. Sarah Caspar, Downingtown, PA
1800. Kathryn Slagle, Erie, PA
1801. RESERVED
1802. Piers Marchant, Philadelphia, PA
1803. Sam Simon, Philadelphia, PA
1804. Katie Olender, Philadelphia, PA
1805. Kaitlin Clutter, Prosperity, PA
1806. Alison Ollinger-Riefstahl, Erie, PA
1807. Diana Hulboy, Philadelphia, PA
1808. Terre Kerr, New Tripoli, PA
1809. Deb Winkler, Jefferson, PA
1810. Gary Bulas, Wellsboro, PA
1811. Karen Serwatka, Media, PA
1812. Chris Orzechowski, Pottstown, PA
1813. Francine Carlini, Norristown, PA
1814. Ken Dufalla, Clarksville, PA
1815. Wendi Taylor, Camp Hill, PA
1816. Nancy Jackson, Shavertown, PA
1817. Andrew Augustine, Wilkes-Barre, PA
1818. Gregory Stephenson, Smicksburg, PA
1819. Anne/Harvey Katz, Montoursville, PA
1820. Anne Harris Katz, Muncy, PA
1821. Greg/Joanne Wagner, McDonald, PA
1822. Sue Seppi, Pittsburgh, PA
1823. Marilyn Seeling, Trout Run, PA
1824. RESERVED
1825. Ralph Kisberg, Williamsport, PA
1826. Paul Zielinski, Hershey, PA
1827. Ginger Woolridge, Eagles Mere, PA
1828. Laurie Flanders, Dagus Mines, PA
1829. Michael Meloy, Bala Cynwyd, PA
1830. Steven Roth, Franklin, PA
1831. David Reynolds, Philadelphia, PA
1832. Margaret Cronin, Williamsport, PA
1833. James Ashbaugh, Warren, PA
1834. William Fry, Manheim, PA
1835. Erika Staaf, Pittsburgh, PA
1836. Michael Wood, Harrisburg, PA
1837. Michael Killion, Harrisburg, PA
1838. Danielle Boston, Wexford, PA
1839. Andrea BrockmanPA
1840. John Baillie, Pittsburgh, PA
1841. Stephen Rhoads, Warrendale, PA
1842. Lucinda Scott, Trout Run, PA
1843. Kathryn Klaber, Canonsburg, PA
1844. Mike BrownellPA
1845. Bernard McGurlPA
1846. Mary Felley, La Plume, PA
1847. Sharon Mullally, Philadelphia, PA
1848. RESERVED
1849. Kathy Gosliner, Philadelphia, PA
1850. Shawn Towey, Philadelphia, PA
1851. Katy Dunlap, PA
1852. Christine Charnock, Montoursville, PA
1853. John Trallo, Sonestown, PA
1854. Patricia MayerPA
1855. Julian Dohmen, Sayre, PA
1856. Curt Weinhold, Coudersport, PA
1857. Cathy Pedler, Kane, PA
1858. Chris Piazza, Lexington, NY
1859. Steve RicciPA
1860. John Lykens, Wyalusing, PA
1861. James Mosher
1862. Henry Gonzalez
1863. Diane Ward, Wysox, PA
1864. Holly Lee, Chalfont, PA
1865. Dale Emmart Lieberman, Honesdale, PA
1866. Edward Behr, Berwyn, PA
1867. Daniel Alters, Williamsport, PA
1868. Frank McPherson, Telford, PA
1869. Jan Milburn, Ligonier, PA
1870. Ron George, Chambersburg, PA
1871. Jim Casselberry, State College, PA
1872. William Ballantine, Pipersville, PA
1873. Barbara Jarmoska, Montoursville, PA

1874. Diane McLaughlin, Howard, PA
1875. Robert McLaughlin, Howard, PA
1876. Pat Ferry, Bloomsburg, PA
1877. Kirk Rys, McKees Rocks, PA
1878. John Patalon
1879. Elaine Futej
1880. John Rossey
1881. Thomas Burkholder, Montoursville, PA
1882. Laurie Burkholder, Montoursville, PA
1883. Delbert Doty II, Berwick, PA
1884. Cynthia Walter, Greensburg, PA
1885. Katrin Schnabl, Chicago, IL
1886. Conrad Skalba, Starrucca, PA
1887. Mary Aull, Philadelphia, PA
1888. Erma Rhodes
1889. Matthew Chimenti, Erie, PA
1890. Marie Esher Coia, New Britain, PA
1891. Joshua Drouin, Lock Haven, PA
1892. William Druschel, Eagles Mere, PA
1893. Mike Anceravige
1894. Robert Cross, Williamsport, PA
1895. Gerry Givnish, Philadelphia, PA
1896. Peter Glaubitz, Eagles Mere, PA
1897. Wanda Skalba
1898. Lacey Wozny, Kansas City, MO
1899. Thomas Au, Harrisburg, PA
1900. Thomas Beausang
1901. Connie Borichevsky
1902. K.R. Kasparian, Doylestown, PA
1903. Tyler Caruso
1904. Cynthia Werstein, Chambersburg, PA
1905. Claire Pentecost, Chicago, IL
1906. Joe Zbozien, Stewartstown, PA
1907. Alastair Gordon, Milford, PA
1908. Curt Meeder, Pittsburgh, PA
1909. Paul Antolosky, Bellefonte, PA
1910. Patrick Walker
1911. Denise DeGeorge, Lemont, PA
1912. Jennifer Borneman, Wellsboro, PA
1913. Susan Schwartz, Doylestown, PA
1914. John Leary, Chambersburg, PA
1915. Jack Wilkerson, Point Pleasant, PA
1916. Rex Miller
1917. Mary Lee Resnick, Butler, PA
1918. Rolf Hanson, Harrisburg, PA
1919. Alix Berenzy
1920. Haschert
1921. Robert Shaw, Mechanicsburg, PA
1922. John Allison, Doylestown, PA
1923. Steve Hebbard
1924. John De Matteo, Chalfont, PA
1925. John Tramontano, Warwick, PA
1926. Sherri Grasmuck, Eagles Mere, PA
1927. Charlotte Luchak, Eagles Mere, PA
1928. Mary Alice Wheeler, Bloomsburg, PA
1929. Paul Kozel, Doylestown, PA
1930. Daphne Metzger, Montoursville, PA
1931. Aaron Goldblatt, Philadelphia, PA
1932. Rebecca Renner, Williamsport, PA
1933. Janet Fishman, Philadelphia, PA
1934. Lance Robson, P.E., Eagles Mere, PA
1935. Sharon Carson, Eagles Mere, PA
1936. David Carson, Eagles Mere, PA
1937. Ronald Aikins, Vandergrift, PA
1938. Paul Coleman, Lewisburg, PA
1939. Grace Coleman, Aliquippa, PA
1940. RESERVED
1941. Thomas Yatsonsky, Lake Ariel, PA
1942. Michael Ochs, Williamsport, PA
1943. Carmalene Churba, Montoursville, PA
1944. Rich Adams, Montoursville, PA
1945. Russ Cowles, Williamsport, PA
1946. Rod Vogel, Pittsburgh, PA
1947. Tom Hoffman
1948. Bechtold
1949. Bob Hedin, Pittsburgh, PA
1950. Jack Solomon
1951. J. Paul Linnan, Summerville, PA
1952. William Roach, Erie, PA
1953. Emily Krafjack, Mehoopany, PA
1954. Craig Stevens, Silver Lake Twp., PA
1955. Virginia Cody
1956. Joyce Stone, Montrose, PA
1957. Craig Sautner, Dimock, PA
1958. Wayne Chudleigh, Uniondale, PA
1959. Jody Falls, Pittston, PA
1960. JoAnne Fiorito, Tunkhannock, PA
1961. Paul Rocher, Tunkhannock, PA
1962. William Ernest, Laceyville, PA
1963. Tom Frost, Jr., Nicholson, PA
1964. Rebecca Roader, Kingsley, PA
1965. Angela Seyler, Noxen, PA
1966. Pat Farnelli, Montrose, PA
1967. Kristin Jones, Larksville, PA
1968. Sarah Chudleigh, Uniondale, PA
1969. Jay Sweney, Dalton, PA
1970. Sharon Brown, McCandles, PA
1971. Theodore Robinson, Pittsburgh, PA
1972. Kurt Limbach
1973. Bridget Dolby, Springdale, PA
1974. Ron Slabe, Upper Burell, PA
1975. Barbara Grover, Pittsburgh, PA
1976. Loretta Weir, Munhall, PA
1977. Adam Pecharka, Pittsburgh, PA
1978. Robert Dunnan, McMurray, PA
1979. Alex Lototro

1980. Cynthia Walters, Greensburg, PA
1981. Mark Benkoski, Indiana Twp., PA
1982. Kate St. John, Pittsburgh, PA
1983. Al Bicinie, Pittsburgh, PA
1984. Lynn Williams, Springdale, PA
1985. Mary Magan, Pittsburgh, PA
1986. Ken Weirton, Pittsburgh, PA
1987. Scott Left
1988. Maryann Evans, Tunkhannock, PA
1989. Kim Kaufman, Harrisburg, PA

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
POLICY OFFICE

October 12, 2010

Mr. Kim Kaufman, Executive Director
Independent Regulatory Review Commission
14th Floor
333 Market Street
Harrisburg, PA 17120

Re: Final-Form Rulemaking – Dam Safety and Waterway Management (#7-452)
Final-Form Rulemaking – Oil and Gas Well Casing and Cementing (#7-459)

Dear Mr. Kaufman:

Pursuant to Section 5.1(a) of the Regulatory Review Act, please find enclosed copies of two final-form rulemakings for review and comment by the Independent Regulatory Review Commission (IRRC). The Environmental Quality Board (EQB) approved these final-form rulemakings at its October 12, 2010, meeting.

The first final rulemaking enclosed, **the Dam Safety and Waterway Management final rulemaking**, amends the Department's Dam Safety and Waterway Management regulations to incorporate amendments to strengthen the program, including amendments to address the findings of a recent audit of the Dam Safety Program by the Auditor General's Office. The final rulemaking clarifies and makes the regulations easier to understand in order to assure proper planning, design, construction, operation, maintenance and monitoring of dams and reservoirs throughout the Commonwealth. Specific amendments in the rulemaking include provisions that require an owner of a hazard potential Category 1 or Category 2 Dam to provide proof of financial responsibility as a requirement for approval of a permit from the Department. Category 1 and Category 2 Dams include those that present a substantial potential risk to life or property. Through this rulemaking, financial assurance will be required to assure that these dams are not only properly constructed, but also properly repaired, operated and maintained. In Pennsylvania, there are approximately 800 dams that are either a Category 1 or Category 2 Dam, with over half of these privately owned. The financial assurance requirements included in the rulemaking will provide the Commonwealth with the financial wherewithal to remove or otherwise modify an unsafe or deficient high-hazard dam that is abandoned by an owner or when an owner refuses to make the necessary safety improvements to a dam.

The EQB approved the proposed rulemaking at its February 16, 2010, meeting. The proposed rulemaking was published in the *Pa Bulletin* on April 24, 2010, where a 30-day public comment period was advertised. In addition to the Independent Regulatory Review Commission, five commentators provided comments to the Board on the proposed rulemaking. The comments received resulted in minor revisions and clarifications to the final rulemaking. The final form

rulemaking was presented to the Water Resources Advisory Committee (WRAC) for review and discussion at the committee's July 14, 2010, meeting. The committee unanimously voted to approve the rulemaking and requested the Department present the final regulations to the EQB for consideration.

The second final rulemaking enclosed, **the Oil and Gas Well Casing and Cementing final rulemaking,** includes amendments to Chapter 78 to augment and strengthen existing oil and gas well cementing and casing requirements in order to prevent gas migration and its associated impacts, including adverse affects on water supplies and public health and safety. The modifications included in the final rulemaking include updated material specifications and performance testing for casing and cementing and revised design, construction, operational, monitoring, plugging, water supply replacement, and gas migration reporting requirements designed to minimize gas migration and protect water supplies.

The EQB approved the proposed rulemaking at its May 17, 2010, meeting. The proposal was published for public comment in the *PA Bulletin* on July 10, 2010, where a 30-day public comment period and five public hearings were advertised. The EQB received nearly 2,000 comments on the proposed rulemaking. The majority of comments received were supportive of the proposal. In direct response to public comments, the Department has made several important changes to the rulemaking, which further strengthen well design requirements to prevent gas migration incidents. These include: the addition of a provision that requires operators to have a pressure barriers plan to minimize well control events; 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; and the addition of a provision that improves the quality of the cement placed in the casing that protects fresh groundwater. In addition to these important provisions, the final rulemaking also now requires operators to keep a list of emergency contact phone numbers at the well site and specifies the actions an operator must take in the event of a gas migration incident. The final rulemaking also includes amended provisions that clarify how and when blow-out prevention equipment is to be installed and operated and revisions to the reporting requirements for chemicals used to hydraulically fracture a well.

The Department presented the draft final form rulemaking to the Oil and Gas Technical Advisory Board (TAB) for their consideration on September 16, 2010. At that meeting, TAB members made several recommendations regarding the definition of unconventional formations, the use of blow-out preventers, cementing the intermediate casing, producing gas off the intermediate casing, and the actions the operator must take when it loses circulation of cement. At the conclusion of the meeting, TAB members were not able to endorse or disapprove the rulemaking and instead expressed an interest in having the TAB subcommittee review the amendments to the final form rulemaking. In addition to TAB, the Department has met with numerous oil and gas operators, industry groups and environmental groups to discuss the rulemaking in detail.

The Department will provide assistance as necessary to facilitate the Commission's review of these final-form rulemakings under Section 5.1(e) of the Regulatory Review Act. Please contact me at the number above if you have any questions or need additional information.

Please contact me at the number above if you have any questions or need additional information.

Sincerely,

Michele L. Tate

Michele L. Tate
Regulatory Coordinator

Enclosures

0120-FM-PY0011 8/2006

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF POLICY

TRANSMITTAL SHEET FOR REGULATIONS SUBJECT TO THE REGULATORY REVIEW ACT

I.D. NUMBER: 7- 459

SUBJECT: Oil and Gas Well Casing and Cementing

AGENCY: DEPARTMENT OF ENVIRONMENTAL PROTECTION

TYPE OF REGULATION

- ☐ Proposed Regulation
- ☒ Final Regulation
- ☐ Final Regulation with Notice of Proposed Rulemaking Omitted
- ☐ 120-day Emergency Certification of the Attorney General
- ☐ 120-day Emergency Certification of the Governor
- ☐ Delivery of Tolled Regulation
  - a. ☐ With Revisions
  - b. ☐ Without Revisions

RECEIVED
IRRC
2010 OCT 12 P 3:36

FILING OF REGULATION

DATE	SIGNATURE	DESIGNATION
10-12-10	D Newton	Majority Chair, HOUSE COMMITTEE ON ENVIRONMENTAL RESOURCES & ENERGY Rep. Camille George
10/12/10	[illegible]	Minority Chair, HOUSE COMMITTEE ON ENVIRONMENTAL RESOURCES & ENERGY
10-12-10	B. Lester	Majority Chair, SENATE COMMITTEE ON ENVIRONMENTAL RESOURCES & ENERGY Senator Mary Jo White
10-12-10	A. Lybarger	Minority Chair, SENATE COMMITTEE ON ENVIRONMENTAL RESOURCES & ENERGY
10/12/10	K Cooper	INDEPENDENT REGULATORY REVIEW COMMISSION
		ATTORNEY GENERAL (for Final Omitted only)
		LEGISLATIVE REFERENCE BUREAU (for Proposed only)